



# NORTHERN IRELAND DRINKING WATER QUALITY 2000

*A Report by the Northern Ireland  
Drinking Water Inspectorate*



An Agency within the  
Department of the  
Environment

# NORTHERN IRELAND DRINKING WATER QUALITY 2000

*A Report by the Northern Ireland  
Drinking Water Inspectorate*

# CONTENTS

	<b>Page Nos</b>
Summary	1
1 Introduction	6
2 The Regulatory Framework	7
3 The Role and Activities of the Drinking Water Inspectorate	9
4 The Technical Audit	12
Assessment of Water Quality	14
The 2000 and 2001 Inspection Programmes	17
5 Overview of Drinking Water Quality in Northern Ireland in 2000	20
Physical/Chemical Quality in Water Supply Zones	31
6 Drinking Water Quality Incidents and Complaints	42
7 Private Water Supplies	44
8 Drinking Water Research	46
9 Definitions and Glossary of Terms	49

# SUMMARY

*This report is the fifth prepared by the Drinking Water Inspectorate Unit of Environment and Heritage Service, acting in its regulatory role in matters of drinking water quality. It describes the work of the Inspectorate and provides an overview of drinking water quality in Northern Ireland for 2000.*

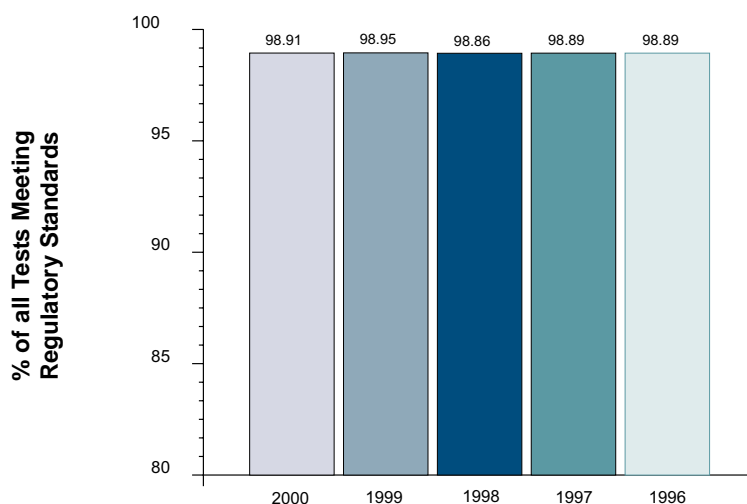
*During this reporting period, the drinking water quality results show that out of a total of 110,242 tests carried out by Water Service in 2000, 98.91% met the regulatory standards. This overall water quality is the percentage compliance rate for all samples and all parameters collected from water supply zones (consumers' taps), service reservoirs and water treatment works. The overall compliance figure has remained at around 98.9% in Northern Ireland since 1996.*

*During 2000, the compliance rate at consumers' taps for the important microbiological parameters has been maintained at 99.66% (99.67% in 1999); these figures demonstrate the good microbiological quality of tap water in Northern Ireland. Compliance rates at water treatment works have been maintained at 99.83% (99.86% in 1999). An increase, however, in the number of microbiological non-compliances has been reported for service reservoirs (0.52% in 2000, 0.29% in 1999), and it is this that has contributed to a reduction in the overall microbiological compliance rate from 99.75% in 1999 to 99.61% in 2000.*

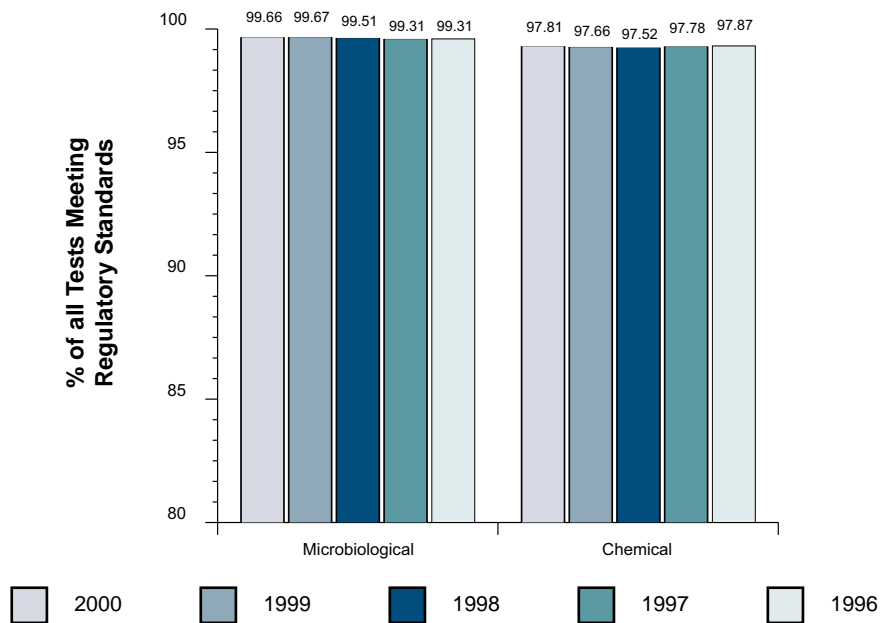
*Although the microbiological compliance rate of 99.66% for drinking water at consumers' taps is good, the overall water quality figure, which also includes physical/chemical tests, is reduced to 98.20% due to poorer performance rates for certain chemical parameters. These are notably: trihalomethanes, iron, aluminium and lead.*

Comparable figures are given in Figures 1-3 below.

**Figure 1: Overall Water Quality**

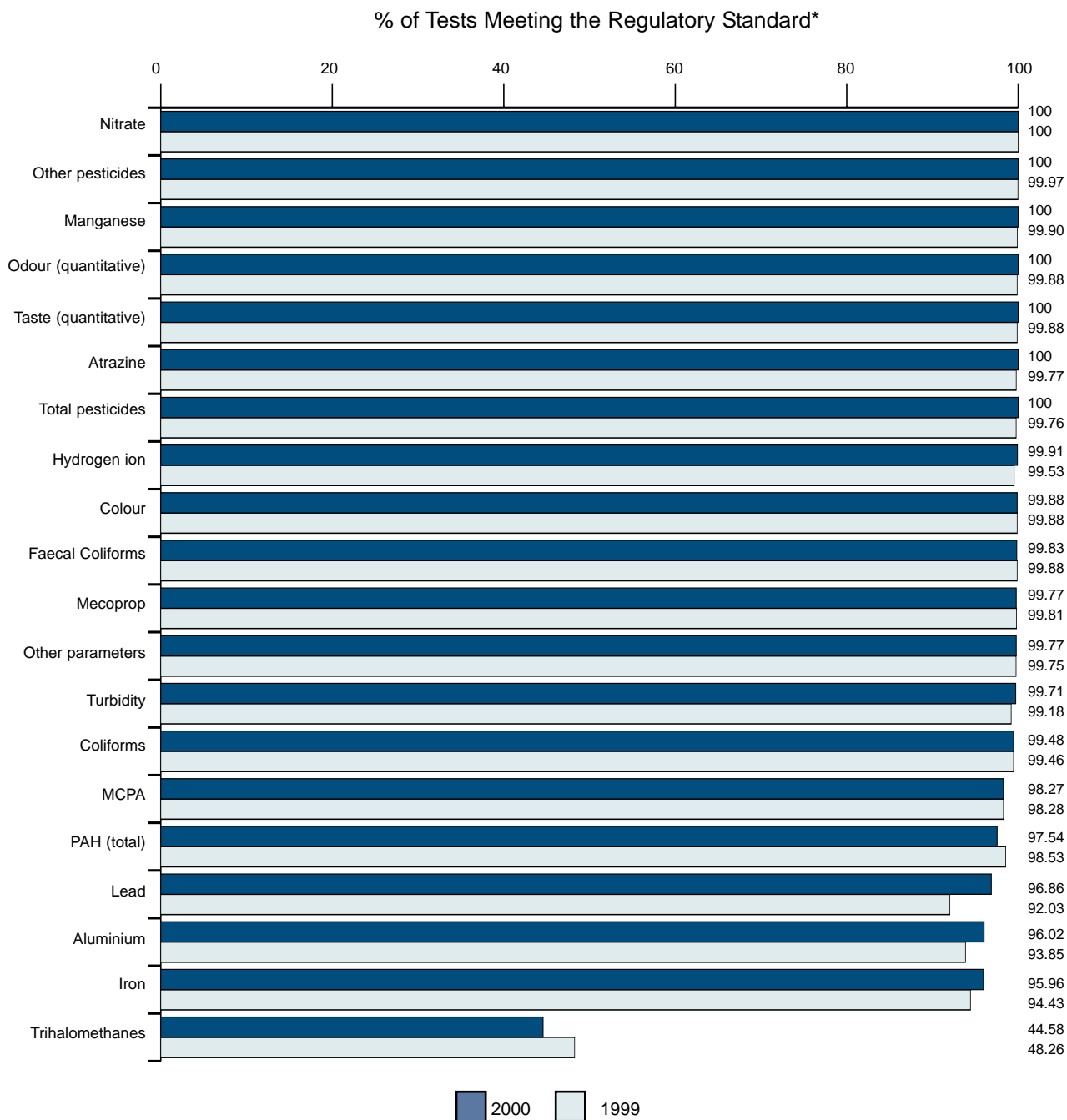


**Figure 2: Microbiological and Chemical Quality at Consumers' Taps**



*During 2000, the level of compliance was reported for 103 water supply zones which were routinely monitored for 87 individual parameters. The regulatory requirements were met for 73 of these parameters. A water supply zone can be non-compliant if one parameter fails on a single occasion. Figure 3 shows the percentage of determinations in water supply zones meeting the regulatory standards.*

**Figure 3: Microbiological & Chemical Quality in Water Supply Zones**



\* Regulatory standard refers to the Prescribed Concentration or Value (PCV) or Relaxed PCV.

*The overall number of physical/chemical tests not meeting the standards shows a small improvement, with 2.19% of 42,788 tests failing to meet the required standards in 2000; the comparable figure for 1999 was 2.34%.*

*As with previous reporting years, the non-compliances continue to relate largely to trihalomethanes, iron, aluminium and lead. While microbiological quality of water supplies has been maintained in 2000, it may, at the same time, have contributed to the continuing high failure rate for trihalomethanes. The non-compliance rates for trihalomethanes have increased to 55.42% in 2000, from 38.54% in 1996. The World Health Organization has stated that in controlling trihalomethanes, primary consideration should be given to ensuring that disinfection, and hence microbiological quality, is never compromised.*

*Many of the water quality non-compliances which were detected arose in circumstances which require the implementation of improvement programmes for water treatment works and distribution systems. Improvements to several water treatment works have been completed or are underway, and in certain areas, there are indications that this has improved the individual aluminium compliance figures. In other situations, however, compliance monitoring continues to identify areas where a targeted improvement programme is necessary to achieve aluminium compliance. In 2000, lead and iron showed improved rates of non-compliance at 3.14% and 4.04% respectively; the comparable figures reported for 1999 were 7.97% and 5.57%. Targeted work programmes continue to be required to improve lead and iron compliance. With regard to the lead parameter, the Inspectorate notes Water Service's commitment to introducing treatment during autumn 2001 at prioritized locations to assist in meeting future regulatory standards for lead by the required dates.*

*The Water Quality Regulations (Northern Ireland) 1994 set demanding standards for public drinking water quality. During 2000, 979 contraventions of the standards were reported for samples taken at consumers' taps. Contraventions were reported for 14 parameters, and each contravention has been followed up and assessed by the Inspectorate. Depending on the magnitude or duration of the contravention, each has been assessed as being trivial or non-trivial.*

*Formal notifications for non-trivial contraventions were notified to Water Service for the following nine parameters:*

*Total coliforms, faecal coliforms, trihalomethanes, iron, aluminium, lead, MCPA, turbidity and ammonium.*

*All contraventions are followed up by Water Service and remedial action taken where practical and appropriate. When contraventions of the regulatory standards occur, Water Service notifies the Health and Social Services Boards and district councils on an ongoing basis, under an agreed reporting procedure. Only some of the parameters are of health significance, and their standards are generally set with a wide margin of safety. The other parameters are of aesthetic significance, with standards set generally well below the level at which water would become unacceptable to consumers.*

*The Inspectorate welcomes Water Service's commitment to its capital works programme, targeted at water treatment works and the distribution system, which is necessary to mitigate the contraventions within the shortest possible timescale. The last four years have seen a commitment to increased investment in water treatment works and refurbished infrastructure. Continued commitment to funding further investment in water treatment and*

*supply infrastructure needs to be maintained and applied with maximum efficiency to ensure the continuing provision of high quality drinking water; and to improve regulatory compliance. The investment programme needs to continue to address: the substantial improvements required in compliance, in particular, with the trihalomethane, iron, aluminium and lead parameters; further investment in quality driven water treatment and water mains rehabilitation; enhanced protection against Cryptosporidium; and the additional requirements of the new European Drinking Water Directive.*

*In line with the rest of the United Kingdom, a major activity during 2000 was the implementation of new arrangements for monitoring Cryptosporidium. The arrangements were established for public health protection and incorporate a formal notification level of one or more oocysts per 10 litres and an alert level of 0.1 oocysts per 10 litres. This monitoring programme is ongoing throughout the year and an assessment of this monitoring will be made in next year's report.*

*The Water Quality Regulations (Northern Ireland) 1994 set out sampling and other regulatory requirements to demonstrate the wholesomeness of drinking water supplies. In the 2000 Compliance Assessment, a sampling shortfall of 1.04% of the required number of determinations was identified for regulatory standard sampling frequencies for water supply zones; the comparable figure reported for 1999 was 1.33%. Water Service is taking forward the introduction of a new Laboratory Information Management System which, it anticipates, will greatly improve sample frequency compliance.*

*The Inspectorate's other activities and responsibilities, including those relating to the Private Water Supplies Regulations (Northern Ireland) 1994, are presented in this report.*

# INTRODUCTION

The Drinking Water Inspectorate (the 'Inspectorate') is a unit within the Environment and Heritage Service, an agency of the Department of the Environment, in Northern Ireland. The Inspectorate has a responsibility to regulate drinking water quality in Northern Ireland under the Water Quality Regulations (Northern Ireland) 1994 and the Private Water Supplies Regulations (Northern Ireland) 1994. This report details the work of the Inspectorate and reviews drinking water quality in Northern Ireland for 2000. This is the fifth annual report prepared by the Inspectorate, and, as with the previous reports, it will act as a criterion against which water quality in Northern Ireland will be measured in future years. The Inspectorate continues to progress water quality issues, with a view to improving compliance with regulatory standards.

- 1.1** The Inspectorate prepared the summary and assessment of drinking water quality in Northern Ireland from information provided by Water Service. The information was obtained from Water Service's monitoring programme, carried out as prescribed in the Water Quality Regulations (Northern Ireland) 1994 (the 'Regulations'). Water Service has published its own report, entitled 'Drinking Water Quality Report 2000', in accordance with regulation 28. The Inspectorate's report includes a detailed independent assessment of drinking water quality in Northern Ireland in terms of the standards set out in the Regulations.
  
- 1.2** In the report, Section 2 describes the regulatory framework within which the Inspectorate operates. Section 3 broadly reviews the Inspectorate's activities regarding drinking water quality, including those defined by the Private Water Supplies Regulations (Northern Ireland) 1994. The technical audit process, carried out to support the Inspectorate's administration of the Regulations, is considered in detail in Section 4. Section 5 overviews public drinking water quality in Northern Ireland for 2000, comments on the key non-compliances with the standards, including non-trivial water supply zone contraventions, and draws relevant comparisons to water quality in previous years. An assessment of standard sampling frequencies for water supply zones, water treatment works and service reservoirs is also included in this section. In Section 6, water quality incidents have been identified, and, in Section 7, a summary of the various classification types of private water supplies in Northern Ireland is provided. Section 8 refers to the \*Department of the Environment, Food and Rural Affairs (DEFRA's) Drinking Water Research Programme on water quality and health, which is steered by the Drinking Water Inspectorate for England and Wales. Finally, the Glossary provides brief explanations of the technical terms and abbreviations used in this report.

\* Formerly, Department of the Environment, Transport and the Regions (DETR).

# THE REGULATORY FRAMEWORK

Water quality requirements in the United Kingdom fully incorporate the European Directive of 15 July 1980 (80/778/EEC), the 'Drinking Water Directive'<sup>1</sup>, relating to the quality of water intended for human consumption.

In Northern Ireland, the primary legislative powers to transpose the Drinking Water Directive are contained in the Water and Sewerage Services (Northern Ireland) Order 1973 No. 70 (N.I. 2) as amended by the Water and Sewerage Services (Amendment) (Northern Ireland) Order 1993 No. 3165 (N.I. 16). The Water Quality Regulations (Northern Ireland) 1994 S.R. No. 221 set the standards for public supplies for drinking (which includes use in food production). The Private Water Supplies Regulations (Northern Ireland) 1994 S.R. No. 237 set standards for private water supplies.

The treatment of raw water referred to in regulation 22 of the Water Quality Regulations (Northern Ireland) 1994 is now contained in the Surface Waters (Abstraction for Drinking Water) (Classification) Regulations (Northern Ireland) 1996 S.R. No. 603.

The key points of the Order and Regulations are:

## 2.1 The Water and Sewerage Services (Northern Ireland) Order 1973 and the Water and Sewerage Services (Amendment) (Northern Ireland) Order 1993

- place a duty on the Department<sup>2</sup> when supplying water to premises for domestic or food production purposes, to supply water which is wholesome at the time of supply;

- require the Department<sup>3</sup> to keep itself informed about the wholesomeness and sufficiency of private water supplies;
- empower the Department<sup>3</sup> to require remedial action to be taken where private supplies are found to be unwholesome or insufficient; and
- provide regulation making powers relating to preserving water quality and setting standards for wholesomeness.

## 2.2 The Water Quality Regulations (Northern Ireland) 1994

- define wholesomeness by setting standards for 55 parameters and descriptive standards for a further two;
- set and define a water supply zone as the basic unit for water quality monitoring;
- require the Department<sup>2</sup> to monitor the quality of its supplies;
- specify detailed sampling requirements for samples taken at taps within water supply zones, at service reservoirs and at water treatment works;
- make provision in certain circumstances whereby, taking account of public health risk, standards may be relaxed where the water is not of the required quality;
- control substances coming into contact with drinking water; and
- require the Department<sup>2</sup> to publish an annual report and keep public registers of water quality at its Water Service Divisional Headquarters' offices.

<sup>1</sup> The new Drinking Water Directive was agreed by the Member States of the European Union in November 1998.

<sup>2</sup> Under government reorganization, now the Department for Regional Development.

<sup>3</sup> Under government reorganization, now the Department of the Environment.

### 2.3 The Private Water Supplies Regulations (Northern Ireland) 1994

- define wholesomeness in the same manner and prescribe the same standards as for public supplies (paragraph 2.2 refers);
- require the Department<sup>3</sup> to classify private water supplies according to size and use; and
- require the Department<sup>3</sup> to monitor private supplies according to the classification category.

### 2.4 The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations (Northern Ireland) 1996

- set standards for the quality of surface water to be used as sources of public water supply;
- permit waivers for certain parameters where these have a natural origin; and
- require the Department<sup>2</sup> to classify all its sources of water in accordance with prescribed quality criteria subject to authorized waivers.

<sup>2</sup> Under government reorganization, now the Department for Regional Development.

<sup>3</sup> Under government reorganization, now the Department of the Environment.

#### References

Copies of individual Regulations may be obtained from Her Majesty's Stationery Office, 16 Arthur Street, BELFAST BT1 4GD.

# THE ROLE AND ACTIVITIES OF THE DRINKING WATER INSPECTORATE

## Regulatory Role

In Northern Ireland, the administration of the Water Quality Regulations (Northern Ireland) 1994 ('the Regulations') and the Private Water Supplies Regulations (Northern Ireland) 1994 is carried out by the Drinking Water Inspectorate Unit of Environment and Heritage Service.

In the case of the Water Quality Regulations (Northern Ireland) 1994, Water Service, an executive agency within the Department for Regional Development, is responsible for implementing the requirements of the Regulations. The Inspectorate has an independent responsibility to assess and regulate compliance against these standards.

In relation to private water supplies, the Drinking Water Inspectorate is responsible for the implementation of the Private Water Supplies Regulations (Northern Ireland) 1994. The Department of Agriculture and Rural Development and the 26 district councils also have interests in these private water supplies.

## The Water Quality Regulations (Northern Ireland) 1994

**3.1** The Inspectorate's duties in implementing its responsibilities under the Regulations are mainly carried out by an ongoing programme of **technical audit**. The technical audit process is an annual assessment which includes the following core tasks:

- the transfer of information from Water Service on the quality of water at water treatment works, service reservoirs and in water supply zones;
- a **compliance assessment** of this information against the regulatory standards;
- an **inspection programme** which examines the sampling, analytical and reporting procedures; and
- an assessment to establish if satisfactory practices and processes are in place for water treatment and distribution.

**3.2** Inspection reports, which provide conclusions, opinions and recommendations of the inspection findings, are sent to Water Service.

**3.3** Where a regulatory standard has not been met, the compliance assessment process classifies the contraventions as trivial or non-trivial. The non-trivial contraventions are listed and **formally notified** to Water Service. This formal notification requires a response from Water Service, outlining proposals for remedial action.

## The Private Water Supplies Regulations (Northern Ireland) 1994

**3.4** In 1997, the Inspectorate began an annual survey to identify the private water supplies falling within the Private Water Supplies Regulations (Northern Ireland) 1994:

- to date, 1189 private water supplies have been identified and categorized into one of ten classes according to size, nature and use of the private water supply; and
- a monitoring programme for private water supplies, based on these classifications, is in place.

## Products and Processes in the Provision of Water Supplies

**3.5** A scheme for the statutory approval of substances, products and processes used in the provision of public water supplies is administered in Northern Ireland by the Inspectorate. The purpose of the scheme is to ensure that chemicals and construction materials do not cause any adverse effect on water quality. The Drinking Water Inspectorate for England and Wales operates the approval process on behalf of its Secretary of State.

**3.6** The Committee on Products and Processes advises on approval issues.

**3.7** A list of chemicals and materials, approved by the Secretary of State for England and Wales, is published annually by the Drinking Water Inspectorate for England and Wales. Regulation 24 of the Water Quality Regulations (Northern Ireland) 1994 endorses the use of the substances and products contained in this document and consequently, it is applicable in Northern Ireland. The list of all the currently approved products that may be used in public water supply can be accessed on the Drinking Water Inspectorate for England and Wales website:

<http://www.dwi.detr.gov.uk/regs/soslist>

## Quality Assurance

**3.8** The Regulations require water quality to be monitored using analytical systems which are capable of achieving and maintaining compliance with the appropriate quality criteria. These systems must have internal and external analytical quality control schemes in place and are subject to external inspection.

**3.9** Water Service routinely checks the performance of its laboratories by participating in external quality control schemes. These include the Water Research Centre's Aquacheck scheme. The Inspectorate audits external and internal analytical quality control systems and procedures as part of its inspection programme.

**3.10** Water Service is also implementing the requirements of the Drinking Water Testing Specification (DWTS). DWTS is an optional national scheme agreed between the Drinking Water Inspectorate for England and Wales, the Northern Ireland Drinking Water Inspectorate, the Scottish Office's Water Services Unit and the United Kingdom Accreditation Service (UKAS), for the accreditation of laboratories carrying out drinking water analyses. The accreditation, among other requirements, will demonstrate compliance with regulation 20 of the Water Quality Regulations (Northern Ireland) 1994

and regulation 19 of the Private Water Supplies Regulations (Northern Ireland) 1994.

## Consumer Complaints and Water Quality Incidents

**3.11** The Inspectorate's policy, on receiving a complaint on drinking water quality from a member of the public, is to log the complaint details and to refer the matter to Water Service for follow-up investigation and comment. The Inspectorate will inform the complainant when Water Service has been notified. In some instances, the local Environmental Health Officer may also be involved in the follow-up investigation. In 2000, the Inspectorate received 30 complaints.

**3.12** Where a water quality incident has occurred, Water Service is required to provide the Inspectorate with information, in accordance with agreed procedures. During 2000, 12 drinking water quality incidents and one event were brought to the attention of the Inspectorate (see Section 6 for further details).

## Contact with other Organizations

**3.13** The Inspectorate has regular contact with the Department of Health, Social Services and Public Safety (DHSSPS), the Environment and Planning Division of the Department of the Environment, and the Department of Agriculture and Rural Development. It represents Northern Ireland interests in the development of United Kingdom drinking water regulatory policy through liaison with the Drinking Water Inspectorate for England and Wales, the Water Services and Regulation Division of the Department of the Environment, Food and Rural Affairs (DEFRA) and the Scottish Office's Water Services Unit. The Inspectorate keeps itself informed of research being carried out by the Water Research Centre (WRC) and other organizations. This includes having representation on the DEFRA Water Distribution, Conservation and Quality Research Programme Committee (see Section 8 for details). Contact with Member

States of the European Union is made through a European Drinking Water Regulators' Forum.

- 3.14** The Inspectorate has regular contact with Environmental Health Officers in the district councils in connection with both private and public water supplies. Contact is also maintained with the General Consumer Council for Northern Ireland.
- 3.15** Meetings are also held with the Northern Ireland Water Council, which is a Statutory Advisory Council appointed to advise the DoE, DARD and Department of Culture, Arts and Leisure, on the promotion of conservation of water measures and the cleanliness of water in waterways and underground strata.
- 3.16** Medical advice is obtained from the Chief Medical Officer of the Northern Ireland Department of Health, Social Services and Public Safety. The Inspectorate liaises with the Chief Medical Officer and the Chief Environmental Health Officer (also of the DHSSPS) on relevant health related matters.
- 3.17** The Inspectorate has been in contact with researchers at the Department of Food Science, Queen's University of Belfast and has given advice on a project looking at paratuberculosis in water.

## DWI Information

- 3.18** To increase awareness of the water quality of private water supplies, the Inspectorate produced a leaflet '*Is Your PRIVATE Water Supply SAFE?*', which was widely circulated to owners through the Department of Agriculture for Northern Ireland\*, and the 26 district councils. During 2000, the Inspectorate presented papers and delivered lectures on a number of occasions to learned societies and public bodies.
- 3.19** Previous Inspectorate Annual Report publications include:
- Northern Ireland Drinking Water Quality 1999;
  - Northern Ireland Drinking Water Quality 1998;
  - Northern Ireland Drinking Water Quality 1997; and
  - Northern Ireland Drinking Water Quality 1996.
- 3.20** The 2000, 1999 and 1998 Northern Ireland Drinking Water Quality reports, together with general information about the Northern Ireland Drinking Water Inspectorate, is available on the website: <http://www.ehsni.gov.uk>

\* Under government reorganization, now the Department of Agriculture and Rural Development.

# THE TECHNICAL AUDIT

The Inspectorate's technical audit assesses compliance with the Regulations and consists of two main elements:

- the assessment of Water Service's analytical data on drinking water for compliance against regulatory standards; and
- an ongoing inspection programme which examines Water Service's policies and relevant procedures for sampling, analysis, reporting, water treatment and distribution.

This section details the compliance assessment process and outlines the results of the 2000 Inspection Programme. Section 5 details the results of the compliance assessment and gives an overview of drinking water quality in Northern Ireland.

The Inspectorate acknowledges the co-operation of Water Service staff in facilitating the technical audit process.

## General Compliance Assessment

- 4.1** Schedule 2 to the Regulations refers to the number of samples required to be taken for each parameter. In practice, each sample is tested for several parameters and, thus, the text and tables relate to the number of determinations made for each individual parameter rather than to the number of samples taken.
- 4.2** Compliance assessment for 2000 is shown in two ways: firstly, the total number of all determinations that fail to meet the regulatory standards; and secondly, water supply zone compliance (see Section 5 for further details).
- 4.3** The number of samples per annum specified in Schedule 2 to the Regulations is that required in the various situations to which the Schedule refers. For 2000, the Inspectorate has looked for full compliance with the required standard sampling frequencies for water supply zones, water treatment works and service reservoirs.
- 4.4** 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' will be used to represent the total coliform parameter. The detection of coliforms in a sample is indicative of potential contamination which must be investigated urgently. The presence of faecal coliforms in the same sample would strongly suggest that the contamination was of faecal origin.

- 4.5** Six parameters specified in the Regulations have no prescribed concentration or value (PCV) assigned to them. These are:

- total organic carbon;
- colony counts at 22°C;
- colony counts at 37°C;
- residual disinfectant;
- taste (qualitative); and
- odour (qualitative).

Although all have an assigned sampling frequency, the absence of a PCV means that it is not appropriate to include the number of their determinations in the overall total of compliance determinations carried out, when assessing compliance with water quality standards. These parameters are included in the standard sampling frequency compliance assessment.

- 4.6** The parameters alkalinity and total hardness have a PCV assigned to them only for water which is artificially softened (to reduce alkalinity and hardness). The PCV, in this case, is a minimum value which must be exceeded. These two parameters have an assigned sampling frequency but, because no softening of water supplied by Water Service takes place, these PCVs effectively do not apply. It is, therefore, not appropriate to include determinations for these two parameters when assessing compliance with water quality standards.
- 4.7** Sampling frequencies are not specified in the Regulations for 6 parameters which have PCVs:
- kjeldahl nitrogen;
  - dissolved or emulsified hydrocarbons;

- phenols;
- faecal streptococci;
- sulphite-reducing clostridia; and
- substances extractable in chloroform.

There is, therefore, no regulatory requirement to sample for these parameters.

- 4.8** The number of individual pesticides monitored by Water Service may vary from year to year. The monitoring strategy is based upon those pesticides understood to be used within catchment areas and which could reach water sources. During 2000, water samples were analysed for 40 individual pesticides. These included mecoprop and MCPA which are extensively used in agriculture. The monitoring programme also included atrazine and simazine which have been widely used in non-agricultural situations, although their use on non-crop land is no longer approved.
- 4.9** The total pesticides parameter is defined in the Regulations as the sum of the detected concentrations of individual substances. In practice, the detected concentrations of whatever pesticides are determined in a particular sample are summed and assessed against the prescribed concentration of 0.5 µg/l for total pesticides.

# ASSESSMENT OF WATER QUALITY

## Water Treatment Works

**4.10** Regulation 3(7) of the Water Quality Regulations (Northern Ireland) 1994 requires 100% compliance with water quality standards for coliforms and faecal coliforms at water treatment works. For 2000, the Inspectorate has generally regarded the detection of coliforms and faecal coliforms on a single occasion as a trivial contravention of the standards. All other contraventions were considered to be non-trivial and these have been formally notified to Water Service.

## Service Reservoirs

**4.11** Regulation 3(8) of the Water Quality Regulations (Northern Ireland) 1994 requires 95% of samples taken in the preceding 12 months from a service reservoir to be free from coliforms. For 2000, compliance was assessed on the basis of results of samples taken from each service reservoir in the 12 months of the calendar year. Non-trivial contraventions of the coliform standard at service reservoirs were formally notified to Water Service.

**4.12** The detection of one or two faecal coliforms in 100 ml of sample taken from a service reservoir on a single occasion has been regarded as a trivial contravention of the faecal coliforms standard. All other contraventions of this standard were formally notified to Water Service.

## Water Supply Zones

**4.13** Regulation 3 prescribes concentrations or values for 55 of the 57 parameters as listed in Tables A to E of Schedule 1 to the Water Quality Regulations (Northern Ireland) 1994, and also for trihalomethanes. In general, to be wholesome: water must not contain a parameter in excess of a PCV; total hardness and alkalinity must not be below prescribed values if the water is treated by softening or desalination; and in the case of hydrogen ion (pH), the pH value must be in a range defined by a maximum and minimum prescribed value.

**4.14** The Drinking Water Directive and regulation 4 of the Water Quality Regulations (Northern Ireland) 1994 permit standards to be relaxed in certain specified circumstances. The circumstances applying in Northern Ireland stem from the nature and structure of the ground from which the supplies are taken, as the composition of geological strata can affect background levels of substances occurring in water. The Drinking Water Directive and regulation 5 place certain restrictions on the relaxed standards, in particular, that public health shall not be put at risk. Regulation 5 also requires the specification of the extent to which the PCV for any parameter can be contravened. Following consultation with DHSSPS, relaxed standards are permitted in specified water supply zones in Northern Ireland for taste (quantitative), odour (quantitative), colour, aluminium and manganese. The number of water supply zones with permitted relaxations for 2000 are listed below.

## Relaxations in Water Supply Zones

Parameter	Number of Water Supply Zones with Relaxations
Colour	90
Manganese	98
Odour (quantitative)	80
Taste (quantitative)	80
Aluminium	34

**4.15** In assessing water quality in water supply zones, the Inspectorate has taken into account the existence of permitted relaxations. Thus, throughout the text and tables of this report, reference to contravention of a PCV means that, where a relaxation is in place, a concentration or value greater than the relaxed standard has occurred. Concentrations or values up to the relaxed concentration or value are not included in the number or percentage of PCV contraventions.

**4.16** The regulations prescribe standards for a wide range of parameters, of which only some have a health significance and their standards are generally set with a wide margin of safety. The other parameters are of aesthetic significance, with standards set well below the level at which water would become unacceptable to consumers, and contravention of these standards does not necessarily indicate that the water is unfit to drink.

**4.17** Contravention of a PCV, even for only one parameter and in only one sample out of the large number taken from each water supply zone in the course of the year, indicates that the water supplied at the time the sample was taken cannot be regarded as wholesome. That does not mean that the water was harmful to health or unfit for drinking, but it may mean, when considered in the light of other monitoring results, that the water quality needs improvement in order to meet the high standards specified in the Regulations.

**4.18** The general rule that any contravention of a PCV constitutes a breach of the Water Quality Regulations (Northern Ireland) 1994 and, thus, causes the water to be regarded as unwholesome, does not apply to some parameters specified in regulation 3. Water supply zones have only been regarded as non-compliant if:

- the average concentration for trihalomethanes in any three-month period has exceeded the concentration of 100 µg/l as prescribed in regulation 3(3)(e), (*trihalomethanes' refers to the sum of the concentrations of trichloromethane, dichlorobromomethane, dibromochloromethane and tribromomethane*);
- 20% or more sodium determinations carried out in the preceding 36 months exceeded the prescribed concentration of 150 mg/l specified in Table A and regulation 3(5);
- coliforms were detected in 5% or more of the samples taken in the 12 months

of the calendar year or, where less than 50 samples were taken in the 12 month period, the assessment will be made using the previous 50 samples; and

- in the case of Table D parameters which include benzo 3,4 pyrene, the average concentrations or values during the calendar year 2000 exceeded the prescribed concentrations or values.

**4.19** Where a contravention of the regulatory standard has been identified, the number and percentage of individual determinations in excess of the relevant numerical PCV are shown in Table 5.7 in Section 5. A water supply zone is assessed as being non-compliant if just one sample has not met the required standard. The percentage of non-compliant water supply zones for each parameter in contravention of the Regulations is also shown in Table 5.7.

**4.20** For 2000, the Inspectorate has generally regarded a contravention of a standard for an individual non-microbiological parameter on a single occasion in a water supply zone as trivial, provided that ten or more samples have been taken in that zone or, if a smaller number has been taken, provided that there was not a corresponding contravention in the previous calendar year. In other cases, the Inspectorate has taken into account the number of determinations carried out and the number and extent of the contraventions in deciding whether the contraventions were trivial or not. Water Service has been formally notified of all cases where the contraventions were regarded as non-trivial.

**4.21** For 2000, the Inspectorate assessed nitrite contraventions of the regulatory standard for triviality taking into consideration nitrite and nitrate prescribed values as formulated in the new Drinking Water Directive. Water supply zones were assessed as trivial if the nitrite value was <0.5 mg/l and if the calculated value was < or = 1. The formula is:

$$\frac{\text{Nitrate (mg/l)}}{50} + \frac{\text{Nitrite (mg/l)}}{3} < \text{or} = 1$$

**4.22** For 2000, the Inspectorate assessed total polycyclic aromatic hydrocarbons contraventions of the regulatory standards for triviality taking into consideration the new Drinking Water Directive's requirements. Water supply zones were assessed as trivial if the new standard, which is based on the sum of the following four substances: benzo 1.12 perylene, benzo 11.12 fluoranthene, indeno (1,2,3-cd) pyrene and benzo 3.4 fluoranthene, was  $\leq$  to 0.1  $\mu\text{g/l}$ .

**4.23** Taking into consideration the tighter lead standards in the new Drinking Water Directive, the Inspectorate has, for 2000, considered all exceedences of the 50  $\mu\text{g/l}$  standard as non-trivial contraventions.

**4.24** Where five or less faecal coliforms in 100 ml have been detected on a single occasion in a water supply zone, the contravention of the standard has been regarded as trivial. Where more than 100 samples have been taken, two contraventions of the standard have been regarded as trivial, provided that no more than two faecal coliforms in 100 ml were detected in either sample and there was no contravention of the standard in the previous calendar year. Contraventions of the coliform regulatory standard were regarded as non-trivial because compliance is assessed on a 95 percentile basis. All cases where contraventions of the standard for a microbiological parameter were regarded as non-trivial have been formally notified to Water Service.

# THE 2000 AND 2001 INSPECTION PROGRAMMES

## 2000 Inspection Programme

**4.25** In 2000, the inspection programme was based on the following topics:

- detailed audit of the continuous monitoring process for *Cryptosporidium* at a selected site, including an audit at a water quality laboratory;
- detailed audit of a selected water treatment plant;
- review of *Cryptosporidium* risk assessment and monitoring practices;
- monitoring of general progress on the recommendations of the Group of Experts contained in the Second\* and Third\*\* Reports, *Cryptosporidium in Water Supplies*; and
- progress on agreed follow-up action as a result of the 1998 and 1999 Inspection Programmes.

**4.26** During May and June 2000, the Drinking Water Inspectorate carried out inspections at Lisnabreeny Service Reservoir, Westland House Laboratory and Lough Island Reavy Water Treatment Works.

**4.27** On completion of the inspections, conclusions, opinions and recommendations were reported to Water Service. The recommendations require a written response from Water Service, and an agreed action plan is produced.

**4.28** The reports and their conclusions, opinions and recommendations are, of necessity, based on the audit and inspection of a small selection of records, documents and locations. Any statements of satisfaction therefore represent the inspectors' opinions at the time, based on the information available to and inspected by them, and do

not constitute a general endorsement of the adequacy of Water Service's procedures and practices. The main findings of these inspections are summarized in paragraphs 4.29 to 4.42.

## Lisnabreeny Service Reservoir

**4.29** An inspection of the continuous monitoring for *Cryptosporidium* at Lisnabreeny Service Reservoir was carried out on 10 May 2000. An inspection of the laboratory procedures for *Cryptosporidium* was also undertaken at Westland House Laboratory.

The objective of the inspection process was to assess the various arrangements and procedures for *Cryptosporidium* sampling, transportation, analysis and reporting.

As a result of the inspection, the Inspectorate made ten recommendations considered necessary to consolidate procedures. The recommendations were conveyed to Water Service for formal response. Water Service has agreed to take action on all of the recommendations.

## Lough Island Reavy Water Treatment Works

**4.30** An inspection of Lough Island Reavy Water Treatment works was carried out on 2 August 2000. The overall objective was to check the efficiency of a new ultra fine mechanical filtration process which had been recently installed at the treatment works for the control of *Cryptosporidium* oocysts.

As a result of the inspection, the Inspectorate made nine recommendations to consolidate operating practices. The recommendations were conveyed to Water Service for formal response. One recommendation has been implemented; the remaining eight recommendations are still under consideration by Water Service.

\* Reference - Badenoch J (1995) *Cryptosporidium in Water Supplies - Second Report of the Group of Experts*, Department of the Environment, Department of Health, London, UK, HMSO. (ISBN 0 11 753136 7.)

\*\* Reference - Bouchier I (1998) *Cryptosporidium in Water Supplies - Third Report of the Group of Experts*, Department of the Environment, Department of Health, London, UK, HMSO. (ISBN 1 85112 131 5.)

## 2001 Inspection Programme

**4.31** The 2001 Inspection Programme, which includes the following topics, has commenced:

- detailed audit of a water quality laboratory for *Cryptosporidium* analysis and reporting;
- ongoing review of *Cryptosporidium* risk assessment and monitoring practices;
- audit of a selected analytical water quality laboratory; and
- progress on agreed follow-up action as a result of the 1998-2000 Inspection Programmes.

**4.32** During March and April 2001, inspections were carried out on behalf of the Inspectorate, at Altnagelvin Laboratory and Westland House Laboratory (both Water Service laboratories used to monitor public water supplies) and at Newforge Laboratory (a Department of Agriculture and Rural Development Laboratory utilized by the Inspectorate, to monitor private water supplies on dairy farms).

**4.33** On completion of the inspection programme, conclusions, opinions and recommendations were reported to the respective authorities and are being followed up.

### Altnagelvin Laboratory

**4.34** An initial joint assessment of Altnagelvin Laboratory was carried out by the Northern Ireland Inspectorate and the Drinking Water Inspectorate for England and Wales. This was followed up by a detailed inspection undertaken by the Drinking Water Inspectorate (E&W) during March 2001. The overall objective was to carry out a further assessment for accreditation purposes, of the monitoring methods in place for *Cryptosporidium* analysis. The following topics were included in the assessment:

- sample protocols;
- laboratory analysis;
- analytical quality control procedures;
- reporting procedures; and
- procedures and analysis audit trail.

As a result of the inspection of the protocols and the analytical procedures, the Inspectorate endorses the approval given by the Drinking Water Inspectorate for England and Wales for *Cryptosporidium* analysis.

### Westland House Laboratory

**4.35** The United Kingdom Accreditation Service (UKAS) carried out an inspection of Westland House Laboratory during April 2001. The overall objective was to carry out an inspection to assess if the requirements of the Drinking Water Testing Specification (paragraph 3.10 refers) were being met. The process is ongoing.

### Newforge Laboratory

**4.36** The United Kingdom Accreditation Service carried out an inspection of Newforge Laboratory during 2001. The overall objective was to carry out an inspection to assess if the requirements of the Drinking Water Testing Specification were being met.

As a result of the inspection of the analytical quality control procedures, the Inspectorate endorses the approval given by UKAS.

### *Cryptosporidium* Risk Assessment and Monitoring

**4.37** As part of the ongoing inspection programme, the Inspectorate, in co-operation with Water Service, continues to review the *Cryptosporidium* risk assessments at water treatment works. The overall objective is to use the results of the risk assessments to develop the annual *Cryptosporidium* sampling programme.

**4.38** Following the introduction of Draft Protocols for the Monitoring of *Cryptosporidium* in Treated Water Supplies in Northern Ireland in December 1999, the administrative

arrangements were reviewed by the Inspectorate through liaison with Water Service and the health authorities. A revised Guidance Document was issued by the Inspectorate in March 2001. Further work and discussions will continue, and are being progressed through the Drinking Water Liaison Group, which takes representation from the Inspectorate, Water Service and the health authorities.

### Dunore Point Water Treatment Works

**4.39** Following the outbreak of Cryptosporidiosis in April 2001, in water supply areas served by Dunore Point Water Treatment Works, the Inspectorate was involved in a detailed post incident analysis review. The inquiry team had membership from Queen's University Belfast, the Inspectorate and Water Service. This review focused on investigations which aimed to identify measures which could be taken to endeavour to prevent recurrence of contamination at this and other water treatment works.

### Follow-up to the 1998 Inspection Programme

**4.40** Follow-up action resulting from the 1998 Inspection Programme has been completed.

### Follow-up to the 1999 Inspection Programme

**4.41** Follow-up action resulting from the 1999 Inspection Programme is as follows:

- Forked Bridge Water Treatment Works - ongoing;
- Marlborough House Laboratory - completed;
- Ladyhill Service Reservoir - completed; and
- Teebane West Service Reservoir - completed.

### Follow-up to the 2000 Inspection Programme

**4.42** Follow-up action resulting from the 2000 Inspection Programme is outlined below:

- Lisnabreeny Service Reservoir - completed;
- Lough Island Reavy Water Treatment Works - ongoing;
- *Cryptosporidium* risk assessment review - ongoing; and
- Progress on the implementation of the recommendations of the *Cryptosporidium* in Water Supplies Reports<sup>\*/\*\*</sup> - ongoing.

\* Reference - Badenoch J (1995) *Cryptosporidium in Water Supplies - Second Report of the Group of Experts*, Department of the Environment, Department of Health, London, UK, HMSO. (ISBN 0 11 753136 7.)

\*\* Reference - Bouchier I (1998) *Cryptosporidium in Water Supplies - Third Report of the Group of Experts*, Department of the Environment, Department of Health, London, UK, HMSO. (ISBN 1 85112 131 5.)

# OVERVIEW OF DRINKING WATER QUALITY IN NORTHERN IRELAND IN 2000

## Introduction

In 2000, Water Service supplied on average 680 million litres/day of water to 98.5% of Northern Ireland's population of approximately 1.69 million people. These water supplies are mostly derived from surface water (92%), with the remainder being groundwater sources. Water from all these sources is treated and distributed through 22,250 km of watermains. Regulatory compliance monitoring is carried out at 63 water treatment works, 372 service reservoirs and 103 water supply zones (Tables 5.1-5.3 refer). The majority of the service reservoir sampling points correspond to single reservoir sites, although some have more than one reservoir on site.

In 2000, there were 103 water supply zones in Northern Ireland which were categorized for monitoring purposes depending on the size of the population served. As Water Service upgrades and develops its infrastructure, and rural supply zones are rationalized by developing regional schemes, the number of water supply zones may change from year to year; in 1999, there were 104 water supply zones; in 1998, there were 106 water supply zones; in 1997, there were 108 water supply zones.

**Table 5.1: Water Treatment Works Volume Categories**

Water Treatment Works		Volume Distributed from Works (m <sup>3</sup> /d) Categories
Number	Percentage	
23	36.5	<3,000
24	38.1	3,000 - 12,000
16	25.4	>12,000

**Table 5.2: Service Reservoir Capacity Categories**

Service Reservoirs		Capacity of Reservoirs (m <sup>3</sup> ) Categories
Number	Percentage	
208	55.9	<2000
125	33.6	2,000 - 10,000
39	10.5	>10,000

**Table 5.3: Water Supply Zone Population Categories**

Water Supply Zones		Population Category
Number	Percentage	
23	22.3	<5,000
32	31.1	5,000 - 20,000
48	46.6	20,000 - 50,000

A water supply zone is a designated geographical area with a population of no more than 50,000, supplied with water from one water treatment works or blended water from several works. Samples are routinely collected from consumers' taps for analysis as part of the regulatory compliance requirements.

## COMPARISON OF WATER QUALITY

**5.1** The tables included in this section (Tables 5.4-5.8 refer) provide summary information on water quality, and relevant comparisons are made with water quality in previous years. When comparing annual compliance information, there may be factors which account wholly, or in part, for a particular difference and this must be considered before drawing any conclusions about possible differences in water quality. These factors include:

- adoption of increased sampling frequencies as a result of contraventions for a particular parameter;
- modifications to the pesticide monitoring strategy in the light of reassessment of pesticide usage within the water catchments (see paragraph 4.8);
- changes in the sampling programme due to the annual review of the delineation of water supply zones; and

- improvements in analytical systems which may have reduced or eliminated the possible contribution to earlier data of results of uncertain accuracy.

In 2000, the number of determinations carried out for individual pesticides has increased by over 2,500 on the number carried out in 1998. This should be taken into consideration when making direct comparisons for pesticides and overall physical/chemical quality between the respective years.

Any or all of these factors may result in an observed difference in the number or percentage of determinations showing contravention of the PCV for a particular parameter being largely a consequence of the sampling programme, rather than indicative of any underlying difference in water quality.

**5.2** However, using the number of zones showing non-compliance with the PCV for a particular parameter, comparison between the five years is rather less affected by the factors set out in the previous paragraph.

**Table 5.4: Summary of Overall Water Quality**

	2000	1999	1998	1997	1996
<b>Water Treatment Works</b>					
Total number of determinations	18,522	19,360	19,648	20,224	19,832
- number exceeding PCV	32	28	44	60	60
- % exceeding PCV	0.17	0.14	0.22	0.30	0.30
<b>Service Reservoirs</b>					
Total number of determinations	37,314	38,044	37,972	37,973	38,708
- number exceeding PCV	193	109	150	207	245
- % exceeding PCV	0.52	0.29	0.40	0.55	0.63
<b>Water Supply Zones</b>					
Total number of determinations	54,406	53,826	50,802	49,551	48,519
- number exceeding PCV	979	1,033	1,038	930	879
- % exceeding PCV	1.80	1.92	2.04	1.88	1.81
<b>All Samples</b>					
Total number of determinations	110,242	111,230	108,422	107,748	107,059
- number exceeding PCV	1,204	1,170	1,232	1,197	1,184
- % exceeding PCV	1.09	1.05	1.14	1.11	1.11

## Overall Water Quality

**5.3** The level of compliance is shown in two ways. The first, and best overall measure, because it takes into account all the results for the calendar year, is the total of all determinations that meet the regulatory standards. During 2000, a total of 110,242 reported determinations were carried out at water treatment works, service reservoirs and consumers' taps (Table 5.4 refers). Of these determinations, 98.91% complied with the relevant water quality standards. These results confirm that, overall, the water supplied is of good quality. This overall water

quality figure shows a small decrease in the compliance rate for 2000 when compared to the compliance figure of 98.95% reported during 1999, and, in addition, the overall microbiological compliance rate decreased to 99.61% from the 99.75% compliance figure reported for 1999 (Figure 4 refers). This decrease is due to an increase in the number of microbiological non-compliances for service reservoirs in 2000 (0.52%) compared to 1999 (0.29%). The compliance rate for the key microbiological parameters for samples taken at consumers' taps was maintained at 99.66%; the comparable figure for 1999 was 99.67%.

While the overall number of physical/chemical reported exceedences shows an improvement for 2000, with a compliance figure of 97.81% when compared to the 97.66% figure for 1999, there continues to be poorer performance rates for certain chemical parameters. These are notably trihalomethanes, lead, iron and aluminium.

**5.4** The second measure which is used to check water quality is water supply zone compliance. A water supply zone is assessed as being non-compliant if just one sample has not met the required standard. Comparable figures with previous compliance assessments are given in Tables 5.4 to 5.8 and Figures 4 to 16.

**5.5** During 2000, the level of compliance was assessed for 103 water supply zones which were routinely monitored for 87 individual determinations. The regulatory requirements were not met for 14 of these parameters (two microbiological and 12 physical/chemical). As with previous reports, the non-compliances continue to relate largely to trihalomethanes, iron, aluminium and lead. The percentage of non-compliant zones for the following 19 key parameters is shown in Table 5.7.

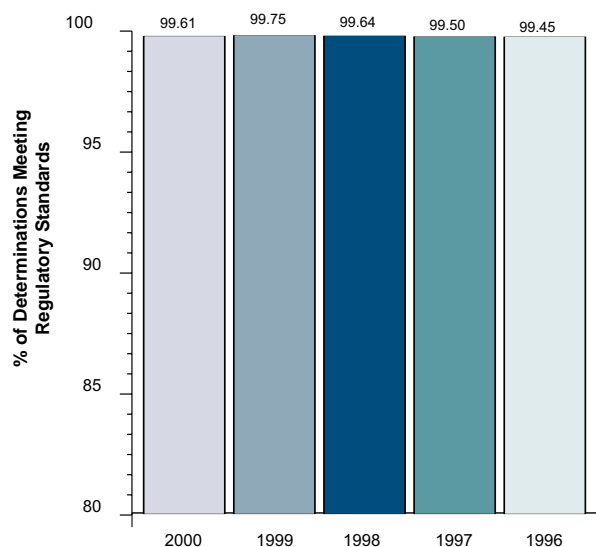
- Coliforms
- Faecal Coliforms
- Colour
- Turbidity
- Odour (quantitative)
- Taste (quantitative)
- Hydrogen ion
- Nitrate
- Aluminium
- Iron
- Manganese
- Lead
- PAH (total)
- Trihalomethanes
- Total pesticides
- Atrazine
- MCPA
- Mecoprop
- Other pesticides

**5.6** Where the regulatory standards have been exceeded, agreed procedures exist for the reporting of exceedences to the Health and Social Services Boards.

**5.7** The compliance figure for all microbiological samples shows a decrease in the level of compliance in 2000; 99.61% of 67,454 determinations meet the required standards,

when compared to the 99.75% reported for 1999. The comparable figures for previous years are given in Figure 4. During 2000, the compliance rate at consumers' taps for the important microbiological parameters has been maintained at 99.66% (99.67% in 1999). Compliance rates at water treatment works have also been maintained at 99.83% (99.88% in 1999) for overall microbiological quality. An increase, however, in the number of non-compliances has been reported for service reservoirs (0.52% in 2000, 0.29% in 1999).

**Figure 4: Overall Microbiological Quality**



**5.8** While good overall microbiological quality of water at consumers' taps has been maintained for 2000, it may, at the same time, have contributed to the continuing high failure rate for trihalomethanes. For 2000, as in the previous four years, trihalomethanes continue to be the parameter with the highest non-compliance rate of the regulatory standard. Water Service has taken measures to improve the disinfection of water supplies, and it needs to continue to take steps to bring about compliance with the trihalomethane standard. It is also paramount that in doing so, the microbiological quality of drinking water should not be compromised.

**5.9** During 2000, out of a total of 110,242 determinations carried out at water treatment works, service reservoirs and water supply zones, 1,204 determinations contravened the standards. Depending on the magnitude or duration of the contravention, each has been assessed as being trivial or non-trivial. Formal notifications for non-trivial contraventions were notified to Water Service for the following nine parameters: total coliforms, faecal coliforms, trihalomethanes, iron, aluminium, lead, MCPA, turbidity and ammonium. Water Service is dealing with contraventions by follow-up action in each individual case and by a major capital works programme, targeted at water treatment works and the distribution system.

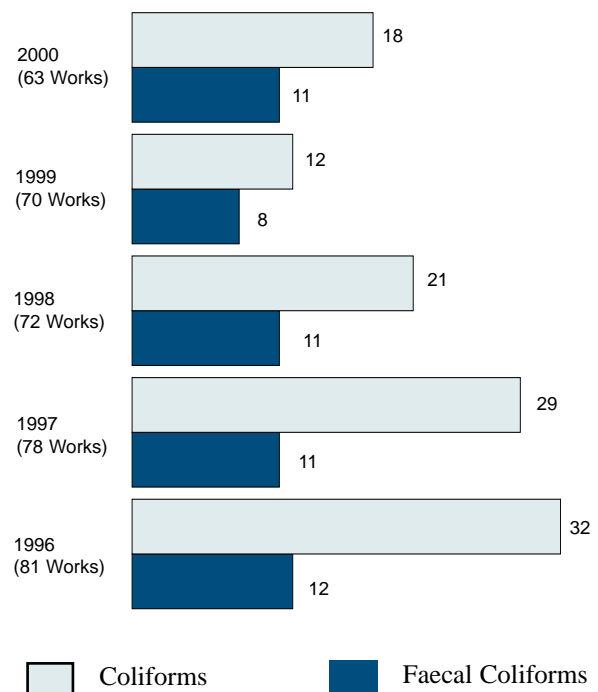
### Microbiological Quality of Water Leaving Water Treatment Works

**5.10** Summary results for water treatment works are given in Tables 5.4 and 5.5. These indicate that the overall microbiological quality has been maintained for 2000 with a compliance rate of 99.83%. The results show that, in respect of the number of determinations at water treatment works in 2000, 99.77% and 99.88% complied with the regulatory standards for coliforms and faecal coliforms respectively. The number of works not complying with the coliform standard reported an increase from 12 in 1999 to 18 in 2000 (Figure 5 refers). During 2000, contraventions for faecal coliforms were detected at 11 water treatment works, of

which, four were considered non-trivial. The coliform standard was contravened at 18 water treatment works, seven of those being considered non-trivial.

All non-trivial contraventions of the faecal coliform and coliform standards have been formally notified to Water Service. All contraventions of microbiological standards at water treatment works are followed up urgently, and remedial action taken by Water Service as a matter of policy.

**Figure 5: Number of Water Treatment Works Not Complying With Standards**



**Table 5.5: Microbiological Quality of Water Leaving Water Treatment Works**

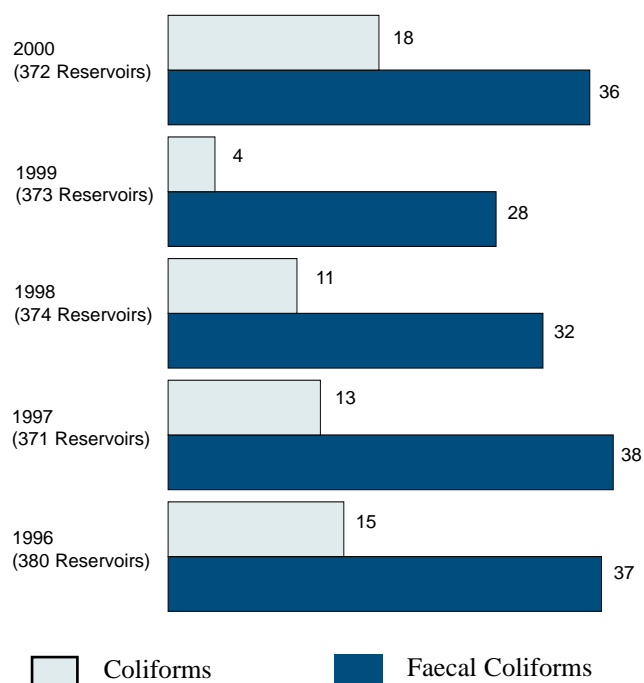
	2000	1999	1998	1997	1996
<b>Coliforms</b>					
Total number of determinations	9,261	9,680	9,824	10,112	9,916
- number of determinations containing coliforms	21	18	28	48	46
- % containing coliforms	0.23	0.19	0.29	0.47	0.46
Treatment works with coliforms detected	18	12	21	29	32
<b>Faecal Coliforms</b>					
Total number of determinations	9,261	9,680	9,824	10,112	9,916
- number of determinations containing faecal coliforms	11	10	16	12	14
- % containing faecal coliforms	0.12	0.10	0.16	0.12	0.14
Treatment works with faecal coliforms detected	11	8	11	11	12
<b>Number of Water Treatment Works</b>	<b>63</b>	<b>70</b>	<b>72</b>	<b>78</b>	<b>81</b>

### Microbiological Quality of Water in Service Reservoirs

**5.11** Summary results for service reservoirs are given in Tables 5.4 and 5.6. These results indicate a deterioration in the water quality at service reservoirs compared to that reported for 1999, with an increase in the number of microbiological non-compliances from 0.29% in 1999 to 0.52% in 2000. The number of service reservoirs not complying with the microbiological standards also reported an increase in 2000 (Figure 6 refers).

The Inspectorate notes that while Water Service needs to continue to take steps to bring about compliance with the THM standard, maintenance of microbiological quality is paramount and should not be compromised.

**Figure 6: Number of Service Reservoirs Not Complying With Standards**



**Table 5.6: Microbiological Quality of Water in Service Reservoirs**

	2000	1999	1998	1997	1996
<b>Coliforms</b>					
Total number of determinations	18,657	19,022	18,986	18,987	19,354
- number of determinations containing coliforms	147	79	114	164	199
- % containing coliforms	0.79	0.42	0.60	0.86	1.03
Service reservoirs with coliforms detected in more than 5% of samples	18	4	11	13	15
<b>Faecal Coliforms</b>					
Total number of determinations	18,657	19,022	18,986	18,986	19,354
- number of determinations containing faecal coliforms	46	30	36	43	46
- % containing faecal coliforms	0.25	0.16	0.19	0.23	0.24
Service reservoirs with faecal coliforms detected	36	28	32	38	37
<b>Number of Service Reservoirs</b>	<b>372</b>	<b>373</b>	<b>374</b>	<b>371</b>	<b>380</b>

**5.12** Of the 18,657 determinations in samples taken at service reservoirs in 2000, 99.21% were free from coliforms. Coliforms were detected in at least one sample collected during the year at 90 service reservoirs. However, the Regulations are only contravened at a service reservoir if more than 5% of the samples taken during the year contain coliforms. On this basis, 18 service reservoirs contravened the coliform standard (Figure 6 refers); these contraventions have been considered non-trivial and have been formally notified to Water Service.

**5.13** Of the 18,657 determinations carried out for faecal coliforms in samples taken at service reservoirs during 2000, 99.75% met the regulatory requirements. Faecal coliforms were detected in at least one sample at 36 service reservoirs. Contraventions of the faecal coliform standard were considered

trivial for 18 of these service reservoirs. Non-trivial contraventions of the faecal coliform standard at 18 service reservoirs have been formally notified to Water Service.

**5.14** All contraventions of microbiological standards at service reservoirs are followed up urgently, and remedial action taken by Water Service as a matter of policy. Water Service also has an ongoing programme of service reservoir inspection which includes addressing the problem of possible groundwater and/or surface water ingress.

### Water Quality in Water Supply Zones

**5.15** Table 5.7 gives a summary of water quality for the 19 key parameters which are significant in Northern Ireland. All other parameters, with the exception of pesticides, have been taken together in the penultimate item of the table under the parameter

description 'Other parameters'. Only those parameters which have numerical standards are included under this heading (see paragraphs 4.5 and 4.6). Table 5.7 includes comparable figures for 1999 and 1998. It also outlines:

- the total number of reported determinations for parameters having a PCV;
- the number of determinations and the percentage of the total number of determinations which contravened the numerical PCV, or the concentration or value to which the PCV is permitted to be relaxed under regulation 4 (see paragraphs 4.14 and 4.15); and
- percentage compliance of water supply zones, including non-trivial contraventions.

**5.16** For some parameters, exceedences of the numerical value for the PCV, recorded when considering individual determinations, need

not necessarily constitute a contravention of the Water Quality Regulations (Northern Ireland) 1994 when assessing compliance for water supply zones (see paragraphs 4.18 and 4.19). In Table 5.7, these circumstances apply to coliforms, trihalomethanes and benzo 3,4 pyrene. (Benzo 3,4 pyrene is included under other parameters.)

**5.17** When considering non-compliant zones, it needs to be remembered that a single marginal contravention for a parameter may have caused the water supply zone to become non-compliant (see paragraph 4.17). Such contraventions have been included with those regarded as trivial in the compliance assessment (see paragraphs 4.20 to 4.23). A fuller discussion, parameter by parameter, is given in paragraphs 5.19 to 5.70.

**5.18** Depending on the magnitude or duration of the contravention, the Inspectorate has assessed each one as being trivial or non-trivial for each water supply zone. The results of the compliance assessment are summarized in Table 5.7.

**Table 5.7: Water Quality in Water Supply Zones, 2000**

Parameter	Determinations in 2000			Determinations in 1999		Zones in 2000	Zones in 1999	Zones in 1998
	Total No.	Exceeding PCV or Relaxed PCV		Total No.	% Exceeding PCV or Relaxed PCV	% Exceeding PCV or Relaxed PCV	% Exceeding PCV or Relaxed PCV	% Exceeding PCV or Relaxed PCV
		No.	%					
Coliforms	5,809	30	0.52	5,605	0.54	0.97	2.88	5.66
Faecal coliforms	5,809	10	0.17	5,605	0.12	9.71	6.73	10.38
Colour	840	1	0.12	856	0.12	0.97	0.96	0.00
Turbidity	1024	3	0.29	974	0.82	2.91	6.73	0.00
Odour (quantitative)	776	0	0.00	802	0.12	0.00	0.96	0.00
Taste (quantitative)	776	0	0.00	800	0.13	0.00	0.96	0.00
Hydrogen ion	3,374	3	0.09	3,430	0.47	2.91	8.65	9.43
Nitrate	732	0	0.00	777	0.00	0.00	0.00	0.94
Aluminium	1,582	63	3.98	1,658	6.15	19.42	22.12	21.70
Iron	2,326	94	4.04	2,371	5.57	34.95	50.96	34.91
Manganese	935	0	0.00	957	0.10	0.00	0.96	0.94
Lead	827	26	3.14	878	7.97	14.56	21.15	18.87
PAH (total)	570	14	2.46	679	1.47	9.71	6.73	8.49
Trihalomethanes	1,265	701	55.42	1,181	51.74	64.08	75.00	71.70
Total pesticides	413	0	0.00	417	0.24	0.00	0.96	0.00
Atrazine	420	0	0.00	437	0.23	0.00	0.96	0.00
MCPA	463	8	1.73	523	1.72	3.88	4.81	5.66
Mecoprop	443	1	0.23	515	0.19	0.97	0.96	2.83
Other pesticides	15,271	0	0.00	14,961	0.03	0.00	4.81	0.94
Other parameters	10,751	25	0.23	10,400	0.25	9.71	10.58	10.38
<b>Total</b>	<b>54,406</b>	<b>979</b>	<b>1.80</b>	<b>53,826</b>	<b>1.92</b>	<b>No. of Water Supply Zones</b>		<b>106</b>
						<b>103</b>	<b>104</b>	

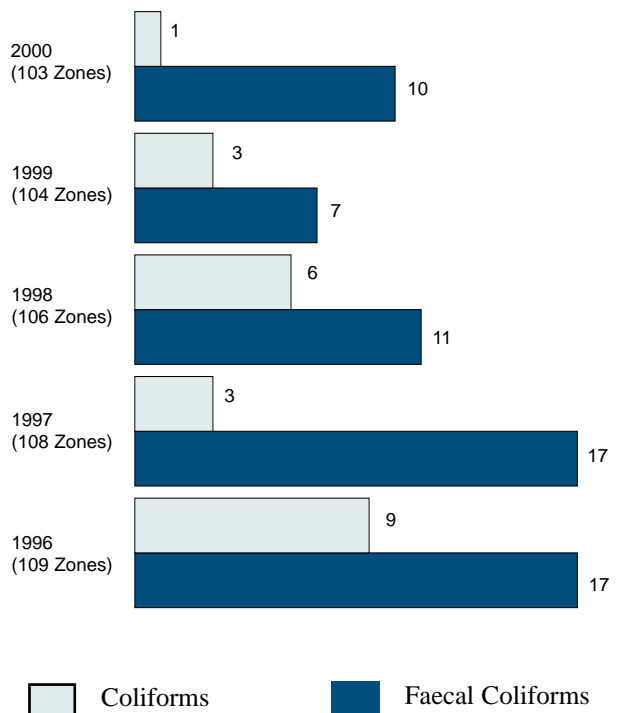
## Microbiological Quality in Water Supply Zones

**5.19** Of the 5,809 determinations for faecal coliforms carried out in water supply zones during 2000, 99.83% met the regulatory standards. A total of ten zones were non-compliant for faecal coliforms in respect of the Regulations (Figure 7 refers). Contraventions in three of these water supply zones were regarded as non-trivial.

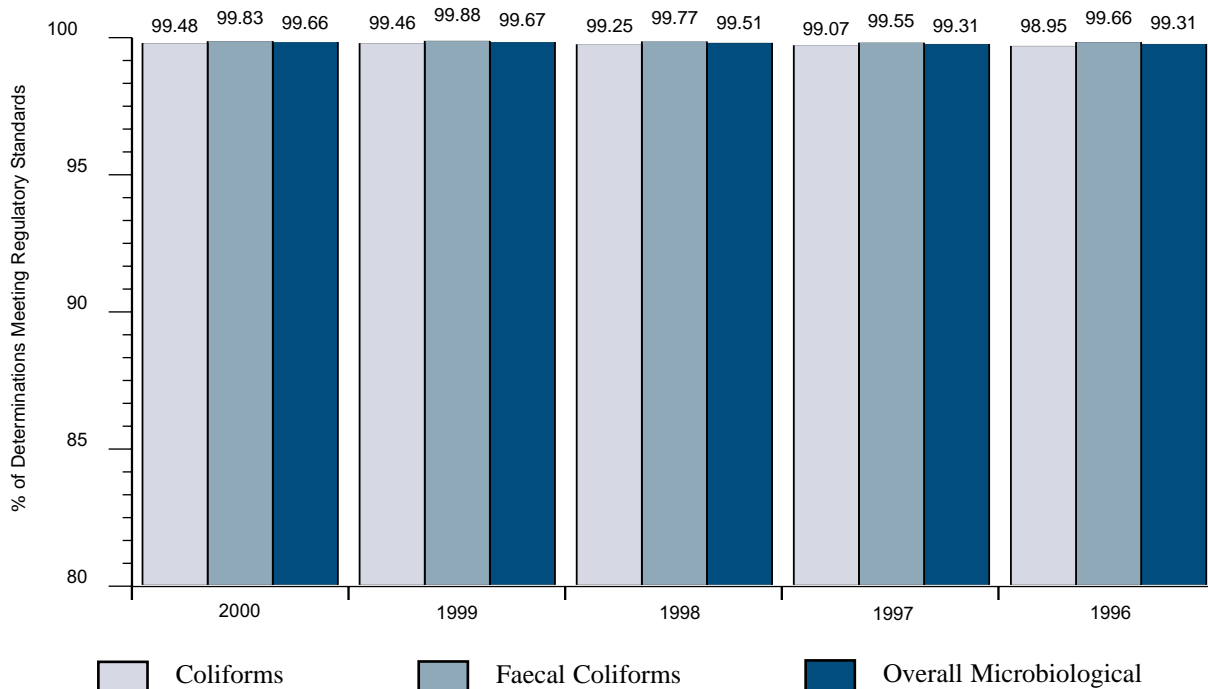
For coliform determinations in water supply zones, 99.48% complied with the numerical standard for the PCV in Table C of Schedule 1 to the Water Quality Regulations (Northern Ireland) 1994. Coliforms were detected in at least one sample collected during the year in 22 water supply zones. However, the Regulations are only contravened in a water supply zone if more than 5% of samples taken contain coliforms (see paragraph 4.18). On this basis, one water supply zone contravened the coliform standard. Taking the two key microbiological parameters together, the overall compliance rate with the numerical standards for determinations at consumers' taps reported for 2000 was 99.66% (Figure 8 refers); comparable to the 99.67% figure reported for 1999.

The non-trivial contraventions of the faecal coliform standard in three water supply zones, and the one water supply zone with a non-trivial contravention of the coliform standard have been formally notified to Water Service.

**Figure 7: Number of Zones Not Complying With Microbiological Regulatory Standards**



**Figure 8: Microbiological Determinations Meeting Regulatory Standards in Water Supply Zones**



**5.20** Regulation 11(2) requires that at least 50% of samples taken from water supply zones for monitoring compliance with the key microbiological parameters be taken from randomly selected consumers' taps. Water Service collects all samples for microbiological testing from such taps. Contraventions of the standards in samples taken from consumers' taps can be caused solely by the condition of the consumer's plumbing; this means that the information in

Table 5.7 need not necessarily reflect the microbiological quality of the water supplied. Contraventions of microbiological standards are not necessarily a risk to human health, but indicate a potential risk. All microbiological contraventions in water supply zones, as with those at water treatment works and service reservoirs, are followed up urgently, and remedial action initiated by Water Service as a matter of policy.

## Trihalomethanes (THM)

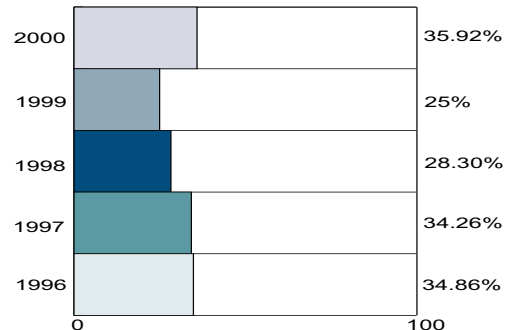
**5.21** Drinking water in Northern Ireland is predominantly obtained from surface waters, which are likely to contain naturally occurring organic materials. The leaching of this organic content into water supplies is affected by seasonal variations in the climate. Trihalomethanes are by-products of the reaction between chlorine, which is used to disinfect the water and make it microbiologically safe, and these naturally occurring organic materials. Water treatment is necessary to remove the organic material prior to disinfection.

**5.22** There is no maximum admissible standard for trihalomethanes in the Drinking Water Directive but the Regulations set a standard for trihalomethanes of 100 µg/l as an average over a three-month period for the sum of four specified trihalomethanes (see paragraph 4.18).

**5.23** In 2000, the number of determinations exceeding the numerical standard for trihalomethanes (100 microgrammes per litre) remains high at 55.42%, with 35.92% of water supply zones complying with the regulatory standard. Trihalomethanes, as in previous years remains the parameter with the lowest reported compliance rate (Figure 9 refers). The new Drinking Water Directive, which comes into force at the end of 2003, sets an interim standard for trihalomethanes of 150 µg/l (see paragraph 5.82 and Table 5.8). In the interim, trihalomethane compliance will continue to be reported against the current regulatory standard, but it can be noted that the 2000 compliance rate for trihalomethanes against the 150 µg/l standard would be 85.22%, with 44.66% of water supply zones complying with the standard.

**5.24** In 2000, the regulatory standard was contravened in 66 (64.08%) water supply zones. Contraventions in all of these zones were assessed as non-trivial and formally notified to Water Service. An improved compliance rate for water supply zones is reported for 2000 (Figure 9 refers) when compared to previous years.

**Figure 9: Water Supply Zones Complying with THM Standard**



**5.25** The maintenance of compliance rates reported in the microbiological quality of water supplies (see paragraph 5.7) may, at the same time, have contributed to the continuing high failure rate for trihalomethanes. While Water Service has taken measures to reassess the disinfection of water supplies in an effort to bring about improved compliance with the trihalomethane standard, it is important that microbiological quality should not be compromised (see paragraph 5.11).

**5.26** Government guidance encourages that action be taken to reduce trihalomethane concentrations, but only if this can be achieved without prejudicing microbiological quality, which is considered much more important. The World Health Organization has guideline values for trihalomethanes at higher levels than the regulatory standard, and also stresses that primary consideration should be given to ensuring that disinfection is never compromised.

**5.27** Water Service's policy is to give priority to the maintenance of microbiological quality in water. Its major water treatment capital works programme is designed to reduce organic material prior to chlorination and, thereby, reduce trihalomethane levels. Water Service is also assessing the potential for wider use of monochloramine as an alternative disinfectant. In the interim, Water Service continues to review operational procedures, with the aim of reducing trihalomethane levels in the distribution system, while maintaining microbiological quality. Improved compliance is expected as

improvements to water treatment works and distribution systems are completed.

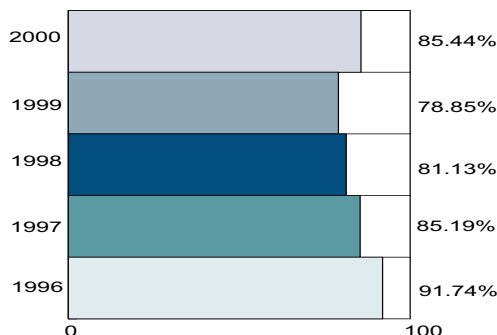
## Lead

**5.28** In 2000, the regulatory standard for lead was contravened in 15 (14.56%) water supply zones. In light of the tighter lead standards in the new Drinking Water Directive, all 15 zones were assessed as having non-trivial contraventions of the regulatory standard for lead and these have been formally notified to Water Service.

**5.29** Continued targeted planned investment is necessary to improve regulatory compliance with the lead standard.

**5.30** Water Service has undertaken a more detailed investigative programme to identify water supply zones where there is a significant risk that the lead standard may be exceeded. In addition, Water Service is identifying water supply zones where there is a significant risk that future, more stringent lead standards may be exceeded. A pilot project, designed to minimize the solubility of lead, has been implemented using phosphate dosing in one water supply zone to enable optimum operating conditions to be determined. Water Service proposes to extend this treatment during autumn 2001 at selected water treatment plants to facilitate compliance with the existing 50 µg/l standard and the new interim standard of 25 µg/l.

**Figure 10: Water Supply Zones Complying with Lead Standard**



**5.31** In considering contraventions of the lead standard, it is particularly important to bear in mind that the nature and condition of the pipework at sampling locations will greatly influence the results obtained. Water leaving treatment works and in the distribution systems is essentially lead free. If lead is detected at a consumer's tap, it is caused by the action of water on existing lead service piping between the watermains and the tap. Whether or not the lead standard is contravened at a particular tap depends on a number of factors, an important one being the plumbosolvency (the tendency for lead to dissolve in water) of the water. Water Service has an ongoing programme of pH adjustment to reduce plumbosolvency (see paragraph 5.51).

**5.32** In individual cases where samples have exceeded the regulatory standard for lead, Water Service will take follow-up samples and give the consumer appropriate advice as a matter of policy. Water Service has a general ongoing programme of replacement of its part of lead service pipes, which is carried out during mains rehabilitation. Water Service will also replace, free of charge, any

of its pipes which may be made of lead in the supply to a property, but only when a written request is received from a consumer who has replaced the portion of lead service pipe for which the householder is responsible.

## Aluminium

**5.33** Aluminium is naturally occurring in many water sources, particularly those derived from upland areas. Aluminium compounds are used as an important part of the processes in the treatment and purification of water, including the removal of harmful organisms. In addition to this primary role, aluminium-based water treatment removes naturally occurring aluminium from water.

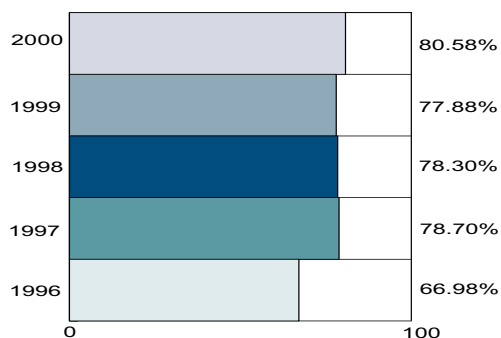
**5.34** The regulatory standard for aluminium is based on aesthetic considerations because high concentrations in water may cause discoloration. Water supply zones served from the Silent Valley source in the Mournes have, due to the nature and structure of the ground, naturally occurring aluminium in their water supplies.

There are permitted relaxations of the aluminium standard in these water supply zones (see paragraph 4.14). There are no other relaxations for aluminium in Northern Ireland, irrespective of whether aluminium is present in the raw water source or not, since aluminium-based water treatment is usually in place if required. The compliance assessment takes permitted relaxations into account (see paragraph 4.15).

**5.35** In 2000, the number of determinations exceeding the aluminum standards showed a decrease in the number of non-compliances from 6.15% in 1999, to 3.98% in 2000. Contraventions of the regulatory standards for aluminium were recorded in 20 (19.42%) water supply zones in 2000; 23 water supply zones were non-compliant in 1999. In 2000, 12 zones were assessed as having trivial contraventions. The non-trivial contraventions of the aluminium standards in eight water supply zones have been formally notified to Water Service. These contraventions can result from changes in

raw water quality or from fluctuations in the control of the water treatment process.

**Figure 11: Water Supply Zones Complying with Aluminium Standards**

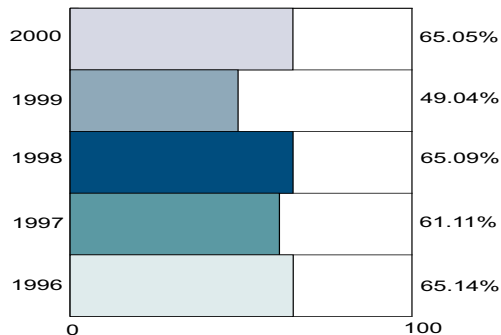


**5.36** As part of a major capital works programme, improvements to several water treatment works have been completed or are underway. In certain areas, there are indications that this has improved the individual aluminium compliance figures. In other situations, however, compliance monitoring identifies areas where a targeted continued planned investment programme is necessary to further improve regulatory compliance with the aluminium standards.

## Iron

**5.37** The regulatory standard for iron has been set for aesthetic reasons because levels persistently above the standard can give rise to discoloured water. In 2000, the number of determinations exceeding the iron standard showed a decrease in the number of non-compliances from 5.57% in 1999 to 4.04% in 2000. Contraventions of the regulatory standard for iron were recorded in 36 (34.95%) water supply zones in 2000; this is an improvement in the non-compliance rate of 50.96% for water supply zones reported for 1999. Contraventions in 15 of these zones were assessed as being trivial. The non-trivial contraventions of the iron standard in 21 water supply zones have been formally notified to Water Service.

**Figure 12: Water Supply Zones Complying with Iron Standard**

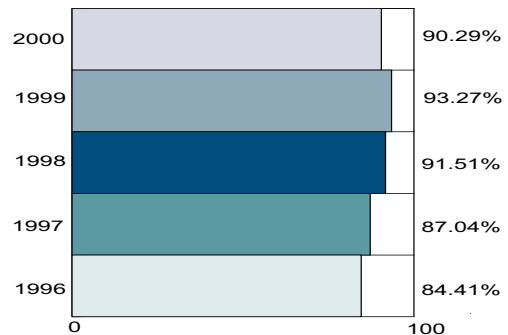


**5.38** There is no health risk from the reported exceedences of the iron standard, but the presence of excessive iron may make the appearance and taste of the water unacceptable to consumers. The majority of iron contraventions are considered to be caused by corrosion of older, cast-iron watermains. Water Service has an ongoing programme of scouring and cleaning of the distribution system to minimize the problem. In addition, there is a continuing planned maintenance programme into the next decade, to reline and replace parts of the distribution system. Continued targeted planned investment is necessary to improve regulatory compliance with the iron standard.

### Polycyclic Aromatic Hydrocarbons (PAH)

**5.39** PAH can leach into the water from the coal tar linings of cast-iron distribution mains. These linings were used in the past to protect the iron pipes from corrosion. PAH contraventions will be a localized phenomenon in the distribution system dependent on the pipe lining material and its condition; contravention of the standard in a water supply zone does not mean that the entire supply in that zone is non-compliant. In 2000, contraventions of the regulatory standard for PAH were recorded in ten (9.71%) water supply zones. Contraventions in all of these zones were regarded as trivial because the 2000 Compliance Assessment evaluated PAHs for triviality taking into consideration the new Drinking Water Directive requirements (see paragraph 4.22).

**Figure 13: Water Supply Zones Complying with PAH Standard**



**5.40** Although the reported PAH exceedences mean the water cannot be regarded as wholesome according to the definition in regulation 3, they are not regarded by the Inspectorate as being of immediate concern because the requirements of the new Drinking Water Directive were met. Water Service's planned maintenance programme of relining and replacing parts of the distribution system will, although primarily targeted at iron exceedences, continue to improve PAH compliance.

### Pesticides

**5.41** Pesticides include insecticides, herbicides, fungicides and algicides. Government guidelines specify that sampling and analysis should be undertaken for those pesticides used on catchments in significant amounts and those most likely to reach water supplies. Water Service has an ongoing pesticide monitoring programme, and during 2000, 40 individual pesticides were monitored.

**5.42** During 2000, 16,597 determinations were carried out for individual pesticides. Of these, nine (0.05%) exceeded the very stringent 0.1 µg/l regulatory standard.

In every instance, the contraventions corresponded to exposures far smaller than those known to be harmful or likely to affect health. For all of the nine contraventions, the levels detected were all well within the Government Advisory Values given in the

Guidance Document, *Safeguarding Public Water Supplies*.\*

**5.43** During 2000, contraventions of the regulatory standard for MCPA were reported in four water supply zones. Contraventions for one water supply zone was assessed as trivial; three water supply zones were assessed as having non-trivial contraventions and these have been formally notified to Water Service.

**5.44** One contravention of the regulatory standard for mecoprop was reported in one water supply zone in 2000, and was assessed as being trivial.

**5.45** Pesticides are used in Northern Ireland for a range of purposes and can find their way into watercourses from a variety of sources, mainly from agricultural usage or weed control. The pesticides that have been detected above the regulatory standard since monitoring began, were some of those more commonly used: MCPA, mecoprop, atrazine, glyphosate and asulam (Table 5.8 refers).

**Table 5.8: Number of Individual Pesticide Exceedences in Water Supply Zones, 2000-1996**

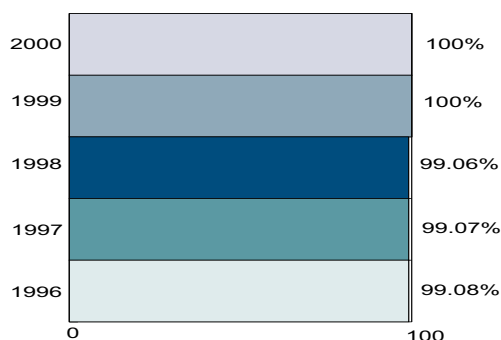
Pesticide Name	2000	1999	1998	1997	1996
MCPA	8	9	13	21	4
Mecoprop	1	1	3	18	2
Atrazine		1		5	
Glyphosate		3	1		
Asulam		1			
Simazine					1
Isoproturon					2

**5.46** Meetings of the current interdepartmental liaison group, comprising Department of Agriculture and Rural Development, Environment and Heritage Service and Water Service, provide the forum for discussion of pesticide usage and catchment control, including evaluation of the possibility of reducing the impact of pesticides in raw water sources from which drinking water is derived. The Inspectorate has provided information to the group.

### Nitrate

**5.47** The main source of nitrate in surface and groundwaters is from agricultural activity on land. Nitrate only occurs at concentrations near the regulatory standard in a few of Water Service's groundwater sources. These sources are usually blended with low nitrate water, derived from other abstractions, before entering supply.

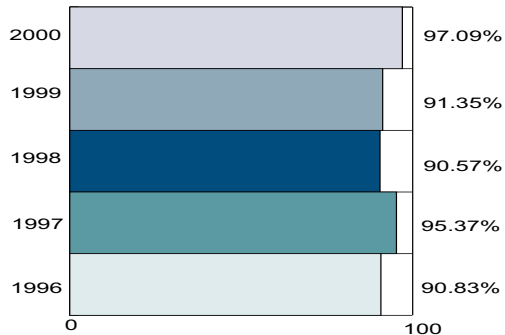
**Figure 14: Water Supply Zones Complying with Nitrate Standard**



**5.48** The Inspectorate notes that changes made in operational practice have improved compliance and there were no contraventions of the regulatory standard reported for nitrate in 2000.

\* Reference - *Guidance on Safeguarding the Quality of Public Water Supplies*. Department of the Environment, Welsh Office, HMSO, 1989. (ISBN 0 11 752262 7.)

**Figure 15: Water Supply Zones Complying with pH Standard**



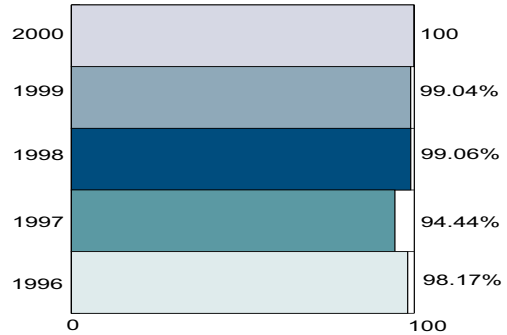
### Hydrogen ion (pH)

**5.49** The pH is a measure of acidity (or alkalinity) in water. The Regulations prescribe that pH should be between 5.5 and 9.5.

**5.50** Contraventions of the maximum pH regulatory standard were recorded in three (2.91%) water supply zones. Contraventions in all of these water supply zones were regarded as trivial.

**5.51** In Northern Ireland, many upland waters used for public supply contain acidic organic material derived from peat. The pH of water supplied is adjusted during treatment to control the corrosion of watermains and to reduce the uptake of metals such as lead, copper and zinc from consumers' plumbing. Contraventions of the pH standard in treated water can often be related to a problem at the water treatment works. Another, usually temporary cause of contravention of the pH standard, arises from water in contact with the cementitious lining of newly installed water mains in the distribution system.

**Figure 16: Water Supply Zones Complying with Manganese Standards**



### Manganese

**5.52** The regulatory standard for manganese has been set for aesthetic reasons. Manganese occurs naturally in many of Northern Ireland's water sources and, therefore, there are extensive permitted relaxations of the manganese standard in water supply zones (see paragraph 4.14). The compliance assessment takes permitted relaxations into account (see paragraph 4.15).

**5.53** In 2000, there were no contraventions of the regulatory standard for manganese recorded in any water supply zones.

### Turbidity

**5.54** Turbidity measurements provide an assessment of the fine particles suspended in water. This parameter is often, but not always, associated with discoloration which, in turn, can be caused by corrosion within the distribution system. Excessive turbidity can make the appearance of the water unacceptable to consumers.

**5.55** Contraventions of the regulatory standard for turbidity were recorded in three (2.91%) water supply zones during the 2000 compliance assessment. Contraventions in two of these water supply zones were regarded as trivial; one water supply zone was assessed as non-trivial and has been formally notified to Water Service.

## Odour (quantitative) and Taste (quantitative)

**5.56** Naturally occurring substances which have odour and taste properties are present in many water sources. In the purification of water supplies, the treatment process may remove or introduce odour or taste to the water supply. Odour and taste determinations are carried out using defined analytical procedures to provide quantitative assessment.

**5.57** There are extensive permitted relaxations of the odour (quantitative) and taste (quantitative) standards. The compliance assessment takes permitted relaxations into account (see paragraph 4.15).

In 2000, there were no contraventions of the regulatory standards recorded for odour (quantitative) and taste (quantitative) in any water supply zones.

## Colour

**5.58** The regulatory standard for colour is based on aesthetic considerations; water should be clear and bright. Due to the nature and structure of the ground, through, and over which water flows, water may become coloured. In some circumstances, water may also become coloured as it comes into contact with old iron mains.

**5.59** There are extensive permitted relaxations of the colour standard where the colour is due to the nature and structure of the ground. The compliance assessment takes permitted relaxations into account (see paragraph 4.15). In 2000, one contravention of the regulatory standard for colour was recorded, and assessed as trivial.

## Other Parameters

**5.60** The penultimate item (other parameters) in Table 5.7 shows that in 2000, 10,751 determinations were made on the wide range of other parameters in the Regulations. Of

these, only two parameters, (oxidizability and ammonium) contravened the regulatory standard.

**5.61** The oxidizability parameter provides an indication of changes in water quality and estimates organic content. Total organic carbon measurement also fulfils this function but does not have a PCV assigned to it (see paragraph 4.5). Therefore, the 19 contraventions of the regulatory standard for oxidizability which were reported in nine water supply zones were considered trivial.

**5.62** Ammonium concentrations contravened the regulatory standard on six occasions in one water supply zone; this contravention was assessed as non-trivial and formally notified to Water Service.

**5.63** Ammonium can be present in water naturally or due to certain water disinfection processes. Enhanced operational control of the water treatment process should improve compliance.

## *Cryptosporidium*

**5.64** *Cryptosporidium* is a parasitic organism which has been recognized as a cause of gastro-intestinal illness in humans. It is present in the aquatic environment, usually in small numbers, and is found more commonly in surface waters than in groundwater. It is closely associated with livestock and is, therefore, more likely to occur in areas of agricultural activity than in remote upland catchments. Conventional water treatment, operated in accordance with good practice, is normally an effective barrier against *Cryptosporidium*.

**5.65** During 2000, the Inspectorate with the co-operation of Water Service, continued to review the *Cryptosporidium* risk assessments at water treatment works. This work continues to be ongoing to enable *Cryptosporidium* sampling programmes to be developed.

**5.66** In March 2001, with the co-operation of the health authorities and Water Service, the Inspectorate issued a revised document, *\*Guidance for the Monitoring of Cryptosporidium in Treated Water Supplies in Northern Ireland - Administrative Arrangements*. This guidance document includes:

- risk assessment guidance;
- sampling frequencies;
- new sampling and analytical testing methods;
- liaison between Water Service and the health authorities; and
- outbreak control guidance.

**5.67** In line with the rest of the United Kingdom, a major activity during 2000 was the implementation of new arrangements for monitoring *Cryptosporidium*. The arrangements were established for public health protection and incorporate a formal notification level of one or more oocysts per 10 litres and an alert level of 0.1 oocysts per 10 litres. Initially, continuous monitoring was introduced at one site in February 2000. The sampling programme has now been extended to cover a further two sites. This monitoring programme is ongoing throughout the year and an assessment of this monitoring will be detailed in next year's report.

**5.68** During 2000, two *Cryptosporidium* outbreaks were reported. In the first outbreak, the water supplies into north Down and the southeast Belfast areas were under investigation and the incident was managed to established procedures. Remedial action has been taken and a report of the incident has been produced. The second incident involved an outbreak of Cryptosporidiosis in the Lisburn and southwest Belfast areas, resulting from damage to the 110-year-old Lagmore Conduit which serves the area concerned. Water Service managed the

outbreak as a Category 1 major incident. Following identification of the contamination, remedial action was taken.

**5.69** During 2001, an outbreak of Cryptosporidiosis in water supply areas in south Antrim and the north Belfast area was reported. Water Service managed the outbreak as a Category 1 major incident. Following the incident, an independent inquiry team was set up (paragraph 4.39 refers).

**5.70** *Cryptosporidium* remains a water quality issue of concern and it is imperative that enhanced protection measures continue to be considered by Water Service.

## Standard Sampling Frequencies

**5.71** The Water Quality Regulations (Northern Ireland) 1994 set out sampling requirements which demonstrate the wholesomeness of drinking water supplies. For 2000, the Inspectorate carried out an assessment of the regulatory standard sampling frequencies for water supply zones, water treatment works and service reservoirs.

**5.72** Only where the annual sampling frequency is for 50 samples or more, has any shortfall of the regulatory sampling requirements been considered trivial, and then only to the extent of 2% of the requirement.

**5.73** Excess samples can be programmed into the sampling programme so that if a sample is not collected for any reason, it does not cause a shortfall. The excess samples should not be more than 5-10% of the required number and should not concentrate on any one group of parameters.

**5.74** Based on the compliance assessment of the regulatory requirements for sampling and analysis, Water Service has generally met the requirements. Deficiencies where the requirements have not been met are identified and further information for each sampling location type is given in paragraphs 5.75-5.80.

\* First issued in December 1999.

**5.75** During 2000, 54,406 determinations were carried out on samples taken at consumers' taps in water supply zones. The Inspectorate identified a shortfall of 568 determinations; 1.03% of the regulatory standard sampling requirements for water supply zones were assessed as non-trivial. The comparable figure reported for 1999 was 1.33%.

**5.76** The compliance assessment of each water supply zone is made on a parameter basis; 72 (69.90%) water supply zones recorded a non-trivial sampling contravention for at least one parameter; the comparable figure for 1999 was 74%. Fifty two water supply zones had sampling shortfalls for more than one parameter in 2000; 71 water supply zones in 1999.

**5.77** Compliance assessments of regulatory sampling requirements were carried out for water treatment works and service reservoirs.

**5.78** In 2000, sampling points at 63 water treatment works were routinely sampled and analysed. The Inspectorate identified 33 (52.38%) water treatment works where there was a shortfall of the regulatory standard sampling frequency; 13 water treatment works (20.63%) recorded a non-trivial sampling contravention.

**5.79** In 2000, samples were taken from 372 service reservoirs. The Inspectorate identified a shortfall of the required sampling frequencies in 159 (42.74%) service reservoirs; 39 (10.48%) service reservoirs had non-trivial sampling frequency contraventions.

**5.80** Water Service has been formally notified of the non-trivial contraventions of the standard sampling frequencies for water supply zones, service reservoirs and water treatment works. Action will be taken to remedy the sampling shortfall.

**5.81** The Inspectorate notes the rate of non-compliances reported for the standard sampling frequencies and is aware of the difficulties experienced with the current

sample scheduling and tracking facilities of the Laboratory Information Management System (LIMS). The Inspectorate, therefore, anticipates improved compliance rates for sampling frequencies when the new LIMS becomes operational for 2002.

## Compliance with New Standards

**5.82** A new European Drinking Water Directive (98/83/EC) was published in the Official Journal of the European Communities on 25 December 1998. Most of the new and tighter standards have to be met by the end of 2003. For bromate, lead and trihalomethanes, interim standards have to be met by the end of 2003, and final standards by the end of 2008, 2013 and 2008 respectively.

**5.83** The new Drinking Water Directive contains two types of parameter values. Firstly, there are mandatory standards that have to be met by the specified dates given above. Table 5.9 shows those mandatory standards of the new Drinking Water Directive that have changed or are new, together with the current regulatory standards. It does not include those standards that have been dropped altogether or those that have not changed. Secondly, there are non-mandatory indicator values for monitoring purposes. Any exceedence of a value has to be investigated, but remedial action only needs to be taken when there is a risk to public health. Table 5.10 shows the new indicator values of the new Drinking Water Directive, together with the current regulatory standards. Some of these indicator values may be retained as mandatory standards when the new Regulations are made. The table does not include those parameters that have been dropped altogether.

**5.84** The new Northern Ireland Regulations to implement the new Drinking Water Directive are currently being prepared. In advance of these, the Inspectorate has initiated, with Water Service, some measures to prepare for parameter compliance.

**Table 5.9: New Mandatory Standards**

Parameter	Current Regulatory Standard	New Directive Mandatory Standard	Unit	Comment
Faecal coliforms	0		No/100 ml	Parameter name change
<i>E coli</i>		0	No/100 ml	
Faecal streptococci	0		No/100 ml	Parameter name change
Enterococci		0	No/100 ml	
Acrylamide		0.10	g/l	Control by product specification
Antimony	10	5	g/l	
Arsenic	50	10	g/l	
Benzene		1	g/l	
Benzo 3,4 pyrene	0.01 <sup>(a)</sup>	0.01	g/l	
Boron	2.0 <sup>(a)</sup>	1.0	mg/l	
Bromate		25	g/l	by end 2003
		10	g/l	by end 2008
Copper	3.0	2.0	mg/l	
1,2 dichloroethane		3.0	g/l	
Epichlorohydrin		0.10	g/l	Control by product specification
Lead	50	25 <sup>(c)</sup>	g/l	by end 2003 } Monitoring
		10 <sup>(c)</sup>	g/l	by end 2013 } to be decided
Nickel	50	20	g/l	
Nitrite		0.1	mg/l	Ex works
	0.1	0.5	mg/l	Consumers' taps
Nitrate/nitrite		Formula <sup>(d)</sup>		
PAH	0.2		g/l	6 substances incl. fluoranthene
		0.1	g/l	4 substances excl. fluoranthene
Tetrachloroethene	10	} 10	g/l	Sum of two substances
Trichloroethene	30		g/l	
Trihalomethanes	100 <sup>(b)</sup>	150	g/l	by end 2003 } sum of
		100	g/l	by end 2008 } 4 THM
Vinyl chloride		0.5	g/l	Control by product specification

(a) annual average

(b) three-monthly average

(c) weekly average

(d) the formula is  $[\text{nitrate}]/50 + [\text{nitrite}]/3 \leq 1$

**Table 5.10: New Non-Mandatory Standards**

Parameter	Current Regulatory Standard	New Directive Indicator Value	Unit	Comment
Aluminium	200	200	g/l	
Iron	200	200	g/l	
Manganese	50	50	g/l	
Chloride	400 <sup>(a)</sup>	250	mg/l	
Colour	20	Acceptable to consumers and no abnormal change	mg/l Pt/Co	
Odour	3		Dilution No	
Taste	3		Dilution No	
Turbidity	4		FTU	
			NTU	Strive for ex works
Coliforms	0 <sup>(c)</sup>	1	No/100 ml	
Conductivity	1500 <sup>(a)</sup>	0	S/cm at 20°C	
Hydrogen ion	5.5 min 9.5 max	2500 6.5 min		
Sodium	150 <sup>(b)</sup>	9.5 max	mg/l	
Oxidizability	5	200	mg oxygen/l	
Sulphate	250	5	mg/l	
Sulphite reducing clostridia	<1	250	No/20ml	Parameter name change
<i>Clostridium perfringens</i>		0	No/100 ml	Surface Water
Radioactivity:				
Tritium		100	Bq/l	} Monitoring to be decided
Total indicative dose		0.1	mSv/year	

- (a) annual average
- (b) three-yearly average
- (c) 95% of results must comply

# DRINKING WATER QUALITY INCIDENTS AND COMPLAINTS

## Drinking Water Quality Incidents

6.1 Where a water quality incident or event has occurred, Water Service is required to provide the Inspectorate with information, in accordance with agreed procedures. The Inspectorate defines an incident as a situation where there has been a demonstrable deterioration in the quality of drinking water giving rise to a significant potential risk to the health of consumers, or a significant consumer perceived adverse water quality change. Where no such deterioration has taken place, the situation is classified as an event. All incidents and events are assessed by the Inspectorate. In 2000, Water Service notified the Inspectorate of 12 water quality incidents and one event.

A summary of the water quality related incidents/events is provided in the table below.

### Water Quality Incidents/Events

Date	Location	Nature of Incident/Event	Classification
April 2000	Ballinrees Catchment	Contamination of reservoir catchment.	Incident
April/May 2000	Silent Valley	<i>Cryptosporidium</i> outbreak.	Incident
May 2000	River Moyola	Chemical spill into tributary - no effect on WTW's intake from Lough Neagh.	Event
August 2000	Omerbane Service Reservoir	Bacteriological exceedence - 'Boil Notice' issued.	Incident
August 2000	Glenavy Road, Lisburn	Bacteriological exceedence - 'Boil Notice' issued.	Incident
August 2000	Layde Service Reservoir	Bacteriological exceedence - 'Boil Notice' issued.	Incident
August/September 2000	Dunmurry/Lisburn	<i>Cryptosporidium</i> outbreak - 'Boil Notice' issued.	Incident
September 2000	Dromore Service Reservoir	Bacteriological exceedence - 'Boil Notice' issued.	Incident
September 2000	Rathkeel Service Reservoir	Bacteriological exceedence - 'Boil Notice' issued.	Incident
October 2000	Croaghmore Service Reservoir	Bacteriological exceedence - 'Boil Notice' issued.	Incident
October 2000	Nelson Drive, Londonderry	Bacteriological exceedence - 'Boil Notice' issued.	Incident
October 2000*	Carmoney WTW	Untreated water passed into supply - 'Boil Notice' issued.	Incident
October 2000*	Bagny Hill Road, Dromara	Bacteriological exceedence - 'Boil Notice' issued.	Incident

\* Incidents fully completed in 2001.

---

## Drinking Water Complaints

**6.2** In 2000, the Inspectorate received 30 complaints relating to drinking water quality. All complaints were referred to Water Service, district councils or health authorities, as appropriate, for follow-up investigation. The main categories of complaint were:

- discoloration (14 complaints);
- taste and odour (7 complaints);
- presence of *Cryptosporidium* (2 complaints)
- discoloration and odour (2 complaints);
- discoloration and sediment (2 complaints);
- discoloration and taste (1 complaint);
- presence of aquatic fauna (1 complaint); and
- potential contamination (1 complaint).

As a matter of policy, all complaints, events and incidents are followed up urgently, and remedial action initiated by Water Service.

# PRIVATE WATER SUPPLIES

## Private Water Supplies Monitoring Programme

**7.1** The Private Water Supplies Regulations (Northern Ireland) 1994 apply to private supplies which serve more than one household for purely domestic purposes, or are used in commercial food production, that is, the making, processing, preserving, preparing, or marketing of food or drink (including water) for sale for human consumption. Private water supplies in Northern Ireland are defined as any supplies of water provided otherwise than by the public supplier, Water Service.

**7.2** The Inspectorate is responsible for monitoring private water supplies. Before monitoring takes place, all private water supplies must first be identified and classified. The Inspectorate continues to review the private supplies falling under the Private Water Supplies Regulations (Northern Ireland) 1994:

- to date, 1,189 private water supplies have been identified and categorized into one of ten classes according to size, nature and use of the private water supply; and

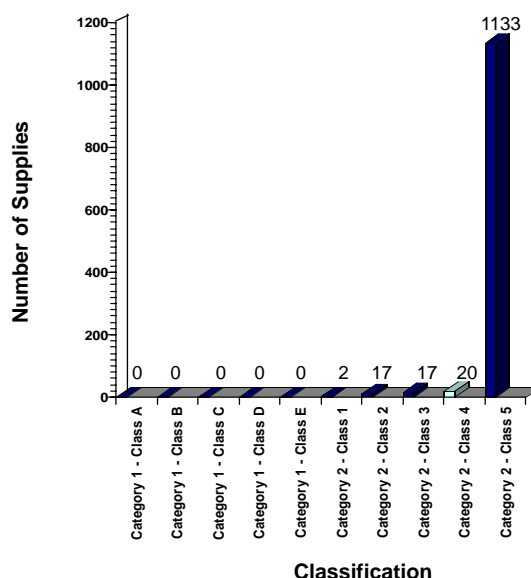
- a sampling and analysis monitoring programme for private water supplies based on these classifications has been implemented.

**7.3** In Northern Ireland, the majority of private water supplies are category 2, class 5, (predominantly used by dairy farms). The various private supplies are classed in Figure 17.

**7.4** The monitoring requirements of the Regulations vary according to the size and nature of a private supply. For each supply, these will be based on one of the ten classes specified in Schedule 1 to the Private Water Supplies Regulations (Northern Ireland) 1994. There are two categories of private water supplies:

- **category 1** - a supply which is used only for drinking, washing or cooking by people living in properties receiving the supply. Category 1 supplies are placed in classes A to E depending on the number of people supplied, or the volume of water used; and

**Figure 17: Private Water Supplies Classification Categories**



- **category 2** - a supply which is used to make food or drink that is sold, or is used in properties with a regularly changing population, for example, hospitals, hotels, caravan sites or schools. Category 2 supplies are placed in classes 1 to 5 depending on the volume of water used.

## Overview of Water Quality

**7.5** Since June 1999, the Inspectorate has been carrying out a sampling and analysis programme. Environmental Health Officers collect the samples and the Inspectorate has in place a contract for sample analyses. The majority of the private water supplies are used by dairy farms and a separate sampling analysis and reporting programme is undertaken by the Department of Agriculture and Rural Development, on behalf of the Inspectorate.

**7.6** During 2000, 79 private water supplies were sampled on 407 sampling occasions for a wide range of parameters. During this reporting period, 7,037 determinations were carried out. The regulatory requirements were not met for 131 of these and they are listed below.

## Contraventions of the Regulatory Standards for Private Water Supplies

Parameter	Number of Contraventions
• Total Coliforms	- 59
• Faecal Coliforms	- 27
• Iron	- 11
• Trihalomethanes	- 9
• Manganese	- 7
• Individual pesticides (4 MCPA, 1 Mecoprop and 1 Isoproturon)	- 6
• Odour	- 5
• Aluminium	- 2
• Ammonium	- 2
• Nitrate	- 1
• Colour	- 1
• Total Organic Carbon	- 1

## Groundwater Monitoring

**7.7** Environment and Heritage Service (EHS) is responsible for the management and protection of groundwater sources\*. Under the Water (Northern Ireland) Order 1999, the Water Management Unit (a functional unit within EHS) implemented a groundwater monitoring programme in 2000, for a range of representative sampling locations. Of interest to the Drinking Water Inspectorate, are those samples collected from private water supplies from a single well/single household, which are used for domestic purposes and, which do not have a regulatory sampling requirement under the Private Water Supply Regulations (Northern Ireland) 1994. The Water Management Unit liaises with the Inspectorate where the regulatory standards have not been met in these supplies.

## Provision of Information

**7.8** Procedures are in place whereby the Inspectorate notifies all results to the owners of the private water supplies and to the relevant Environmental Health Departments within the district councils.

**7.9** To increase awareness of the water quality of private water supplies, the Inspectorate produced a leaflet *Is Your PRIVATE Water Supply SAFE?*, which was widely circulated to owners through the Department of Agriculture and Rural Development, and the 26 district councils. The purpose of the leaflet is to alert owners and users of private water supplies to the risks of contamination of their water supplies.

\* Reference - Policy and Practice for the Protection of Groundwater in Northern Ireland. Environment and Heritage Service, July 2001.

# DRINKING WATER RESEARCH

**8.1** Most research into drinking water quality and health is funded by the Department of the Environment, Food and Rural Affairs (DEFRA) as part of a research programme designed to meet the needs of the United Kingdom Government in formulating policy relating to the quality of public and private water supplies, and in imparting sound scientific input to European and worldwide debate on drinking water issues. The Drinking Water Inspectorate for England and Wales provides the research programme management and administration function for the Water and Land Directorate (WLD) of DEFRA. The Drinking Water Inspectorate for England and Wales also provides the contract management function for the Water Distribution, Conservation and Quality (WDCQ) research programme. The content of the research programme is determined at the annual meeting of the Research Programme Committee. The objectives of the programme are to assist DEFRA and the Welsh Office to formulate policy on the quality of water supplies and to make an input to European and international drinking water issues. It also assists the Drinking Water Inspectorate for England and Wales in formulating its approach to the technical audit of water companies.

## Information on WDCQ Research

**8.2** Executive summaries of the WDCQ research reports and earlier Department of the Environment drinking water research reports are posted on the Foundation for Water Research (FWR) web site:  
[www.fwr.org](http://www.fwr.org) <<http://www.fwr.org>>

This web site also contains details of how to obtain copies of research reports.

**8.3** Enquiries should be addressed to DWI Enquiries, DWI, 2/A2 Ashdown House, 123 Victoria Street, London SW1E 6DE.

## COMPLETED RESEARCH PROJECTS

### *Cryptosporidium*

**8.4** Monitoring for *Cryptosporidium* in public water supplies at water treatment plant outlets using the regulatory continuous monitoring technique. Investigation of possible associations between operational parameters and concentrations of *Cryptosporidium*. Low concentrations of *Cryptosporidium*, at significantly less than the regulatory standard, were detected occasionally at all sites. Some *Cryptosporidium* detections were associated with increases in clostridia or aerobic spore counts. Others were associated with particle size or turbidity measurements. However, no systematic correlation was observed between *Cryptosporidium* concentrations and any of the parameters studied. Project contractor - CREH Analytical Ltd.

**8.5** Investigation of risk from *Cryptosporidium* in a sample of large, medium, and small private supplies and general review of outbreaks of drinking-water-related illnesses in areas served by private supplies. Intensive monitoring carried out for six-week periods in summer and autumn. Analysis for *Cryptosporidium* and Giardia using the regulatory continuous monitoring technique. Analysis for microbiological indicator parameters and selected pathogens also performed. Protozoan parasites were detected at all sites, even those where general microbiological quality was high. There were generally higher detection rates in autumn, and some detections were reported in supplies that consistently complied with microbiological indicator standards. This project was part funded by the Inspectorate in Northern Ireland. Project contractor - CREH Analytical Ltd.

## Other Health Risks and Monitoring

- 8.6** Investigation of the susceptibility of *Mycobacterium Avium* complex (MAC) to removal and inactivation in water treatment and distribution systems. Development of culture techniques for isolation of MAC and *Mycobacterium paratuberculosis* (Map). Optimized methodologies for detection of MAC and Map in water supply samples were developed. The rate of detection of MAC in source waters at the six study sites was reported as very low and no detections of Map were reported in source or treated water samples. The results indicate that exposure to MAC bacteria via drinking water is very low but further work has been proposed to assess whether biofilms provide a habitat for these organisms. Project contractor - Public Health Laboratory Service.
- 8.7** A study of the distribution of cases of Crohn's disease in relation to the provision of drinking water from surface water and groundwater sources. Review of an ecological study on distribution of Crohn's disease indicated no correlation between incidence of cases and exposure to environmental waters. Results of a statistical analysis considering whether or not there is a relationship between source of drinking water and incidence of the disease will be published in summer 2001. Project contractor - London School of Hygiene and Tropical Medicine.
- 8.8** Development of an analytical method for steroid residues in environmental waters. A methodology capable of detecting less than 1 ng/l of components of steroid residues in environmental waters has been developed. Results of inter-laboratory performance trails will be published in autumn 2001. Project contractor - Horseracing Forensic Laboratory and LGC (Teddington).

## Materials Testing and Approval

- 8.9** Phase 2 of a study on the potential for endocrine disruptors to leach from approved water supply products. Characterization of worst-case scenarios within domestic water supply systems. The effects on water quality of leaching from polymeric pipe and tank materials on water quality were studied in domestic installations. None of the results indicated an unacceptable level of exposure to substances migrating from the polymeric materials. Project contractor - The Water Quality Centre.
- 8.10** A review of compliance of approved granular activated carbon (GAC) filter media with the limits for leaching of toxic metals prescribed in the European Standard for GAC. A number of the products tested did not comply with the toxic metal limits prescribed in the European Standard. A meeting between the water industry and suppliers is being organized to discuss improved quality assurance requirements. Project contractor - The Water Quality Centre.
- 8.11** Mutagenicity testing on 3-monochloro propane 2-diol (3-MCPD). Study commissioned following imposition of stricter conditions of use on polyamine flocculants in public water supplies. The results were considered by the Committee on Mutagenicity, which advised that 3-MCPD has no significant genotoxic potential in vivo. The Committee on Carcinogenicity, advised that 3-MCPD was unlikely to present a carcinogenic risk to man, provided that the exposure was 1000 times lower than the No Observed Effect Level for tumorigenicity. Project contractor - Covance Laboratories.

## CURRENT RESEARCH PROJECTS

### *Cryptosporidium*

- 8.12** To develop a genetic typing system for *Cryptosporidium*, development of gene probes to characterize the surfaces of oocysts is being carried out to trace sources of outbreaks and sporadic infections. Project contractor - Scottish Centre for Infection and Environmental Health.
- 8.13** West Cumbria epidemiological study (commissioned in 1995); an ongoing study that is now investigating whether upgrading of water treatment processes has an impact on the reported levels of incidence of cryptosporidiosis. The study is also investigating whether the installation of treatment is accompanied by any changes in the sero-prevalence status of the population. Project contractor - West Cumbria Health Authority.

### Materials Testing and Approval

- 8.14** Technical support for a Drinking Water Inspectorate for England and Wales sponsored CEN Workshop Agreement on membranes for drinking water treatment. The workshop is seeking to develop an international consensus on approval testing for drinking water treatment membranes. Further details are available on the CEN web site at:  
[http://www.cenorm.be/standardization/tech\\_bodies/workshop/listws.htm](http://www.cenorm.be/standardization/tech_bodies/workshop/listws.htm)  
Project contractor - BSI and WRc.

## Other Health Risks and Monitoring

- 8.15** Collaboration with the American Water Works Association Research Foundation (AWWARF) to evaluate techniques for monitoring the integrity of low-pressure membrane processes for drinking water treatment. Project Contractor (AWWARF).
- 8.16** Support for the review of World Health Organization (WHO) guidelines for drinking water. The contractor has produced a report evaluating progress achieved during the WHO review meetings. Project contractor - Warren Associates.

### Water Supply within Consumers' Premises

- 8.17** Review of international standards for re-use of grey water. Proposals will be incorporated in the Construction Industry Research and Information Association (CIRIA's) final review of the application of rainwater infiltration systems. Project contractor - CIRIA.

# DEFINITIONS AND GLOSSARY OF TERMS

---

<b>Aquifers</b>	water-containing underground strata.
<b>Catchment</b>	the area of land that drains into a watercourse.
<b>Coliforms</b>	a group of bacteria which may be faecal or environmental in origin.
<b>Compliance assessment</b>	a comparison made by the Inspectorate of data gathered by Water Service against standards and other regulatory requirements.
<b>Contravention</b>	a breach of the regulatory requirement.
<b>Cryptosporidiosis</b>	the illness produced by infection with <i>Cryptosporidium</i> .
<b><i>Cryptosporidium</i></b>	a protozoan parasite.
<b>Determination</b>	a single analytical result for a specific parameter.
<b>Distribution systems</b>	a water supplier's network of mains, pipes, pumping stations and service reservoirs through which treated water is conveyed to consumers.
<b>Drinking Water Directive</b>	European Council Directive (80/778/EEC) relating to the quality of water intended for human consumption. (Replaced by Council Directive 98/83/EC in December 1998 - the "New Directive").
<b>Event</b>	a situation affecting or threatening to affect drinking water quality.
<b>Exceedence</b>	synonym for contravention (see above).
<b>Faecal coliforms</b>	a sub-group of coliforms, almost exclusively faecal in origin.
<b>GCMS/MS</b>	analytical techniques used - gas chromatography mass spectrometry/mass spectrometry.
<b>Groundwater</b>	water from aquifers or other underground sources.
<b>Incident</b>	an event where there has been a demonstrable deterioration in the quality of drinking water.
<b>Indicator organism</b>	an organism which indicates the presence of contamination and, hence, the possible presence of pathogens.
<b>Inspectorate</b>	the Northern Ireland Drinking Water Inspectorate.
<b>Inspectorate website</b>	location of information on the Internet. The Inspectorate website is: <a href="http://www.ehsni.gov.uk">http://www.ehsni.gov.uk</a>

<b>Investment programme</b>	investment in improvement works to water treatment works and distribution systems.
<b>Key parameters</b>	19 parameters chosen for this report to indicate the quality of water in water supply zones.
<b>Leaching</b>	to lose or cause to lose soluble substances by the action of a percolating liquid.
<b>Mains rehabilitation</b>	restoration of watermains pipework to a proper condition.
<b>m<sup>3</sup>/d</b>	cubic metres per day.
<b>mg/l</b>	milligrammes per litre.
<b>ml</b>	millilitre.
<b>MI/d</b>	megalitres per day (one MI/d is equivalent to 1,000 m <sup>3</sup> /d or 220,000 gallon/d).
<b>ng/l</b>	nanogramme per litre.
<b>Oocyst</b>	the resistant form in which <i>Cryptosporidium</i> occurs in the environment, and which is capable of causing infection.
<b>PAH</b>	a group of organic compounds known as polycyclic aromatic hydrocarbons, comprising, for the purposes of the Regulations, 6 substances: fluoranthene, benzo 3,4 fluoranthene, benzo 11,12 perylene, benzo 3,4 pyrene, benzo 1,12 perylene and indeno (1,2,3-cd) pyrene.
<b>Parameter</b>	a parameter is any substance, organism or property listed in Schedule 1 and regulation 3 of the Regulations.
<b>Pathogen</b>	an organism which causes disease.
<b>PCV</b>	see 'Prescribed concentration or value'.
<b>Pesticides</b>	any fungicide, herbicide or insecticide or related product (excluding medicines) used for the control of pests or diseases.
<b>pH value</b>	a measure of the acidity or basicity related to the concentration of the hydrogen ion.
<b>Plumbosolvency</b>	the tendency for lead to dissolve in water.
<b>Prescribed concentration or value</b>	the numerical value assigned to water quality standards (PCV), defining the maximum or minimum legal concentration or value of a parameter. In certain circumstances, under regulation 4 of the Regulations, certain standards may be permitted to be relaxed to a specific amount. See 'Relaxation'.

<b>Private supplies</b>	any supplies of water provided otherwise than by the public supplier, Water Service.
<b>Protozoan</b>	single celled animal.
<b>Public registers</b>	the information made available to the public as required by regulations 26 and 27.
<b>Regulations</b>	The Water Quality Regulations (Northern Ireland) 1994 S.R. No. 221 ISBN 0 337 9122 1 or, in the case of private water supplies, The Private Water Supplies Regulations (Northern Ireland) 1994 S.R. No. 237 ISBN 0 337 91237 8.
<b>Relaxation</b>	a relaxation of the standards according to regulations 4 and 5 by reason of the composition of geological strata from which the supplies are taken.
<b>Service reservoir</b>	a water tower, tank or other reservoir used for the storage of treated water within the distribution system.
<b>Surface water</b>	water from rivers, impounding reservoirs or other surface water sources.
<b>Technical audit</b>	the means of checking that Water Service is complying with its statutory obligations.
<b>Time of supply</b>	the moment when water passes from the water supplier's pipework into a consumer's pipework.
<b>Toxicology</b>	the study of the health effects of substances.
<b>Treated water</b>	water treated for use for domestic purposes as defined in the Regulations.
<b>Trihalomethanes (THM)</b>	a group of organic substances comprising, for the purposes of the Regulations, 4 substances: trichloromethane, (also known as chloroform), dichlorobromomethane, dibromochloromethane and tribromomethane.
<b>µg/l</b>	microgrammes per litre.
<b>Waiver</b>	authorized relaxation.
<b>Water supply zone</b>	the basic unit of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available.
<b>Wholesomeness</b>	a concept of water quality which is defined by reference to standards and other requirements set out in the Regulations.
<b>WRc</b>	Water Research Centre (1989) plc and/or, as the context may require, its predecessor body.

**Environment & Heritage Service  
Drinking Water Inspectorate  
Calvert House, 23 Castle Place  
BELFAST BT1 1FY  
Tel 028 9025 4750 - Fax 028 9025 4865**

**Environment & Heritage Service  
Natural Heritage  
Commonwealth House, 35 Castle Street  
BELFAST BT1 1GH  
Tel 028 9025 1477 - Fax 028 9054 6660**

**Environment & Heritage Service  
Built Heritage  
5-33 Hill Street  
BELFAST BT1 2LA  
Tel 028 9023 5000 - Fax 028 9054 3111**

*Our aim is to protect and conserve the  
natural and built environment and to  
promote its appreciation for the benefit of  
present and future generations.*

