Drinking Water Quality in Scotland 2003

Annual Report by the Drinking Water Quality Regulator

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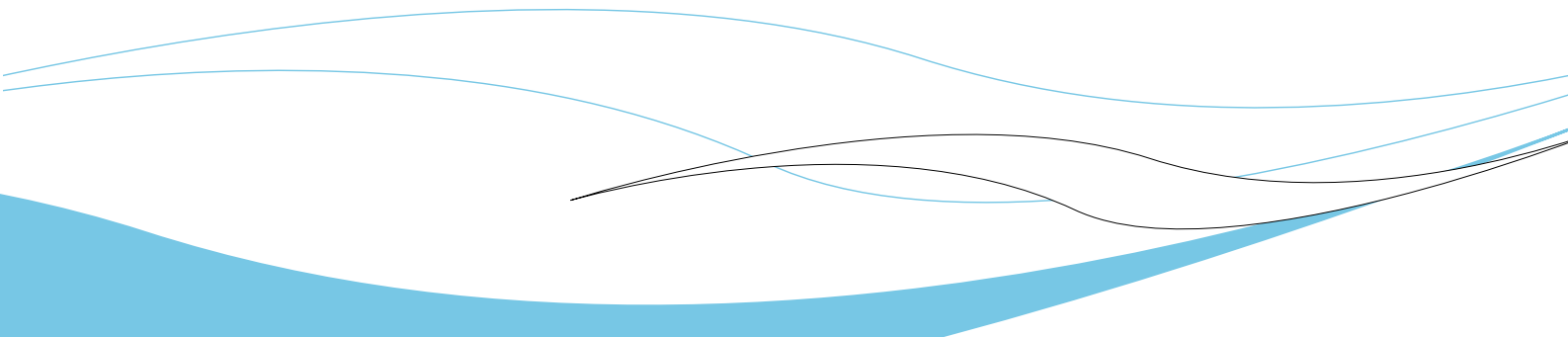

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Foreword

This is the fourteenth in a series of annual reports on Drinking Water Quality in Scotland since 1990. During that period, the Scottish Water Industry has undergone two major institutional reforms. In 1996, the 12 Regional and Islands Councils were abolished and replaced by 32 District Councils. At that time water and sewerage functions were assigned to 3 new regional bodies, North, West and East of Scotland Water Authorities. In 2002, these three authorities were amalgamated to form a single public body, "Scottish Water". It is a unique challenge to the management of Scottish Water to establish a business in the public sector which will inevitably be benchmarked against the private water companies of England and Wales.

The series of reports up to 2003 give an account of the improvements which have taken place over that period, particularly for rural water supplies. The large numbers of drinking water quality failures reported in the early 1990's were generally not associated with the large cities and conurbations of Central and North East Scotland. In the early 1990's, improvements were made to rural supplies by simply ensuring that good water treatment practice was followed. From 1996 onwards, it became increasingly clear that major investment would be needed in many areas if further improvements were to be made.

The major cities of Scotland were provided with good water treatment facilities but in some cases that was well over 100 years ago. The performance of these facilities against modern standards has revealed many shortcomings, in particular the identification of Cryptosporidium as a risk factor was only taken into full account in the design of new water treatment facilities after the introduction of the Cryptosporidium Directions in 2000. In some cases, such as at Edinburgh, Aberdeen and Dundee, relatively small additional treatment stages have been added to meet current requirements. At Inverness, and at other water treatment works such as at Balmore and Carron Valley which serve much of central Scotland, completely new treatment plants have been provided. A new water treatment works is also currently under construction at Milngavie to provide Glasgow with a water supply of the standard required.

As I write this foreword in September 2004, the importance of completing the investment programme to provide assurance that water supplies will not suffer severe deterioration during periods of bad weather is all too apparent. The provision of robust facilities which can cope with the typical extremes in Scottish weather conditions is essential if Scottish Water is to achieve the planned savings in operational expenditure without jeopardising public health. The operational savings already made through reductions in manpower pose a serious risk where investment in new technology is not yet complete. It is important that the delivery of new investment keeps pace with wider operational changes in the business. The loss of knowledge and experience held by staff leaving the business will be covered in due course by a more carefully structured approach to the management of risk. Careful planning of the delivery of new investment is an important aspect of this risk management process.

In Chapter 6 of this report I discuss problems that arose in 2003 with Scottish Water's regulatory sampling programme. My investigation into these problems resulted in Scottish Water taking a number of actions to ensure that they will not recur in the future. The sampling programme, required by the regulations, must be carried out in accordance with the Drinking Water Testing Specification (DWTS) for which Scottish Water must have accreditation from the United Kingdom Accreditation Service. My further investigation into Scottish Water's compliance with the analytical requirements of the DWTS resulted in commencement of enforcement proceedings against Scottish Water in June 2004, as provided for by Section 10(1) of The Water Industry (Scotland) Act 2002. I am pleased to report however, that Scottish Water's response to the commencement of proceedings was swift and effective. The completion of ongoing work will be closely monitored.

In 2004 new regulations, The Water Supply (Water Quality)(Scotland) Regulations 2001, came into force which require a completely new sampling programme. It will not, therefore, be possible to draw any comparisons between the summary results reported here for 2003, and the summary report for 2004.

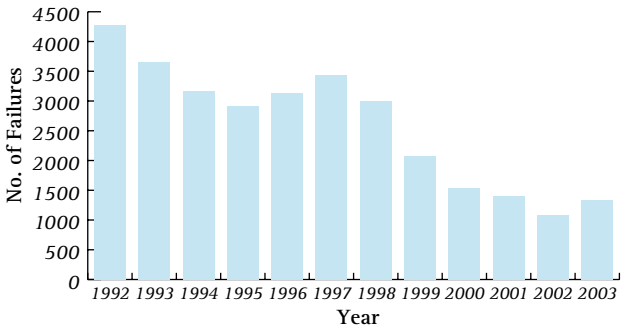
This report for 2003 is the last report to be made under The Water Supply (Water Quality)(Scotland) Regulations 1990. It is also the last that I shall make as Drinking Water Quality Regulator for Scotland before retirement. It has been a privilege to occupy this post during a period of significant change. The water industry structures inherited from local government of the early 1990's are being forged into a modern efficient public sector water industry capable of meeting high standards of customer service and drinking water quality. The process is not yet complete but I am optimistic that Scottish Water is on the right track.

Tim Hooton
Drinking Water Quality Regulator for Scotland
September 2004

1. Executive Summary

The drinking water quality results reported by Scottish Water for 2003 show that overall there were more drinking water quality failures in 2003 than in 2002. 155,427 tests were carried out on samples taken from customers' taps during 2003 and 1,338 (0.86%) of the tests failed to meet the relevant standard. This compares with 1,076 failures (0.72%) during 2002 from 148,349 tests. The increase in test failures in 2003 is due to an increase in failures for colour and iron which have no significance for public health.

Figure S1 **shows the overall number of all water tests on tap samples not meeting relevant standards**



The result for the key microbiological parameters show that there was some improvement of the microbiological standards in 2003 compared with 2002. The 135 failures of the coliform standard at customers' taps in 2003 is less than the 204 in 2002. The number of faecal coliform failures also fell from 30 in 2002 to 24 in 2003. Results going back to the year 1992 are also shown in Figures S2 and S3 to allow historical comparisons to be drawn and trends to be identified.

Figure S2 **shows the number of microbiological tests on tap samples containing coliforms**

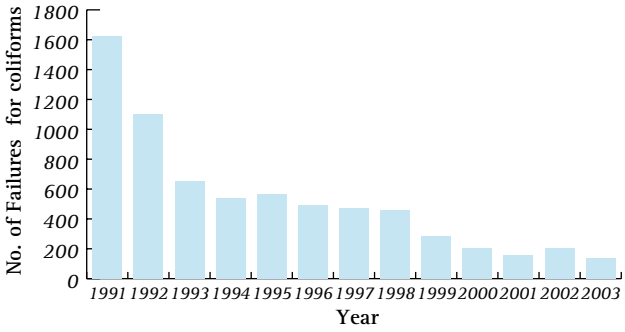
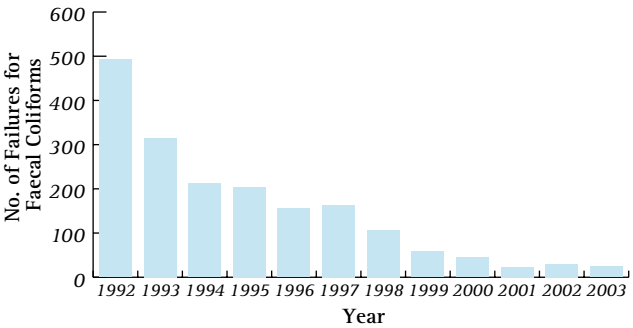


Figure S2 shows that the number of coliform tests not meeting the standards at customers' taps in 2003 was less than 8.3% of that recorded in 1991, which was the first full year of the present Regulations' operation. This statistic suggests that significant improvements have been made to the quality of drinking water in Scotland through the operation of the 1990 Regulations, although there is clearly still room for improvement.

Figure S3 **shows the number of microbiological tests on tap samples containing faecal coliforms**



2. Introduction

Role of the Regulator

Section 7 of the Water Industry (Scotland) Act 2002 created the post of Drinking Water Quality Regulator for Scotland (DWQR). This placed the functions of the Regulator on a statutory footing. Although the DWQR has similar functions to those of the Drinking Water Inspectorate (DWI) in England and Wales, the separation between Ministers and the Regulator is greater in Scotland than England and Wales because Scottish Water is a publicly owned body. This contrasts with the position in England and Wales where the water utilities are privately owned companies. In Scotland the DWQR is responsible for enforcing The Water Supply (Water Quality)(Scotland) Regulations independently of Ministers, whereas the DWI carries out this role on behalf of Ministers.

Powers of the Regulator

The DWQR has three main powers. These are in respect of the power to obtain information, the power of entry or inspection and the power of enforcement.

In addition, the DWQR has emergency powers to require a water supplier to carry out works to ensure that the quality of water supplied is safe for public consumption. The DWQR can also vary and/or withdraw notices but he must keep a register of any notices issued. Finally, the DWQR can instruct a local authority to provide information held by it with regard to enforcement undertaken by the local authority.

Activities of the Regulator

At the end of each calendar year the Regulator must submit an annual report to Scottish Ministers. The annual report summarises and comments on the drinking water quality results for the preceding year. It also includes an account of any investigations or enforcement actions carried out by the Regulator during the period covered by the report.

This is the second annual report that has been prepared by the Drinking Water Quality Regulator for Scotland (DWQR) and submitted to Scottish Ministers. It presents and reviews the information provided by Scottish Water under the Water Supply (Water Quality) (Scotland) Regulations 1990 and reflects the dealings that the DWQR had with Scottish Water between 1 January and 31 December 2003.

This report presents a detailed assessment of drinking water quality in Scotland during 2003 in terms of the standards set in the 1990 Regulations. Where appropriate the report also makes comparisons of the performance in 2003 with that in earlier years. It should be noted that the DWQR allowed 1990 Regulations to remain in position until 31 December 2003 despite the 2001 Regulations coming into force on 25 December 2003. Annex A refers.

Throughout the report reference is made to the need for action where non-trivial breaches of the standards set in the 1990 Regulations have been identified. If Scottish Water is not able to take action quickly to remedy such a breach then Scottish Water will normally give a legally binding undertaking to Scottish Ministers to take steps to secure compliance. If Scottish Ministers do not receive an appropriate undertaking, enforcement action can be taken.

The 10 Key Drinking Water Quality Standards in Scotland are:

Parameter	Significance
Total Coliforms	The coliform group of organisms is present in large numbers in the gut of all warm-blooded animals but are also widely distributed in the environment. While their presence in water supplies indicates a breach in the integrity of the water supply system, it may not be presumed that faecal pollution has occurred.
Faecal Coliforms	Faecal coliforms are present in large numbers in the gut of all warm-blooded animals. Their presence in water supplies indicates a breach in the integrity of the water supply system and that faecal pollution may have occurred.
Colour	Colour is derived from humic substances which occur naturally, particularly in acidic water sources derived from moorland catchment areas. High colour may be unacceptable to consumers on aesthetic grounds and the humic substances responsible for colour are precursors of disinfection by-products. Colour may be removed by coagulation/sedimentation/filtration.
Turbidity	Naturally occurring turbidity is caused by suspension of finely divided or colloidal matter of predominantly inorganic origin. Turbidity may also be caused by the breakthrough of coagulant floc from overloaded or badly maintained filters. High turbidity is unacceptable to consumers on aesthetic grounds and may also compromise disinfection. Turbidity levels are controlled by effective operation of treatment processes.
Hydrogen Ion (pH)	Most surface waters and many groundwaters are slightly corrosive towards the materials used in water treatment systems and consumers installations. This effect persists even when the pH exceeds the neutral point (pH7) and is countered by adding an alkali during treatment to raise the pH. As chlorine disinfection is more effective at low pH addition of Alkali is normally made after the disinfection stage. Extreme pH values may present a risk to the health of consumers.

2. Introduction

Parameter	Significance
Aluminium	Aluminium occurs in acidic waters derived from moorland catchments and is removed in water treatment by coagulation and filtration. High concentrations are unacceptable to consumers on aesthetic grounds. Aluminium sulphate is used as a coagulant in water treatment. Claims of a weak association between low concentrations of aluminium in water supplies and the incidence of Alzheimer's disease have not been substantiated.
Iron	Iron is present naturally in many water sources and is removed by conventional water treatment processes. Iron in water supplies may also be derived from corrosion of iron mains and inadequate filtration of the residues of iron based coagulants used in water treatment. High iron concentrations are unacceptable to consumers on aesthetic grounds.
Manganese	Manganese occurs naturally in many water sources and particularly high concentrations are encountered in anaerobic groundwaters. Conventional water treatment processes remove manganese. Elevated manganese concentrations are unacceptable to consumers on aesthetic grounds.
Lead	Lead is not normally present in water sources but significant concentrations may be present at consumers' taps if lead pipes are present and the water supply is plumbo-solvent.
Trihalomethanes	Trihalomethanes occur in drinking water principally as products of the reaction of chlorine with naturally occurring organic materials and with bromide, which may also be present in the water. In controlling trihalomethanes, a multi-step treatment system should be used to reduce organic trihalomethane precursors, and primary consideration should be given to ensuring that disinfection is never compromised.

3. Overview of Water Quality in Scotland

Key Facts

Developed Sources	Lochs, Burns, Springs, River Abstractions	Reservoirs	Boreholes	TOTAL
Number	373	175	40	588
Yield (Ml/d)	457	1,866	55	2,378
		Volume of Water Distributed (Ml/d)		
Treatment Works	<2.5	2.5 to 10	>10	TOTAL
Number	262	55	54	371
Daily Supply (Ml/d)	70	161	2,135	2,366
		Capacity of Reservoir (Ml)		
Service Reservoirs*	<2	2 to 10	>10	TOTAL
Number	1,040	218	56	1,314
Capacity (Ml)	368	1,009	1,320	2,697
Distribution Network		*Length of Mains (Km)*		
Diameter of pipe	<150mm	150-300mm	>300mm	TOTAL
Length (Km)	26,954	13,736	5,121	45,811
		Size of Zone (Population)		
Supply Zones	<5,000	5,000 to 20,000	>20,000	TOTAL
Number	280	95	102	477
Population	191,669	1,149,209	3,635,152	4,976,030

Note: *only 1,119 Service Reservoirs were in operation during 2003

Water supplies in Scotland

In Scotland 93% of water supplies are derived from surface water sources with the remainder being derived from groundwater sources. Water from all these sources is treated at 371 treatment works before distribution through 1,314 service reservoirs and over 45,800 km of mains. On average, about 1,560 Megalitres (Ml) of potable water is supplied each day to about 99% of the resident population.

In 2003 there were 477 water supply zones in Scotland. *Figure 1* illustrates the distribution of the population by zone size and *Figure 2* illustrates the distribution of the zones by population size. *Figure 3* shows the reduction in the number of zones since 1991 to the current number of 477. This reduction is a result of Scottish Water and its predecessors developing regional schemes to replace many of the smaller supplies.

Figure 3.1

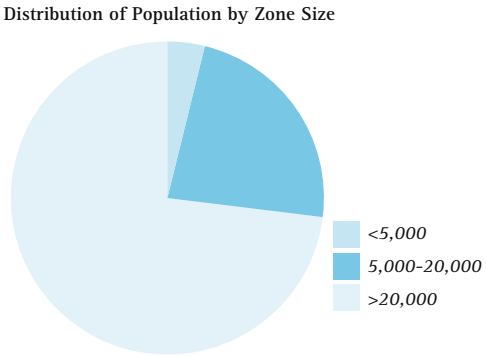


Figure 3.2

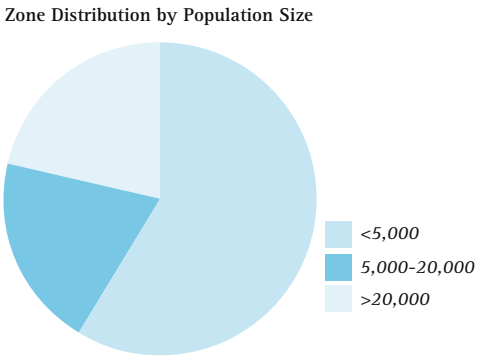
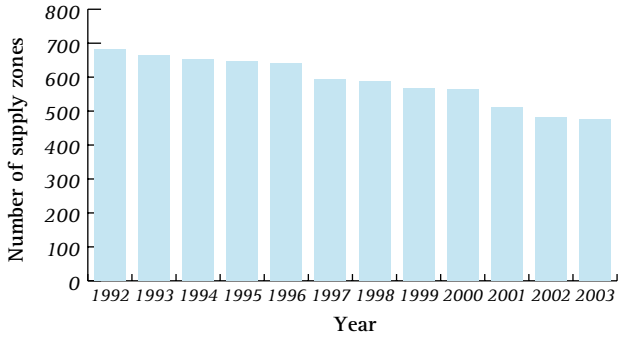


Figure 3.3



Assessment of compliance (general points)

Schedule 2 of the Water Supply (Water Quality)(Scotland) Regulations 1990 sets out the number of samples that have to be taken for each parameter in each supply zone. In practice, each sample is tested for several parameters so the text and the tables relate to the number of determinations (tests) made for each individual parameter rather than to the number of samples taken. Also, if Scottish Ministers have authorised supply point sampling for certain parameters, the results for these parameters are recorded for each zone supplied from the point the sample was taken. A single result could therefore be recorded against 2 or more zones.

The number of samples specified in Schedule 2 is the minimum required to be taken per annum. The Drinking Water Quality Regulator expects full compliance with the required sampling frequencies.

Full compliance with the sampling requirement during 2003 was not achieved. Scottish Water has given a number of detailed reasons for the shortfall which are set out in their water quality report published in August 2004. In essence most of the shortfall can be attributed to the reorganisation of the Authority and the integration of the system inherited from former Authorities.

The term “total coliforms” refers to the parameter listed in Table C of Schedule 1 to the Regulations. It includes all coliform organisms whether faecal in origin or not. In the following sections, the term “coliforms” has been used for the total coliform parameter to simplify the text. The detection of coliforms in a sample is indicative of potential contamination that must be investigated. The presence of faecal coliforms (*E.coli*) in the same sample would indicate that the contamination was of faecal origin. It should be noted that while the Regulations require that faecal coliforms should be absent in all samples, they permit up to 5% of samples taken from each service reservoir, or from consumers’ taps in any one zone, to contain coliforms.

The Regulations only require summary information about microbiological results at service reservoirs and treatment works to be submitted. Where comment is made about compliance with the coliform standard at treatment works and service reservoirs, it should be borne in mind that the overall results given here may comprise a mixture of results for individual reservoirs, some of which pass and others which fail.

The 1990 Regulations prescribe concentrations or values for 57 parameters. In general, to be wholesome, water must not contain a parameter in excess of a PCV; for total hardness and alkalinity (where water is softened or desalinated) the concentration must not be below a prescribed value and, in the case of the hydrogen ion

3. Overview of Water Quality in Scotland

parameter (pH) the value must lie in a range defined by a maximum and minimum prescribed value. For two parameters, total organic carbon and colony counts, the PCV is simply "no significant increase over that normally observed".

Seven of the 57 parameters with a prescribed concentration or value set out in the 1990 Regulations do not have a required sampling frequency assigned to them. The absence of a required sampling frequency means that it is not appropriate to include any determinations for those parameters when reporting the overall number of determinations carried out under the Regulations. When assessing compliance therefore, any determinations for these parameters are not included in the tabulated figures. Any failures to comply with the PCV's set for the seven parameters are reported in the text of the reports.

In particular cases, Scottish Ministers may authorise, under Regulation 4, the relaxation of a PCV. Relaxations may be authorised in emergencies, as a result of exceptional meteorological conditions or by reason of the nature and structure of the ground in the area from which the supply emanates. A relaxation may also be authorised if the supply is used solely for food production purposes and failure to meet the regulated standards does not affect the fitness for consumption of the final product. Regulation 5 places certain restrictions on the authorisation of relaxations. In particular, it requires that public health shall not be jeopardised and that any relaxation shall specify the extent to which the contravention of a PCV is authorised.

In assessing water quality in supply zones, the Drinking Water Quality Regulator takes into account the existence of authorised relaxations. Thus, throughout the text and tables, reference to the contravention of a PCV implies that, where a relaxation is in place, a concentration or value greater than the authorised relaxation has been recorded. Concentrations or values up to the authorised relaxation are therefore not included in the number, or percentage, of PCV contraventions.

Although the text and tables make reference to contraventions of PCVs, there is no evidence that any of the contraventions were of such a magnitude or duration as to endanger the health of consumers. The PCV set for parameters that are of health significance are set with a wide margin of safety. For parameters that are of aesthetic significance, the standards set generally well below the level at which water would become unacceptable to consumers. A contravention of a standard is not necessarily indicative that the water is unfit to drink.

A contravention of a PCV is of significance. Because the water supplied at the time the sample was taken cannot be regarded as wholesome. This does not mean that the water was harmful to health or otherwise unfit for drinking, but it may mean, when considered along with other monitoring results, that the water quality needs improving in order to meet the high standards set in the Regulations. When considering microbiological results it is important to remember that samples that are taken at consumer's taps are susceptible to microbiological contamination due to the sanitary condition of the tap and associated plumbing.

The general rule that any contravention of a PCV constitutes a breach of the Regulations and thus causes the water to be regarded as unwholesome, does not apply to a number of standards specified in Regulation 3. These standards are:

a. the trihalomethanes (THM) standard, specified in regulation 3(3)(e), is only breached if the average concentration over the preceding 3 months exceeds the prescribed concentration of 100µg/l (THM being the aggregate of the concentrations of trichloromethane, dichlorobromomethane, dibromochloromethane and tribromomethane);

b. the sodium standard, specified in the 1990 Regulations Table A and regulation 3(5), is only breached if 20% or more of the determinations carried out over the preceding 36 months exceed the prescribed concentration of 150 mg/l;

c. the coliform standard in water supply zones, specified in the 1990 Regulations Table C of Schedule 1 and regulation 3(6), is only breached if 5% or more of determinations carried out over the preceding year contain coliforms (when less than 50 samples have been taken in the year, the criterion applies to the last 50 samples taken). A similar concession is permitted in service reservoirs; and

d. the standards for the parameters specified in the 1990 Regulations Table D of Schedule 1 and regulation 3(3)(d), are only breached if the average concentrations or values over the preceding 12 months exceed the prescribed concentrations or values.

In all the above cases, the number and percentage of individual determinations in excess of the relevant numerical PCV is shown in the tables on water quality in supply zones. However, only those zones (if any) which were non-compliant for those parameters on the basis described above are included in the part of the table listing non-compliant zones.

Table 3.1 **Summary results from treatment works with comparison for previous years**

	2003	2002	2001	2000	1999
Coliforms					
Number of determinations	35,325	39,584	39,230	42,288	42,197
Number containing coliforms	108	131	111	213	299
Percentage containing coliforms	0.3	0.33	0.28	0.5	0.71
Faecal coliforms					
Number of determinations	35,325	39,584	39,230	42,267	42,197
Number containing faecal coliforms	59	75	63	118	156
Percentage containing faecal coliforms	0.17	0.19	0.16	0.28	0.37

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Sampling in 2003

Problems arose with sampling and analysis during 2003. Scottish Water has given an account of these problems in their own Water Quality Report. This report contains further commentary on this aspect in Chapter 6.

Microbiological quality of water leaving treatment works

Summary results from treatment works in 2003 are given below left; figures for the previous 4 years are given for comparison.

The results for 2003 indicate a reduction in the number of failures for both coliforms and faecal coliforms. As in previous years, a detailed examination of the data (*Table 3.2*) shows that the majority of these failures occurred at small water treatment works. Small works generally only have basic water treatment that is vulnerable to changes in raw water quality. Seasonal affects, especially high levels of precipitation, can overwhelm the works' ability to maintain microbiological integrity of the treated water.

Table 3.2 **Microbiological quality of water leaving treatment works in Scotland for 2003**

	volume of water distributed from works (Ml/d)			
	<3	3 to 12	>12	total
Number of works	262	55	54	371
No of samples taken for coliforms from works in operation	14,639	5,319	15,367	35,325
Total coliform failures	92	5	11	108
Percentage of failures	0.63	0.09	0.07	0.3
No of samples taken for faecal coliforms from works in operation	14,639	5,319	15,367	35,325
Total faecal coliform failures	55	1	3	59
Percentage of faecal failures	0.38	0.02	0.02	0.17

The sampling regime prescribed in the Regulations has over the years, revealed service reservoirs to be a particularly common source of contamination. Historically, many service reservoirs were built underground and grassed over. Consequently, they are prone to inward leakage from contaminated surface water. Scottish Water is carrying out a risk analysis approach to this problem and at high risk sites is addressing this problem by carrying out service reservoir refurbishment programmes. This usually involves excavation to expose and re-seal tank walls and roofs, replacement of covers and ventilators. Secondary disinfection is also being installed at some service reservoirs but this should only be used where the reservoirs are part of long distribution networks. In such cases there may be a need to boost disinfection levels to achieve a disinfection residual at the end of the network. However, secondary disinfection could disguise a more fundamental problem with a service reservoir and should only be used as a last resort.

Summary results for service reservoirs for 2003 compared to those for previous years are shown overleaf:

Table 3.3 **Summary results for service reservoirs in Scotland with comparison for previous years**

	2003	2002	2001	2000	1999
Coliforms					
Number of determinations	56,582	58,445	56,542	61,343	62,786
Number containing coliforms	245	403	298	489	647
Percentage containing coliforms	0.43	0.69	0.53	0.8	1.03
Faecal coliforms					
Number of determinations	56,582	58,445	56,542	61,307	62,786
Number containing faecal coliforms	46	93	88	160	202
Percentage containing faecal coliforms	0.08	0.16	0.16	0.26	0.32

The results for 2003 show that overall there was a significant fall in the number of failures for total coliforms during the year when compared with the previous year. The Regulations require that there are no faecal coliforms present in any sample and for total coliforms the requirement for service reservoirs is that 95% of samples are free of contamination. Thus, these results suggest that Scottish Water still have work to undertake in order to comply with the Regulations. As in previous years, the smallest service reservoirs are failing at a higher rate than the larger service reservoirs as shown in *Table 3.4*.

Table 3.4 **Microbiological quality of water in service reservoirs in Scotland for 2003**

	Capacity of service reservoirs (including water towers) (Ml)			
	<2	2 to 10	>10	total
Number of service reservoirs	1,040	218	56	1,314
No of samples taken for coliforms from service reservoirs in operation	44,087	9,574	2,921	56,582
Total coliform failures	203	37	5	245
Percentage of failures	0.46	0.39	0.17	0.43
No of samples taken for faecal coliforms from service reservoirs in operation	44,087	9,574	2,921	56,582
Total faecal coliform failures	44	1	1	46
Percentage of faecal failures	0.10	0.01	0.03	0.08

Microbiological quality of water in water supply zones

Summary results for the microbiological quality of water in supply zones in 2003 are given, above right; figures for previous years are given for comparison.

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Table 3.5 **Summary results for supply zones with comparison for previous years**

	2003	2002	2001	2000	1999
Coliforms					
Number of determinations	15,625	16,299	17,180	18,545	18,669
Number containing coliforms	135	204	158	207	285
Percentage containing coliforms	0.86	1.25	0.92	1.12	1.53
Faecal coliforms					
Number of determinations	15,625	16,299	17,180	18,534	18,669
Number containing faecal coliforms	24	30	23	45	58
Percentage containing faecal coliforms	0.15	0.18	0.13	0.24	0.31

Results for 2003 show that overall there was a reduction in the number of failures for both total coliforms and faecal coliforms during the year when compared with previous years. *Table 3.6* provides a more detailed examination of the data and confirms that there was an overall decrease in failures for total and faecal coliforms. The Drinking Water Quality Regulator will continue to monitor this situation and take appropriate action where required with Scottish Water.

Table 3.6 **Microbiological quality of water at consumers taps in Scotland for 2003**

	Size of zone (Population x 1000)			
	<5	5 to 20	20 to 50	total
Number of zones	280	95	102	477
Population of zones (x 1000)	191.669	1149.209	3635.152	4976.03
No of samples taken for coliforms from zones	3,068	3,481	9,076	15,625
Total coliform failures	40	31	64	135
Percentage of failures	1.3	0.89	0.7	0.86
No of samples taken for faecal coliforms from zones	3,068	3,481	9,076	15,625
Total faecal coliform failures	18	4	2	24
Percentage of faecal failures	0.59	0.11	0.02	0.15

The overall water quality results for 2003

The majority of determinations made for water quality during 2003 complied with the standards set in the Regulations. Over 155,427 determinations were carried out on tap samples for individual parameters and 1,338 of these determinations failed to meet the relevant standards representing 0.86% of all samples.

Table 3.7 Key drinking water quality parameters for Scotland 2003

Scotland 2003		Determinations exceeding PCV*			Zones Regulatory requirements not met		
Parameter	Total No. of samples taken	No. of sample fails	% of samples	2002 No. of samples	No. of Zones	% of Zones	2001 No. of Zones
Total coliforms	15,625	135	0.86	204	99	20.75	130
Faecal coliforms	15,625	24	0.15	30	20	4.19	27
Colour	3,185	121	3.80	6	63	13.21	81
Turbidity	3,027	4	0.13	6	4	0.84	6
Hydrogen ion (PH)	4,114	9	0.22	6	7	1.47	7
Aluminium	3,304	39	1.18	30	17	3.56	23
Iron	4,343	239	5.50	78	84	17.61	87
Manganese	3,499	57	1.63	14	30	6.29	22
Lead	2,226	9	0.40	16	8	1.68	16
Total Trihalomethanes	3,392	485	14.30	575	122	25.58	130
All others**	97,087	216	0.22	111	–	–	–
Total	155,427	1338	0.86	1,076	–	–	–
Total number of zones = 477		Total number of samples taken in 2002 = 148,349					

Notes *means PCV or relaxed PCV **means all other parameters reported on for which a numerical standard exists

Table 3.7 gives a summary of water quality in 2003 in supply zones across Scotland for 10 key parameters (including the microbiological results discussed above).

The 10 key drinking water quality parameters are:

Parameter	Significance
Total Coliforms	The coliform group of organisms is present in large numbers in the gut of all warm-blooded animals but are also widely distributed in the environment. While their presence in water supplies indicates a breach in the integrity of the water supply system, it may not be presumed that faecal pollution has occurred.
Faecal Coliforms	Faecal coliforms are present in large numbers in the gut of all warm-blooded animals. Their presence in water supplies indicates a breach in the integrity of the water supply system and that faecal pollution may have occurred.

3. Overview of Water Quality in Scotland

Colour	Colour is derived from humic substances which occur naturally, particularly in acidic water sources derived from moorland catchment areas. High colour may be unacceptable to consumers on aesthetic grounds and the humic substances responsible for colour are precursors of disinfection by-products. Colour may be removed by coagulation/sedimentation/filtration.
Turbidity	Naturally occurring turbidity is caused by suspension of finely divided or colloidal matter of predominantly inorganic origin. Turbidity may also be caused by the breakthrough of coagulant floc from overloaded or badly maintained filters. High turbidity is unacceptable to consumers on aesthetic grounds and may also compromise disinfection. Turbidity levels are controlled by effective operation of treatment processes.
Hydrogen Ion (pH)	Most surface waters and many groundwaters are slightly corrosive towards the materials used in water treatment systems and consumers installations. This effect persists even when the pH exceeds the neutral point (pH7) and is countered by adding an alkali during treatment to raise the pH. As chlorine disinfection is more effective at low pH addition of Alkali is normally made after the disinfection stage. Extreme pH values may present a risk to the health of consumers.
Aluminium	Aluminium occurs in acidic waters derived from moorland catchments and is removed in water treatment by coagulation and filtration. High concentrations are unacceptable to consumers on aesthetic grounds. Aluminium sulphate is used as a coagulant in water treatment. Claims of a weak association between low concentrations of aluminium in water supplies and the incidence of Alzheimer's disease have not been substantiated.
Iron	Iron is present naturally in many water sources and is removed by conventional water treatment processes. Iron in water supplies may also be derived from corrosion of iron mains and inadequate filtration of the residues of iron based coagulants used in water treatment. High iron concentrations are unacceptable to consumers on aesthetic grounds.

Manganese	Manganese occurs naturally in many water sources and particularly high concentrations are encountered in anaerobic groundwaters. Conventional water treatment processes remove manganese. Elevated manganese concentrations are unacceptable to consumers on aesthetic grounds.
Lead	Lead is not normally present in water sources but significant concentrations may be present at consumers' taps if lead pipes are present and the water supply is plumbo-solvent.
Trihalomethanes	Trihalomethanes occur in drinking water principally as products of the reaction of chlorine with naturally occurring organic materials and with bromide, which may also be present in the water. In controlling trihalomethanes, a multi-step treatment system should be used to reduce organic trihalomethane precursors, and primary consideration should be given to ensuring that disinfection is never compromised.

In addition, all other parameters that have numerical standards are reported in the "All Others" count in the last item of *Table 3.7*.

The physico-chemical parameters listed in *Table 3.7* are discussed on page 18. Summary results for each parameter for the period 1998-2003 are also included.

Colour: Colour is an aesthetic parameter and treatment is given to remove or reduce it to produce water that will have an acceptable appearance to customers. The colour of raw water may vary considerably according to seasonal and weather conditions. Variations in the raw water mean that many supplies, especially the smaller ones, exceed the standard for colour.

Table 3.8 **Colour results for 2003 with comparisons for previous years**

Colour	2003	2002	2001	2000	1999	1998
Number of determinations exceeding PCV or relaxed PCV	121	6	59	31	32	69
Percentage of determinations exceeding PCV or relaxed PCV	3.8	0.17	1.19	0.71	0.76	1.23
Number of Zones not meeting regulatory requirements	63	6	24	16	17	38
Percentage of Zones not meeting regulatory requirements	13.21	1.2	0.2	2.84	2.99	6.46

Turbidity: Turbidity is used as an assessment of the fine particles suspended in water. This parameter is often, but not always, associated with colour and has many of the same unacceptable characteristics.

3. Overview of Water Quality in Scotland

Table 3.9 **Turbidity results for 2003 with comparisons for previous years**

Turbidity	2003	2002	2001	2000	1999	1998
Number of determinations exceeding PCV or relaxed PCV	4	6	9	5	16	16
Percentage of determinations exceeding PCV or relaxed PCV	0.13	0.12	0.19	0.12	0.42	0.33
Number of Zones not meeting regulatory requirements	4	6	11	2	12	11
Percentage of Zones not meeting regulatory requirements	0.84	1.2	2.1	0.35	2.12	1.87

Hydrogen ion (pH): Hydrogen ion (pH) is a measure of the acidity of a water and the Regulations set limits for pH outside which the water is deemed unwholesome. The Regulations prescribe that pH should lie between 5.5 and 9.5. There are a number of reasons for the natural pH of many Scottish waters being outwith the regulatory limit. These include:

- *upland waters used for water supply generally contain acidic organic material derived from peat.*
- *hard rock areas in the south west and north of Scotland suffer as a result of acid rain. Excessive acidity occurs because the runoff has very low levels of dissolved solids and consequently poor buffering capacity.*
- *deposition of marine salt in water catchments following severe storms at sea can cause rapid fluctuation in raw water pH.*

The natural pH of most Scottish raw waters is altered during treatment by the addition of chemicals to aid coagulation and filtration and is finally corrected to control the corrosion of water mains and the uptake of lead, copper and zinc in household plumbing. Failures of pH in treated water are therefore most often related to a failure of the treatment plant and can be high or low pH failures depending on the fault. Another cause of failure arises from water mains with cementitous lining materials. Some water of high purity is prone to a rise in pH when in contact with such pipes.

Table 3.10 **Hydrogen ion results for 2003 with comparisons for previous years**

Hydrogen ion (pH)	2003	2002	2001	2000	1999	1998
Number of determinations exceeding PCV or relaxed PCV	9	6	10	20	19	31
Percentage of determinations exceeding PCV or relaxed PCV	0.22	0.08	0.14	0.25	0.25	0.35
Number of Zones not meeting regulatory requirements	7	6	10	13	13	22
Percentage of Zones not meeting regulatory requirements	1.47	1.2	1.9	2.3	2.29	3.74

Aluminium: Aluminium is a natural constituent of many water sources, particularly upland surface waters. Aluminium compounds also play an important part in water treatment as coagulants to remove suspended matter and impurities, including pathogenic organisms. The Regulations set a standard for aluminium of 200 micrograms (mg) per litre. This is based on aesthetic considerations since high concentrations may cause unacceptable discoloration of the water.

Many water supplies contain concentrations of aluminium that exceed the standard from time to time. This can occur either because of natural changes in the raw water quality or because of poor control of the treatment process.

In areas where there is a relaxation of the regulatory standard, consumers' intake of aluminium from water will still be lower than the average from food and other sources and should be well within acceptable levels of intake established by the World Health Organisation.

Table 3.11 **Aluminium results for 2003 with comparisons for previous years**

Aluminium	2003	2002	2001	2000	1999	1998
Number of determinations exceeding PCV or relaxed PCV	39	30	27	55	82	87
Percentage of determinations exceeding PCV or relaxed PCV	1.18	0.7	0.52	1.11	1.58	1.44
Number of Zones not meeting regulatory requirements	17	20	26	31	33	39
Percentage of Zones not meeting regulatory requirements	3.56	4.1	5	5.5	5.83	6.63

Iron and Manganese: Upland surface waters which are naturally acidic because of low concentrations of bicarbonates tend to dissolve, or form compounds of, iron and manganese from the soils and minerals in the catchment. Significant seasonal variations in concentrations of iron and manganese can occur but there can also be variations in manganese concentrations due to disturbance of accumulated deposits on the beds of reservoirs when the water is drawn down or when it circulates.

The standards for iron and manganese are set at levels that ensure they will not be responsible for unpleasant tastes, dirty water or staining. Iron and manganese are not health-related parameters. For that reason, and because these are substances that occur naturally in the raw water, relaxations have been authorised in supply zones where the standards are exceeded from time to time.

3. Overview of Water Quality in Scotland

Scottish Water has mains rehabilitation programmes in place that will help to reduce the number of iron failures resulting from old cast iron mains. These improvement programmes should deliver other benefits, including fewer bursts and reduced leakage.

Table 3.12 **Iron results for 2003 with comparisons for previous years**

Iron	2003	2002	2001	2000	1999	1998
Number of determinations exceeding PCV or relaxed PCV	239	78	121	167	188	237
Percentage of determinations exceeding PCV or relaxed PCV	5.5	1.18	2.18	2.59	3.12	3.62
Number of Zones not meeting regulatory requirements	84	52	62	79	84	94
Percentage of Zones not meeting regulatory requirements	17.61	10.8	12.2	14	14.84	15.99

Table 3.13 **Manganese results for 2003 with comparisons for previous years**

Manganese	2003	2002	2001	2000	1999	1998
Number of determinations exceeding PCV or relaxed PC	57	14	25	27	33	24
Percentage of determinations exceeding PCV or relaxed PCV	1.63	0.37	0.47	0.61	0.75	0.52
Number of Zones not meeting regulatory requirements	30	14	10	24	24	18
Percentage of Zones not meeting regulatory requirements	6.29	2.9	1.9	4.26	4.24	3.06

Lead: Water supplied from the mains does not contain any significant amount of lead. The lead recorded in determinations, carried out on samples of water taken from consumers' taps, is derived from the action of the water on lead piping between the main and the tap. The soft acidic water typical of many Scottish upland sources is particularly likely to have this effect. To overcome this effect the water is treated, where practical, to reduce the tendency for lead to be dissolved from plumbing. The 1990 Regulations set a standard for lead of 50 micrograms per litre at the time of supply. Where there is a risk of the lead standard being exceeded after the time of supply, the Regulations require that the water be treated if a significant reduction in lead concentrations can be achieved and treatment is reasonably practicable. Due to the property-specific nature of lead failures, the percentage of determinations failing year on year can vary considerably.

The World Health Organisation (WHO) published guidelines for drinking water quality in 1993. These included a guideline value for lead of 10 micrograms (µg) per litre. In December 1998 the European Commission published a revised Drinking Water Directive which reflects the WHO guideline for lead. The Directive states that the standard for lead at customers' taps should be reduced to 10 µg/l by 2013, with an interim standard of 25 µg/l to be achieved by 2003.

Table 3.14 **Lead results for 2003 with comparisons for previous years**

Lead	2003	2002	2001	2000	1999	1998
Number of determinations exceeding PCV or relaxed PCV	9	16	25	43	24	33
Percentage of determinations exceeding PCV or relaxed PCV	0.40	0.29	0.68	1.14	0.68	1.02
Number of Zones not meeting regulatory requirements	8	16	20	28	23	27
Percentage of Zones not meeting regulatory requirements	1.68	3.3	3.9	4.97	4.06	4.59

Total Trihalomethanes: Upland surface waters, from which most Scottish supplies are drawn, are likely to contain significant quantities of natural organic substances. When the water is disinfected using chlorine these can react with the chlorine to form by-products. The group of substances known as trihalomethanes (THM) is used to monitor this process. The revised Drinking Water Directive sets an interim standard of 150 µg/l for THM to be achieved by 2003 and a final standard of 100 µg/l to be achieved by 2008. There is no standard for THM in the original Drinking Water Directive but the current Regulations set a UK standard for THM of 100 µg/l as an average over 3 months. Although there is no strong evidence of any health risk from chlorination by-products in water supplies, medical advisers have recommend that, as a matter of prudence, action should be taken to reduce THM concentrations where they persistently exceed the standard. However, action should only be taken where it can be carried out without compromising disinfection.

Improvements in the microbiological quality of water supplies have, at the same time, resulted in an increase in the failure rate for THM. Scottish Water recognise that as well as taking measures to improve the disinfection of water supplies it must also take steps to bring about compliance with the THM standard. The large number of undischarged undertakings reflects the increasing commitment to controlling THM formation along with improving microbiological quality. Many of the zones where failures occur are small rural supplies, having at best only simple treatment prior to chlorination.

Table 3.15 **Total THM's results for 2003 with comparisons for previous years**

Total Trihalomethanes	2003	2002	2001	2000	1999	1998
Number of determinations exceeding PCV or relaxed PCV	485	575	694	798	1150	1614
Percentage of determinations exceeding PCV or relaxed PCV	14.3	17.1	15.45	16.49	23.84	35.26
Number of Zones not meeting regulatory requirements	122	130	163	193	232	280
Percentage of Zones not meeting regulatory requirements	25.58	27	31.9	34.22	40.85	47.62

All Other Parameters: The final item on Table 3.7 shows that in 2003 over 97,087 determinations were made on the wide range of other parameters in the Regulations. Out of this number there were 216 failures, but these were practically all trivial in nature.

4. Scottish Water Results (by Local Authority)

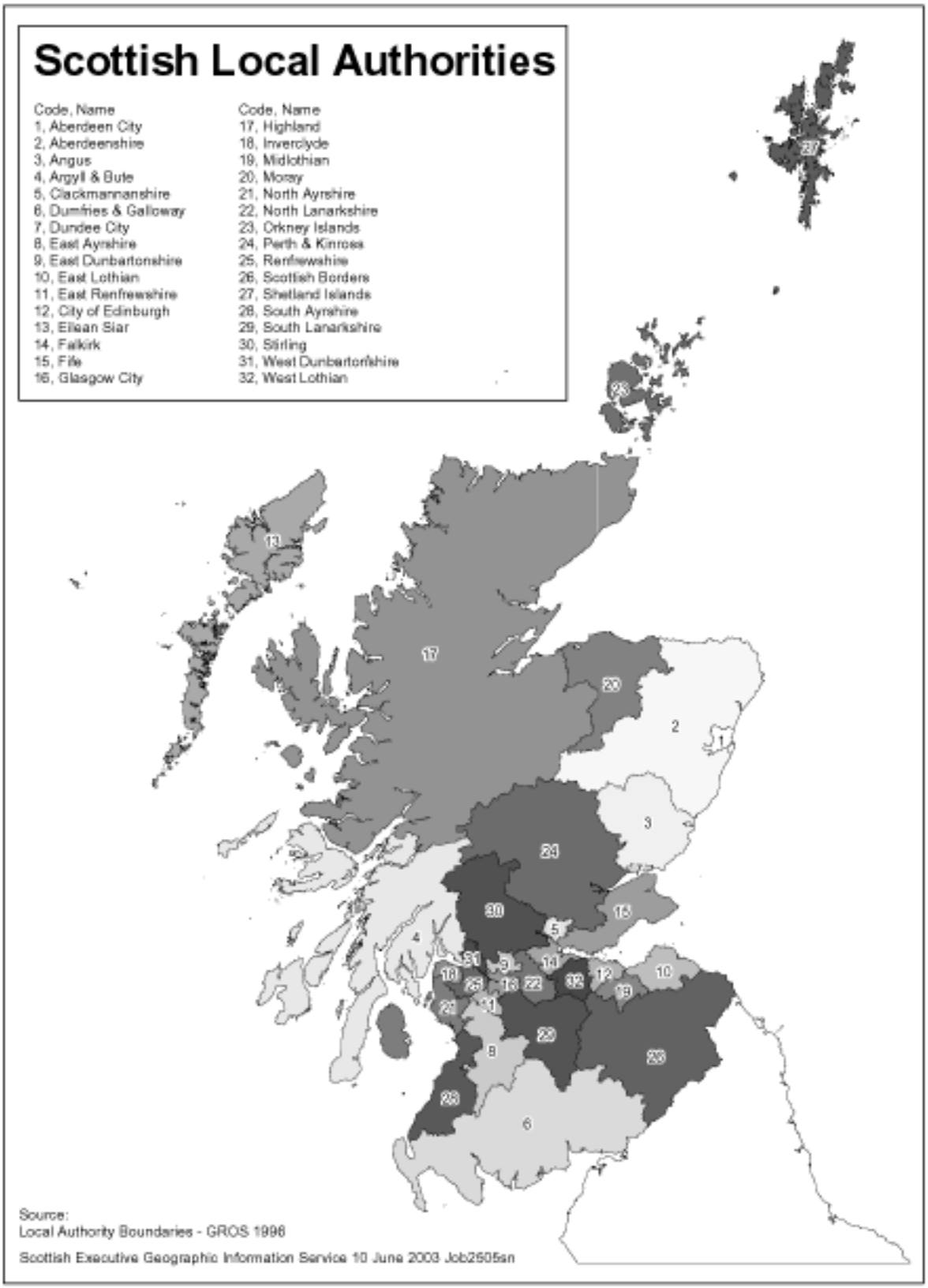
This chapter provides detailed information in respect of the water quality in supply zones located within each of the thirty two (32) local authorities which are supplied by Scottish Water.

A map with a key, which indicates each local authority, appears on the next page.

Each local authority page provides information on the names of the zones located within the local authority boundary. The pages also provide details of any incidents/events, which took place during 2003 in which either bottled water was made available or a boil water notice issued.

Finally, the local authorities comments on its dealings with Scottish Water during 2003 are also provided.

For ease of reference the local authorities are dealt with in alphabetical order.



4. Scottish Water Results (by Local Authority)

ABERDEEN CITY COUNCIL

Supply zones in Aberdeen City
Airlyhill, Bluehill, Craigie, Fernhill, Kingshill, Kirkhill, Mannofield North, Mannofield South, Pitfodels

Water Quality in Supply Zones

Scottish Water carried out at total of 3,043 tests on tap samples taken in the 9 water supply zones within Aberdeen City boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	743	6	0.81
Faecal coliforms	743	0	0
Colour	166	0	0
Turbidity	148	0	0
Hydrogen ion (pH)	309	1	0.32
Aluminium	160	1	0.62
Iron	263	1	0.38
Manganese	270	19	7.04
Lead	83	0	0
Trihalomethanes	158	7	4.43

Incidents or Events

There were no drinking water quality incidents or events reported within the Aberdeen area during 2003.

Local Authority Comments

No comments were received from Aberdeen Council on the quality of water supplied by Scottish Water.

ABERDEENSHIRE COUNCIL

Supply zones in Aberdeenshire
Aboyne, Alford, Ballater, Banff, Braemar, Brathens, Cairnborrow, Coast Trunk Main, Crathie, Forehill rural, Forehill Peterhead, Gartly, Glendye, Glenkindie, Huntly, Loch Lee, Lumsden, Rhynie, South Trunk Main, Strathdon, Turriff

Water Quality in Supply Zones

Scottish Water carried out at total of 3,119 tests on tap samples taken in the 22 water supply zones within Aberdeenshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	765	4	0.52
Faecal coliforms	765	0	0
Colour	172	0	0
Turbidity	159	0	0
Hydrogen ion (pH)	223	0	0
Aluminium	223	1	0.45
Iron	259	1	0.39
Manganese	220	4	1.82
Lead	115	0	0
Trihalomethanes	218	0	0

Incidents or Events

A burst chlorine dosing line at Aboyne Water Treatment Works in May 2003 resulted in bottled water being supplied in the Aboyne area for two days whilst repairs took place and satisfactory results were obtained.

Local Authority Comments

No comments were received from Aberdeenshire Council on the quality of water supplied by Scottish Water.

4. Scottish Water Results (by Local Authority)

ANGUS COUNCIL

Supply zones in Angus Council
Clatto East, Clatto North, Clatto West, Glenogil, Lintrathen East, Loch Lee (Tayside)

Water Quality in Supply Zones

Scottish Water carried out at total of 1,756 tests on tap samples taken in the 6 water supply zones within Angus Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total number of fails	% of fails
Total coliforms	571	4	0.7
Faecal coliforms	571	0	0
Colour	50	1	2.0
Turbidity	107	0	0
Hydrogen ion (pH)	50	0	0
Aluminium	57	0	0
Iron	203	7	3.45
Manganese	50	0	0
Lead	56	0	0
Trihalomethanes	41	0	0

The high number of fails for iron has been noted and the DWQR will ask Scottish Water for more information regarding these fails. It is likely however, that the iron fails are as a result of the poor condition of the water mains in the Angus area. This is a common problem across Scotland, which is being addressed through Scottish Water's mains rehabilitation programme.

Incidents or Events

There were no drinking water quality incidents or events reported within the Angus Council area during 2003.

Local Authority Comments

Angus Council advise that they are content with the way Scottish Water provide drinking water within the Council area and have no comments to make.

ARGYLL AND BUTE COUNCIL

Supply zones in Argyll and Bute

Rothesay North, Rothesay Town, Dunoon, Carrick Castle, Lochgoilhead, Tighnabruaich, Old Kilpatrick, Balloch, Helensburgh, Inverary, Ardishaig, Ardfern, Kilmelford, Claddich, Eredine, Dalmally, Taynuilt, Kilchrennan, Oban, Craignure, Tobermory, Dervaig, Ross of Mull, Coll, Tiree, Tarbert, Kilberry, Gigha, Campbeltown, Peninver, Saddell, Carradale, Jura, Colonsay, Lossit, Bowmore, Port Charlotte

Water Quality in Supply Zones

Scottish Water carried out a total of 2,243 tests on tap samples taken in the 37 water supply zones within Argyll and Bute Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	551	5	0.9
Faecal coliforms	551	3	0.5
Colour	156	0	0
Turbidity	122	0	0
Hydrogen ion (pH)	144	0	0
Aluminium	151	1	0.6
Iron	179	11	6.1
Manganese	113	0	0
Lead	110	0	0
Trihalomethanes	166	32	19.3

Incidents or Events

Following a power failure in the Port Charlotte area, the water treatment works lost power and was therefore unable to treat the water and as a result a boil water notice was issued on 26 July. Following satisfactory results the notice was lifted on 29 July.

Local Authority Comments

No comments were received from Argyll and Bute Council on the quality of water supplied by Scottish Water.

4. Scottish Water Results (by Local Authority)

CLACKMANNANSHIRE COUNCIL

Supply Zones in Clackmannanshire
Clackmannanshire

Water Quality in Supply Zones

Scottish Water carried out a total of 417 tests on tap samples taken in the 1 water supply zone within Clackmannanshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	134	3	2.23
Faecal coliforms	134	0	0
Colour	16	0	0
Turbidity	17	0	0
Hydrogen ion (pH)	25	0	0
Aluminium	15	0	0
Iron	44	3	4.8
Manganese	16	0	0
Lead	10	0	0
Trihalomethanes	6	0	0

Incidents or Events

There were no drinking water quality incidents or events reported within the Clackmannanshire area during 2003.

Local Authority Comments

Clackmannanshire Council whilst content with the service provided would like Scottish Water to take action to remedy the situation in relation to the supplies with elevated iron levels.

DUMFRIES AND GALLOWAY COUNCIL

Supply zones in Dumfries and Galloway
Langholm, Black Esk, Winterhope, Kettleton, Killyour, New Abbey, Lochinvar, Lochenkit, Glengap, Newton Stewart, Palnure, Penwhirn, Auchneel, Carsphairn, Moffat

Water Quality in Supply Zones

Scottish Water carried out a total of 1,765 tests on tap samples taken in the 15 water supply zones within Dumfries and Galloway Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	459	7	1.52
Faecal coliforms	459	1	0.22
Colour	137	3	2.19
Turbidity	77	0	0
Hydrogen ion (pH)	107	0	0
Aluminium	83	0	0
Iron	129	19	14.73
Manganese	175	2	1.43
Lead	58	0	0
Trihalomethanes	81	15	18.32

The high number of fails for iron has been noted and the DWQR will ask Scottish Water for more information regarding these fails. It is likely however, that the iron fails are as a result of the poor condition of the water mains in the Dumfries and Galloway area. This is a common problem across Scotland, which is being addressed through Scottish Water's mains rehabilitation programme.

Incidents or Events

There were no drinking water quality incidents or events reported within the Dumfries and Galloway area during 2002.

Local Authority Comments

Dumfries and Galloway Council advise that they are content with the way Scottish Water provide drinking water within the Council area and have no comments to make.

4. Scottish Water Results (by Local Authority)

DUNDEE CITY

Supply zones in Dundee City
Clatto East, Clatto North, Clatto South, Clatto West

Water Quality in Supply Zones

Scottish Water carried out at total of 1,217 tests on tap samples taken in the 4 water supply zones within Dundee City boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	414	1	0.24
Faecal coliforms	414	0	0
Colour	38	0	0
Turbidity	38	0	0
Hydrogen ion (pH)	38	0	0
Aluminium	38	0	0
Iron	143	1	0.69
Manganese	38	0	0
Lead	34	0	0
Trihalomethanes	22	0	0

Incidents or Events

There were no drinking water quality incidents or events reported within the Dundee area during 2003.

Local Authority Comments

No comments were received from Dundee City Council on the quality of water supplied by Scottish Water.

EAST AYRSHIRE COUNCIL

Supply zones in East Ayrshire
Neilston, Lanark and Carluke, Chapelton, Ayr Country, Irvine, Kilmarnock South, Rankinston, Cumnock and Mauchline, Garnock Valley, Troon and Dundonald, New Cumnock and Sanquhar

Water Quality in Supply Zones

Scottish Water carried out at total of 2,748 tests on tap samples taken in the 11 water supply zones within East Ayrshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	910	3	0.33
Faecal coliforms	910	0	0
Colour	99	0	0
Turbidity	97	0	0
Hydrogen ion (pH)	173	0	0
Aluminium	97	0	0
Iron	163	0	0
Manganese	212	15	7.07
Lead	45	1	2.22
Trihalomethanes	42	1	2.38

Incidents or Events

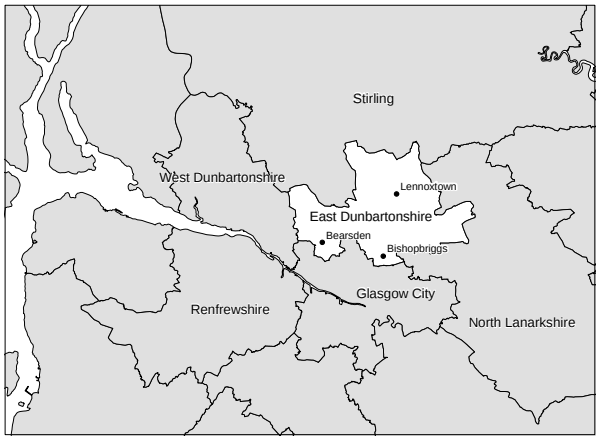
There were no drinking water quality incidents or events reported within the East Ayrshire area during 2003.

Local Authority Comments

East Ayrshire Council advise that they are content with the way Scottish Water provide drinking water within the Council area and have no comments to make.

4. Scottish Water Results (by Local Authority)

EAST DUNBARTONSHIRE COUNCIL



Supply zones in East Dunbartonshire
Lenzie, Kirkintilloch, Lennoxtown, Glasgow Robroyston, Glasgow Bishopbriggs, Glasgow Maryhill, Glasgow Knightswood, Glasgow Drumchapel, Clydebank and Bearsden

Water Quality in Supply Zones

Scottish Water carried out at total of 2,356 tests on tap samples taken in the 9 water supply zones within East Dunbartonshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	757	12	1.58
Faecal coliforms	757	1	0.13
Colour	96	0	0
Turbidity	98	0	0
Hydrogen ion (pH)	178	1	0.56
Aluminium	95	0	0
Iron	108	3	2.78
Manganese	97	0	0
Lead	41	0	0
Trihalomethanes	129	9	6.98

Incidents or Events

There were no drinking water quality incidents or events reported within the East Dunbartonshire area during 2003.

Local Authority Comments

East Dunbartonshire Council advise that they are content with the way Scottish Water provide drinking water within the Council area and have no comments to make.

EAST LOTHIAN COUNCIL

Supply zones in East Lothian
Whittinghame, Traprain, Garleton, Hopes, Kingslaw, Fountainhall, Chalkieside, Alnwickhill, Joppa

Water Quality in Supply Zones

Scottish Water carried out at total of 963 tests on tap samples taken in the 8 water supply zones within East Lothian Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	290	3	1.03
Faecal coliforms	290	0	0
Colour	49	0	0
Turbidity	56	0	0
Hydrogen ion (pH)	73	0	0
Aluminium	41	0	0
Iron	54	0	0
Manganese	49	0	0
Lead	38	0	0
Trihalomethanes	23	0	0

Incidents or Events

There were no drinking water quality incidents or events reported within the East Lothian area during 2003.

Local Authority Comments

No comments were received from East Lothian Council.

4. Scottish Water Results (by Local Authority)

EAST RENFREWSHIRE COUNCIL

Supply zones in East Renfrewshire
Barrhead, Pollock, Castlemilk, Neilston, Newton Mearns, Clarkston, Busby and East Kilbride, Chapelton and Blantyre, Stewarton

Water Quality in Supply Zones

Scottish Water carried out at total of 2,421 tests on tap samples taken in the 9 water supply zones within East Renfrewshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	766	5	0.65
Faecal coliforms	766	1	0.13
Colour	112	0	0
Turbidity	77	0	0
Hydrogen ion (pH)	180	0	0
Aluminium	95	1	1.05
Iron	111	0	0
Manganese	161	0	0
Lead	55	1	1.82
Trihalomethanes	98	21	21.43

Incidents or Events

There were no drinking water quality incidents or events reported within the East Renfrewshire area during 2003.

Local Authority Comments

East Renfrewshire Council advise that they are content with the way Scottish Water provide drinking water within the Council area and have no comments to make.

CITY OF EDINBURGH COUNCIL

Supply zones in City of Edinburgh
Alnwickhill Joppa, Alnwickhill Portobello, Alnwickhill Newington, Alnwickhill Leith, Castlehill, Fairmilehead Direct, Firhill West, Firhill South, Firhill Mid, Firhill North, Fairmilehead Gilmerton, Hillend, Humbie, Marchbank

Water Quality in Supply Zones

Scottish Water carried out at total of 3,227 tests on tap samples taken in the 14 water supply zones within Edinburgh Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	1034	8	0.77
Faecal coliforms	1034	0	0
Colour	133	2	1.50
Turbidity	147	0	0
Hydrogen ion (pH)	248	0	0
Aluminium	122	0	0
Iron	167	0	0
Manganese	133	0	0
Lead	100	0	0
Trihalomethanes	109	1	0.92

Incidents or Events

There were no drinking water quality incidents or events reported within the Edinburgh area during 2003.

Local Authority Comments

No comments were received from City of Edinburgh Council on the quality of water supplied by Scottish Water.

4. Scottish Water Results (by Local Authority)

EILEAN SIAR

Supply zones in Eilean Siar
Ardvourlie, Barra, Benbecula, Berneray, Cliasmol, Eriskay, Galson, Govig, Gravir, Habost, Hushinish, Lemreway, Lochmaddy, Maaruig, Meavaig, Ness, North Lochs, North Uist, Rhenigidale, South Harris, South Uist, Stornoway, Tarbert, Tolsta, Uig, West Lewis

Water Quality in Supply Zones

Scottish Water carried out at total of 1,694 tests on tap samples taken in the 26 water supply zones within Eilean Siar boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	316	1	0.3
Faecal coliforms	314	0	0
Colour	98	10	10.2
Turbidity	109	1	0.9
Hydrogen ion (pH)	124	0	0
Aluminium	164	2	1.2
Iron	164	57	34.7
Manganese	123	0	0
Lead	109	0	0
Trihalomethanes	173	34	19.6

Incidents or Events

There were no drinking water quality incidents or events reported within the Eilean Siar area during 2003.

Local Authority Comments

No comments were received from Eilean Siar Council on the quality of water supplied by Scottish Water.

FALKIRK COUNCIL

Supply zones in Falkirk Council
Falkirk, Larbert, Polmont, Grangemouth, Bo'ness, Denny, Bonnybridge

Water Quality in Supply Zones

Scottish Water carried out at total of 1,254 tests on tap samples taken in the 7 water supply zones within Falkirk Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	391	3	0.77
Faecal coliforms	391	1	0.26
Colour	62	0	0
Turbidity	70	0	0
Hydrogen ion (pH)	95	0	0
Aluminium	56	0	0
Iron	69	2	2.90
Manganese	62	0	0
Lead	34	0	0
Trihalomethanes	24	0	0

Incidents or Events

There were no drinking water quality incidents or events reported within the Falkirk area during 2003.

Local Authority Comments

No comments were received from Falkirk Council on the quality of water supplied by Scottish Water.

4. Scottish Water Results (by Local Authority)

FIFE COUNCIL

Supply zones in Fife
Dunfermline South, Dunfermline, Fordell, Cowdenbeath, Cleish, Auchterderran, Kirkcaldy West, Glenrothes North, Glenrothes South, Kinross, Falkland, Buckhaven, East Neuk, North Fife, North East Fife, Kirkcaldy East, Newburgh

Water Quality in Supply Zones

Scottish Water carried out at total of 2,635 tests on tap samples taken in the 17 water supply zones within Fife Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	822	8	0.97
Faecal coliforms	822	0	0
Colour	128	0	0
Turbidity	156	0	0
Hydrogen ion (pH)	197	0	0
Aluminium	109	0	0
Iron	131	1	0.76
Manganese	131	0	0
Lead	75	0	0
Trihalomethanes	64	0	0

Incidents or Events

There were no drinking water quality incidents or events reported within the Fife area during 2003.

Local Authority Comments

No comments were received from Fife Council on the quality of water supplied by Scottish Water.

GLASGOW CITY COUNCIL

Supply zones in Glasgow
Easterhouse, Shettleston, Rutherglen, Castlemilk, Kings Park, Pollok, Hillington, City Centre, Govan, Partick, Possilpark, Robroyston, Bishopbriggs, Maryhill, Knightswood, Drumchapel, Barrhead, Renfrew Town, Newton Mearns, Clarkston, Clydebank, Busby, Cambuslang, Uddingston, Airdrie, North Coatbridge, South Coatbridge

Water Quality in Supply Zones

Whilst the areas specified in this section are within the Scottish Water definition of "Glasgow", the under noted areas are not within this Council's area – Rutherglen, Bishopbriggs, Barrhead, Renfrew Town, Newton Mearns, Clarkston, Clydebank, Busby, Cambuslang, Uddingston, Airdrie, North Coatbridge, and South Coatbridge.

Scottish Water carried out at total of 7,771 tests on tap samples taken in the 27 water supply zones within Glasgow City Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	2510	21	0.8
Faecal coliforms	2510	1	0.1
Colour	368	0	0
Turbidity	346	0	0
Hydrogen ion (pH)	609	1	0.1
Aluminium	259	0	0
Iron	365	3	0.8
Manganese	360	0	0
Lead	139	1	0.7
Trihalomethanes	305	58	19.0

Incidents or Events

There were no drinking water quality incidents or events reported within the Glasgow area during 2003.

Local Authority Comments

In addition to the routine sampling undertaken by Scottish Water, the Council's Environmental Protection Services also undertakes sampling of dietetic water supplies.

4. Scottish Water Results (by Local Authority)

HIGHLAND COUNCIL

A list of all the zones in Highland Council appears on the next page.

Water Quality in Supply Zones

Scottish Water carried out at total of 10,194 tests on tap samples taken in the 98 water supply zones within Highland Council. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	1932	25	1.3
Faecal coliforms	1932	14	0.7
Colour	562	89	15.8
Turbidity	687	0	0
Hydrogen ion (pH)	704	7	1.0
Aluminium	876	6	0.7
Iron	933	119	12.8
Manganese	658	9	1.4
Lead	683	3	0.4
Trihalomethanes	1227	398	32.4

Incidents or Events

There were six incidents during 2003 within the Highland Council area. Full details of two of these incidents which affected the Applecross and Earlish areas of Highland appear in Annex C. The others are as follows. In early June a boil water notice was placed in Oykel Bridge. Following satisfactory results the notice was lifted on 12 June. In July low chlorine levels at Laid resulted in bottled water being supplied until the levels were boosted and satisfactory results obtained. August saw heavy rain in the Diabeg area which resulted in low chlorine and a boil notice issued. Following two days of satisfactory results the notice was lifted on 23 August. Again heavy rain caused problems in the Achnasheen area during the first part of November. A boil notice was placed on the supply until the levels of chlorine were high and satisfactory results obtained. The notice was lifted on 6 November.

Local Authority Comments

No comments were received from Highland Council on the quality of water supplied by Scottish Water.

HIGHLAND COUNCIL

Zones in Highland Council Area

Achaphubuil, Acharacle, Achiltibuie, Achmelvich, Achmore, Achnasheen, Alligin, Altnaharra, Applecross, Ardgour, Ardneaskin, Armadale, Arnisdale, Aultbea.

Badachro, Badcaul, Ballachulish, Balmacara, Balnain, Beasdale, Beauly, Bettyhill (Meadie), Bettyhill (Mor), Blaich, Bohuntin, Bonar Bridge, Bracadale, Braes, Broadford,

Cannich, Carbost, Caithness, Caol, Cromarty, Culloden,

Dalcreichart, Dalwhinnie, Diabeg, Dingwall, Dores, Dornie, Dornoch, Dounreay, Drimmin, Drumbeg, Drumfearn, Dunvegan, Durness, Duror,

Elgol, Elphin,

Fort Augustus, Fort William,

Gairloch, Garve, Glencoe, Glendale, Glenelg, Glenfinnan, Glenuig, Glenurquhart (coilte), Glenurquhart (nam bat), Golspie, Gorthleck,

Helmsdale (caen), Helmsdale (ord),

Inchlaggan, Inverasdale, Invergarry, Inverinate, Invermoriston, Inverness, Isleornsay,

Kilchoan, Kilmaluag, Kilmuir, Kinlochbervie, Kinlochewe, Kinlochleven, Kishorn, Kyle, Kylesku,

Laggan Bridge, Laid, Laide, Lairg, Letterfearn, Lochaline, Lochcarron, Lochend, Lochinver, Loth & Portgower,

Mallaig, Mellon Udrigle, Melness, Melvich,

Nairn, Nedd, North Erradale,

Onich, Oykel Bridge,

Penifiller, Poolewe, Portree,

Raasay, Ratagan, Rosehall, Rosemarkie, Roybridge,

Salen, Sallachy, Sanna, Sconser, Scourie, Shiel Bridge, Sheildaig, Skerray, Spean Bridge, Spey, Staffin, Stoer, Strath Halladale, Strath Naver, Strathcarron, Stromallus, Strontian,

Tain, Tarskavaig, Teangue, Tomatin, Tomich,Tongue, Torridon, Torrin, Treslaig,

Uig, Ullapool,

Waternish, Waterstein, Wick

4. Scottish Water Results (by Local Authority)

INVERCLYDE COUNCIL

Supply zones in Inverclyde
Gourock, Greenock, Dougliehill, Inchinnan, Lochwinnoch

Water Quality in Supply Zones

Scottish Water carried out at total of 1,032 tests on tap samples taken in the 5 water supply zones within Inverclyde Council boundary. The table below provides details of the main parameters tested. .

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	328	3	0.91
Faecal coliforms	328	1	0.30
Colour	43	0	0
Turbidity	43	0	0
Hydrogen ion (pH)	68	0	0
Aluminium	43	0	0
Iron	67	1	1.49
Manganese	64	0	0
Lead	20	0	0
Trihalomethanes	28	1	3.57

Incidents or Events

There were no drinking water quality incidents or events reported within the Inverclyde area during 2003.

Local Authority Comments

Inverclyde Council advise that they are content with the way Scottish Water provide drinking water within the Council area and have no comments to make.

MIDLOTHIAN COUNCIL

Supply zones in Midlothian
Rosebery East, Rosebery Gourlaw, Rosebery West, Lawhead

Water Quality in Supply Zones

Scottish Water carried out at total of 552 tests on tap samples taken in the 4 water supply zones within Midlothian Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	155	0	0
Faecal coliforms	155	0	0
Colour	28	0	0
Turbidity	32	0	0
Hydrogen ion (pH)	47	0	0
Aluminium	25	0	0
Iron	50	2	4.0
Manganese	38	0	0
Lead	12	1	8.33
Trihalomethanes	10	0	0

Incidents or Events

There were no drinking water quality incidents or events reported within the Midlothian area during 2003.

Local Authority Comments

No comments were received from Midlothian Council on the quality of water supplied by Scottish Water.

4. Scottish Water Results (by Local Authority)

MORAY COUNCIL

Supply zones in Moray Council
Aultmore, Badentian, Bomakelloch, Buckie, Clerkly Hill, Coast Trunk Main, Crannoch, Drummuir, Glenlatterach, Herricks, Spynie, Tomintoul, Tomnavoulin

Water Quality in Supply Zones

Scottish Water carried out at total of 1,150 tests on tap samples taken in the 13 water supply zones within Moray Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	285	1	0.35
Faecal coliforms	285	0	0
Colour	63	0	0
Turbidity	49	0	0
Hydrogen ion (pH)	49	0	0
Aluminium	95	1	1.05
Iron	124	1	0.81
Manganese	98	1	1.02
Lead	32	0	0
Trihalomethanes	70	0	0

Incidents or Events

There were no drinking water quality incidents or events reported within the Moray area during 2003.

Local Authority Comments

Moray Council advise that they are content with the way Scottish Water provide drinking water within the council area.

NORTH AYRSHIRE COUNCIL

Supply zones in North Ayrshire
Gourock, Lochwinnoch, Irvine, Kilmarnock North, Stewarton, Arran South, Arran North, Saltcoats, Garnock Valley, Largs, Troon and Dundonald, Arran Corrie

Water Quality in Supply Zones

Scottish Water carried out at total of 2,166 tests on tap samples taken in the 12 water supply zones within North Ayrshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	686	5	0.73
Faecal coliforms	686	1	0.14
Colour	87	0	0
Turbidity	87	1	1.15
Hydrogen ion (pH)	142	0	0
Aluminium	103	1	0.97
Iron	110	4	3.64
Manganese	151	9	5.96
Lead	52	0	0
Trihalomethanes	62	1	1.61

Incidents or Events

There were no drinking water quality incidents or events reported within the North Ayrshire area during 2003.

Local Authority Comments

No comments were received from North Ayrshire Council on the quality of water supplied by Scottish Water.

4. Scottish Water Results (by Local Authority)

NORTH LANARKSHIRE COUNCIL

Supply zones in North Lanarkshire
Kilsyth, Cumbernauld North, Cumbernauld South, Lanark and Carluke, Stonehouse and Larkhall, Lanark North East, Hamilton, North Motherwell, Uddingston, Wishaw and Overton, Airdrie and Shotts, Moodiesburn, South Coatbridge, Easterhouse, Robroyston, Bishopbriggs

Water Quality in Supply Zones

Scottish Water carried out at total of 4,089 tests on tap samples taken in the 16 water supply zones within North Lanarkshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	1344	17	1.26
Faecal coliforms	1344	1	0.07
Colour	212	0	0
Turbidity	167	0	0
Hydrogen ion (pH)	316	0	0
Aluminium	158	0	0
Iron	194	0	0
Manganese	165	0	0
Lead	101	1	0.99
Trihalomethanes	88	6	6.82

Incidents or Events

There were no drinking water quality incidents or events reported within the North Lanarkshire area during 2003.

Local Authority Comments

North Lanarkshire Council advise that they are content with the way Scottish Water provide drinking water within the Council area and have no comments to make.

ORKNEY ISLANDS COUNCIL

Supply zones in Orkney Islands
Eday, Mainland Kirkwall, Mainland Stromness, Mainland North & West, Mainland South & East, North Hoy, North Ronaldsay, Rousay, Sanday, Shapinsay, South Hoy, Stronsay, Westray

Water Quality in Supply Zones

Scottish Water carried out at total of 995 tests on tap samples taken in the 13 water supply zones within Orkney Islands Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	164	0	0
Faecal coliforms	164	0	0
Colour	116	10	8.62
Turbidity	72	0	0
Hydrogen ion (pH)	49	0	0
Aluminium	94	0	0
Iron	116	11	9.48
Manganese	81	2	2.47
Lead	49	1	2.04
Trihalomethanes	90	16	17.78

Incidents or Events

In September 2003 following a dry spell the spring supplying North Ronaldsay began to run dry. Water was augmented from a nearby loch. A boil water notice was placed as a precaution until satisfactory results were obtained. Following two days of satisfactory results the boil notice was lifted.

Local Authority Comments

No comments were received from Orkney Islands Council on the quality of water supplied by Scottish Water.

4. Scottish Water Results (by Local Authority)

PERTH AND KINROSS COUNCIL

Supply zones in Perth and Kinross
Bridge of Cally, Clatto West, Dunkeld, Glenfarg, Kenmore, Kinloch Rannoch, Kirkmichael, Lintrathen West, Perth, Pitlochry, Turret

Water Quality in Supply Zones

Scottish Water carried out at total of 1,518 tests on tap samples taken in the 11 water supply zones within Perth and Kinross boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	429	1	0.23
Faecal coliforms	429	0	0
Colour	108	0	0
Turbidity	62	0	0
Hydrogen ion (pH)	65	0	0
Aluminium	95	0	0
Iron	142	2	1.41
Manganese	56	0	0
Lead	69	2	2.90
Trihalomethanes	63	3	4.76

Incidents or Events

There were no drinking water quality incidents or events reported within the Perth and Kinross area during 2003.

Local Authority Comments

No comments were received from Perth and Kinross Council on the quality of water supplied by Scottish Water.

RENFREWSHIRE COUNCIL

Supply zones in Renfrewshire
Barrhead, Pollock, Hillington, Govan, Renfrew Town, Partick, Neilston, Paisley and Port Glasgow, Inchinnan, Lochwinnoch, Paisley West, Paisley South, Stewarton, Garnock Valley

Water Quality in Supply Zones

Scottish Water carried out at total of 3,492 tests on tap samples taken in the 14 water supply zones within Renfrewshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	1111	5	0.45
Faecal coliforms	1111	0	0
Colour	150	0	0
Turbidity	125	0	0
Hydrogen ion (pH)	300	0	0
Aluminium	142	1	0.70
Iron	160	1	0.62
Manganese	197	4	2.03
Lead	55	1	1.82
Trihalomethanes	141	18	12.77

Incidents or Events

There were no drinking water quality incidents or events reported within the Renfrewshire area during 2003.

Local Authority Comments

The quality of public drinking water supplied in the Renfrewshire Council area in 2003 was once again shown to be of a reasonably high standard, with only a very few isolated failures due mainly to the presence of coliform organisms. Liaison meetings with Scottish Water have been re-introduced and these provide an excellent opportunity for local authorities to discuss in detail the local requirements of incident and event reporting.

4. Scottish Water Results (by Local Authority)

SCOTTISH BORDERS COUNCIL

Supply zones in Scottish Borders
Innerleithen, Peebles, Drumelzier, Skirling, Broughton, Tweedsmuir, Galashiels, Heriot, Earnscleugh, Selkirk, Ettrickbridge, Yarrowford, Yarrowfeus, Acreknowe, Bonchester, Southdean, Newcastleton, Dodburn, Alemoor, Watch Water

Water Quality in Supply Zones

Scottish Water carried out a total of 1,564 tests on tap samples taken in the 20 water supply zones within Scottish Borders Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	386	2	0.52
Faecal coliforms	386	0	0
Colour	98	0	0
Turbidity	97	0	0
Hydrogen ion (pH)	126	0	0
Aluminium	86	0	0
Iron	104	0	0
Manganese	99	0	0
Lead	107	0	0
Trihalomethanes	75	0	0

Incidents or Events

A boil water notice was placed on the supply in the Broughton area on 5 August 2003. Following works to the filtration system and satisfactory results the boil notice was lifted on 15 August. Full details appear in Annex C.

Local Authority Comments

No comments were received from Scottish Borders Council.

SHETLAND ISLANDS COUNCIL

Supply zones in Shetland Islands
Bigton, Bressay, Cullivoe, Cunningsburgh, Eela Water, Fair Isle, Fetlar, Foular, Lerwick, Mid Yell, Papa Stour, Sandwick, Skerries, South Yell, Sumburgh, Unst, West Burrafirth, Whalsay

Water Quality in Supply Zones

Scottish Water carried out at total of 1,354 tests on tap samples taken in the 18 water supply zones within Shetland Islands Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	220	5	2.27
Faecal coliforms	220	2	0.91
Colour	110	9	8.18
Turbidity	107	1	0.93
Hydrogen ion (pH)	67	0	0
Aluminium	161	27	16.77
Iron	154	7	4.54
Manganese	108	3	2.78
Lead	74	0	0
Trihalomethanes	133	22	16.54

Incidents or Events

Two incidents occurred during 2003 in the Shetlands area. The first was in the Papa Stour area in early September. Full details appear in Annex C. The second was also in September and was a landslide which occurred as a result of heavy prolonged rain. This caused the mains to burst and an alternative temporary supply was put in place. However a boil water notice was placed on the temporary supply until full repairs were made and samples satisfactory.

Local Authority Comments

No comments were received from Shetlands Islands Council on the quality of water supplied by Scottish Water.

4. Scottish Water Results (by Local Authority)

SOUTH AYRSHIRE COUNCIL

Supply zones in South Ayrshire
Girvan, Ayr Country, Ayr Town, Irvine, Kilmarnock South and Darvel, Cumnock and Mauchline, Troon and Dundonald

Water Quality in Supply Zones

Scottish Water carried out at total of 1,842 tests on tap samples taken in the 7 water supply zones within South Ayrshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	614	2	0.32
Faecal coliforms	614	0	0
Colour	63	0	0
Turbidity	63	0	0
Hydrogen ion (pH)	136	0	0
Aluminium	62	0	0
Iron	95	0	0
Manganese	142	14	9.86
Lead	28	0	0
Trihalomethanes	25	2	8.00

Incidents or Events

There were no drinking water quality incidents or events reported within the South Ayrshire area during 2003.

Local Authority Comments

No comments were received from South Ayrshire Council on the quality of water supplied by Scottish Water.

SOUTH LANARKSHIRE COUNCIL

Supply zones in South Lanarkshire
Shettleston, Rutherglen, Castlemilk, Kings Park, Clarkston, Lanark and Carluke, Stonehouse, Biggar, Lanark South East, Lesmahagow South, Busby and East Kilbride, East Kilbride South, Hamilton, Cambuslang, Uddingston, Wishaw and Overton, Airdrie and Shotts, Belshill, Greengairs, Elsrickle, Dolphinton, Strathaven, Chapelton

Water Quality in Supply Zones

Scottish Water carried out at total of 5,756 tests on tap samples taken in the 23 water supply zones within South Lanarkshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	1881	20	1.06
Faecal coliforms	1881	1	0.05
Colour	343	0	0
Turbidity	201	0	0
Hydrogen ion (pH)	404	0	0
Aluminium	201	0	0
Iron	283	0	0
Manganese	268	0	0
Lead	127	1	0.79
Trihalomethanes	167	10	5.99

Incidents or Events

There were no drinking water quality incidents or events reported within the South Lanarkshire area during 2003.

Local Authority Comments

South Lanarkshire Council advise that they are content with the way Scottish Water provide drinking water within the Council area and have no comments to make.

4. Scottish Water Results (by Local Authority)

STIRLING COUNCIL

Supply zones in Stirling
Dunblane, Stirling, West Stirlingshire, Bannockburn, Strathyre, Balquhidder, Killin, Ardeonaig, Crianlarich, Tyndrum, Lochearnhead, Brig o'Turk

Water Quality in Supply Zones

Scottish Water carried out at total of 1,261 tests on tap samples taken in the 12 water supply zones within Stirling Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	308	5	1.62
Faecal coliforms	308	1	0.32
Colour	89	0	0
Turbidity	98	0	0
Hydrogen ion (pH)	87	0	0
Aluminium	68	0	0
Iron	105	2	1.90
Manganese	86	0	0
Lead	51	0	0
Trihalomethanes	61	0	0

Incidents or Events

There were no drinking water quality incidents or events reported within the Stirling area during 2003.

Local Authority Comments

No comments were received from Stirling Council on the quality of water supplied by Scottish Water.

WEST DUNBARTONSHIRE COUNCIL

Supply zones in West Dunbartonshire
Paisley and Port Glasgow, Clydebank and Bearsden, Old Kilpatrick and Leven Valley, Balloch and Cardross, Finlas, Glasgow Partick, Glasgow Knightswood, Glasgow Drumchapel

Water Quality in Supply Zones

Scottish Water carried out at total of 2,007 tests on tap samples taken in the 8 water supply zones within West Dunbartonshire Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	665	3	0.45
Faecal coliforms	665	0	0
Colour	78	0	0
Turbidity	77	0	0
Hydrogen ion (pH)	145	1	0.69
Aluminium	77	1	1.30
Iron	84	1	1.19
Manganese	78	0	0
Lead	33	0	0
Trihalomethanes	105	1	0.95

Incidents or Events

There were no drinking water quality incidents or events reported within the West Dunbartonshire area during 2003.

Local Authority Comments

West Dunbartonshire Council advise that they are content with the way Scottish Water provide drinking water within the Council area.

4. Scottish Water Results (by Local Authority)

WEST LOTHIAN COUNCIL

Supply zones in West Lothian
Pateshill Direct, Pateshill Longridge, Pateshill, Balgreen, West Mains, Dechmont Law, Waterston, Preston, East Craigs, Dechmont, Deans, Latch, Harburnhead, Belstane

Water Quality in Supply Zones

Scottish Water carried out at total of 1,577 tests on tap samples taken in the 14 water supply zones within West Lothian Council boundary. The table below provides details of the main parameters tested.

Parameter	Total no of tests	Total no of fails	% of fails
Total coliforms	431	0	0
Faecal coliforms	431	0	0
Colour	87	0	0
Turbidity	100	0	0
Hydrogen ion (pH)	112	0	0
Aluminium	70	0	0
Iron	118	1	0.85
Manganese	119	0	0
Lead	49	0	0
Trihalomethanes	60	8	13.33

Incidents or Events

There were no drinking water quality incidents or events reported within the West Lothian area during 2003.

Local Authority Comments

No comments were received from West Lothian Council on the quality of water supplied by Scottish Water.

5. Private Water Supplies

Introduction

In the UK private water supplies are defined as any water supply that is not provided by a statutory water undertaker and in which the responsibility for its maintenance lies with the owner or person who uses the supply. Private water supplies may be drawn from a variety of surface and groundwater sources. Surface sources will include streams and rivers as well as private impoundment reservoirs. Groundwater sources include wells and boreholes (where an aquifer is penetrated by a shaft originating on the ground surface and the groundwater is then removed from the shaft) or springs where groundwater issues naturally at the surface from the aquifer.

Local Authority Responsibilities

Local Authorities should have procedures in place for ensuring that they are meeting the requirements of the Private Water Supply (Scotland) Regulations 1992. The 1992 Regulations place a considerable workload on those Authorities serving the more rural areas. These areas often include a large number of private water supplies. More details of the regulatory framework are given below.

Current Regulatory Framework

Private water supplies are currently governed by the Private Water Supply (Scotland) Regulations 1992, which transpose the 1980 European Drinking Water Directive (80/779/EEC) in relation to private water supplies. In general terms, the 1992 Regulations and the Directive seek to safeguard the health of users of private water supplies. The legislation places responsibilities on Local Authorities to monitor and improve private supplies. It also provides a framework within which Local Authorities can develop policies although these will vary in accordance with the number of private water supplies in a particular area and the specific priorities of the Local Authority. Private water supplies are very varied in their nature (source) and the legislation has been designed to enable Local Authorities to tailor their actions to their particular circumstances. Further details on the current regulatory framework for private water supplies is provided in Annex A.

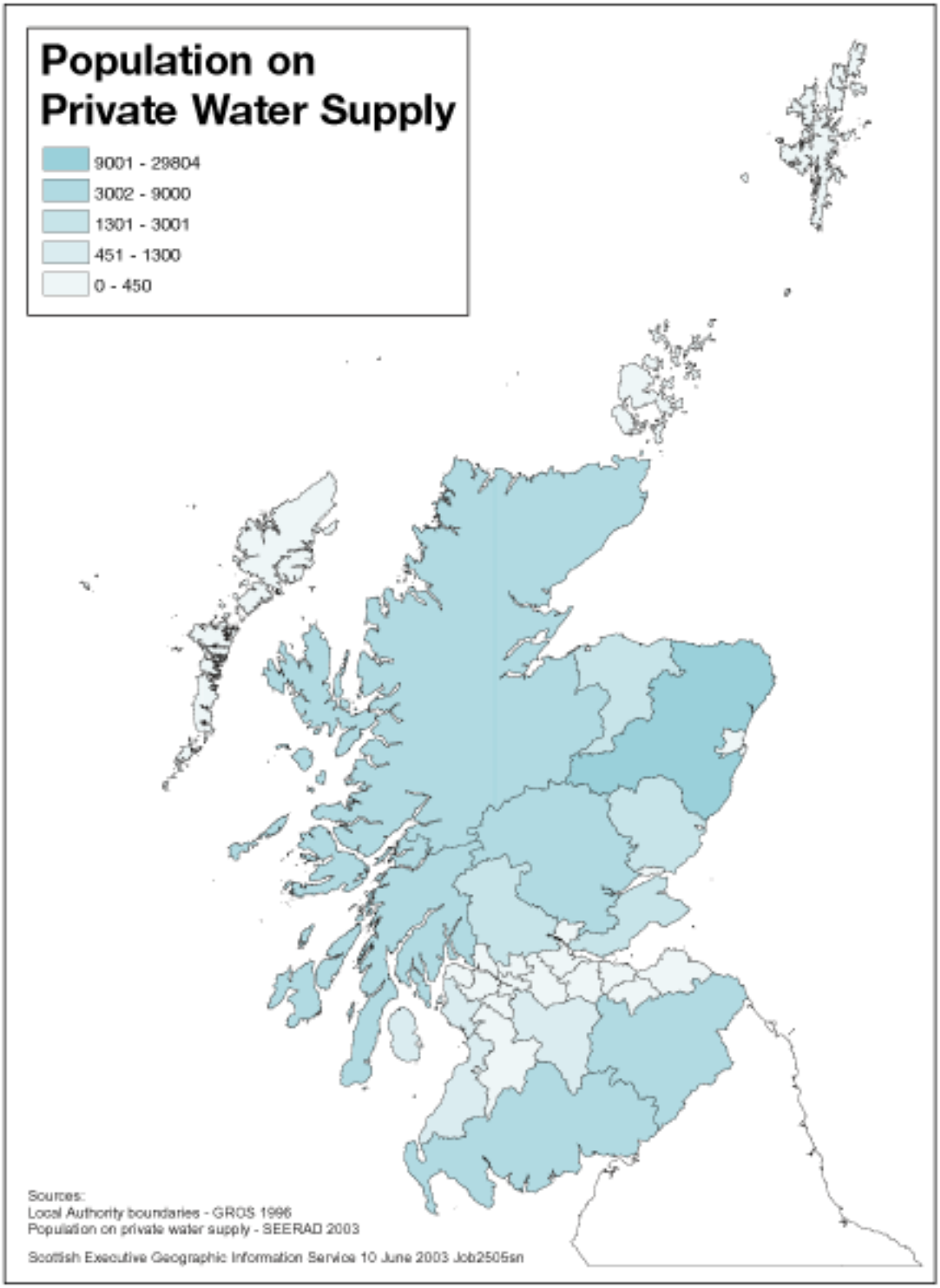
Private Water Supplies in Scotland 2003

In Scotland just over 1.6% of the population (approximately 82,703 people) are served by a private water supply with approximately a further 64,543 estimated to use private water supplies either through use of food production facilities or as visitors to hotels, campsites etc.

Figure 1 shows the percentage of the population served by private water supplies in each Local Authority area.

Data collected from Local Authorities in Scotland reveal that there are 18,654 private water supplies supplying approximately 82,703 people in category one, and over 64,543 people in category two. Approximately 14,112 of the supplies in category one serve single dwellings (category one F). In Annex D, *Table D.1* shows the breakdown of the data for category one supplies by Local Authority and *Table D.2* shows the same for category two.

Figure 1 Distribution of private water supplies in Scotland



5. Private Water Supplies

The results of monitoring to the end of 2003 show that in category one 3,509 of the supplies tested failed to meet requirements of the Regulations. Local Authorities reported that 2,266 of the category one failures related to class F supplies, which they have no direct obligation to test under the Regulations. However, tests on class F supplies are carried out for many reasons. Some Local Authorities have had a long-standing policy of checking all private supplies. Others have found that they receive a significant number of requests to carry out tests. These requests can arise directly from the householder or as a result of enquiries from solicitors involved in the sale or purchase of houses with private supplies. In category two, 466 supplies tested failed to meet the requirements of the Regulations. Local Authorities reported a total of 9,089 supplies in category one and 127 supplies in category two across Scotland had yet to be assessed as to whether they complied with the Regulations.

Note In 2003 there were no category one class A or B supplies located in Scotland.

Following the failure of a supply the Local Authority may ask the householders or owners to improve the supply. Section 76G of the Water (Scotland) Act 1980 gives the Local Authorities powers to serve a notice requiring an improvement. Such a notice must specify the steps to be taken to improve the supply and the time scale. In addition, the notice must give details of the householders rights to object and explain the procedure for referring the matter to Scottish Ministers for confirmation or otherwise. In practice, the formal procedure of serving a notice has not been widely adopted by Local Authorities with the Authorities generally preferring an informal approach where the householder is notified of the failure and persuaded that they should undertake an improvement. While this informal approach has advantages it also has the major drawback in that the householders may not be aware of their rights to object. In addition, where households seek grant aid for house improvements, the existence of a formal notice to improve water supplies may facilitate the availability of grant for this purpose.

The Local Authority reports to the end of 2003 show that in category one supplies improvement programmes were arranged for 610 supplies, just over 17% of those that failed. In category two 80 supplies or 17% of those failing also had improvement programmes arranged.

6. Public Water Supplies Sampling Shortfall

Sampling of drinking water within a supply zone is an important tool in ensuring that the quality of drinking water provided can be classified as wholesome in terms of Regulation 3 of the Water Supply (Water Quality)(Scotland) Regulations 1990.

Schedule 2 of the Regulations sets out the number of samples that have to be taken for each parameter in each supply zone. In practice, each sample is tested for several parameters so the text and the tables within this report relate to the number of determinations (tests) made for each individual parameter rather than to the number of samples taken. Also, if Scottish Ministers have authorised supply point sampling for certain parameters, the results for these parameters are recorded for each zone supplied from the point the sample was taken. A single result could therefore be recorded against 2 or more zones.

The number of samples specified in Schedule 2 of the Regulations is the minimum required to be taken per annum. The Drinking Water Quality Regulator expects full compliance with the required sampling frequencies.

Based on a total of 477 water supply zones within Scotland, Scottish Water has failed to take sufficient samples in 2003 to meet the required frequencies under the relevant Regulations. Based on the minimum number of tap water samples for each of the parameters in each of the zones a shortfall of 35,381 tests was identified for a range of parameters, some of which are crucial to the interpretation of results.

Scottish Water has provided an account of these shortfalls in their Drinking Water Quality Report published in August 2004. This report contains some explanation and a schedule of the steps taken by them to ensure that sampling shortfalls do not recur in 2004.

The DWQR has spent some time trying to understand how the programme of sampling for 2003, that was scheduled in accordance with the Regulations, was not completed. There proved to be a number of reasons all associated in one way or another with the major reorganisation of Scottish Water and the introduction of the new Regulations for 2004.

The fact remains that the management system for securing compliance with the required sampling during this transition period was not effective.

As reported by Scottish Water the consequence has been shortfalls in sampling as follows:

	Shortfall No	Shortfall %
Water Treatment Works	12,145	9.5%
Service Reservoirs	10,879	4.6%
Customers Taps	12,276	7.1%
	35,381	

The DWQR does not believe that the missing results cause any distortion to the overall picture of improving drinking water quality related to the investment programme.

It should however be noted that the 10 key parameters in Table 3.7 in Chapter 3 recorded shortfalls up to 11.8% for THM. The DWQR conclusion for this is that it would not be appropriate to use these data for the purposes of aggregate performance monitoring.

The regulatory standards for drinking water quality in Scotland largely stem from European Directives. On 5 December 1998 a revised Drinking Water Directive (98/83/EC) was published in the 'Official Journal of the European Communities'. Member States of the European Union have been given 5 years to meet the standards set in the revised Directive. Exceptions to this timescale are the final standards for trihalomethanes (8 years) and lead (15 years). However, the original Drinking Water Directive of 15 July 1980 (80/778/EEC) was in force during 2000. Scotland and the rest of the UK implemented the revised Directive before the end of 2003 as required by the EC.

The key regulations are:

The Water (Scotland) Act 1980

- *Scottish Water must supply wholesome water for domestic purposes. It is a criminal offence to supply water unfit for human consumption;*
- *Scottish Ministers must take enforcement action against Scottish Water if it fails in its duty to supply wholesome water unless the failure is trivial or Scottish Water is complying with a legally binding undertaking to remedy the matter;*
- *Local Authorities must take appropriate steps to keep themselves informed about the wholesomeness of public and private water supplies in their area and notify Scottish Water if not satisfied,.*
- *Local Authorities are required to secure improvements to private water supplies if they consider them necessary,' and*
- *wholesomeness is defined for public supplies in the Water Supply (Water Quality) (Scotland) Regulations 1990 and for private supplies in the Private Water Supplies (Scotland) Regulations 1992.*

The Water Supply (Water Quality)(Scotland) Regulations 1990

- *define wholesomeness by setting standards for 55 parameters and descriptive standards for a further 2;*
- *set and define, the supply zone as the basic unit for quality monitoring;*
- *require Scottish Water to monitor the quality of its supplies;*
- *specify detailed sampling requirements for samples taken at taps within zones, at service reservoirs and at water treatment works;*
- *make provision whereby, taking account of public health risk, standards may be relaxed where the water is not of the required quality; and*
- *require Scottish Water to publish an annual report and keep a public register of water quality in its area.*

The Water Supply (Water Quality)(Scotland) Regulations 2001

- *the 2001 regulations effectively came into force on 25 December 2003;*
- *transpose the requirements of Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption into Scottish legislation.*

Annex A – The Regulatory Framework

The Water Industry (Scotland) Act 2002

- *created the post of Drinking Water Quality Regulator for Scotland (DWQR);*
- *DWQR is responsible for enforcing the Water Supply (Water Quality)(Scotland) Regulations 2001;*
- *DWQR is independent of Ministers;*
- *DWQR has powers to obtain information, power of entry or inspection and power of enforcement;*
- *DWQR also has emergency powers to require a water supplier to carry out works to ensure quality of water supplied is safe for public consumption.*

The Surface Waters (Abstraction for Drinking Water) (Classification) (Scotland) Regulations 1996

- *sets standards for the quality of surface water to be used as sources of public water supply;*
- *permits waivers for certain parameters where these have a natural origin; and*
- *requires Scottish Water to classify all its sources of water in accordance with prescribed quality criteria subject to authorised waivers.*

The Cryptosporidium (Scottish Water) Directions 2002

- *the Cryptosporidium (New Water and Sewerage Authorities) Direction 2000 was re-issued in April 2002 as the Cryptosporidium (Scottish Water) Directions 2002. The requirements of the 2002 Directions are identical to the earlier version. The Direction was re-issued to reflect the change from the three authorities into one;*
- *requires Scottish Water to implement the recommendations contained in the Third Report of the 'Group of Experts on Cryptosporidium in Water Supplies';*
- *sets out a framework for assessing the risk of Cryptosporidium in public water supplies in Scotland and requires Scottish Water to assign a score to each of their supplies depending on the assessed risk; and*
- *requires continuous monitoring of high-risk supplies for Cryptosporidium.*

The Cryptosporidium (Scottish Water) Directions 2003

- *the Cryptosporidium (Scottish Water) Directions 2003 came into force on 1 January 2004;*
- *revised Directions provide for more widespread testing for Cryptosporidium to provide data about background levels in water supplies;*
- *provision put in place for Cryptosporidium sampling at all water treatment works between January and June 2004;*
- *from June 2004, every supply in Scotland will be tested at least once a month with the frequency of testing being based on the assessed risk and the flow through the works.*

The Private Water Supplies (Scotland) Regulations 1992

- *define wholesomeness in the same manner and prescribe the same standards as for public supplies;*
- *require Local Authorities to classify private supplies according to size and use;*
- *require Local Authorities to monitor private supplies in their area according to classification; and*
- *requires Local Authorities to secure improvements to private supplies if they consider them necessary.*

Information Letter number	TITLE
1/2003	The suitability of analytical methods used for lead analysis
2/2003	*Cryptosporidium* in water supplies: use of electrically pumped vacuum systems for regulatory *cryptosporidium* analysis
3/2003	Analysis of regulatory samples for the monitoring of *cryptosporidium* oocysts in treated water supplies
4/2003	Requirements to meet new lead standard
5/2003	Distribution operation and maintenance strategy (DOMS)
6/2003	Monitoring for *Clostridium perfringens* (including spores)

Guidance Letter number	TITLE
1/2003	Annual list of approved products and processes – December 2002
2/2003	Changes to national condition of use for polyacrylamide flocculants
3/2003	Reminder letter about the prohibition in the use of lead based compounds in PVC-U water supply pipes that comes into force on 25 December 2003
4/2003	Civil engineering uses of concrete in water treatment works – prohibition of traditional use exemptions under Regulation 25 (1) (c)
5/2003	Requirements for small surface area products and certain traditional construction products under Regulation 27 of the Water Supply (Water Quality)(Scotland) Regulations 2001

Copies of these letters are available from:
Scottish Executive Water Services Division upon request

Annex B – Index of Information Letters/Guidance Letters issued during 2003

Scottish Water is required to provide drinking water which is wholesome. Where the quality of drinking water supplied is not of a satisfactory standard (does not comply with the Regulations) they are under an obligation to advise Scottish Ministers of these instances. These are classified as events. However, an event may also be classified as an incident where bottled water and/or a boil notice have been issued. Details of selected incidents, which occurred during 2003, are detailed below. There were a total of 13 Incidents reported during 2003, 10 of which resulted in bottled water and/or a boil notice being issued. Each local authority page in chapter 4 provides information in respect of those not highlighted below:

Applecross, Highland June 2003:

This incident commenced on 21 June when a regulatory sample taken at the water treatment works gave high numbers of coliforms and *e-coli*. The regulatory sample taken within the distribution zone supplied by the works gave an initial result of 87 coliforms and 93 *e-coli* per 100 ml. The maximum concentration prescribed in the relevant Regulations is 0 per 100 ml for both items. The Consultant in Public Health Medicine (CPHM) instructed Scottish Water to issue a boil water notice and provide bottled water until resamples could be reviewed. Boil water leaflets were issued to householders and Community Councils informed to aid speed of information. The area affected approximately 820 customers (327 properties). Following remedial works which included the boosting of the chlorine levels and the gentle flushing of the affected water mains, supplies were returned to normal on 27 June with the agreement of the CPHM to the lifting of the boil water notice. Following investigation by Scottish Water engineers, the failure was attributed to a failure of the chlorine injector at the works.

Earlish, Skye July 2003

Following a period of very heavy rain, Scottish Water indicated to Highland NHS Board Public Health Department and the Scottish Executive that there were difficulties with the water supply to Earlish/Uig, Skye. On 17 July sample results indicated the presence of *Cryptosporidium* in both the raw and final waters. The Earlish/Uig supply provides water to 240 households. A boil water notice was placed on the supply and daily monitoring for *Cryptosporidium* on both raw and final water was put in place. Each dwelling was informed by a personal visit from a Scottish Water employee. The standard Boil Water Notice was issued to each household. In addition leaflets were delivered and bottled water supplied to any 'vulnerable' customers. In addition to this Environmental Health Officers of Highland Council contacted all food premises and gave specific advice as required. These included a youth hostel, hotel, school and a residential home. In addition to the public, close liaison was undertaken with all local elected members to ensure that they were kept informed of events.

One element of the criteria for removing a boil water notice is 3 consecutive sample results indicating levels below 0.1 oocysts per 10 litres. During the incident Scottish Water explored several options to improve the treatment process at Earlish/Uig. It was agreed that the best solution was the installation of appropriate filters small enough to capture all oocysts.

Annex C – Selected Drinking Water Quality Incidents

Works were carried out and sampling was undertaken on a daily basis between 25 July and 5 August. Final water samples taken on a daily basis following this date were entirely clear of occysts.

Following 3 consecutive daily clear final water sample results the boil water notice was lifted on Monday 11 August. Throughout the period of the boil notice, Scottish Water kept both the respective Health Board and the Executive fully informed as per the guidelines issued. At no time either during, or after, the incident was there any human cases of cryptosporosis infection or an increased incidence of diarrhoeal illness.

On an anecdotal note, it was highlighted that there were public toilets in Uig which, as it is near a ferry terminal, would have been accessed by considerable numbers of tourists, some of whom would be foreign nationals. During the incident, therefore, a multi-lingual laminated boil water notice was placed within the public toilets to alert tourists not to drink the water without boiling. This was felt to have been good practice and will be made available as a laminated sign in several European languages for future incidents.

Broughton, Borders August 2003:

Following an exceptional rainfall on 1 August elevated levels of *Cryptosporidium* were detected in the Talla/Fruid reservoirs raw water supply. The villages of Broughton and Tweedsmuir in the Borders are supplied directly from the Talla/Fruid aqueduct with only chlorination for treatment. Initial samples gave results of 1.66 oocysts per 10 litres.
The maximum concentration prescribed in the relevant Regulations is 1 oocyst per 10 litres.

Following this result, the Consultant in Public Health Medicine for the Borders instructed Scottish Water to issue a precautionary boil water notice on 5 August. The village of Broughton consists of 152 properties while Tweedsmuir has 18 properties. Regular dialogue and meetings between NHS Borders, Scottish Water, SCIEH and Scottish Borders Council meant that all relevant areas were fully informed during the period in which the boil water notice was in place. The final water was analysed on a daily basis and various counts were recorded. The highest count was one of 2 oocysts per 10 litres. An improved filtration system was installed and counts diminished to below 0.1 oocysts per 10 litres. Following two days of negative results the boil water notice was lifted on 15 August. During the period of the boil water notice there were no reported cases of cryptosporidiosis amongst the 240 population.

Papa Stour, Shetland September 2003:

A regulatory sample taken on 11 September at Papa Stour Water Treatment Works indicated levels of coliforms and *e-coli* which were above the regulatory limit. Following discussions between Scottish Water, CPHM and the local authority Environmental Health Officer it was agreed to issue a boil water notice to customers until further notice. Due to transportation difficulties (there being no transport available from the island on a Thursday), no samples were able to be analysed until Saturday 13th. Health guidance indicates that two clear consecutive results must be obtained before a boil notice can be lifted. Meanwhile, additional chlorine was added to the raw water at the works and the mains pipe was flushed. Following two consecutive days of clear sample results, the boil notice was lifted on 14 September.

Annex C – Selected Drinking Water Quality Incidents

Table D.1 Category One Supplies – Statistics reported by Local Authorities for 2003

Authority	Total, Private Water Supplies	Total Population	Population on PWS	% Total Population on PWS	1A	1B	1C	1D	1E	1F	Number failed	Number Improved	Improvement Programmes	Number to be tested
Aberdeen City	108	212,125	319	0.15	0	0	0	0	85	33	73	0	0	0
Aberdeenshire	8184	226,871	29,368	12.94	0	0	1	55	1,255	6,873	1,193	0	0	5,719
Angus	351	108,400	1,854	1.71	0	0	1	7	94	249	38	0	38	175
Argyll & Bute	1,154	91,306	7,952	8.71	0	0	2	10	344	798	542	0	26	318
Clackmannanshire	26	48,077	306	0.64	0	0	0	4	13	9	0	0	25	0
Dumfries and Galloway	1,330	147,765	6,377	4.32	0	0	0	15	400	915	173	0	30	347
Dundee City	1	145,663	20	0.01	0	0	0	0	1	0	0	0	0	0
East Ayrshire	140	120,235	0	0.00	0	0	0	0	46	94	29	0	0	0
East Dumbartonshire	20	108,243	102	0.09	0	0	0	1	4	15	14	0	0	0
East Lothian	31	90,088	420	0.47	0	0	0	3	15	14	8	0	2	0
East Renfrewshire	162	89,311	440	0.49	0	0	0	0	45	117	108	0	108	14
Edinburgh City	11	448,624	127	0.03	0	0	0	2	7	2	0	0	1	0
Eilean Siar	39	26,502	228	0.86	0	0	0	1	6	32	0	0	0	0
Falkirk District	8	145,191	27	0.02	0	0	0	0	2	6	4	0	1	0
Fife	295	349,429	2,014	0.58	0	0	0	5	161	129	123	0	17	12
Glasgow City	0	577,869	0	0.00	0	0	0	0	0	0	0	0	0	0
Highland	2,165	208,914	8,173	3.91	0	0	0	11	409	1,745	363	0	114	1,247
Inverclyde	46	84,203	189	0.22	0	0	0	1	18	27	28	0	0	0
Midlothian	65	80,941	448	0.55	0	0	0	1	29	35	0	0	0	0
Moray	544	86,940	2,947	3.39	0	0	3	15	162	364	72	0	0	250
North Ayrshire	288	135,817	1,138	0.84	0	0	0	2	64	222	23	0	0	50
North Lanarkshire	14	321,067	37	0.01	0	0	0	0	13	1	1	0	11	0
Orkney	220	19,245	440	2.29	0	0	0	0	10	210	13	0	13	140
Perth and Kinross	965	134,949	6,233	4.62	0	0	0	24	381	560	197	0	0	431
Renfrewshire	94	172,867	399	0.23	0	0	0	0	20	74	55	0	55	21

Annex D – Detail of Local Authority private water supplies returns

Annex D – Detail of Local Authority private water supplies returns

continued

Authority	Total, Private Water Supplies	Total Population	Population on PWS	% Total Population on PWS	1A	1B	1C	1D	1E	1F	Number failed	Number Improved	Improve-ment Notices	Number to be tested
Scottish Borders	1,242	106,764	8,273	7.75	0	0	0	20	573	649	192	0	6	163
Shetland Islands	72	21,988	198	0.90	0	0	0	0	15	57	22	0	7	14
South Ayrshire	223	112,097	1,066	0.95	0	0	0	6	65	152	153	0	153	0
South Lanarkshire	283	302,216	1,177	0.39	0	0	1	2	79	201	56	0	2	188
Stirling	513	86,212	2,070	2.40	0	0	0	3	19	491	0	0	0	0
West Dumbartonshire	16	93,378	91	0.10	0	0	0	0	6	10	9	0	0	0
West Lothian	44	158,714	270	0.17	0	0	0	1	15	28	20	0	1	0
SCOTLAND	18,654	5,062,011	82,703	1.63	0	0	8	189	4,356	14,112	3,509	0	610	9,089

Category One Supplies (for domestic purposes) – definitions

Class	Number of person supplies	Consumption (m3d – sup 1)	Sampling Frequency (per annum)
A	>5,000	>1,000	24
B	501-5,000	101-1,000	12
C	101-500	21-100	2
D	25-100	5 to 20	1
E	<25	<5	0.2
F	1 dwelling		

Table D.2 Category Two Supplies – Statistics reported by Local Authorities for 2003

Authority	2(I)1	2(I)2	2(I)3	2(I)4	2(I)5	Total 2(I)	2(ii)1	2(ii)2	2(ii)3	2(ii)4	2(ii)5	Total 2(ii)	Total Cat 2	Total people served 2(i)	Total people served 2(ii)	TOTAL people served Cat 2
Aberdeen City	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Aberdeenshire	64	0	48	81	6	199	0	0	0	2	2	4	203	5670	43	5713
Angus	3	0	4	4	0	11	0	0	0	8	24	32	43	0	0	0
Argyll & Bute	221	29	0	51	145	446	0	1	17	53	82	153	599	10123	10559	20682
Clackmannanshire	0	0	3	0	1	4	0	0	0	1	0	1	5	100	100	200
Dumfries and Galloway	161	0	13	7	3	184	1	0	9	11	19	40	224	6346	5782	12128
Dundee City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Ayrshire	10	0	3	0	0	13	0	0	0	6	7	13	26	143	40	183
East Dumbartonshire	1	0	1	0	0	2	0	0	0	0	0	0	2	0	0	0
East Lothian	0	0	3	0	0	3	0	0	0	0	3	3	6	0	20	20
East Renfrewshire	11	0	0	0	0	11	0	0	0	0	2	2	13	30	60	90
Edinburgh City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eilean Siar	0	0	1	4	0	5	0	0	0	0	0	0	5	100	0	100
Falkirk District	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fife	9	0	6	1	4	20	0	0	3	4	7	14	34	685	170	855
Glasgow City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Highland	2	0	130	182	4	318	0	1	2	66	314	383	701	3540	3021	6561
Inverclyde	5	0	1	1	2	9	0	0	1	1	0	2	11	31	0	31
Midlothian	1	0	2	0	0	3	0	0	0	0	0	0	3	16	0	16
Moray	9	0	31	12	1	53	0	0	0	0	0	0	53	680	0	680
North Ayrshire	11	0	4	0	4	19	0	0	0	8	4	12	31	207	218	425
North Lanarkshire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orkney	8	0	2	3	0	13	0	0	0	0	0	0	13	100	0	100
Perth and Kinross	6	0	12	44	0	62	0	2	4	61	50	117	179	5795	4962	10757
Renfrewshire	5	0	1	3	0	9	0	0	0	0	0	0	9	220	0	220

Annex D – Detail of Local Authority private water supplies returns

(continued)

Authority	2(I)1	2(I)2	2(I)3	2(I)4	2(I)5	Total 2(I)	2(ii)1	2(ii)2	2(ii)3	2(ii)4	2(ii)5	Total 2(ii)	Total Cat 2	Total people served 2(i)	Total people served 2(ii)	TOTAL people served Cat 2
Scottish Borders	3	0	16	29	17	65	0	2	6	22	33	63	128	505	726	1231
Shetland Islands	0	0	0	0	0	0	0	0	0	2	0	2	2	0	8	8
South Ayrshire	11	0	4	1	0	16	0	0	0	5	9	14	30	570	156	726
South Lanarkshire	16	0	0	1	0	17	0	0	0	0	0	0	17	81	0	81
Stirling	5	0	17	34	0	56	0	0	5	6	0	11	67	2245	1415	3660
West Dumbartonshire	2	0	0	2	0	4	0	0	0	0	0	0	4	36	0	36
West Lothian	2	0	0	2	0	4	0	0	0	0	2	2	6	40	0	40
SCOTLAND	567	29	302	462	187	1547	1	6	47	256	558	868	2415	37263	27280	64543

Category Two Supplies – Definitions

Class	Consumption (m3d – sup1)	Sampling Frequency (per annum)
1	>1,000	24
2	101-1,000	12
3	21-100	6
4	2 to 20	2
5	<2	1

Data for Figure	Dairy farms	Crop wash	Food/ Drink	Residential	Other	Total
Aberdeen City	1	0	0	0	0	1
Aberdeenshire	64	0	48	81	6	199
Angus	3	0	4	4	0	11
Argyll & Bute	221	29	0	51	145	446
Clackmannanshire	0	0	3	0	1	4
Dumfries and Galloway	161	0	13	7	3	184
Dundee City	0	0	0	0	0	0
East Ayrshire	10	0	3	0	0	13
East Dumbartonshire	1	0	1	0	0	2
East Lothian	0	0	3	0	0	3
East Renfrewshire	11	0	0	0	0	11
Edinburgh City	0	0	0	0	0	0
Eilean Siar	0	0	1	4	0	5
Falkirk District	0	0	0	0	0	0
Fife	9	0	6	1	4	20
Glasgow City	0	0	0	0	0	0
Highland	2	0	130	182	4	318
Inverclyde	5	0	1	1	2	9
Midlothian	1	0	2	0	0	3
Moray	9	0	31	12	1	53
North Ayrshire	11	0	4	0	4	19
North Lanarkshire	0	0	0	0	0	0
Orkney	8	0	2	3	0	13
Perth and Kinross	6	0	12	44	0	62
Renfrewshire	5	0	1	3	0	9
Scottish Borders	3	0	16	29	17	65
Shetland Islands	0	0	0	0	0	0
South Ayrshire	11	0	4	1	0	16
South Lanarkshire	16	0	0	1	0	17
Stirling	5	0	17	34	0	56
West Dumbartonshire	2	0	0	2	0	4
West Lothian	2	0	0	2	0	4
SCOTLAND	567	29	302	462	187	1,547

Table E1 Monitoring Results from high risk sources

Treatment Works	Number of samples	Number of positive samples	Number of occysts per 10 litres		
			Minimum	Mean	Maximum
Badentian	365	2	0.007	0.0075	0.008
Banff Raw	12	0	0	0	0
Blairlinnans Raw	363	159	0	0.026	0.667
Blairlinnans Final	365	1	0	0	0.008
Forehill Raw	52	17	0.079	1.303	10.0
Forehill Final	365	2	0.008	0.0085	0.009
Invercannie Raw	365	183	0.009	0.11	0.6
Invercannie Final	365	49	0.004	0.012	0.046
Mannofield Raw	365	213	0.011	0.16	1.366
Mannofield Final	365	4	0.006	0.007	0.015
Milngavie M4	365	68	0	0.002	0.045
Milngavie C5	360	75	0	0.002	0.038
Perth Raw	52	6	0.011	0.094	0.487
Perth Final	365	2	0.007	0.007	0.007
Rochomie	365	4	0.009	0.009	0.009
Toftcarl	52	0	0	0	0
Turriff Raw	52	26	0.036	0.285	1.299
Turriff Final	365	1	0.008	0.008	0.008

Table E2 Monitoring Results from other sources considered to be at risk

Number of sources monitored	Total number of samples collected during 2003	Number of positive results during 2003
0	0	0

Annex E Cryptosporidium Sampling Results for 2003

Acknowledgments

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