

# Drinking Water Quality

Annual Report 2008





*Front cover image: children drinking water at Silent Valley.*

# Foreword

**I am pleased to commend to you Northern Ireland Water's (NI Water) Annual Drinking Water Quality report covering the calendar year 2008. This is our fifth annual review on the quality of drinking water in Northern Ireland since new regulations came into force in January 2004, and shows that we are delivering the best ever quality drinking water to our customers.**

Our investments in water treatment, storage and mains improvements (including the £110 million Alpha PPP schemes) have led to increased regulatory compliance. This is mainly due to greatly reduced levels of Trihalomethanes (THMs) at the customer tap. This is a step change in water quality, as historically we have had a significant number of exceedances with this parameter.

While we are making positive progress, we are also aware that further challenges lie ahead and that investment must continue to maintain this high standard and address the remaining areas of non compliance. We relish these

challenges and will continue to work closely with our economic and environmental regulators, the Consumer Council and other stakeholders throughout this process.

I trust you will find this report informative and relevant to your needs. As we gain the benefits of the ongoing capital investment by NI Water, you can be assured of our commitment to maintaining and where possible improving the quality of the drinking water delivered to our customers.



**Chris Mellor**  
**Chairman and Chief Executive**



**“... and shows that we are producing the best quality of water ever to our customers”**





Louise McGovern and Emma Colgan pictured at Silent Valley Reservoir

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# Introduction

**Northern Ireland Water Ltd (NI Water) is a government owned company with the Department for Regional Development as its sole shareholder.**

Water supplied for domestic or food production purposes, must meet the standards contained in "The Water Supply (Water Quality) Regulations (Northern Ireland) 2007". The Department for Regional Development is responsible under the Water and Sewerage Services (Northern Ireland) Order 2006 to supply and distribute water, and NI Water performs the Department's water supply functions

Water is regularly monitored and tested for quality. This report summarises NI Water's regulatory results from 1 January 2008 to 31 December 2008 to meet the requirements of the above regulations. During this reporting period, 99.49% of all tests carried out on samples taken from customers' taps and authorised supply points, complied with the regulatory standards assessed using the Mean Zonal Compliance (MZC) method of assessment. MZC is the method supported by the drinking water regulator in Northern Ireland.

NI Water aims to provide high quality drinking water, in a cost effective manner, to meet the requirements of existing and future customers. By doing this we contribute to the health and well being of the community, the needs of commerce and the protection of the environment.

NI Water continues to meet the obligations placed upon it to comply with regulatory standards and increasing customers' expectations. Investing in the extension and upgrading of water treatment works remains a high priority and the current programme is detailed in Appendix 4.

During 2007 a degradation in the raw water quality led to a higher than expected number of Total Trihalomethane (THM) exceedances. These exceedances were the principle cause for a slight reduction in compliance for 2007, compared with 2006. The new Water Treatment Works which came into service during 2008 have provided a more effective treatment regime which has significantly reduced the amount of THMs reaching customers' taps.

A higher percentage of the Northern Ireland population, as compared to Great Britain, live in rural areas. As a result there is a greater length of watermain per head of population connected to the public supply. The average length of watermain per head of population served in Northern Ireland is estimated at 14.9 metres as compared to 6.3 metres in England and Wales, and 9.0 metres in Scotland. This means that NI Water's ongoing mains rehabilitation programme to restore or replace the existing water mains pipework requires more investment than the comparable process in Great Britain.

To assist in understanding the contents of this report, a glossary of technical terms is provided (Appendix 5).



Spelga Reservoir, Co Down





Kristina Hennebruder, Water Analysis,  
Westland Laboratory, Belfast

# Drinking Water Quality Summary – Year on Year

Compliance assessed against the “Water Supply (Water Quality) Regulations (Northern Ireland) 2007”

Reporting Year	2004	2005	2006	2007	2008
<b>Mean Zonal Compliance (i)</b> (average water quality at customer tap at parameter level)	98.65%	99.02%	99.34%	99.30%	99.49%
<b>Customer Tap / Supply Point Water Quality (ii)</b> (not including Authorised Departures and including total coliforms)	98.63%	99.19%	99.42%	99.33%	99.47%
<b>Customer Tap / Supply Point Water Quality (ii)</b> (including Authorised Departures and including total coliforms)	99.63%	99.73%	99.66%	99.63%	99.66%
<b>Service Reservoirs Water Quality</b>	99.81%	99.71%	99.79%	99.86%	99.93%
<b>Water Treatment Works Water Quality</b>	99.83%	99.89%	99.90%	99.92%	99.95%
<b>Overall Quality (including Authorised Departures)</b>	99.72%	99.75%	99.75%	99.75%	99.79%

## Notes

- i. Mean Zonal Compliance (MZC) – method of assessment used across the UK, and supported by the Drinking Water Inspectorate as an industry comparator.
- ii. Previous methods of compliance calculation, now phased out but included here for historical information.



The Twitchett Family  
at Silent Valley

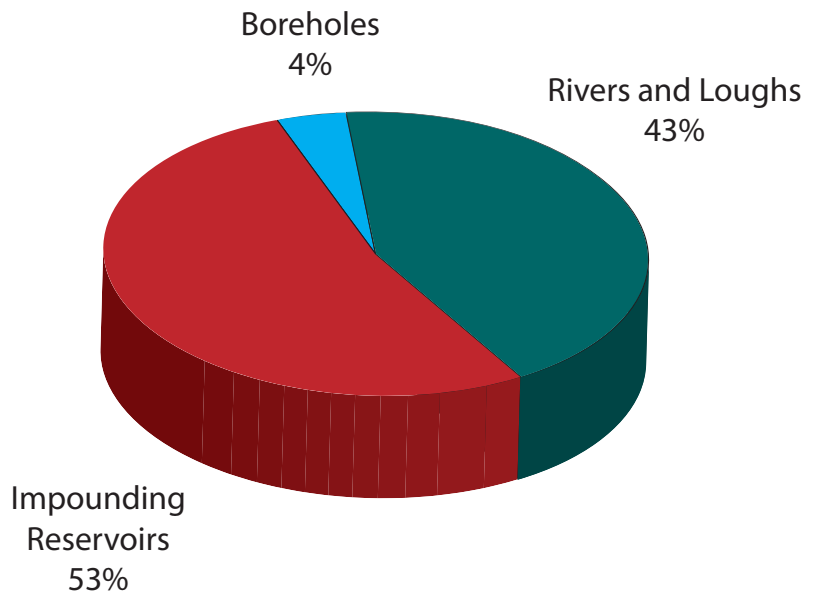


# Sufficiency of Supply

**Approximately 800,000 domestic, agricultural, commercial and business properties in Northern Ireland are connected to the public water supply. Each day during 2008 we supplied more than 614 million litres of high quality drinking water to customers. NI Water utilised approximately 44 sources which include upland Impounding Reservoirs, Boreholes, Rivers and Loughs.**

NI Water, through its Water Resource Strategy, plans to ensure that demand for drinking water is met for the period up to 2030. The strategy emphasises the need to rationalise existing uneconomic water sources and concentrate on the sources that can meet our needs cost-effectively and reliably.

For the period of this report, water supplies in Northern Ireland were obtained from three types of source, as shown: -



Lough Island Reavy Reservoir, Castlewellan, Co Down





# Water Safety Plans

**A Water Safety Plan (WSP) is the most effective way of ensuring that a water supply is safe for human consumption and that it meets the health based standards and other regulatory requirements. It is based on a comprehensive risk assessment and risk management approach to all the steps in a water supply chain from catchment to consumer.**

The primary objectives of a water safety plan in protecting human health and ensuring good water supply practice are the minimisation of contamination of source waters and effective treatment using appropriate processes. The majority of the regulatory requirements are monitored at the customer tap thereby ensuring the quality of the product at the point where it is made available to the customer.

The Water Industry has adopted the WSP approach to risk management from the raw water source, through water treatment, distribution and to our customer's taps. As the first steps towards complete WSPs, NI Water has put in place systems to identify hazards which could potentially threaten each stage of the water supply process from catchment to consumer. These include a comprehensive catchment management plan, liaison with the Northern Ireland Environment Agency (NIEA), raw water monitoring and the completion of "Tests of Likely Significance" studies and subsequent attainment of Abstraction Licences for our raw waters. We have in place a system of audits and procedures to effectively deal with risks associated with treatment at our water treatment works.

NI Water has a well established Environmental Management System certified to ISO 14001. In terms of its distribution system, it is progressing with a comprehensive Mains Rehabilitation Programme to upgrade an ageing distribution system of drinking water mains. NI Water has a monitoring programme in place which covers raw waters, water at various treatment stages, drinking water in distribution and at customer tap. NI Water liaises with its customers on a wide variety of issues and where there is an exceedance of a regulatory parameter, investigations and remedial work is carried out to ensure that drinking water is regulatory compliant. Where the monitoring programme highlights a problem with the customer's plumbing, NI Water informs the customer, the local Environmental Health Officer and the Drinking Water Inspectorate.

## **Authorised Departures (ADs)**

Authorised Departures (ADs) from standards in Northern Ireland are authorised and administered by the Department of the Environment's Drinking Water Inspectorate (DWI) with the agreement of the Health Authorities. The standards that have a time limited AD are for Total Trihalomethanes and 2 pesticides (MCPA and MCPP(Mecoprop)) and apply to the water supplied to the Water Supply Zones listed in Appendix 2. These named Zones are supplied from Water Treatment Works that have an agreed fixed programme of works intended to make them fully compliant with the regulations.

## **Mean Zonal Compliance (MZC)**

Under "The Water Supply (Water Quality) Regulations (Northern Ireland) 2007", assessment of the quality of water supplied to NI Water's customers

is monitored using a measurement known as "Mean Zonal Compliance".

This is the average water quality supplied to our customers and is based on 40 specified parameters measured at either customers' taps or authorised supply points. These parameters are specified by the Drinking Water Inspectorate (DWI).

This method provides a simple means of summarising drinking water compliance and comparing year on year performance, and gives a consistent method of comparing water quality across the UK. It is supported by the DWI as an industry comparator allowing direct comparisons of results.

The traditional method has also been included in this report as a transitional feature, but in the future Mean Zonal Compliance will be the main method of assessing compliance.

**"The majority of the regulatory requirements are monitored at the customer tap thereby ensuring the quality of the product at the point where it is made available to the customer"**

# Drinking Water Quality Standards

**During 2008 Drinking Water Quality in Northern Ireland was assessed against standards set in the Water Supply (Water Quality) Regulations (Northern Ireland) 2007. These Regulations are currently being amended and from Summer 2009, Northern Ireland Water will be assessed against the standards in the Water Supply (Water Quality) (Amendment) Regulations (NI) 2009.**

The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 (the "Regulations") incorporate the requirements of the European Commission's Drinking Water Directive 98/83/EC (the "Directive") relating to the quality of water intended for human consumption and, for certain parameters, more stringent UK national standards. These regulations updated "The Water Supply (Water Quality) Regulations (Northern Ireland) 2002" with effect from 1st April 2007.

The Regulations set out the requirements to be met by NI Water when supplying water for domestic or food production purposes and include: -

- water quality standards for wholesomeness;
- sampling locations for monitoring purposes;
- minimum requirements for the number, frequency and types of water samples to be taken at sampling locations;
- water sample collection and testing regimes;

- maintaining records of water sample results; and
- provision and publication of information

NI Water assesses standards for water quality against the parameters as listed in Appendix 1. The standards in the Regulations are normally expressed as 'Prescribed Concentrations or Values' (PCV) and are generally specified as maximum, minimum, percentile or average concentrations for a particular substance. Standards are set to ensure that water is safe to drink and aesthetically acceptable.

The Directive and the Regulations permit standards to be relaxed in certain specified circumstances provided there is no risk to public health under a process of "Authorised Departures". These allow a time limited Authorised Departure from the regulatory limit for certain parameters, provided there is a planned programme of work at the Water Treatment Works to improve the water quality and there are no adverse health implications.

The Regulations set demanding standards for the quality of drinking water but contraventions of these standards do not necessarily imply the water represents any public health risk. These contraventions are reported to the Drinking Water Inspectorate, investigated by NI Water, and prompt remedial action taken where appropriate.



Terence McGeown, Water Analysis,  
Westland Laboratory, Belfast



Jana Galbraith,  
Kinallen, Dromara



# Drinking Water Inspectorate - Technical Audit

**A Drinking Water Inspectorate (DWI), a unit within the Northern Ireland Environment Agency, has an independent responsibility to audit drinking water quality compliance against the standards set in the Regulations.**

Each year DWI undertakes a technical audit of the measures taken by NI Water to comply with the Regulations. The technical audit process includes:

- the transfer, to DWI, of analytical results of samples taken throughout the year, from water treatment works, service reservoirs and customers' taps;
- a compliance assessment of this information against the regulatory standards; and
- carrying out an inspection programme which examines the sampling, analytical, reporting, water treatment, distribution policies and relevant procedures

In 2008, the technical audit inspection programme included:

- audit of two service reservoirs (Corrany and Lisnagardy);
- audits of Altmore and Lenamore Springs Water Treatment Works (full audits);
- audits of Altnahinch and Dorisland Water Treatment Works (post-incident analysis);
- two analytical laboratory audits (Altnagelvin and Westland House);
- two sampling audits (Altnagelvin and Westland House);
- the Laboratory Information Management System (LIMS) audit (Northland House);



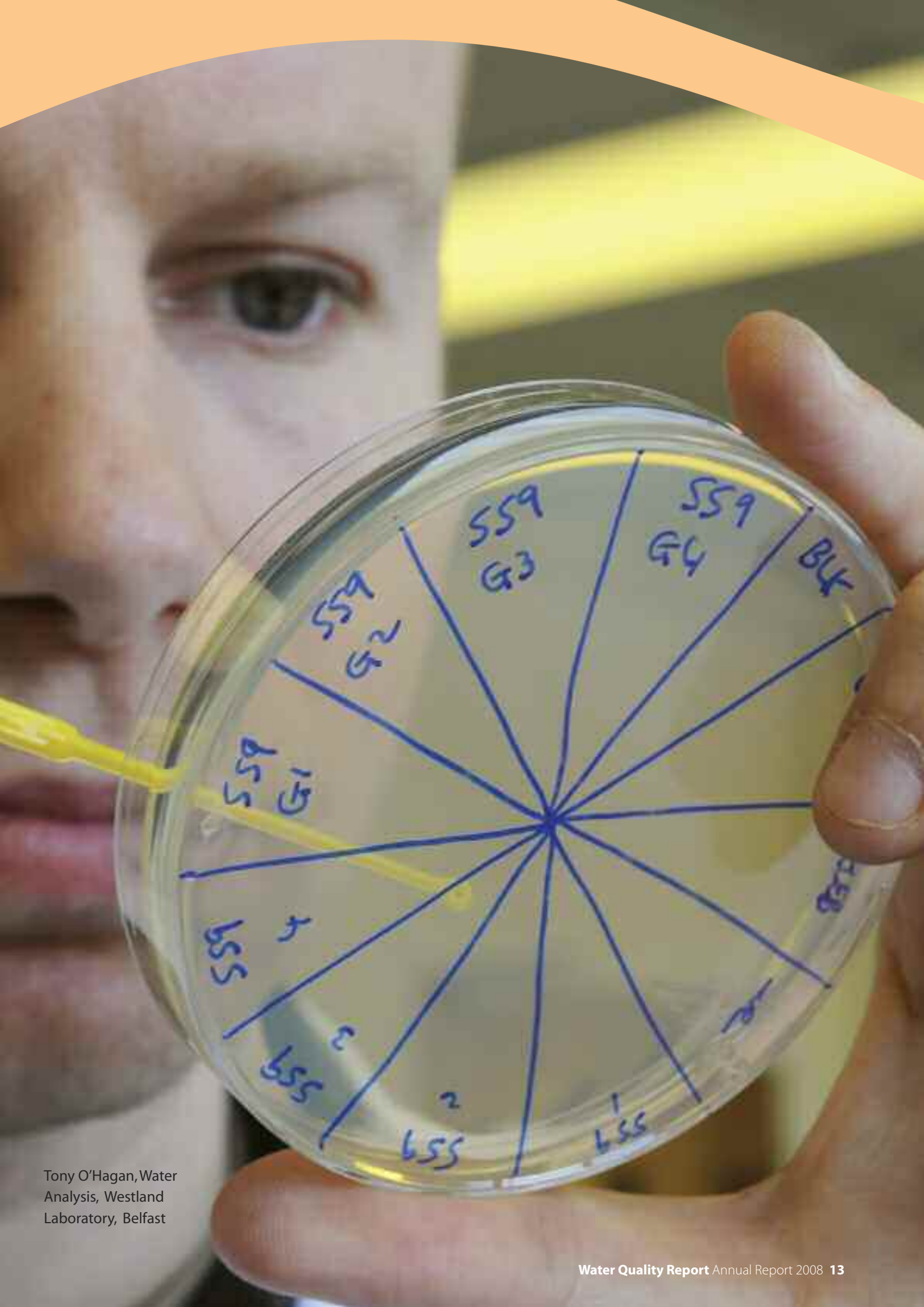
Aaron Cairns enjoying a glass of water

- an audit of procedures and practices used within Networks Operations;
- a *Cryptosporidium* risk assessment and monitoring review; and
- progress reporting on agreed follow-up action including non-trivial parameter contraventions, previous inspections and post incident analysis

DWI made a number of recommendations and suggestions and NI Water has followed up on these issues. DWI will report on the inspections and the quality of water supplied by NI Water in its annual report, due to be published later in the year. DWI is located at Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast BT7 2JA.

**“...NI Water has followed up on these issues”**





Tony O'Hagan, Water Analysis, Westland Laboratory, Belfast

# Events

In addition to DWI's audit of drinking water quality, DWI requires that it be notified whenever an event occurs that has the potential to impact on drinking water quality. After investigation these may prove not to have had a detrimental effect on water quality and are classified in the "Drinking Water Inspector's Report" as "non-incidents" as opposed to "incidents".

During 2008, there were 41 notifiable events of which 29 were categorised as incidents:

## Water Quality Events

Date	Area and Estimate of Population / Properties Potentially Affected	Nature and Cause of Event	Incident or Non-Incident
14 -16 January 2008	Doriland WTWs (169,000 population)	A treatment failure led to aluminium exceedances in the final water and related supply area.	Incident
22 - 23 January 2008	Moyola WTWs (66,000 population)	A number of factors led to a turbidity exceedance in the final water.	Incident
16 -19 February 2008	Moyola WTWs (66,000 population)	A number of factors led to turbidity exceedances in the final water.	Incident
May/June 2008	Carmony WTWs (122,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
5 May - 4 June 2008	Lough Fea WTWs (50,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
1 - 4 June 2008	Altmore Supply Area (24,000 population)	Loss of supply leading to discoloured water and media interest.	Incident
11 -16 June 2008	Killymore SR & Gortin area (700 properties)	Coliform bacteria exceedances due to inadequate disinfection led to a Boil Water Notice.	Incident
4 - 13 July 2008	Rasharkin area (150 properties)	<i>E-coli</i> & coliform bacteria exceedances due to mains contamination led to a Boil Water Notice.	Incident
7 – 21 July 2008	Carmony WTWs (122,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
July 2008	Ballykelly area (32,000 population)	Treatment difficulties at Caugh Hill WTWs led to aluminium exceedances in the Ballykelly area.	Incident
21 July 2008	Altnahinch WTWs (38,000 population)	Treatment difficulties led to hydrogen ion exceedances in the final water and related supply area.	Incident
23 - 24 July 2008	Forked Bridge WTWs (85,000 population)	<i>E-coli</i> & coliform bacteria exceedances due to inadequate disinfection.	Incident
23 June – 23 September 2008	Forked Bridge WTWs (85,000 population)	A number of factors led to manganese & colour exceedances in the final water and related supply area.	Incident
13 August 2008	Camlough WTWs (24,000 population)	Treatment difficulties led to aluminium exceedances in the final water.	Incident
28 August 2008	Camlough WTWs (24,000 population)	Treatment difficulties led to turbidity & aluminium exceedances in the final water.	Incident
1 – 3 September 2008	Killylea SR & Killylea village (150 properties)	<i>E-coli</i> & coliform bacteria exceedances due to inadequate disinfection.	Incident
1 – 23 September 2008	Dungonnell WTWs (20,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
3 – 5 September 2008	Dromore SR & Dromore village (347 properties)	Coliform bacteria exceedances due to inadequate disinfection.	Incident



Date	Area and Estimate of Population / Properties Potentially Affected	Nature and Cause of Event	Incident or Non-Incident
8 - 25 September 2008	Augher area (75 properties)	<i>E-coli</i> & Coliform bacteria exceedances due to inadequate disinfection led to a Boil Water Notice.	Incident
8 & 9 September 2008	Carmoney WTWs (122,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
12 - 14 September 2008	Mullans SR & Rasharkin area (859 properties)	<i>E-coli</i> & coliform bacteria exceedances due to inadequate disinfection.	Incident
13 - 15 September 2008	Caugh Hill WTWs (100,000 population)	Treatment difficulties led to a turbidity exceedance in the final water and an iron exceedance in the related supply area.	Incident
6 - 31 October 2008	Altmore WTWs (2,000 population)	A single pesticide (MCPA) exceedance and also the total pesticide limit were exceeded due to insufficient treatment.	Incident
15 - 30 October 2008	Seskinore area (15 properties)	<i>E-coli</i> & Coliform bacteria exceedances due to back siphonage from a private supply led to a Boil Water Notice.	Incident
3 & 4 November 2008	Killylane WTWs (53,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
4 - 17 November 2008	Dorisland WTWs (169,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
17 - 19 November 2008	Killylane WTWs (53,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
26 November 2008	Killylane WTWs (53,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
8 December 2008 - 22 January 2009	Killylane WTWs (53,000 population)	Treatment difficulties led to aluminium exceedances in the final water and related supply area.	Incident
23 April 2008	Drumaroad WTWs (780,000 population)	Elevated aluminium levels in final water.	Non-Incident
19 - 23 May 2008	Shanmoy WTWs (24,000 population)	Elevated manganese levels led to turbidity exceedances in final water.	Non-Incident
2 - 3 June 2008	Castor Bay WTWs (150,000 population)	Coliform bacteria exceedance due to disinfection problems.	Non-Incident
19 June 2008	Dorisland WTWs (169,000 population)	Coliform bacteria exceedance reported - no apparent reason.	Non-Incident
27 June 2008	Dunore Point WTWs (560,000 population)	Coliform bacteria exceedance reported - no apparent reason.	Non - Incident
29 June 2008	Drumaroad WTWs (780,000 population)	Coliform bacteria exceedance reported - no apparent reason.	Non-Incident
7 July 2008	Altmore WTWs (2,000 population)	Turbidity exceedance in final water.	Non-Incident
12 August 2008	Carmoney WTWs (122,000 population)	<i>E-coli</i> & coliform bacteria exceedances reported. No apparent reason.	Non-Incident
18 August 2008	Moyola WTWs (62,000 population)	Turbidity exceedance in final water.	Non-Incident
6 September 2008	Mourne/Lagan Valley Boreholes @ Breda WTWs (113,500 population)	Coliform bacteria exceedance reported - possibly contamination at time of sampling.	Non-Incident
1 November 2008	Shanmoy WTWs (24,000 population)	Chlorine gas leak.	Non-Incident
30 December 2008	Carmoney WTWs (122,000 population)	Coliform bacteria exceedance reported - no apparent reason.	Non-Incident

# Regulatory Enforcement

**During 2008 DWI monitored NI Water's progress on the implementation of corrective action against one outstanding "Formal Notice Action Letter" issued in 2006 – this required some targeted capital investment by NI Water at Drumharvey Service Reservoir due to bacteriological exceedances and is now being closed.**

DWI also monitored NI Water's progress on the implementation of 3 "Consideration of Provisional Enforcement Orders". These related to 2 of the major PPP water treatment works upgrade projects which came into service in 2008 at Dunore Point and Castor Bay Water Treatment Works as well as targeted capital investment Seagahan Water Treatment Works. The Orders for Dunore Point and Castor Bay Water Treatment Works have now been closed and investment at Seagahan Water Treatment Works is due to be completed in 2009.

DWI also implemented a further 4 "Consideration of Provisional Enforcement Orders" during 2008. These related to investment to reduce THM values in the areas supplied by Derg and Killylane Water Treatment Works, the level of aluminium entering supply from Carmoney Water Treatment Works and the level of iron found in the Dorisland distribution area.



Seagahan Water Treatment Works

# Monitoring Drinking Water Quality

**The Regulations necessitate a thorough and extensive water sampling programme to be undertaken, to monitor water quality throughout the supply and distribution systems. The sampling locations and frequencies for the monitoring of drinking water quality are specified in the Regulations. These are audited by the Drinking Water Inspectorate (DWI). The mandatory sampling programme requires water samples to be collected regularly at water treatment works, at service reservoirs and water towers used to store treated water and at customers' taps in the water supply zones.**

Under the Regulations, samples to be analysed for parameters which do not change in the supply watermain may be collected from Authorised Supply Points. These samples are collected from the final distribution point of the Water Treatment Works, and are considered under the Regulations to be equivalent to samples collected from the customer tap. All samples are carefully collected, handled and transported to ensure that they accurately represent the water quality which customers receive. NI Water employs skilled and experienced sampling staff for the collection and delivery of the regulatory samples to the laboratories. All sampling staff wear uniforms and carry identity cards when they call upon customers to take a sample.

Samples collected from customers' taps are taken at random addresses in each water supply zone. A water supply zone is a designated area with a population of no more than 100,000



Janet Kirk, Killyleagh, Co Down

supplied with water by one treatment works or blended water from several works. The number and boundaries of water supply zones are subject to change according to operational requirements as supply sources to areas are adjusted to meet demand and infrastructure developments. On this basis 61 water supply zones were monitored during the period of this report.

The parameters for which samples are tested include: -

- microbiological, e.g. Coliform bacteria
- physical, e.g. pH (Hydrogen ion)
- chemical, e.g. Iron, Manganese, Lead and Nitrate
- aesthetic, e.g. Taste, Odour and Colour

Compliance with the drinking water standards is determined by comparing the results of laboratory analysis of water samples with the relevant Prescribed Concentrations or Values (PCV). Where monitoring indicates that a standard has not been met, appropriate immediate investigation and remedial action is undertaken to ensure that the water supply does not present any public health risk. Sampling programmes are adjusted and increased testing may be scheduled in the water supply zone for the parameter involved. NI Water will at all times liaise with the DWI and the relevant Health Authorities to ensure customer safety.



# Quality Assurance

**The Regulations require water quality to be monitored using analytical systems which can demonstrate that appropriate accuracy is achieved and maintained. NI Water attaches great importance to the integrity of the analysis and for this reason applies stringent laboratory analytical quality control procedures. These systems and procedures are subject to external inspection and audit by the Drinking Water Inspectorate and an assessment of NI Water's performance will be included in the Inspectorate's annual report.**

NI Water has achieved the requirements of the Drinking Water Testing Specification, a national scheme agreed between the Drinking Water Inspectorate and the United Kingdom Accreditation Service for quality assurance within laboratories carrying out analysis for the water industry.

In addition to this, both NI Water Testing Laboratories have attained the necessary standard of analytical excellence and have been awarded United Kingdom Accreditation Service (UKAS) accreditation. UKAS auditors annually carry out an audit of the laboratories quality system.

In order to rapidly detect *Cryptosporidium* oocysts NI Water has a *Cryptosporidium* Analytical Unit at its Altnagelvin Laboratory. This Unit has Drinking Water Inspectorate approval and is instrumental in the development of new accredited methods for the water industry. This unit has also been awarded United Kingdom Accreditation Service (UKAS) accreditation.



Bob Wells arriving with water samples for testing at Westland Laboratory, Belfast

**“NI Water has achieved the requirements of the Drinking Water Testing Specification...”**





# Water Quality Summary

## NI Water Sites in Service

During 2008, the numbers of NI Water sites in service were:

Location Type	Number in Service
Water Treatment Works	43
Service Reservoirs	340
Water Supply Zones	61
Authorised Supply Points (see glossary)	43

## Overall Water Quality

110,961 microbiological, physical and chemical tests were carried out for Schedule 1 and zonal total coliforms (as set out in Appendix 3) parameters on water samples taken from water treatment works, service reservoirs and customers' taps in the year 2008. 110,727 of these tests complied with the regulatory standards giving an overall percentage compliance of 99.79% including Authorised Departures.

## Microbiological Quality

Water leaving water treatment works is disinfected with chlorine to safeguard public health by destroying microorganisms. This is the most important part of the water treatment process and is monitored for effectiveness at water treatment works, service reservoirs and in the distribution system at customers' taps.

To ensure the wholesomeness of water supplied, treated water is regularly examined to ensure the absence of total coliforms and faecal coliforms (E. coli). The presence of these organisms may indicate potential microbiological contamination of water supplies, and if they are detected in drinking water, immediate action is taken to identify the source and to minimise any risk to public health.

Many instances of microbiological failure in samples taken from customers' taps are due to contamination of the tap itself, in particular with mixer type kitchen taps. For this reason if a positive result is obtained, investigations are immediately carried out to identify if the positive result is due to the specific tap or the general system.

A summary of the microbiological quality of water supplied in 2008 is given below.

## Water Leaving Treatment Works

8,949 samples were taken and examined for coliforms. Of these, total coliforms were absent from 99.92% of samples and E. coli from 99.98%.

## Water in Service Reservoirs

17,408 samples were taken and examined for coliforms. Of these, total coliforms were absent from 99.87% of samples and E. coli from 99.98%.

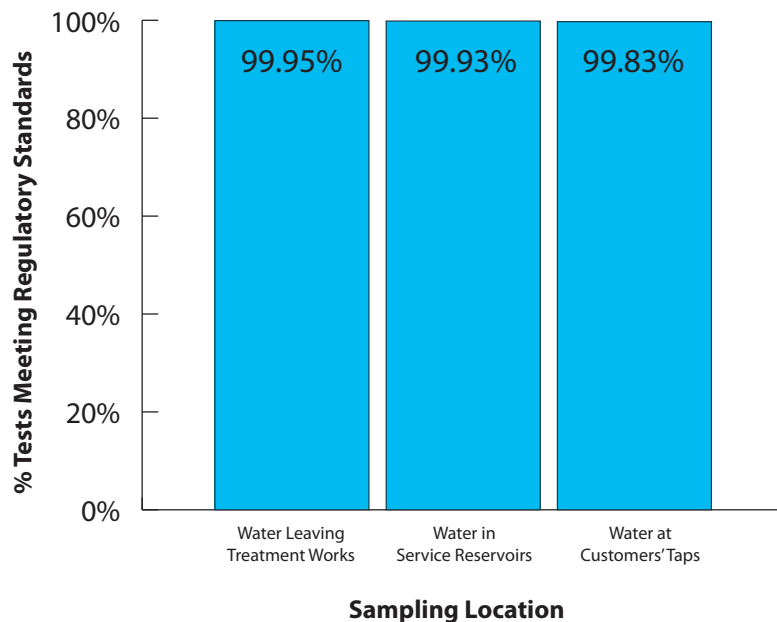
## Water at Customers' Taps

5,823 samples were taken from customers' taps and examined for coliforms. Of these, total coliforms were absent from 99.00% of samples and E. coli from 99.78% of samples. 467 samples were taken from customer's taps and examined for Enterococci, and of these Enterococci was absent from 99.79% of samples. Follow-up investigations determined that the majority of coliform failures were caused by the condition of the actual customer tap at the time of sampling.

■ % Compliance

## Overall Microbiological Water Quality

% Tests Meeting Regulatory Standards





Tony O'Hagan, Water Analysis,  
Westland Laboratory, Belfast



## Overall Water Quality

	Number of Analytical Tests	Number of Tests Exceeding PCV	% Compliance with Regulatory Standards	Number of Tests Exceeding PCV or Authorised Departures	% Compliance with Regulatory Standards including Authorised Departures
<b>Water Leaving Treatment Works</b>					
Total coliform	8,949	7	99.92	7	99.92
E. coli	8,949	2	99.98	2	99.98
Microbiological Total	17,898	9	99.95	9	99.95
Nitrite	367	0	100.00	0	100.00
Total	18,265	9	99.95	9	99.95
<b>Water in Service Reservoirs</b>					
Total coliform	17,408	22	99.87	22	99.87
E. coli	17,408	4	99.98	4	99.98
Total	34,816	26	99.93	26	99.93
<b>Water at Customers' Taps or Authorised Supply Points</b>					
Total coliform	5,823	58	99.00	58	99.00
E. coli	5,823	13	99.78	13	99.78
Enterococci	467	1	99.79	1	99.79
Clostridium perfringens	2,853	3	99.89	3	99.89
Microbiological Total	14,966	75	99.50	75	99.50
Zone Chemical Analysis	24,343	231	99.05	127	99.48
Supply Point Chemical Analysis	21,424	3	99.99	3	99.99
<b>Total</b>	<b>60,733</b>	<b>309</b>	<b>99.49</b>	<b>205</b>	<b>99.66</b>
Overall Water Quality Total	113,814	344	99.70	240	99.79

Note: Total coliform results at customers' taps and *Clostridium perfringens* results at Authorised Supply Points are not used in the Mean Zonal Compliance calculation in Appendix 3.



# Physical and Chemical Quality

Physical and chemical quality standards apply to water supplied at customers' taps. The Regulations lay down the required sampling frequency for each parameter or group of parameters dependent on the resident population of the water supply zones.

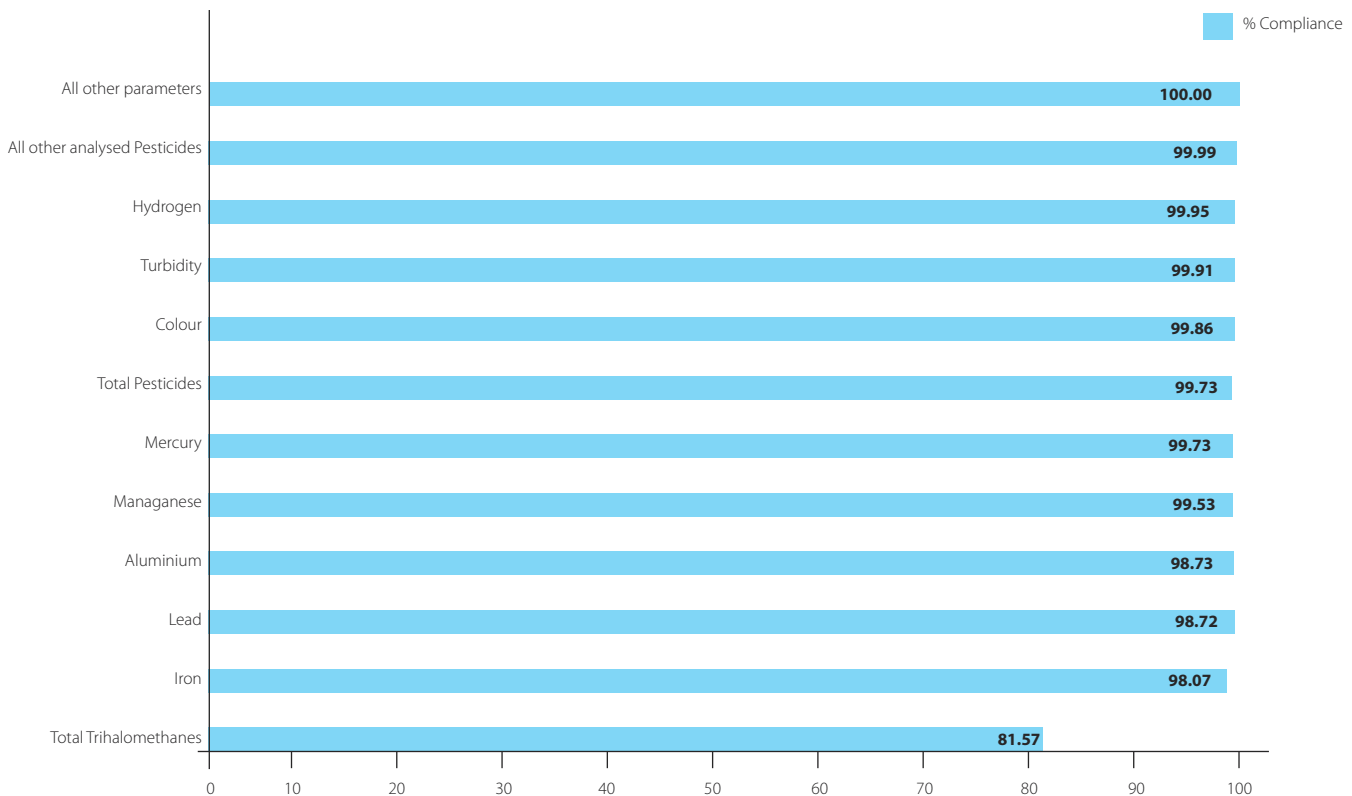
Appendix 3 shows the extent of NI Water's compliance with the

regulatory standards at both customer tap and authorised supply point. For most parameters, compliance is judged on the basis of the results of individual samples. If a single sample exceeds the PCV, that supply is deemed not to comply with the regulatory standards, even if the cause is outside NI Water's control, e.g. defective plumbing within premises. Improved compliance will be achieved

through the water treatment works investment programme and thereafter through improvements to the distribution system. Appendix 3 also shows the Mean Zonal Compliance achieved by NI Water for 2008.

- In 2008 a total of 52,826 physical and chemical parameters analysed for, achieved 100% compliance.

**Physical and Chemical Water Quality or Authorised Supply Point Mean Zonal Compliance Parameter**



Explanatory notes of exceedances of the physical and chemical quality standards with less than 100% compliance are provided in the following section.

# Water Quality Issues

## Total Trihalomethanes (THMs)

THMs are chlorination by-products arising from the reaction of chlorine, used for disinfection, with natural organic material present in water. The maintenance of microbiological quality (and hence the use of chlorine) is NI Water's main priority. NI Water's water abstractions are predominantly drawn from surface sources, which can contain these natural organic materials.

NI Water's ongoing water treatment works investment programme is designed to provide improved treatment to reduce organic matter prior to chlorination and thereby reduce THM levels. In 2008 five of NI Water's existing Water Treatment Works (including the major non-compliant slow sand filter works) were upgraded through a £110 million capital investment under the Alpha PPP Contract. These new Water Treatment Works were designed to provide a more effective treatment regime to reduce the amount of THMs in the distribution system, providing higher quality water and preventing exceedances. The immediate effect of the new Castor Bay WTW can be seen in the graph below.

Further improved compliance over all of Northern Ireland is expected as improvements to water treatment

works and the distribution system continue.

Time limited Authorised Departures for THMs are in place in most of the Water Supply Zones which had exceedances of the THM regulatory PCV level. During the period of the report, there were 22 exceedances of the Authorised Departure level in these zones and the remainder did not exceed the agreed authorised limits.

In addition to its ongoing programmes of work, NI Water is constantly reviewing its operational procedures to reduce THM levels in the distribution system, whilst maintaining microbiological quality.

## Aluminium

Aluminium can be present in water supplies as a natural constituent due to the nature and structure of the ground from which the supplies are taken. Water supply zones served from the Silent Valley source in the Mourne Mountains have naturally occurring aluminium in their water supplies and the treatment facilities at Drumaroad and Fofanny Water Treatment Works lower these levels to below the regulatory standard.

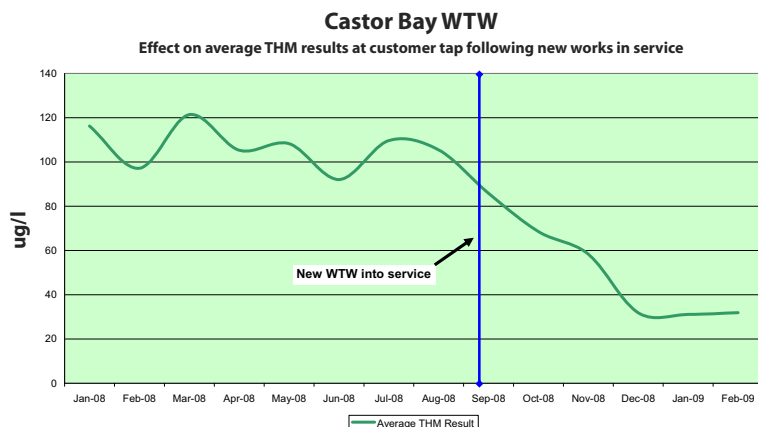
Aluminium compounds are used at some water treatment works as

coagulants, for the removal of suspended matter and impurities. The coagulant is subsequently removed, along with the impurities, before the water leaves the treatment works.

The standard set for aluminium is based on aesthetic considerations. A number of water supplies may contain concentrations of aluminium which could exceed the standard from time to time because of changes in raw water quality or treatment process fluctuations. These treatment processes are regularly reviewed and upgraded where required to lower the aluminium levels to below regulatory levels.

## Iron

The iron standard has been set for aesthetic reasons as levels persistently above the standard can give rise to discoloured water and particulate matter. Where the standard for iron has not been met, this may be due to problems of corrosion of iron water mains. There is an ongoing programme of scouring and cleaning of the distribution system to minimise the problem. In addition, NI Water has an ongoing Water Mains Rehabilitation Programme in which supply zones that experience water quality and other supply problems are subjected to a detailed zonal study. These detailed zonal studies include the analysis of historic water quality data (including iron) and the implementation of targeted water sampling and analysis programmes to determine the nature and extent of the water quality problems. Appropriate solutions to the problems are then developed which include mains cleaning and renovation and replacement of parts of the distribution system. Implementation of the solutions is undertaken either by NI Water or its contractors.



Aaron Cairns, Listooder, Co Down



### Hydrogen ion Concentration (pH)

Hydrogen ion Concentration (pH) is used as a measure of the acidity or alkalinity of water supplies. In Northern Ireland many upland waters used for water supply contain organic matter derived from peat which is acidic by nature.

The pH of water supplied is adjusted to control the corrosion of watermains and as a preventative measure to reduce the uptake of metals such as lead, copper and zinc from customers' plumbing.

Where the standard for pH has not been met in treated water, this may be related to a problem at a water treatment works, or occasionally from newly installed cement lined water mains in the distribution systems. As water treatment works are upgraded the number of future exceedances arising from this source should decrease.

### Lead

Water leaving treatment works and in the distribution systems contains only trace amounts of lead. However, where lead has been used for service pipes between the watermain and the kitchen tap or in domestic plumbing, there may be a risk of concentrations at the customers' tap exceeding the lead standard.

Many older properties still have service pipes and internal plumbing wholly or partly comprised of lead. If a sample is found to exceed the limit for lead in drinking water, both the customer and the local Environmental Health Officer are notified. NI Water will replace free of charge, any of its lead pipes supplying a property, if it receives a written request from a customer who

has replaced the portion of lead service pipe for which the householder is responsible. A leaflet on lead in drinking water "Have you got lead pipes?" is available, free of charge, from NI Water's Customer Service Units.

All major supplies in Northern Ireland are now being treated with a small amount of orthophosphoric acid, which forms a protective coating over lead pipes, to minimise levels of lead in the water supply. This dosing is reviewed for each water treatment works and agreed with the Drinking Water Inspectorate for Northern Ireland.

The Water Mains Rehabilitation Programme detailed Zonal studies referred to earlier includes sampling and testing for lead and aims to identify the presence of lead communication pipes in a zone. Also, where water mains are being rehabilitated, NI Water requires any lead communication pipes encountered to be replaced to the edge of the property.

### Manganese

Manganese occurs naturally in many water sources. Concentrations can vary seasonally or be attributed to the disturbance of accumulated deposits at the bottom of reservoirs when the water is drawn down or when water circulation occurs. The standard for manganese has been set for aesthetic reasons to prevent unpleasant tastes, staining or discoloured water.

### Pesticides

Pesticides include insecticides, herbicides, fungicides and algaecides. These can find their way into watercourses from a variety of sources, mainly from use in agriculture or weed

control. NI Water has an ongoing pesticide monitoring programme and currently analyses samples for 49 individual pesticides. NI Water liaises with other regulatory bodies in Northern Ireland such as the Northern Ireland Environment Agency regarding the control of pesticide usage.

The pesticide exceedance was for one of the more commonly used pesticides – MCPA.

NI Water is engaged on an ongoing series of catchment management plans as part of the overall Water Safety Plans which include looking at pesticide usage and control.

### Turbidity

Particulate matter, usually the re-suspension of sediments present in the distribution system, affects the turbidity of drinking water. Systematic flushing of the local pipe work usually restores water quality.

### Mercury

A single exceedance of the Mercury standard was detected in 2008. Subsequent resamples were all clear, and it is probable that the exceedance was due to contamination of the tap where the sample was taken.

### Other Parameters

Several exceedances were recorded for colour. These were investigated and no repeat exceedances were recorded.

### Summary

All exceedances of the regulatory standard are investigated following procedures agreed with the Health Authorities and the Drinking Water Inspectorate. Closure of an event cannot take place without their approval.





Jana Galbraith saving water

# Investing for the Future

## Water Treatment and the Distribution System

During the period of this report work continued on the on-going programme of improvements to our Water Treatment Works (WTW). During 2008/09 work on upgrading the water treatment facilities at Lough Bradan and Carmoney commenced. Improvement work at Seagahan WTW is ongoing.

Work is planned for the rehabilitation of pipework in more than 71 areas throughout Northern Ireland. Of these 71 areas, 46 studies have been completed with 19 on-going. Studies on 6 of the remaining zones will commence in 2009/10. As a result of these studies some 64 construction work-packages have been initiated. To the end of the year 50 of these work packages have been completed. A further 12 are programmed for completion in 2009 with the balance of 2 in 2010. It is expected that both the on-going and yet to be commenced studies will identify further work packages to be undertaken in subsequent years. Alongside the rehabilitation programme, other frameworks currently have over 59 contracts due to start.

Work continued throughout the year to implement the recommendations of the Water Resource Strategy. The Strategy provides NI Water with a robust basis for the development and management of secure and sustainable water resources in Northern Ireland.

NI Water's programming of improvements is dependent on the level of funding it receives. The current status of NI Water's water treatment investment for water quality

improvements is set out in Appendix 4.

## Asset Management

The second DRD Water Service Asset Management Plan (NIAMP2) was completed in 2003, and set out a possible long term capital investment strategy to meet the then known statutory obligations. Elements of NIAMP2 were subsequently revised and incorporated into the Strategic Business Plan. This was drafted in 2006 and covers the 3 year period from 1st April 2007 (when DRD Water Service became NI Water) to 31st March 2010.

NI Water is now regulated by 'price cap regulation'. The Economic Regulator, which for NI Water is the Northern Ireland Authority for Utility Regulation (NIAUR), will determine efficiency and funding levels for fixed periods. The process of reviewing the company's

submission, requesting income, is called the 'Price Control'. NIAUR has required that the first price control period will commence on 1st April 2010, be known as PC10, and last for a 3 year period ending 31st March 2013. NI Water is required to make a PC10 submission to the NIAUR in June 2009. At the core of the PC10 submission will be the third Asset Management Plan (NIAMP3). This will set out the capital investment needed to maintain base levels of service, the investment to cover enhancements associated with improved quality driven by legislation, investments linked to maintaining the supply / demand balance (having more capacity than demand) and investments linked to improved levels of customer service. NI Water worked with its Environmental Regulators and other key stakeholders to identify investment needs for the NIAMP3



Pupils at Campbell College Belfast

period related to quality, supply demand and enhancements. This was used to assist the DRD Minister in developing Draft Social and Environmental Guidance. The DRD Minister published the Draft Social and Environmental Guidance for consultation in March 2009. NIAUR will take account of the Draft Social and Environmental Guidance in reaching a final determination for the PC10 submission in December 2009. A similar process will be followed for the subsequent Price Control, which will be called PC13, and will cover the 5 year period from 1st April 2013 to 31st March 2018.

### Research and Development

NI Water through its Asset Management Research & Development (R&D) section undertakes a programme of applying research and technology development using innovation where appropriate to support the development of standards and best practice, across all of NI Water's activities.

This programme is driven by the desire to improve quality, whilst making efficiency gains, and contains projects designed to improve drinking water quality and compliance of our consented discharges while protecting the environment. While improving quality the programme also is aimed at improving the efficiency of our treatment processes and practices throughout the company hence offering a constantly improving service to our customers.

NI Water together with other UK Water Companies employs research bodies

such as the United Kingdom Water Industry Research Ltd (UKWIR) and the Water Research Centre (WRC) to provide a collaborative programme of research tailored to suit the needs of the UK water industry. Examples of the areas in which this work is carried out are given below:

- NI Water is a member of UKWIR, the UK organisation that provides the framework for the procurement of a programme of common research for UK water operators on "one-voice" issues. Projects undertaken by UKWIR include work in such areas as:
  - Climate Change
  - Developing a framework for drinking water safety plans
  - Customer Issues
  - Regulation
  - Environment & Quality
  - Drinking Water
  - Sewage Sludge
  - Odour
- NI Water also participates with other utilities in a programme of collaborative research managed by WRC. This programme covers a range of specific topics of interest to smaller groups of water companies including:
  - Asset Management
  - Leakage
  - Sewerage
  - Drinking Water Quality
  - Wastewater treatment.
  - Sustainability
  - Climate change

The R&D section also supports our business in other areas such as identifying appropriate treatment processes and development of strategy to improve efficiency through

ensuring consistency and standardisation across a range of business activities.

The section also manages projects which require industry consultants to provide expertise to bridge knowledge gaps and solve problems specific to NI Water.

The R&D section provides knowledge and technology transfer by identifying and facilitating appropriate workshops and the dissemination of research outputs. The section provides updates to help inform directors, managers and other key staff of current technological developments, industry best practice.

In addition the section manages a research library facility in our College Street Office for the use of all NI Water staff.

Through the R&D section NI Water collaborates with, and supports local and other UK university research. We are members of Queens University Environmental Science and Technology Research Centre (QUESTOR) which is an international environmental research organisation based at Queens University Belfast.



# Public Information

## Drinking Water Register

A Drinking Water Register is maintained recording detailed water quality results for each water supply zone.

The Register is available for inspection, free of charge, during normal working office hours at the customer relations centre below. Customers can examine any record on the register and obtain a free copy of the information for the water supply zone they live in. A charge may be made for printed information on other zones.

Customers, who wish to receive information about the quality of water in their water supply zone by post, can write to the address listed below:

**Customer Relations Centre  
4th Floor  
Capital House  
3 Upper Queen St  
Belfast BT1 6PU**

Customers can alternatively contact the Customer Relations Centre on: 08457 440088

There is also a text number for customers who have hearing difficulties: **08457 023206**

Calls to these numbers are charged at the local rate.

Customers may also contact Customer Services by email on: **waterline@niwater.com**

Further information for customers may be obtained at the following website: **<http://www.niwater.com>**

This site also contains electronic versions of recent Water Quality reports.

## Customer Services

Staff in the Customer Relations Centre record details and the nature of all enquiries, requests for services, emergencies and complaints. All enquiries etc. are logged and routed directly to staff who will investigate the matter and resolve the problem as quickly as possible.

Customer Services produces a range of leaflets about services provided, including those designed to give customers the opportunity to learn more about water quality standards, water efficiency and the need to use water wisely. The leaflets can be obtained from the Customer Relations Centre or may be viewed on the above Website.

To assist its visually impaired customers, a Braille version of this report is also prepared.



Michael Nicholas with the Martin family at Balmoral Show, Belfast



Fiona Rice at the  
Customer Relations  
Centre, Belfast

# Appendix 1

## Drinking Water Quality Standards

### SCHEDULE 1

#### PRESCRIBED CONCENTRATIONS AND VALUES

TABLE A.

#### MICROBIOLOGICAL PARAMETERS

Part I: Directive requirements

Parameters	Concentration or Value (maximum)	Units of Measurement	Point of compliance
<i>Enterococci</i>	0	number/100ml	Customers' taps
<i>Escherichia coli (E. coli)</i>	0	number/100ml	Customers' taps
Coliform bacteria	0	number/100ml	Customers' taps <b>(i)</b>

#### CHEMICAL PARAMETERS Part I: Directive requirements

Parameters	Concentration or Value (maximum)	Units of Measurement	Point of compliance
Acrylamide	0.10	µg/l	<b>(ii)</b>
Antimony	5	µg Sb/l	Customers' taps
Arsenic	10	µg As/l	Customers' taps
Benzene	1	µg/l	Customers' taps
Benzo (a) pyrene	0.01	µg/l	Customers' taps
Boron	1	mg B/l	Customers' taps
Bromate	10	µg BrO <sub>3</sub> /l	Customers' taps
Cadmium	5	µg Cd/l	Customers' taps
Chromium	50	µg Cr/l	Customers' taps
Copper	2	mg Cu/l	Customers' taps
Cyanide	50	µg CN/l	Customers' taps
1,2 Dichloroethane	3	µg/l	Customers' taps*
Fluoride	1.5	mg F/l	Customers' taps
Lead	(a) 25, from 25th December 2003 until immediately before 25th December 2013 (b) 10, on and after 25th December 2013	µg Pb/l	Customers' taps
Mercury	1	µg Hg/l	Customers' taps
Nickel	20	µg Ni/l	Customers' taps



Part I: Directive requirements (cont.)

Parameters	Concentration or Value (maximum)	Units of Measurement	Point of compliance
Nitrate	50	mg NO <sub>3</sub> /l	Customers' taps
Nitrite	0.5	mg NO <sub>2</sub> /l	Customers' taps
Aldrin	0.03	µg/l	Customers' taps*
Dieldrin	0.03	µg/l	Customers' taps*
Heptachlor	0.03	µg/l	Customers' taps*
Heptachlor epoxide	0.03	µg/l	Customers' taps*
Other pesticides	0.1	µg/l	Customers' taps*
Total Pesticides <b>(iii)</b>	0.5	µg/l	Customers' taps*
PAH - Sum of four substances <b>(iv)</b>	0.1	µg/l	Customers' taps
Selenium	10	µg Se/l	Customers' taps
Tetrachloroethene/Trichloroethene – Sum <b>(v)</b>	10	µg/l	Customers' taps*
Total Trihalomethanes <b>(vi)</b>	100	µg/l	Customers' taps
Vinyl chloride	0.50	µg/l	<b>(ii)</b>

Notes:

**(i)** NI Water, with the agreement of the Drinking Water Inspectorate, includes Total Coliforms within the Part I: Directive Requirements table for statistical purposes.

**(ii)** The parametric value refers to the residual monomer concentration in the water as calculated according to specifications of the maximum release from the corresponding polymer in contact with the water. This is controlled by product specification.

**(iii)** Total Pesticides: means the sum of the concentrations of the individual pesticides detected and quantified in the monitoring procedure.

**(iv)** The specified compounds are:

- benzo(b)fluoranthene
- benzo(k)fluoranthene
- benzo(ghi)perylene
- indeno (1,2,3-cd) pyrene.

**(v)** The parametric value applies to the sum of the concentrations of the individual compounds detected and quantified in the monitoring process.

**(vi)** The specified compounds are:

- chloroform
- bromoform
- dibromochloromethane
- bromodichloromethane

\* May be monitored from samples of water leaving treatment works or other supply point, as no significant change during distribution.

## Part II: National requirements

Parameters	Concentration or Value (maximum unless otherwise stated)	Units of Measurement	Point of compliance
Aluminium	200	µg Al/l	Customers' taps
Colour	20	mg/l Pt/Co	Customers' taps
Hydrogen ion	10	pH value	Customers' taps
	6.5 (minimum)	pH value	
Iron	200	µg Fe/l	Customers' taps
Manganese	50	µg Mn/l	Customers' taps
Odour	3 at 25°C	Dilution number	Customers' taps
Sodium	200	mg Na/l	Customers' taps
Taste	3 at 25°C	Dilution number	Customers' taps
Tetrachloromethane	3	µg/l	Customers' taps
Turbidity	4	NTU	Customers' taps

### SCHEDULE 2

#### INDICATOR PARAMETERS

Parameters	Specification Concentration or Value (maximum) or State	Units of Measurement	Point of monitoring
Ammonium	0.5	mg NH <sub>4</sub> /l	Customers' taps
Chloride (i)	250	mg Cl/l	Supply point*
<i>Clostridium perfringens</i> (including spores)	0	Number/100ml	Supply point*
Colony counts	No abnormal change	Number/1ml at 22°C Number/1ml at 37°C	Customers' taps, service reservoirs and treatment works
Conductivity (i)	2500	µS/cm at 20°C	Supply point*
Hydrogen ion	9.5	pH value	Customers' taps
Sulphate (i)	250	mg SO <sub>4</sub> /l	Supply point*
Total indicative dose (for radioactivity) (ii)	0.1	mSv/year	Supply point*
Total organic carbon (TOC)	No abnormal change	mg C/l	Supply point*
Tritium (for radioactivity)	100	Bq/l	Supply point*
Turbidity	1	NTU	Treatment works

Notes:

- (i) The water should not be aggressive.
- (ii) Excluding tritium, potassium-40, radon and radon decay products.

\* May be monitored from samples of water leaving treatment works or other supply point, as no significant change during distribution.

#### Explanatory Notes

##### Measurement Units:

mg/l means one part in a million.

µg/l means one part in a thousand million.

##### Parameter:

A parameter refers to any substance, organism or property listed above.

## Appendix 2

### 2008 Authorised Departures (AD) by Water Supply Zones under Regulation 37

Site Code	Zone/Supply Point Name	Parameter	AD Value	AD Start	AD End
W2501	Altmore	MCPA	0.5	22-Nov-07	24-Dec-09
W3505	Lough Cowey	MCCP(Mecoprop)	0.3	01-Jan-07	24-Dec-09
Z104	Ballymena Borough	Total Trihalomethanes	150	01-Jan-07	15-Oct-09
Z109	Dunore North	Total Trihalomethanes	150	01-Jan-07	15-Oct-09
Z112	Mormeal	Total Trihalomethanes	150	01-Jan-07	16-Jul-09
Z113	Moyola	Total Trihalomethanes	150	01-Jan-07	16-Jul-09
Z116	Unagh	Total Trihalomethanes	150	01-Jan-07	16-Jul-09
Z201	Altmore	Total Trihalomethanes	150	01-Jan-07	24-Dec-09
Z202	Altmore-Gortlenaghan	Total Trihalomethanes	150	01-Jan-07	24-Dec-09
Z209	Castor Bay-Shanmoy	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z219	Seagahan	Total Trihalomethanes	150	01-Jan-07	24-Dec-09
Z221	Banbridge-Babylon Hill	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z222	Ballydougan-Ballyhannon	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z223	Lurgan-Magheraliskmisk	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z225	Newry-Ballintemple	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z227	Castor Bay-Richill	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z309	Dunmurry	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z310	Dunore East	Total Trihalomethanes	150	01-Jan-07	15-Oct-09
Z311	Hollywood	Total Trihalomethanes	150	01-Jan-07	31-Oct-08
Z314	Lisburn North	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z316	Lough Cowey	Total Trihalomethanes	150	01-Jan-07	24-Dec-09
Z318	Oldpark	Total Trihalomethanes	150	01-Jan-07	15-Oct-09
Z320	Stoneyford	Total Trihalomethanes	150	01-Jan-07	24-Sep-09
Z321	Woodvale	Total Trihalomethanes	150	01-Jan-07	15-Oct-09
Z410	Lough Braden	Total Trihalomethanes	150	07-Aug-07	06-Aug-10



### Programmes of Work to meet Authorised Departure Requirements

During 2008, certain planned and remedial programmes of work to meet Authorised Departure requirements continued. These were:

<b>Water Treatment Works</b>	<b>Zone code affected</b>	<b>Zone name affected</b>
Dunore Point WTW	Z104	Ballymena Borough
	Z109	Dunore North
	Z310	Dunore East
	Z318	Oldpark
	Z321	Woodvale
Moyola WTW	Z112	Mormeal
	Z113	Moyola
	Z116	Unagh
Castor Bay WTW	Z209	Castor Bay - Shanmoy
	Z221	Banbridge - Babylon Hill
	Z222	Ballydougan - Ballyhannon
	Z223	Lurgan - Magheraliskmisk
	Z225	Newry - Ballintemple
	Z227	Castor Bay - Richill
Forked Bridge WTW	Z309	Dunmurry
	Z314	Lisburn North
	Z320	Stoneyford
Altmore WTW	Z201	Altmore
	Z202	Altmore-Gortlenaghan
Seagahan WTW	Z219	Seagahan
Creighton's Green WTW	Z311	Hollywood
Lough Cowey WTW	Z316	Lough Cowey
Lough Braden WTW	Z410	Lough Braden

# Appendix 3

## Water Quality Report for Water Supply Zones

Schedule 1 parameters	2008 Samples	No > PCV	% > PCV	No > AD	% > AD
Enterococci	467	1	0.21%	—	—
E. coli	5823	13	0.22%	—	—
Aluminium	2124	27	1.27%	—	—
Antimony	467	0	0.00%	—	—
Arsenic	467	0	0.00%	—	—
Benzo (a) pyrene	467	0	0.00%	—	—
Bromate	467	0	0.00%	—	—
Cadmium	467	0	0.00%	—	—
Chromium	467	0	0.00%	—	—
Colour	2124	3	0.14%	—	—
Copper	467	0	0.00%	—	—
Hydrogen ion	2124	1	0.05%	—	—
Iron	2124	41	1.93%	—	—
Lead	468	6	1.28%	—	—
Manganese	2124	10	0.47%	—	—
Nickel	467	0	0.00%	—	—
Nitrate	492	0	0.00%	—	—
Nitrite	492	0	0.00%	—	—
Odour	2124	0	0.00%	—	—
Selenium	467	0	0.00%	—	—
Sodium	464	0	0.00%	—	—
Taste	2124	0	0.00%	—	—
PAH - Sum of four substances	467	0	0.00%	—	—
Total Trihalomethanes	765	141	18.43%	22	2.88%
Turbidity	2124	2	0.09%	—	—

Indicator parameters	2008 Samples	No > SPEC	% > SPEC
Total Coliforms	5823	58	1.00%
Total - Residual disinfectant	5823	0	0.00%
Free - Residual disinfectant	5823	0	0.00%
Colony Counts 37 (48hrs)	2124	0	0.00%
Colony Counts 22	2124	0	0.00%
Hydrogen ion (indicator) pH value	2124	0	0.00%
Ammonium	2124	0	0.00%

## Water Quality Report for Authorised Supply Points

Schedule 1 parameters	2008 Samples	No > PCV	% > PCV	No > AD	% > AD
Benzene	374	0	0.00%	—	—
Boron	371	0	0.00%	—	—
Cyanide	371	0	0.00%	—	—
1,2 Dichloroethane	374	0	0.00%	—	—
Fluoride	370	0	0.00%	—	—
Mercury	370	1	0.27%	—	—
Aldrin	371	0	0.00%	—	—
Dieldrin	371	0	0.00%	—	—
Heptachlor	371	0	0.00%	—	—
Heptachlor Epoxide	371	0	0.00%	—	—
Total Pesticides	371	1	0.27%	—	—
All other analysed Pesticides	16591	1	0.01%	1	0.01%
Tetrachloroethene/Trichloroethene - Sum	374	0	0.00%	—	—
Tetrachloromethane	374	0	0.00%	—	—

Indicator parameters	2008 Samples	No > SPEC	% > SPEC
Clostridium perfringens	2853	3	0.11%
Chloride	369	0	0.00%
Conductivity	2853	0	0.00%
Sulphate	369	0	0.00%
Total Organic Carbon	369	0	0.00%
Total Indicative Dose	371	0	0.00%
Tritium	371	0	0.00%



### Water Quality Report for Water Treatment Works

Schedule 1 parameters	2008 Samples	No > PCV	% > PCV
Total Coliforms	8949	7	0.08%
E. coli	8949	2	0.02%
Nitrite	367	0	0.00%

Indicator parameters	2008 Samples	No > SPEC	% > SPEC
Turbidity	8949	42	0.47%
Total - Residual disinfectant	8949	0	0.00%
Free - Residual disinfectant	8949	0	0.00%
Colony Counts 37 (48hrs)	8949	0	0.00%
Colony Counts 22	8949	0	0.00%

### Water Quality Report for *Cryptosporidium* Oocysts

Parameter	2008 Samples	No > Reporting Level	% > Reporting Level
<i>Cryptosporidium</i> Oocysts	15	0	0.00%

### Water Quality Report for Service Reservoirs

Schedule 1 parameters	2008 Samples	No > PCV	% > PCV
Total Coliforms	17408	22	0.13
<i>E. coli</i>	17408	4	0.02%

Indicator parameters	2008 Samples	No > SPEC	% > SPEC
Colony Counts 22	17408	0	0.00%
Colony Counts 37 (48hrs)	17408	0	0.00%
Total - Residual disinfectant	17408	0	0.00%
Free - Residual disinfectant	17408	0	0.00%

## 2008 Mean Zonal Compliance

Parameter	Number of Samples	No of fails at zone / supply point	No of zones / supply points with fails	% Zonal Compliance
Colour	2124	3	2	<b>99.66</b>
Turbidity	2124	2	2	<b>99.96</b>
Odour	2124	0	0	<b>100.00</b>
Taste	2124	0	0	<b>100.00</b>
Hydrogen ion	2124	1	1	<b>99.95</b>
Sodium	464	0	0	<b>100.00</b>
Nitrate	492	0	0	<b>100.00</b>
Nitrite	492	0	0	<b>100.00</b>
Nitrite/Nitrate Formula	492	0	0	<b>100.00</b>
Aluminium	2124	27	13	<b>98.88</b>
Iron	2124	41	21	<b>98.24</b>
Manganese	2124	10	7	<b>99.47</b>
Copper	467	0	0	<b>100.00</b>
Fluoride	370	0	0	<b>100.00</b>
Arsenic	467	0	0	<b>100.00</b>
Cadmium	467	0	0	<b>100.00</b>
Cyanide	371	0	0	<b>100.00</b>
Chromium	467	0	0	<b>100.00</b>
Mercury	370	1	1	<b>99.71</b>
Nickel	467	0	0	<b>100.00</b>
Lead	468	6	5	<b>98.57</b>
Antimony	467	0	0	<b>100.00</b>
Selenium	467	0	0	<b>100.00</b>
Pesticides - total substances	371	1	1	<b>99.71</b>
Total PAH (sum of 4 substances)	467	0	0	<b>100.00</b>
<i>E. coli</i>	5823	13	11	<b>99.44</b>
<i>Enterococci</i>	467	1	1	<b>99.80</b>
Boron	371	0	0	<b>100.00</b>
Benzo (a) pyrene	467	0	0	<b>100.00</b>
Tetrachloromethane	374	0	0	<b>100.00</b>
Tetrachloroethene/Trichloroethene - Sum	374	0	0	<b>100.00</b>
Total Trihalomethanes	765	141	24	<b>86.43</b>
1,2 Dichloroethane	374	0	0	<b>100.00</b>
Benzene	374	0	0	<b>100.00</b>
Bromate	467	0	0	<b>100.00</b>
Aldrin	371	0	0	<b>100.00</b>
Dieldrin	371	0	0	<b>100.00</b>
Heptachlor	371	0	0	<b>100.00</b>
Heptachlor epoxide	371	0	0	<b>100.00</b>
Pesticides - other substances (P999)	16591	1	1	<b>99.81</b>
<b>Total Number of Samples / Fails</b>	<b>52549</b>	<b>248</b>		
<b>Mean Zonal Compliance %</b>				<b>99.49</b>

# Appendix 4

## Investment Programme

During 2009/10 it is anticipated that work will be completed at:  
Seagahan WTW

While construction also continued on improvements at the following PPP sites:

Ballinrees WTW  
Dunore Point WTW  
Moyola WTW  
Castor Bay WTW

It is anticipated that during 2009/10 work will continue at:

Lough Bradan WTW  
Carmoney WTW

As the programme for improvement / replacement of WTWs nears completion NI Water is shifting the emphasis of upgrading work into the distribution system:

- North Down Strategic Water Main commenced in 2005 and was completed in 2008.
- Ballinrees to Limavady Water Main commenced in February 2007
- Ballinrees to Ballymoney Water main commenced in February 2007
- Castor Bay to Forked Bridge Water Main commenced in February 2007
- Castor Bay to Dungannon Strategic Trunk Main is anticipated to commence in 09/10.
- Moys to Banagher Trunk Main is anticipated to commence in 09/10.
- Cross Town Main Extension (Barnetts Park to Purdysburn) is anticipated to commence in 09/10.
- During 09/10 it is proposed to provide additional water storage at the following service reservoirs:  
Dungonnell, Tullaghans,
- Glenlough, Altnahinch and Carland.
- The Service Reservoir Rehabilitation Programme started in 2007/08 and continues during 2009/10. To date 31 service reservoirs have been upgraded. It is proposed to upgrade 12 service reservoirs in 2009/10.

# Appendix 5

## Glossary of Technical Terms

<b>Aesthetic</b>	Associated with the senses of taste, smell and sight.
<b>Authorised Departure (AD)</b>	A time limited authorised departure from the regulatory limit for certain parameters, provided that there is a planned programme of work at the water treatment works to improve the water quality and that there are no adverse health implications.
<b>Authorised Supply Point</b>	A sampling point within the distribution system authorised by the DWI for certain parameters, because the results of the analysis of such samples are unlikely to differ in any material respect from the results of the analysis of samples taken from customers' taps.
<b>Catchment</b>	The area of land that drains into a watercourse.
<b>Chloramination</b>	An alternative form of disinfectant, based on chlorine and ammonia, which provides a longer lasting residual disinfectant in the distribution system compared to free chlorine.
<b>Coagulation</b>	The process of aggregating colloidal and fine particulate matter into a settleable material.
<b>Coliforms</b>	A group of bacteria which may be faecal or environmental in origin.
<b>Compliance assessment</b>	A comparison made by the DWI of data (gathered by NI Water) 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>	NI Water's network of mains, pipes, pumping stations and service reservoirs through which treated water is conveyed to customers.
<b>Drinking Water Directive</b>	European Council Directive (98/83/EC) relating to the quality of water intended for human consumption.



<b>DWI</b>	Northern Ireland Drinking Water Inspectorate - has an independent responsibility to audit drinking water quality compliance against the standards set in the Regulations.
<b>Event</b>	A situation affecting or threatening to affect drinking water quality.
<b>Exceedance</b>	Synonym for contravention (see above).
<b>Faecal coliforms</b>	A sub-group of coliforms, almost exclusively faecal in origin.
<b>Filtration</b>	The separation of suspended particulate matter from a fluid
<b>Groundwater</b>	Water from aquifers or other underground sources
<b>Hydrogen ion</b>	A measure of the acidity or basicity related to the concentration of the hydrogen ion (also referred to as pH).
<b>Incident</b>	An event where there has been a demonstrable deterioration in the quality of drinking water.
<b>Investment programme</b>	Investment in improvement works to water treatment works and distribution systems.
<b>Mains rehabilitation</b>	Restoration or replacement of water mains pipework to a proper condition.
<b>Mean Zonal Compliance</b>	The assessment of water quality at a parameter level based on water supply zones.
<b>Microbiological</b>	Associated with the study of microbes.
<b>m<sup>3</sup>/d</b>	Cubic metres per day.
<b>mg/l</b>	Milligrammes per litre
<b>µg/l</b>	Microgrammes 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>Oocyst</b>	The resistant form in which <i>Cryptosporidium</i> occurs in the environment, and which is capable of causing infection.
<b>Orthophosphoric acid</b>	A chemical dosed in low concentrations at water treatment works to minimise the uptake of lead from old pipework into customers' water.
<b>PAHs</b>	A group of organic compounds known as polycyclic aromatic hydrocarbons, comprising, for the purposes of the Regulations, four substances: benzo(b)fluoranthene, benzo(k)fluoranthene benzo(ghi)perylene and indeno (1,2,3-cd) pyrene,
<b>Parameter</b>	A parameter is any substance, organism or property listed in 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>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, the DWI may authorise a time limited departure from the regulatory value. See 'Authorised Departure'.
<b>Protozoan parasites</b>	A single celled organism that can only survive by infecting a host.
<b>Public register</b>	The information made available by NI Water to the public as required by regulation 34.
<b>Regulations</b>	The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 S.R. No.147.
<b>Remedial action</b>	Action taken to improve a situation.
<b>Service reservoir (SR)</b>	A water tower, tank or other reservoir used for the storage of treated water within the distribution system.

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<b>Springs</b>	Groundwater appearing at the surface at the outcrop of the junction of an impermeable stratum.
<b>Surface water</b>	Water from rivers, impounding reservoirs or other surface water sources.
<b>Technical audit</b>	The means of checking by the DWI that NI Water is complying with its statutory obligations.
<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 (THMs)</b>	A group of organic substances comprising, for the purposes of the Regulations, four substances: trichloromethane (also known as chloroform), dichlorobromomethane, dibromochloromethane and tribromomethane.
<b>UKAS</b>	The sole national accreditation body recognized by government to assess, against internationally agreed standards, organisations that provide certification, testing, inspection and calibration services.
<b>Water Safety Plan</b>	A means of ensuring that a water supply is safe for human consumption based on a comprehensive risk assessment and risk management approach to all the steps in a water supply chain from catchment to tap.
<b>Water supply zone (Zone)</b>	The basic unit of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available.
<b>Website</b>	Location of information on the Internet. NI Water's website is: <a href="http://www.NIWater.com">http://www.NIWater.com</a>
<b>Wholesomeness</b>	A concept of water quality which is defined by reference to standards and other requirements set out in the Regulations.