

Drinking Water Quality in Northern Ireland, 2011

A Report by the Drinking Water Inspectorate for Northern Ireland



Northern Ireland
Environment
Agency





Northern Ireland Environment Agency

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www.doeni.gov.uk/niea/water-home/drinking_water.htm

Foreword

The Drinking Water Inspectorate's primary role is to safeguard drinking water quality through effective regulation. I am, therefore, pleased to present our annual report, in which we provide a regulatory assessment of the quality of both public and private water supplies here, in Northern Ireland, for the 2011 calendar year.

Overall public drinking water quality, which includes results of key tests carried out at water treatment works, service reservoirs and consumers' taps, remains high. However, notwithstanding this, I am disappointed to report that for this year the previously reported upward trend has not been maintained, with a reduced level of overall compliance in 2011: 99.83%, compared with 99.86% in 2010. This decline was due to significant increases in the numbers of aluminium and odour tests not complying with the standards from samples taken at consumers' taps; and also elevated numbers of microbiological contraventions in the water being supplied from service reservoirs and at consumers' taps.

As with previous reports, we look at other data that provides information to help us assess how well NI Water carries out its responsibilities to supply safe, clean drinking water. This includes the reporting of events, and the number of reported consumer contacts for those who have had problems with their drinking water quality. Once again, I highlight the number of events that have arisen, particularly, due to operational issues, including ineffective treatment, and sampling errors which have given rise to unrepresentative sampling. While we welcome the co-operation given to us by NI Water, it is imperative that lessons learnt from events are used to ensure that water treatment works are operated effectively; distribution systems are adequately managed; and samples taken are representative, thereby fulfilling the regulatory requirements. These issues are all within NI Water's control.

NI Water must continue to be vigilant as it goes about its daily operational business of providing safe, clean drinking water. It must also exercise proactive risk management of its water supply systems. This is now a fundamental element of our regulatory framework and will be used as part of the prioritization process to meet the challenges of delivering high quality drinking water.

Consumers expect safe, clean drinking water supplies to be available at all times. Across Northern Ireland, consumers contacted NI Water regarding a range of quality issues associated with their drinking water. I am pleased to report there was a significant decrease in the number of contacts received in 2011: 6,207, compared with 7,008 in 2010; a substantial improvement of 11 per cent. These contacts vary across Northern Ireland, and in this year's report we have included maps to show the areas where these were most commonly made regarding two notification categories: discoloured water, and taste and odour concerns.

Not everyone in Northern Ireland receives their drinking water from the public water supplier, NI Water. A small percentage (less than one per cent) receives water from private water supplies. Water from these supplies is used for a range of purposes (from domestic dwellings to those supplying large commercial and public premises), and the quality of some of these supplies is highly variable. Overall compliance with the regulatory standards in 2011 for private supplies is 98.08%; a level notably lower than that for public supplies. The introduction of 'risk assessment' into the 2009 Private Water Supplies Regulations assists us in identifying where improvements should be made to address the contamination risks (in particular, iron, manganese and microbiological) which can persist in some of these small supplies.

I embrace the opportunities for us to continue to work constructively with other stakeholders as we aim to maintain our high quality of public drinking water and further improve the quality for the users of private water supplies across Northern Ireland, ensuring safe, clean drinking water for all.

I hope you find that this report is both an interesting and useful reference source on drinking water quality in Northern Ireland.



Margaret Herron
Chief Inspector of Drinking Water
September 2012

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Executive Summary

This is the 16th report in a series published by the Drinking Water Inspectorate, acting in our regulatory role in matters relating to drinking water quality. We act on behalf of the Department for Regional Development (DRD) in respect of public water supplies, and on behalf of the Department of the Environment (DoE) in relation to private water supplies.

Our report gives an independent commentary on our assessment of, and our checks on, the quality of drinking water provided by Northern Ireland Water Ltd (NI Water). It also presents details of the quality of the private water supplies for which we have regulatory responsibility.

Public Supplies

Overall public drinking water quality, which includes results of key tests carried out at water treatment works, service reservoirs and consumers' taps, is of a high quality. There has, however, been a reduced level of overall compliance reported in 2011: 99.83%, compared with 99.86% in 2010. While high levels of compliance have been achieved for many parameters, there have been significant increases in the numbers of aluminium and odour tests not complying with the standards from samples taken at consumers' taps during this calendar year. Increased numbers of microbiological contraventions in the water being supplied from service reservoirs and consumers' taps have also been reported.

Compliance with microbiological standards is important as contraventions may indicate a breach in the integrity of the water supply system or a failure in the treatment process. Results confirm that the general safety of drinking water supplies is good, with overall microbiological quality at 99.91%. However, there has been a reduced level of compliance from the 99.95% achieved in the previous reporting year, and this is mainly attributed to increased numbers of service reservoirs and consumers' taps failing to meet the microbiological standard for coliform bacteria.

Looking at the quality of water that consumers receive, we assess compliance with the regulatory standards for 39 different tests over a range of microbiological and chemical parameters. The standards are being met for the majority of these parameters (26). Compliance was not achieved in 2011 for the following 13 parameters: iron, odour, aluminium, trihalomethanes (THMs), taste,

bromate, enterococci, lead, polycyclic aromatic hydrocarbons (PAHs), manganese, turbidity, *E. coli*, and the individual pesticide, MCPA.

Some of these parameters, such as iron and lead, are failures which are common across not only Northern Ireland, but also across the United Kingdom water industry, and relate to water quality problems arising in some distribution systems. Other parameters, such as pesticides, may affect more localized areas. Each failure of a standard is investigated by NI Water to identify the cause and to put the necessary corrective action in place to prevent recurrence. The scale of this work varies: it may be that planned investment in the water infrastructure is necessary; or that changes to operational practices are required. Where necessary, particularly for persistent failures, we may take enforcement action to ensure delivery of the required corrective action in a shorter timescale. In 2011, enforcement action was in place for THMs, iron, aluminium, taste and odour, and MCPA.

For comparative purposes in considering the overall drinking water quality at consumers' taps, we have been using an index referred to as percentage mean zonal compliance (% MZC). This is not a regulatory requirement; it is a calculation that was introduced in 2004 to allow a more statistical assessment of NI Water's performance to be made. It is calculated using the 39 parameters from the regulatory sampling programme. From 2004 to date, overall % MZC has improved by 1.18%: 98.65% in 2004; 99.83% in 2011. While we recognize the improvement which is notably due to increased numbers of tests meeting the iron and THMs standards, there are, however, significantly elevated numbers of tests not meeting the standards for aluminium and odour.

The reporting of 'key' statistics, using data from the regulatory monitoring programmes, can be useful in providing information on trends or used as indicators from which comparisons can be made.

However, high levels of compliance do not guarantee that events that have the potential to affect water quality will not happen. In 2011, 69 events were reported to us, with 44 (64 per cent) categorized as incidents which were determined to have affected drinking water quality. Of these incidents, 64 per cent were related to ineffective treatment at 18 water treatment works. Mitigation of the risks of incidents occurring at water treatment works or within the distribution network is within NI Water's control. It is, therefore, essential that NI Water continues to put learning and appropriate mitigation measures in place as part of its drinking water safety plan approach, and works to prevent the recurrence of drinking water quality incidents.

To secure the continuous provision of safe, clean drinking water, effective operational and maintenance practices need to be applied at every stage of water supply. It is imperative that effective operational performance is achieved to ensure that the risks to public health are being robustly managed by reducing the potential for contamination of drinking water supplies. This is especially the case when normal operating conditions do not prevail, such as in incident situations.

Consumers expect safe, clean, drinking water supplies. To enable us to evaluate consumers' confidence in the quality of drinking water at their taps, we receive information from NI Water on the complaints and concerns expressed by its consumers. In assessing the overall number of contacts made, there was a significant decrease in the number received by NI Water in 2011: 6,207, compared with 7,008 in 2010; a substantial improvement of 11 per cent. As with previous years, the highest number of contacts (59 per cent) made by consumers in 2011 related to the appearance of their drinking water, of which 64 per cent were regarding discoloured water. NI Water has a planned long-term programme of work to rehabilitate its network of water mains, which, as it completes, should assist in addressing many of these consumers' concerns.

Private Supplies

Monitoring for private water supplies has been in operation since 1999. An updated regulatory framework was put in place with the introduction of new regulations in 2009. This is our second year of reporting under this new monitoring regime. As with previous reports, we continue to identify the persistent nature of recurring failures, in particular

for iron, manganese and microbiological contraventions of the regulatory standards. For the 116 private water supplies that we monitored in 2011, overall compliance is reported as 98.08%. Where compliance with the regulatory standards has not been achieved, these contraventions have occurred at a range of supplies: from the small domestic types to the larger commercial supplies, where there is often no treatment in operation. We continue to work with private water supply owners and the local councils to make improvements to these supplies. As the necessary remedial action identified through risk assessments at individual private supplies is undertaken throughout 2012, compliance should improve.

Regulatory Framework

At the end of 2010, the regulations covering both public and private water supplies were changed to address deficiencies that had been identified through the European Commission infraction case regarding the transposition of the Drinking Water Directive, into national law. The purpose of the changes was twofold: to make it mandatory for failures in samples collected from public buildings to be remedied; and to make clearer the duty to minimize disinfection by-products.

Firstly, in dealing with failures reported from public buildings, it was necessary for new regulations to be made, and accordingly, 'The Water Supply (Domestic Distribution Systems) Regulations (Northern Ireland) 2010' came into operation (in April 2010). In 2011, of the 4,764 samples taken at consumers' taps as part of the regulatory sampling programme, 66 (1.39 per cent) were taken from public buildings. Of these, five failed to meet the regulatory standards. When a sample fails a regulatory standard, NI Water must investigate the cause. Where NI Water determines the reason for the failure to be due to the internal domestic distribution systems of a public building, we are notified under these regulations. We acknowledge the assistance and co-operation afforded to us by both NI Water and local council staff in investigating and resolving these failures.

Secondly, amendments were made to both the public and private water supply regulations to make clearer the duties to minimize disinfection by-products. The regulatory standard for total trihalomethanes ([THMs], a group of disinfection by-products) is 100µg/l, and it is satisfying to report that this year the significant investment to upgrade and enhance many of NI Water's

treatment works, together with improved operational control, has resulted in a high level of compliance (99.28%) for our public supplies. To further evaluate how NI Water is controlling the level of these disinfection by-products, we report that in 2011 the average concentration of THMs was 45.3µg/l, with 30 per cent of zones (16 out of a total of 53) identified where the annual average exceeds 50µg/l. I welcome the ongoing work that is being undertaken by NI Water to enable it to demonstrate any necessary additional control measures to further minimize the production of these disinfection by-products.

In relation to private water supplies, we will continue to assess progress with minimization of disinfection by-products, in particular, the evaluation of chlorate and chlorite levels at those sites where chlorine dioxide disinfection is used in the treatment process.

Risk Assessments

Legislative changes in 2009 embedded risk assessment in both public and private water supplies regulation through adoption of the World Health Organization (WHO) drinking water safety plan approach to safeguarding our drinking water supplies. This is an effective way of protecting human health and ensuring good water supply practice through: minimization of contamination of source waters; reduction or removal of contamination through effective treatment processes; and prevention of contamination of the distribution systems.

For public water supplies, work commenced in 2010 for NI Water to undertake risk assessments at all stages in the water supply chain: from catchment, through water treatment facilities, and onwards through distribution networks to consumers. To ensure effective controls are in place to safeguard drinking water quality, our work continues with NI Water in monitoring the risks and mitigation measures identified in these assessments.

With the assistance of Environmental Health Officers in the district councils, a similar process was completed in 2011 for our private water supplies. Risk assessments undertaken for private supplies have highlighted a range of issues: poor source protection, lack of treatment, or failure to maintain treatment. For larger supplies, where the water is used as drinking water for the public, we have endeavoured to drive forward the need for

water safety or management plans to be integral at these sites.

Looking Forwards

Looking forwards we have a specific challenge in meeting the stricter European drinking water standard for lead (10µg/l) which comes into force at the end of 2013. NI Water has been working towards this for several years since the introduction of orthophosphate treatment, which is used to build a protective layer inside pipe work to minimize the release of lead into drinking water. While there has been an improving trend in overall compliance with the current 25µg/l standard since orthophosphate treatment began in 2004 (99.75% in 2011; 94.92% in 2004), we note that there is still a significant amount of work required to comply with the 10µg/l standard: 96.80% achieved in 2011.

The most common sources of lead in drinking water are from pipe work installed in buildings before the 1970's, or from the use of non-approved plumbing solder. While effective water treatment is an important factor in controlling lead levels within pipe work, it alone cannot secure compliance with the new standard. We welcome the work that is ongoing with NI Water, the district councils, health professionals and other interested stakeholders such as the Department of Education and the Housing Executive, to reduce consumer exposure to lead in drinking water, particularly, where lead pipe work and fittings remain in older buildings. NI Water is currently updating its lead strategy in its approach to improving lead compliance.

To sustain the delivery of high quality public drinking water supplies, we uphold a 'Partnership Agreement'¹ to achieve this commonly shared goal. We will continue to engage with NI Water, the Northern Ireland Authority for Utility Regulation (Utility Regulator), the Department for Regional Development, the Consumer Council for Northern Ireland, and the Northern Ireland Environment Agency as part of the investment planning process to identify funding priorities. We recognize that competing priorities exist, and our primary objective is to progress programmes of work that are necessary to secure compliance with drinking water quality standards across Northern Ireland, thereby ensuring safe, clean drinking water.

In relation to private water supplies, we will carry on working with supply owners and the local councils, with the aim of reducing the contamination risks at these sites and improving

¹www.drndi.gov.uk/water_stakeholders_partnership_agreement_2012.pdf

their water quality. To assist in the prioritization of required remedial actions, we will continue to work towards standardizing our risk assessment approach across the varied range of private supplies.

During 2011, we continued to work with a variety of stakeholders regarding a range of water quality issues for both public and private supplies. Towards the end of last year, through this collaboration, a document entitled, "Drinking Water and Health; a guide for public and environmental health professionals and for those in the water industry in Northern Ireland"¹ was published. Through a series of workshops, we were involved in helping professional staff better understand their roles and responsibilities in relation to the safety of our drinking water. We are committed to maintaining close liaison with those who have an interest or responsibility for drinking water safety.

¹www.doeni.gov.uk/niea/water-home/drinking_water/public_water/regulations_guidance/technical_guidance.htm

Section 1
Public Water Supplies



Part 1

Drinking Water Quality

In this part of the report we give an overview of the quality of drinking water supplied by Northern Ireland Water Ltd (NI Water).

We look at the results from the regulatory compliance sampling programme, the events notified to us and the consumer contacts made about drinking water quality.

Where the regulatory requirements have not been met, we provide detail on what corrective action has been taken.

NI Water is a government-owned company with responsibility for supplying and distributing public drinking water throughout Northern Ireland. Figure 1.1 below provides some details about the company.

Drinking Water Quality Testing

Throughout 2011, NI Water sampled drinking water across Northern Ireland to test for compliance with the standards in The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 (as amended). The Regulations require sampling programmes to be in place to ensure that water quality is monitored at water treatment works (WTWs), service reservoirs (SRs), water supply points, and consumers' taps in water supply zones (WSZs).

Tests are carried out for 39 different substances or organisms known as parameters. A description of each and the regulatory limits (or prescribed concentration or value [PCV]) is available on our website.¹

Figure 1.1: NI Water Supply Details, 2011



¹www.doeni.gov.uk/niea/water-home/drinking_water/public_water/regulations_guidance.htm

Overall Drinking Water Quality

Table 1.1: Overall Drinking Water Quality in 2011

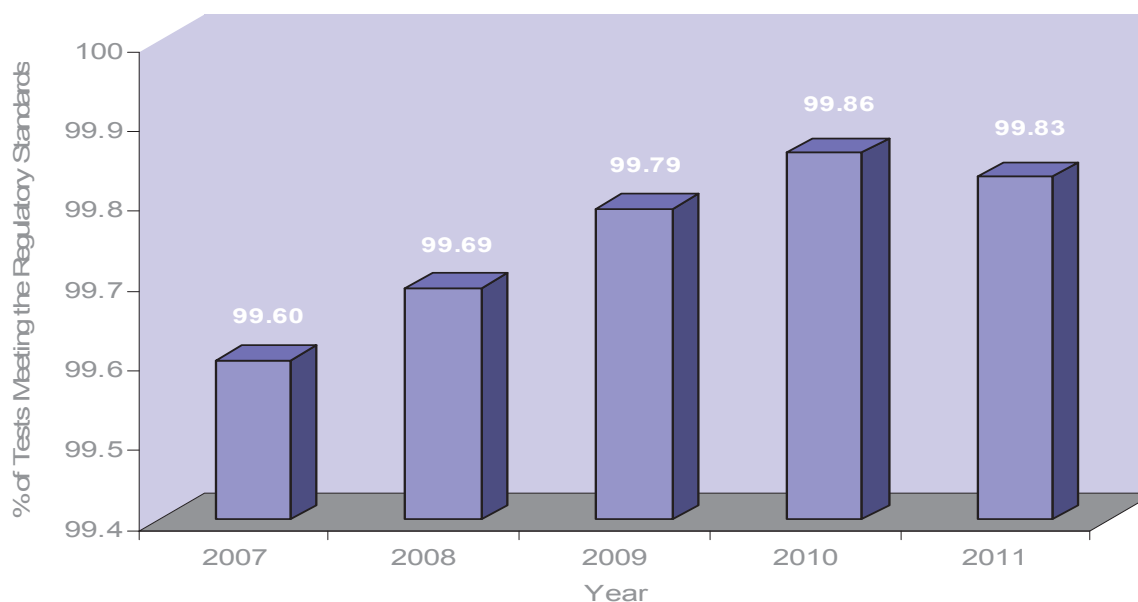
	No. of Tests	No. of Tests not Meeting the Standards
Water Leaving Water Treatment Works		
<i>E. coli</i>	6,927	0
Coliform Bacteria	6,927	0
Microbiological Total	13,854	0
Nitrite	242	0
Turbidity**	6,927	28
Chemical Total	7,169	28
Total (Microbiological and Chemical)	21,023	28
Water in Service Reservoirs		
<i>E. coli</i>	16,862	4
Coliform Bacteria***	16,862	22
Total	33,724	26
Water at Consumers' Taps or Authorised Supply Points		
<i>E. coli</i>	4,764	2
Coliform Bacteria**	4,764	27
Enterococci	408	1
<i>Clostridium perfringens</i> **	2,753	0
Microbiological Total	12,689	30
Zone Chemical Analysis	20,686	89
Supply Point Chemical Analysis	11,950	2
Hydrogen Ion**	1,732	2
Chemical Total	34,368	93
Total (Microbiological and Chemical)	47,057	123
Overall Microbiological Quality	60,267	56 (0.09%)
Overall Drinking Water Quality*	101,804	177 (0.17%)

*Calculated from the mandatory parameters and the four key indicator parameters.

**The four key Indicator parameters.

***All 326 SRs met the 95% compliance rule.

Figure 1.2: Overall Drinking Water Quality, 2007 - 2011



Compliance with microbiological standards is important as contraventions may indicate a breach in the integrity of the water supply system or a failure in the treatment process. Results confirm that the general safety of drinking water supplies is good, with an overall microbiological quality of 99.91% in 2011. There has, however, been a reduced level of compliance from the 99.95% achieved in 2010, and this is mainly attributed to an increased number of service reservoirs and consumers' taps failing to meet the microbiological standard for coliform bacteria in 2011.

Water Quality at Consumers' Taps

Looking more closely at the drinking water quality at consumers' taps, we also report on a comparative index called 'percentage mean zonal compliance' (% MZC); Table 1.2 refers. This is not a regulatory requirement but is a statistical calculation that is based on the 39 parameters contained within Schedule 1 of The Regulations. The calculation reflects the significance of the number of contraventions of a specific parameter in relation to the number of samples taken, which is based on the population size of the water supply zone being monitored. For further details on the % MZC for the parameters for which this indicator is calculated, refer to Part 5 of this report. Thirteen parameters did not achieve full compliance in 2011: iron, odour, aluminium, trihalomethanes (THMs), taste, bromate, enterococci, lead, polycyclic aromatic hydrocarbons (PAHs), manganese, turbidity,

Escherichia coli (*E. coli*), and the individual pesticide, MCPA. The parameter for which the lowest % MZC reported is iron at 98.15%.

Table 1.2: Parameters not Meeting Full Compliance at Consumers' Taps in 2011

Parameter	% MZC
Iron	98.15
Odour	98.47
Aluminium	98.77
Trihalomethanes	99.29
Taste	99.75
Bromate	99.76
Enterococci	99.76
Lead	99.76
Polycyclic aromatic hydrocarbons*	99.76
Manganese	99.87
Turbidity	99.92
<i>E. coli</i>	99.96
Pesticides - other substances**	99.98
% Mean Zonal Compliance	99.83

*(PAHs) - sum of four substances.

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

Substantial investment has been made to improve drinking water quality, particularly, to upgrade water treatment facilities across Northern Ireland. While this is to be welcomed, it is imperative that drinking water quality improvements that have been identified, such as the need to maintain a prioritized programme of water mains rehabilitation across the distribution network, and the ongoing work to optimize water treatment processes, are in place. This should ensure the continued delivery of the necessary measures to enable the provision of safe, clean drinking water supplies across Northern Ireland.

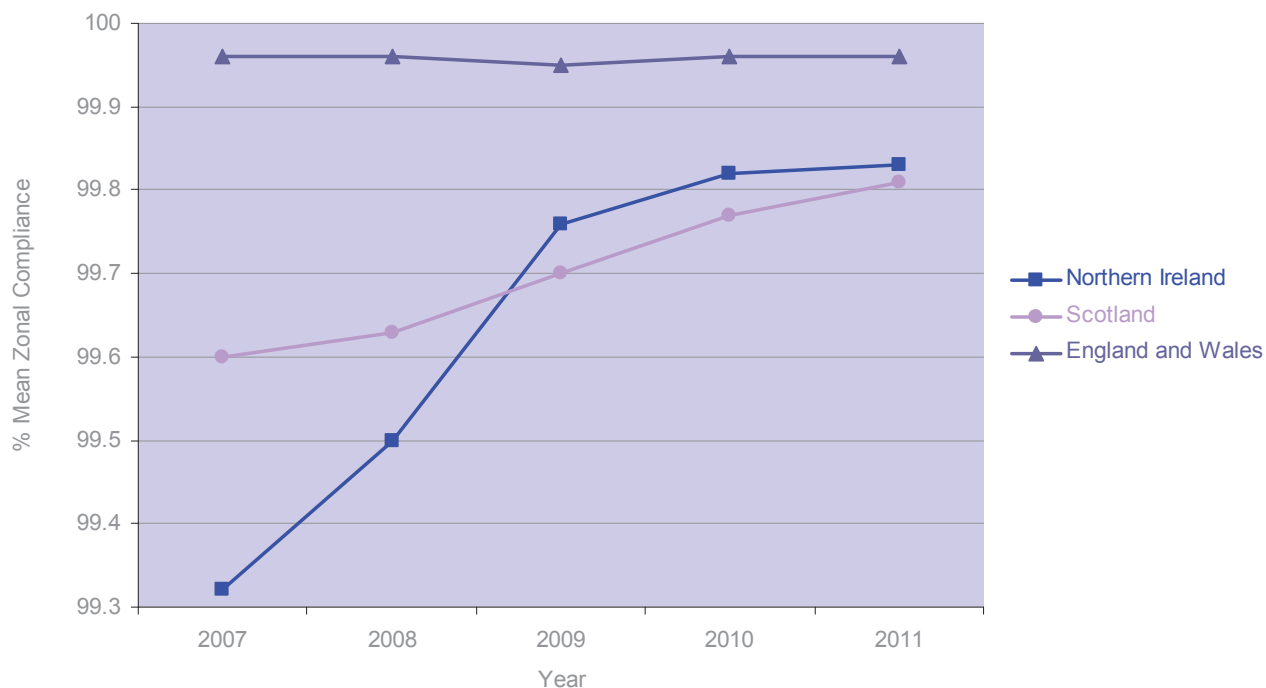
We have previously assessed the quality of water at consumers' taps using % MZC and as improvements, particularly, to water treatment works completed in the last five years, there was significant progress made in improving the overall quality of water received by consumers. Using the % MZC index, Figure 1.3 further illustrates the improvement that has been achieved in Northern Ireland, in the context of the UK, over the last five years in terms of increasing numbers of compliances with drinking water standards at consumers' taps. The overall trend for % MZC continues to improve, with 99.83% reported in 2011.

Water Quality Related to Domestic Distribution Systems

NI Water is required to investigate all failures of drinking water quality standards, including those caused by the internal distribution system within buildings. Where these failures are within domestic dwellings, NI Water must inform the owner of the failure and its assessment of the breach, and give appropriate advice. NI Water does not have any responsibility to put remedial measures in place to deal with such failures relating to the pipe work and distribution systems which fall within the boundary of a property (unless the failure is related to a breach of The Water Fittings Regulations).¹ There were 22 such failures reported to us in 2011 which NI Water determined to be due to the internal plumbing within the domestic property.

However, where NI Water's investigation into the cause of the failure indicates that it is attributable to the internal domestic distribution system in premises where water is supplied to the public (such as schools, hospitals or restaurants), the company is required to notify us under regulation 2(1) of The Domestic Distribution Systems Regulations.²

Figure 1.3: Comparing Drinking Water Quality at Consumers' Taps across the UK, 2007 - 2011*



*% MZC figures reported for Northern Ireland from 2007 to 2010 have been adjusted from those previously reported to standardize the reporting of the % MZC value for the individual pesticide parameter, to enable more accurate year-on-year comparisons to be made.

¹The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009

²The Water Supply (Domestic Distributions Systems) Regulations (Northern Ireland) 2010

- what caused the problem and whether or not it was avoidable;
- what NI Water did in response and how it handled the situation;
- what lessons can be learned to prevent similar incidents in the future; and
- if there were any breaches of The Regulations.

Events Affecting Drinking Water Quality

- 28 (64%) were related to difficulties with the performance of the coagulation processes, or deficiencies at the water treatment works which led to aluminium, hydrogen ion, iron, the individual pesticide (MCPA), THMs and turbidity contraventions;
- two involved *Cryptosporidium* oocysts breaking through the treatment processes which should have acted as barriers; and
- 14 were caused by issues in the distribution system: six bacteriological failures, three of which required “Boil Water Notices” (precautionary measures for public health protection); four due to the condition of the mains; two relating to media interest (one for loss of supply, the second because of significantly elevated chlorine levels); one relating to hydrogen ion arising because of a cement-lined main; and one odour contravention for which the cause was not determined.

Overview of Consumer Complaints

We asked NI Water to provide us with data on the contacts and concerns of its customers during 2011 as we are interested in consumer confidence in drinking water quality.

The data we received for 2011 is presented in Figure 1.4 and shows that, like previous years, the highest percentage of contacts and concerns (59.2%) continues to relate to the appearance of drinking water.

We have been collecting data from NI Water for several years to better understand consumers' concerns (Table 1.3 refers). The information illustrates the high percentage of consumer contacts made relating to the appearance of water, particularly, colour. Concerns about colour can arise when the water can appear orange or brown due to suspended particles of iron, or black due to suspended particles of manganese. Iron and manganese may be present in the raw water passing through inadequate treatment or from corrosion of cast-iron distribution mains.

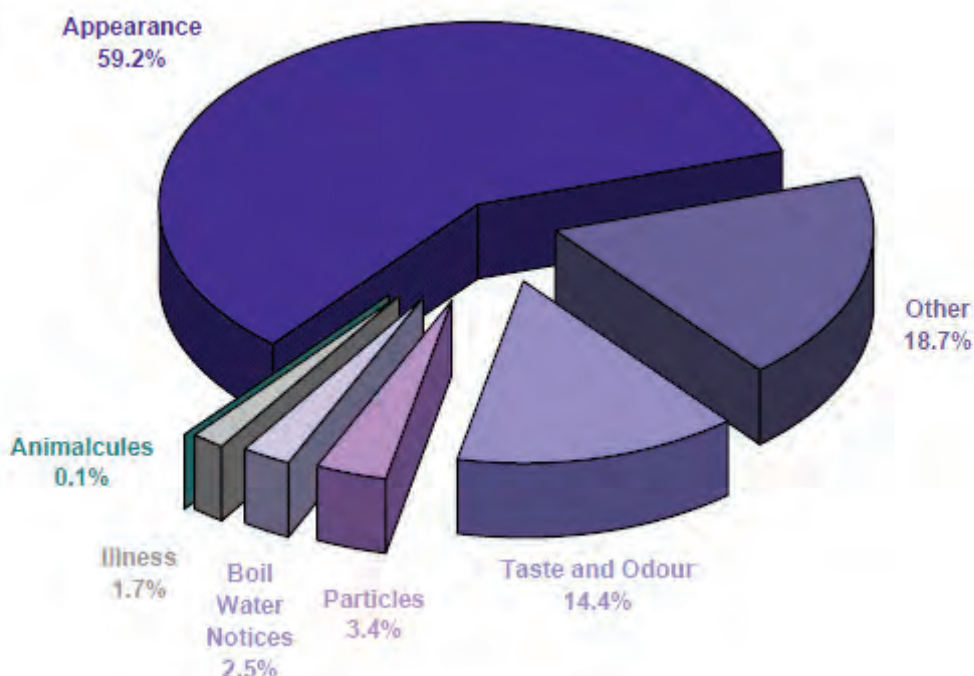
Ongoing and planned long term mains rehabilitation programmes need to target these consumer concerns. More detail on consumer concerns is provided in Part 5.

Table 1.3: Consumer Contacts Relating to Appearance, 2007 - 2011

	Overall Number of Contacts	% of all Contacts Relating to Appearance	% of Appearance Category Relating to Colour
2011	6,207	59.2	63.8
2010	7,008*	67.3	63.9
2009	9,396	65.6	62.3
2008	9,971	63.1	65.0
2007	8,818	66.0	74.1

**This figure does not include the additional number of consumer contacts (approx. 33,350) related to the major 'freeze/thaw' incident that occurred in December 2010/January 2011.*

Figure 1.4: Consumer Contacts and Concerns Received by NI Water in 2011



The Technical Audit Process

Risk Management

Drinking Water Quality Contraventions

Figure 1.5: Risk Assessment Categories in 2011



NI Water's risk assessment scores are based on calculations associated with the significance of results obtained from its sampling programme, along with a factor to take account of the significance of any water quality events within the water supply area. The risk assessment scores are then categorized into low, medium, and high risks, with associated actions required dependent on the risk score banding. The actions required can range from 'no action required' or 'keep under review' for low scores/low risk, to 'probable or possible capital investment' for medium scores/medium risks, through to 'urgent action' required for high scores/high risks. At the beginning of the supply chain, NI Water must continue to be vigilant in its management of its water sources to fully implement a risk-based approach with well informed catchment management plans. This should include close liaison with all those involved in the management of the catchments to assist in the process of preventing potential contaminants entering the water source and impacting on drinking water quality.

NI Water must also take account of how water quality can vary considerably between different sources but can also be affected seasonally as well as during severe weather events. NI Water must make certain that the treatment and controls it has in place at water treatment works are sufficiently robust to satisfactorily treat the variability in raw water quality encountered at each works and ensure water leaving water treatment works is safe and clean.

Regulatory Processes - Enforcement Orders

Where NI Water has failed to comply with its regulatory duties, The Regulations make provision for us to use a range of statutory processes to ensure that compliance is achieved. Details of our Enforcement and Prosecution Policy are available on our website.¹ As part of the enforcement process we may commence with the issue of a 'Consideration of Provisional Enforcement Order' (CPEO) to NI Water, whereby, the company is required to submit an Undertaking to demonstrate what steps it has taken, or is going to take, to ensure compliance with the requirements of The Regulations. Such requirements cover a range of regulatory issues from sample scheduling to remedial measures to bring about compliance with water quality standards.

During 2011, nine CPEOs were in place:

- four of these, relating to non-compliance with the regulatory standard for aluminium, THMs and MCPA, were completed;
- three, relating to non-compliance with the regulatory standard for iron, remained ongoing; and
- two new CPEOs were issued: one related to deficiencies in the sampling schedule; and one addressed significant taste and odour failures within a water supply zone.

For further details on these CPEOs, refer to Annex 7.

Partnership Working

We continue to be part of a partnership agreement,² whereby, all statutory stakeholders are committed to a shared common objective. The aim of the agreement is to facilitate our roles through co-operation and understanding of stakeholders' responsibilities, creating the right working environment and relationships, whilst not overriding our individual responsibilities.

The statutory water stakeholders are:

- Consumer Council for Northern Ireland;
- Department for Regional Development;
- Drinking Water Inspectorate;
- Northern Ireland Authority for Utility Regulation;
- Northern Ireland Environment Agency; and
- NI Water.

The Price Control Process

The price control (PC) process is a mechanism by which NI Water secures its funding and investment priorities for the coming years. Through our involvement in this process we recognize that competing priorities exist and our primary objective is to identify programmes of work that are necessary to secure compliance with drinking water quality standards. This work is carried out as part of the investment planning process and assists in identifying and targeting infrastructure and operational improvements required by NI Water to maintain and enhance its operations in delivering safe, clean water supplies.

¹ www.doeni.gov.uk/niea/dwi_prosecution_policy_-_march_2012.pdf

² www.drndni.gov.uk/water_stakeholders_partnership_agreement_2012.pdf

Part 2
Catchment



Image: Althahinch Water Treatment Works - NI Water

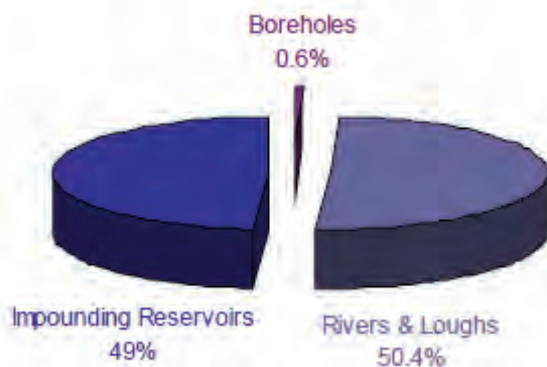
Part 2

Catchment

This section of the report looks at the catchment: the start of the 'water supply chain' from which NI Water abstracts water before it is treated and distributed onwards to consumers' taps. It examines how catchments are managed as part of the drinking water safety plan approach to provide safe, clean drinking water.

Water Abstraction

Figure 2.1: Sources of Drinking Water Used by NI Water



Catchment Risk Assessment

¹[Water Abstraction and Impoundment \(Licensing\) Regulations \(Northern Ireland\) 2006](#)
²[Northern Ireland Environment Agency - Abstraction and Impoundment Licensing Team](#)
³[NI Water's Water Resource Management Plan 2012](#)
⁴[The Water Supply \(Water Quality\) \(Amendment\) Regulations \(Northern Ireland\) 2009 No. 246](#)

the treatment processes to ensure the ongoing provision of safe drinking water supplies. This is particularly important in relation to establishing baseline information on raw water quality to evaluate changes such as increased natural organic matter which can be prevalent in upland peaty surface water sources.

To protect catchments and to keep itself informed of potential contamination and risks, NI Water must liaise closely with other stakeholders such as the NIEA, the Department of Agriculture and Rural Development, and Forestry Service to ensure appropriate lines of communication are in place.

Potential Contaminants

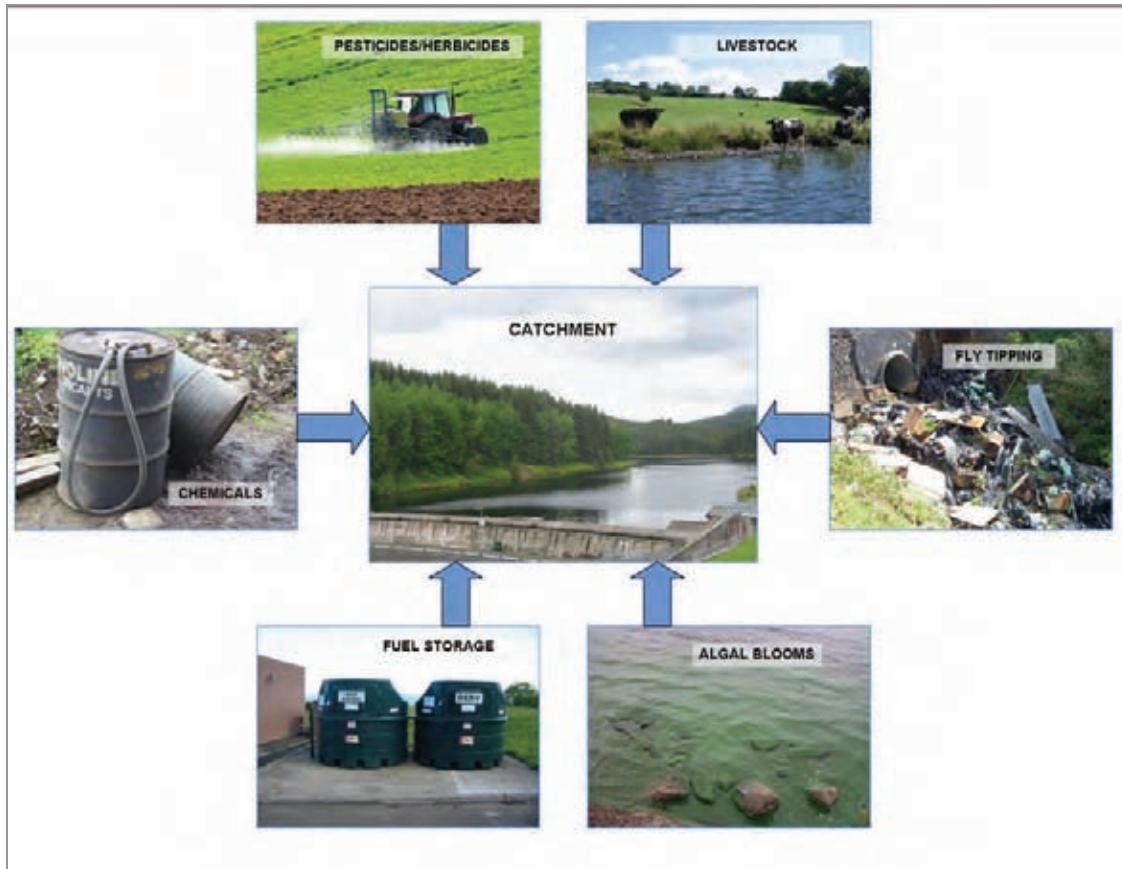
Many factors in catchments have the potential to influence the raw water quality. In general, raw water quality is influenced by both natural and human elements. Important natural factors include wildlife, climate, topography, geology and vegetation; human use factors include point sources (e.g. waste water discharges) and non-point sources (e.g. surface run-off). Many sources contain significant numbers of bacteria, hence, the

importance of having adequate treatment, especially disinfection, to make the water safe to drink. As part of the drinking water safety plan approach, drinking water sources are also risk assessed for the other potential pathogens, such as *Cryptosporidium*. In some catchments the presence of undesirable biologically derived contaminants arising from aquatic micro-organisms such as algae may have the potential to cause taste and odour issues within the water leaving the water treatment works.

NI Water must also consider the deterioration in raw water resulting from increased run off from the surrounding catchment as a result of heavy rain. In tackling such risks identified within the catchment, NI Water is required to have robust treatment processes in place. Having suitable controls in place to enhance source protection provides the first barrier in the provision of safe, clean drinking water.

Some of the sources of potential contaminants which could find their way into the rivers, loughs and reservoirs within our drinking water catchments are detailed in Figure 2.2.

Figure 2.2: Potential Sources of Pollution within Catchments



Pesticides

Table 2.1: Pesticide Detections above the Regulatory Standards

	2011	2010		2009
Water Treatment Works	MCPA	MCPA	Total Pesticides	MCPA
W2501, Altmore*		1	1	
W1701P, Ballinrees		1		
W4722, Belleek	1			
W2802, Carran Hill				2
W4501, Derg	1			1
W3317, Dorisland	1			
W4701, Killyhevlín	1			
Total Number of Contraventions	4	2	1	3

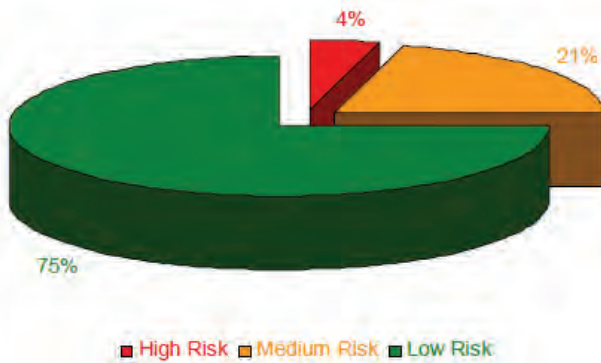
*Altmore WTWs was taken out of service in April 2011.

¹www.dardni.gov.uk/ppp-code

subsequent impact such activities may have on drinking water quality.

Through carrying out its risk assessments, NI Water has identified a potential risk of the herbicide MCPA being present at elevated levels within 25% (six out of 24) of its catchments (see Figure 2.3). The catchments range from loughs and impounding reservoirs fed from upland and lowland sources, to direct river abstractions.

Figure 2.3: Percentage of Catchments and Associated Risk Categorization for Presence of MCPA



The level of risk identified requires NI Water to have in place, or be working towards, remedial measures to ensure levels of MCPA remain below the regulatory standard.

These can include a combination of:

- measures to influence the usage/application and disposal of MCPA within the catchment (e.g. catchment management, liaison with stakeholders);
- balancing flows and abstraction points to reduce the risks of increased MCPA levels during periods of high risk (e.g. following heavy rainfall);
- maintaining and optimizing its treatment for removal of MCPA (e.g. GAC); and
- undertaking feasibility studies for additional treatment options for the reduction of MCPA levels at high risk WTWs.

Surface waters which are abstracted for the production of drinking water for both public and private drinking water supplies are required to be identified and mapped within NIEA's river basin management plans¹

Under Article 8 of the Water Framework Directive (WFD), there is a requirement to put in place an appropriate sampling programme to monitor substances discharged within Drinking Water Protected Areas (DWPAs) that may cause deterioration in the status of the water body.

We are committed to working with NI Water and NIEA in continuing to implement the requirements of the WFD in relation to DWPAs. It is important that NI Water's drinking water safety plans, associated catchment management plans, and raw water sampling programmes are closely aligned with the requirements in the WFD to have clearly defined DWPAs for all of NI Water's drinking water abstractions.

Sustainable Catchment Area Management Planning (SCAMP)

In managing its catchments and its water treatment processes, NI Water has been adopting the principles of SCAMP, within a number of its catchments. During 2011, this SCAMP NI project has involved the company collaborating with a number of organizations, including The Royal Society for the Protection of Birds (RSPB), The Mourne Heritage Trust, The Woodlands Trust, and the Ulster Wildlife Trust, on a number of projects. For 2011/2012, these projects will initially cover the catchments for Dungonnell WTWs, Killylane WTWs, and Moyola WTWs. This work will look at mainly long-term sustainable solutions to improving land management practices within these catchments, with the objective of improving the quality of raw water being used for abstraction purposes. Such improvements should provide more cost-effective treatment options, with the potential cost savings and environmental benefits associated with a reduction in energy and chemical usage.

¹www.doeni.gov.uk/niea/water-home/wfd.htm

Part 3 Water Treatment



Image: Carran Hill Water Treatment Works - NI Water

Part 3 Water Treatment

After source protection, the control measures to remove contaminants are treatment processes. In this part of the report we have provided details of the key parameters such as trihalomethanes, turbidity, and aluminium, which are used to monitor the effectiveness of the treatment processes.

NI Water must ensure that the treatment processes it has in place at each water treatment works are robust and designed to deal with the range of raw water quality which could occur within the water source.

In Northern Ireland, surface waters provide the main source for drinking water supplies. Water treatment processes are used as barriers to control the risk of contaminants entering water supplies.

Water treatment processes include the physical removal of potential contaminants by using chemical coagulation/flocculation, sedimentation, or flotation, and filtration to prepare the water for disinfection. The primary aim in water treatment is to eliminate any pathogenic micro organisms and provide a safe, clean drinking water supply. A typical water treatment process is shown in Figure 3.1.

Figure 3.1: Generic Water Treatment Process

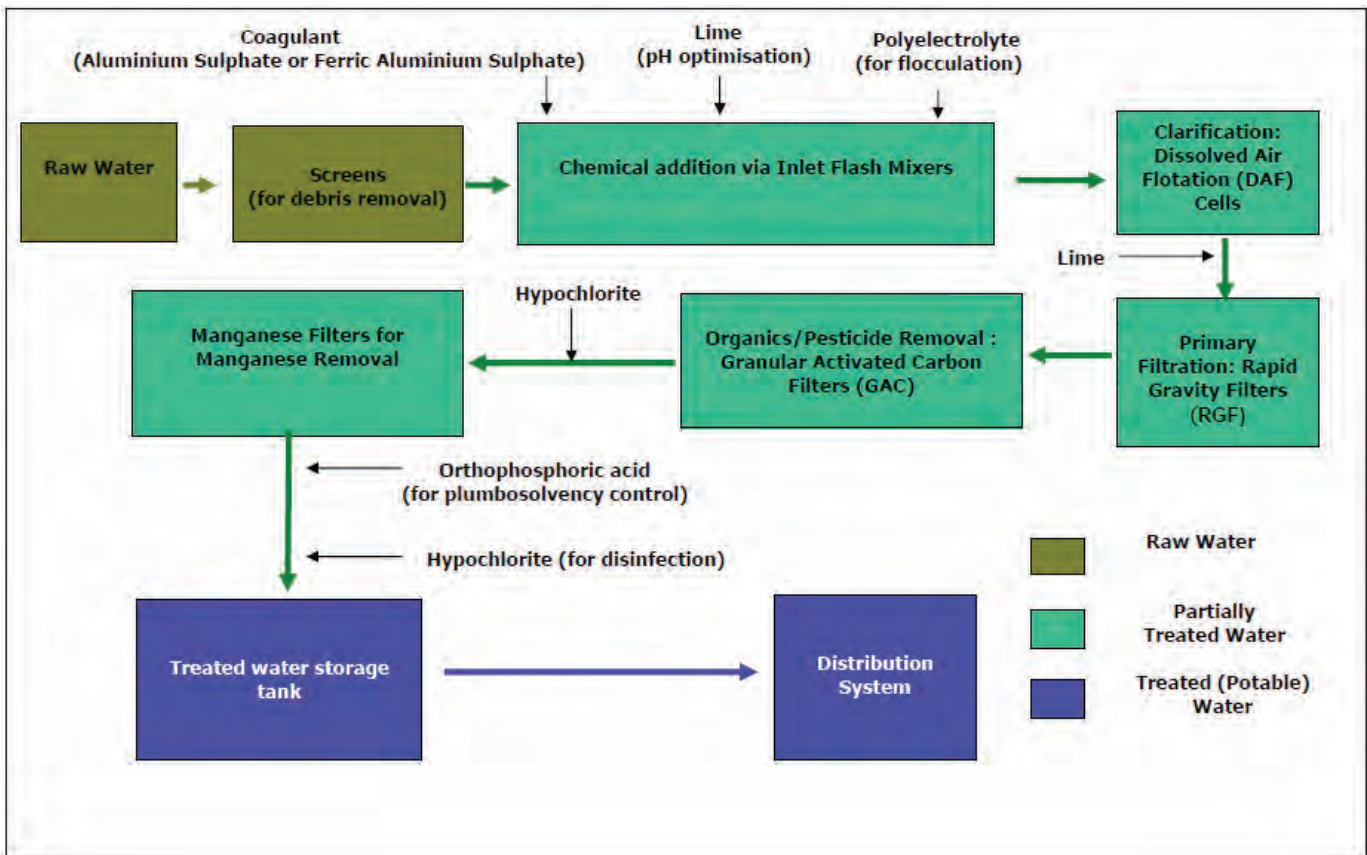


Table 3.1: Water Quality at Water Treatment Works, 2011

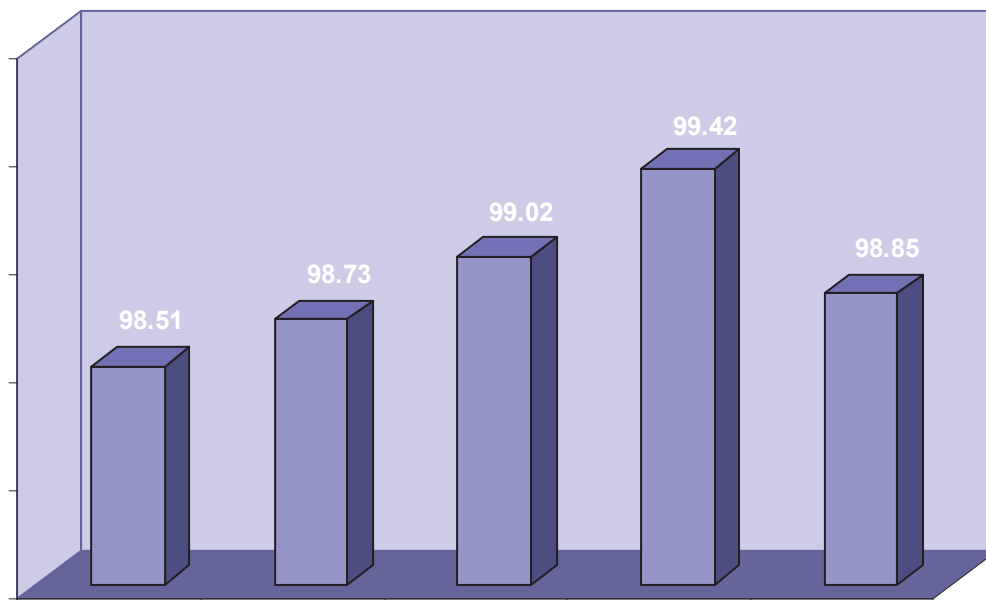
Parameters	Place of Sampling	Total No. of Tests in 2011	No. of Tests not Meeting the Standards in 2011	% of Tests not Meeting the Standards	
				2011	2010
Process Control Parameters					
Colour	WSZ	1,732	0	0.00	0.00
Aluminium	WSZ	1,732	20	1.15	0.58
Trihalomethanes	WSZ	408	3	0.74	1.85
Bromate	WSZ	408	1	0.25	0.00
Disinfection Parameters					
Coliform bacteria	WTWs	6,927	0	0.00	0.01
<i>E. coli</i>	WTWs	6,927	0	0.00	0.00
Turbidity	WTWs	6,927	28	0.40	0.38
Number of Water Supply Zones (WSZs) - 53			Number of Water Treatment Works (WTWs) - 29		

Process Control Parameters

Aluminium

- five were caused by problems with pH adjustment (three at Drumaroad, one at Carmoney and one at Dorisland WTWs);
- four were caused by freeze/thaw damage within Dunore Point WTWs;
- one was caused by a control system instrumentation fault at Lough Macrory WTWs; and
- one was caused by operational work on site at Lough Fea WTWs when a clarifier was taken out of service to be cleaned.

Figure 3.2: Percentage of Tests Meeting the Regulatory Standard for Aluminium, 2007 - 2011



Trihalomethanes (THMs)

THMs are disinfection by-products that arise when chlorine, which is used to disinfect the water and make it microbiologically safe to drink, is added to water containing naturally occurring organic substances. Improved treatment processes introduced over recent years and good operational practice in removing organic substances at water treatment works have resulted in the highest ever THM compliance (99.26%) being recorded in 2011. Only three samples failed to meet the standard (100µg/l). NI Water must fully consider the formation of THMs and other disinfection by-products as part of its overall disinfection policy. Where possible, without compromising disinfection, NI Water must continue to keep all disinfection by-products, including THMs, to as low a level as possible. More details on THMs can be found in Part 5 of this report.

Disinfection Parameters

The disinfection parameters (Table 3.1 refers) look at the effectiveness of disinfection and pathogen removal. To safeguard drinking water from the risk of microbiological organisms being present, the process of effective disinfection is fundamental to treatment works' operation. It is, therefore, paramount that NI Water achieves its primary duty of disinfecting drinking water before it is supplied to consumers and that appropriate critical control measures are in place.

In 2011, NI Water reported full compliance for coliform bacteria and *E. coli* at water treatment works. There was, however, a slight decrease in compliance with the turbidity standard (0.4% in 2011; 0.38% in 2010). Through the ongoing review and implementation of its disinfection policy, NI Water should continue to ensure that the high level of compliance noted for the disinfection parameters is maintained and improved. The policies and procedures relating to disinfection should also inform and be linked into NI Water's risk based approach within its DWSPs and to its regulation 28 risk assessment reports. This will provide an assurance that the disinfection process is appropriately managed and, where it is not, risk factors will be identified through individual DWSPs and the necessary mitigation measures put in place.

E. coli and Coliform Bacteria

Testing for *E. coli* and coliform bacteria at water treatment works provides assurance that water is

being treated adequately to remove bacterial and viral pathogens. In 2011, *E. coli* and coliform bacteria were not detected in any of the 29 water treatment works that supply water across Northern Ireland.

Turbidity

The regulatory standard for turbidity leaving a water treatment works is 1 NTU. The finely suspended particles which cause turbidity in water must be removed by effective water treatment in preparation for the disinfection process. Where treatment is inadequate or there is disturbance during onward storage, these particles may increase turbidity levels in the water going into supply. As well as being a regulatory requirement, it is also considered good operational practice to ensure that a turbidity value below 1 NTU is achieved post treatment to ensure effective disinfection.

Turbidity contraventions occurred at 14 (48%) water treatment works in 2011. Of the 6,927 samples taken for turbidity analysis from water treatment works, 28 (0.40%) failed to meet the standard. Of these failures, 15 (54%) were due to unrepresentative sampling; six (21%) were related to treatment problems; six were due to inadequate treatment in place to remove high levels of iron and manganese which are naturally present in the ground water at Gortlenaghan Borewell; and one was due to disturbance in a tank caused by difficult operating conditions during the 'freeze/thaw' incident. Gortlenaghan Borewell was removed from service in April 2011 as part of the planned infrastructure investment programme.

Indicator Parameter

Clostridium perfringens

The Regulations require monitoring for *Clostridium perfringens* as an indicator parameter, and it can be used in association with other parameters to assess the efficiency of water treatment processes. This organism is a spore-forming bacterium that is exceptionally resistant to unfavourable conditions in the water environment: extremes of temperature and pH; and disinfection processes such as chlorination and ultraviolet light.

In 2011, 2,753 tests were carried out for *Clostridium perfringens* on samples collected from water leaving treatment works. Full compliance with the regulatory standard of 0/100ml was achieved.

Drinking Water Quality Improvements at Water Treatment Works

Enforcement Action - Consideration of Provisional Enforcement Orders (CPEOs)

Part 4 Water Distribution Systems



Image: Ballymageogh Service Reservoir - NIEA

Part 4

Water Distribution Systems

In this part of the report we provide details of the quality of treated water which is supplied through the distribution system. The protection of the distribution system, which is an extensive network of storage reservoirs and pipes, is essential for providing safe drinking water.

E. coli at Service Reservoirs

Microbiological Quality in Distribution Systems

Table 4.1: Water Quality Indicators within the Distribution System

Parameters	Place of Sampling	No. of Tests in 2011	No. of Tests not Meeting the Standards in 2011	% of Tests not Meeting the Standards in 2011	% of Tests not Meeting the Standards in 2010
Reservoir Integrity					
Coliform bacteria	SR	16,862	22	0.13	0.05
<i>E. coli</i>	SR	16,862	4	0.02	0.01
Distribution Maintenance					
Turbidity	WSZ	1732	1	0.06	0.06
Iron	WSZ	1732	30	1.73	2.02
Manganese	WSZ	1732	2	0.12	0.35

Coliform Bacteria at Service Reservoirs

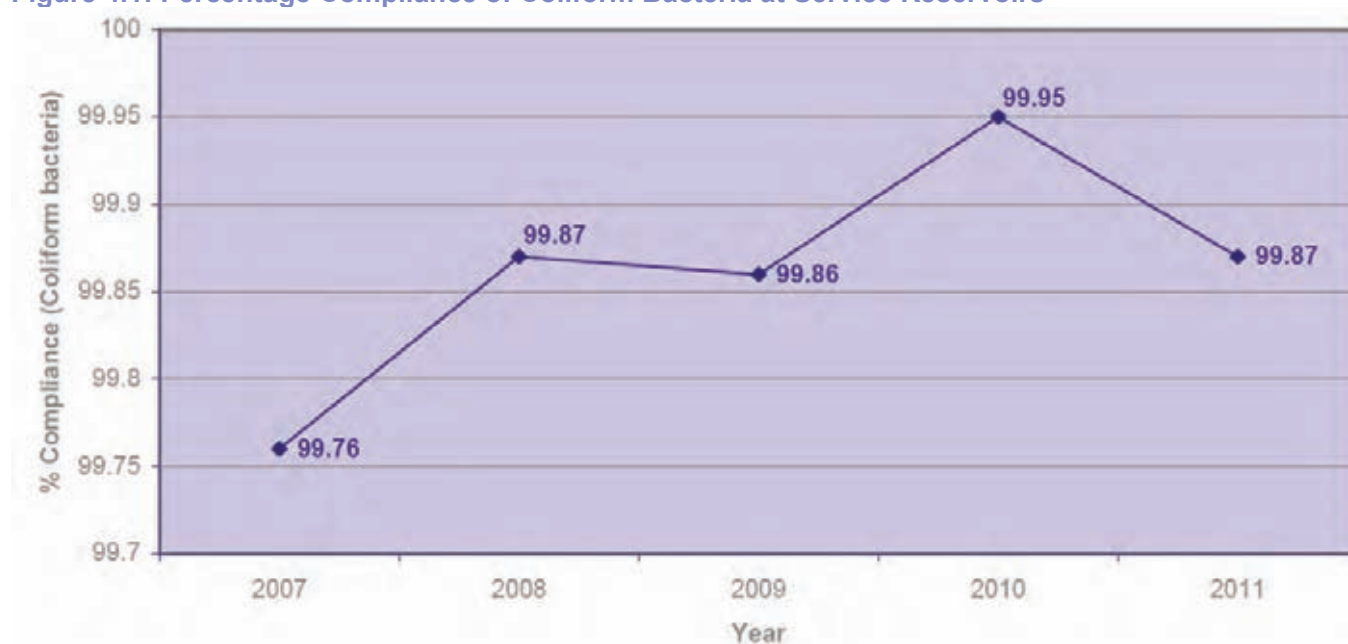
The Regulations require that at least 95 per cent of samples collected weekly from each service reservoir throughout the year are free from all coliform bacteria. Of the 326 service reservoirs sampled in 2011, all met this regulatory standard. However, coliform bacteria were detected on 22 occasions at 20 (6.1%) service reservoirs. Compared with last year, this is a significant increase, as in 2010, coliform bacteria were only detected on eight occasions at eight (2.4%) service reservoirs (see Fig 4.1).

Of the 22 occasions coliform bacteria were detected in 2011, *E. coli* was also detected on four

occasions (see previous section on *E. coli*). Of the other 18 samples which failed the coliform bacteria standard, four were related to inadequate disinfection; no cause could be determined on eight occasions; and six failures were attributed by NI Water to unrepresentative sampling. NI Water must have robust control measures in place to ensure the integrity of sample collection.

An event was reported for one service reservoir (Rathkeel) following the detection of coliform bacteria and associated resample failures in the distribution system. No obvious defects were found during an internal inspection of the reservoir later in the year.

Figure 4.1: Percentage Compliance of Coliform Bacteria at Service Reservoirs



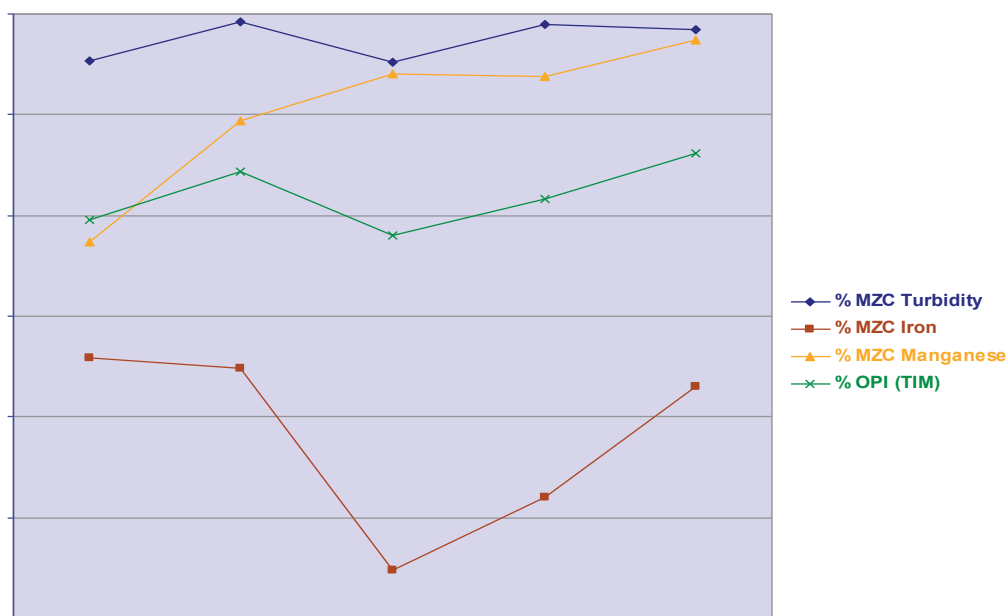
Assessment of Reservoir Integrity

Assessment of Distribution Maintenance

Table 4.2: Operational Performance Index

Parameter	2011 (% MZC)	2010 (% MZC)
Turbidity	99.92	99.95
Iron	98.15	97.60
Manganese	99.87	99.69
OPI (TIM)	99.31	99.08

Figure 4.2: OPI (TIM) and % MZC for Turbidity, Iron and Manganese, 2007 - 2011



Distribution Networks' Mains Rehabilitation Programme

NI Water has an ongoing mains rehabilitation programme to restore or replace the existing water mains pipe work which takes into consideration many factors, including water quality, water pressure, leakage, bursts, and sufficiency of supply.

In Northern Ireland, there are over 26,000 kilometres of water mains that deliver water to consumers' taps, and many of these mains are made of cast iron. The condition of the water mains may result in consumers receiving discoloured drinking water due to the presence of iron or manganese.

The ongoing delivery of new and upgraded treatment works throughout recent years has, in many instances, reduced the levels of iron and manganese being carried over from ineffective treatment into the distribution system as the treatment process is now more robust. However, the accumulation of these deposits over many years within the distribution network needs to be controlled as part of ongoing distribution maintenance. NI Water has operated a continuous scouring and cleaning programme to minimize water quality problems associated with these accumulations.

Water quality issues do occur which may cause localized concerns to consumers. In 2011, one such event occurred in the Ballymoney area. Bacteriological samples taken to check water quality following a mains replacement were unsatisfactory. Further samples were also found to be unsatisfactory and on the advice of the Public Health Agency (PHA), NI Water issued "Boil Water Before Use Notices" to approximately 3,500 properties. Notices remained in place for nine days. The event caused significant customer concern evidenced by over 5,000 customer contacts, and also attracted significant media and political interest.

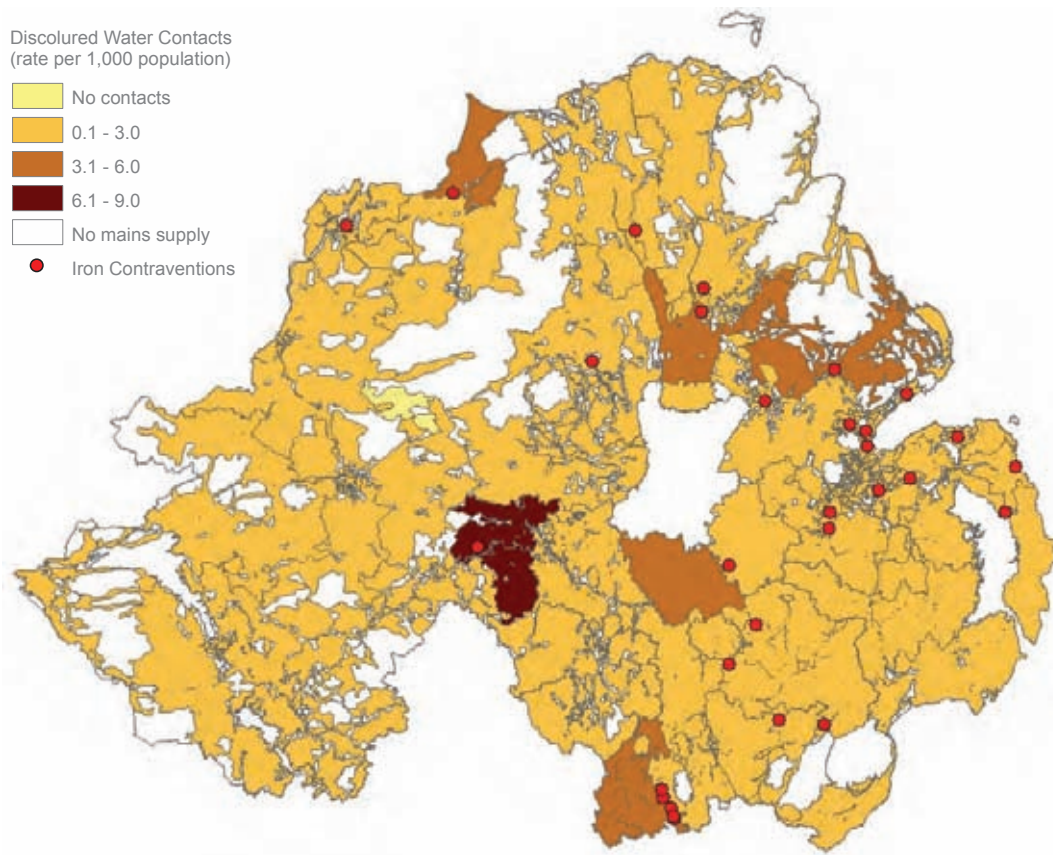
We continue to monitor NI Water's progress with the work associated with the corrective actions required to ensure, as far as is reasonably practicable, that the same problem does not happen again.

NI Water has recently implemented a new Watermains Rehabilitation Framework to undertake work across Northern Ireland as identified by the programmes of work from the zonal studies. The drivers for this programme of work are maintenance of the system, pressure improvement, reduction in interruption to supplies, water quality issues, reduction in levels of leakage and allowance for growth in demand.

To assist in the process of prioritizing its mains rehabilitation programme, NI Water uses water quality information from: the regulatory compliance monitoring programme, operational monitoring, customer contacts, and zonal studies.

Discoloration of tap water often prompts consumers to contact NI Water. The number of people making contact is reported annually to us. In 2011, there were over 2,300 contacts regarding discoloration. This represents 64 per cent of the total contacts regarding appearance. This is a lower figure than for 2010 when there were over 3,000 contacts regarding discoloration (also 64 per cent of the total contacts regarding appearance). Figure 4.3 graphically demonstrates the rate of customer contacts per 1,000 population in water supply zones throughout Northern Ireland. Also included on the map is a plot of regulatory contraventions of the iron standard (200µg/l) throughout Northern Ireland in 2011. The presence of excessive iron may make the appearance of the water unacceptable to consumers. The mains rehabilitation referred to earlier in this section should have a positive impact on iron compliance, and therefore address many of the consumers' concerns about the appearance of their water.

Figure 4.3: Rate of Consumer Contacts per 1,000 Population Reporting Discoloured Water in 2011



Part 5
Consumers' Taps



Part 5

Consumers' Taps

In this part of the report we look at the quality of water at the end of the water supply chain, where after it has been treated, it is distributed and made available at consumers' taps.

Drinking Water Quality at Consumers' Taps

- Northern Ireland reports 99.83%;
- England and Wales, 99.96%; and
- Scotland, 99.81%.

¹[The Water Supply \(Domestic Distribution Systems\) Regulations \(Northern Ireland\) 2010](#)

Table 5.1: % Mean Zonal Compliance of Samples Taken at Consumers' Taps in 2011

Parameter	Number of Samples	Number of Samples not Meeting the Standards	% Zonal Compliance
Iron	1,732	30	98.15
Odour	1,729	24	98.47
Aluminium	1,732	20	98.77
Total trihalomethanes	408	3	99.29
Taste	1,729	6	99.75
Bromate	408	1	99.76
Enterococci	408	1	99.76
Lead	408	1	99.76
PAH - sum of four substances	408	1	99.76
Manganese	1,732	2	99.87
Turbidity	1,732	1	99.92
<i>E. coli</i>	4,764	2	99.96
Pesticides - other substances*	10,277	2	99.98
Colour	1,732	0	100.00
Sodium	408	0	100.00
Nitrate	408	0	100.00
Nitrite	408	0	100.00
Nitrite/nitrate formula	408	0	100.00
Copper	408	0	100.00
Fluoride	240	0	100.00
Arsenic	408	0	100.00
Cadmium	408	0	100.00
Cyanide	238	0	100.00
Chromium	408	0	100.00
Mercury	408	0	100.00
Nickel	408	0	100.00
Antimony	408	0	100.00
Selenium	408	0	100.00
Total pesticides	239	0	100.00
Boron	408	0	100.00
Benzo(a)pyrene	408	0	100.00
Tetrachloromethane	408	0	100.00
Tetrachloroethene/trichloroethene - sum	408	0	100.00
1,2-dichloroethane	408	0	100.00
Benzene	408	0	100.00
Aldrin	239	0	100.00
Dieldrin	239	0	100.00
Heptachlor	239	0	100.00
Heptachlor epoxide	239	0	100.00
Total Number of Samples	38,216	94	
% Mean Zonal Compliance			99.83

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

Chemical/Physical Quality

Iron

Trihalomethanes

Odour

Aluminium

In relation to the requirement to keep the disinfection by-products as low as possible, the average total THM values are presented in Figure 5.1. Across Northern Ireland, the average concentration of THMs was 45.3µg/l in 2011, with 30 per cent of zones (16 out of a total of 53) identified where the annual average exceed 50 per cent of the standard. NI Water is required to demonstrate by risk assessment that disinfection by-products are minimized, ensuring any additional control measures considered necessary are documented.

Taste

Taste can occur naturally in water, particularly in surface sources during the summer due to increased biological activity of micro-organisms. Water treatment aims to remove the organic material that may cause taste problems to arise.

Of the 1,729 samples taken in 2011, six failed to comply with The Regulations. Two (33%) of these failures occurred in the Killyhevlin Enniskillen Water Supply Zone and were notified by NI Water as a water quality event (see odour section above). Another event was notified regarding a single property because of the level detected. All resamples were satisfactory and no cause could be determined. One taste contravention was related to local contamination from diesel saturated ground (again, see odour section above). No reason could be identified for the remaining two failures.

Bromate

Bromate may be generated in the manufacture of sodium hypochlorite disinfectant. It may also be formed during disinfection of drinking water through a reaction between naturally occurring bromide with strong oxidants (usually ozone).

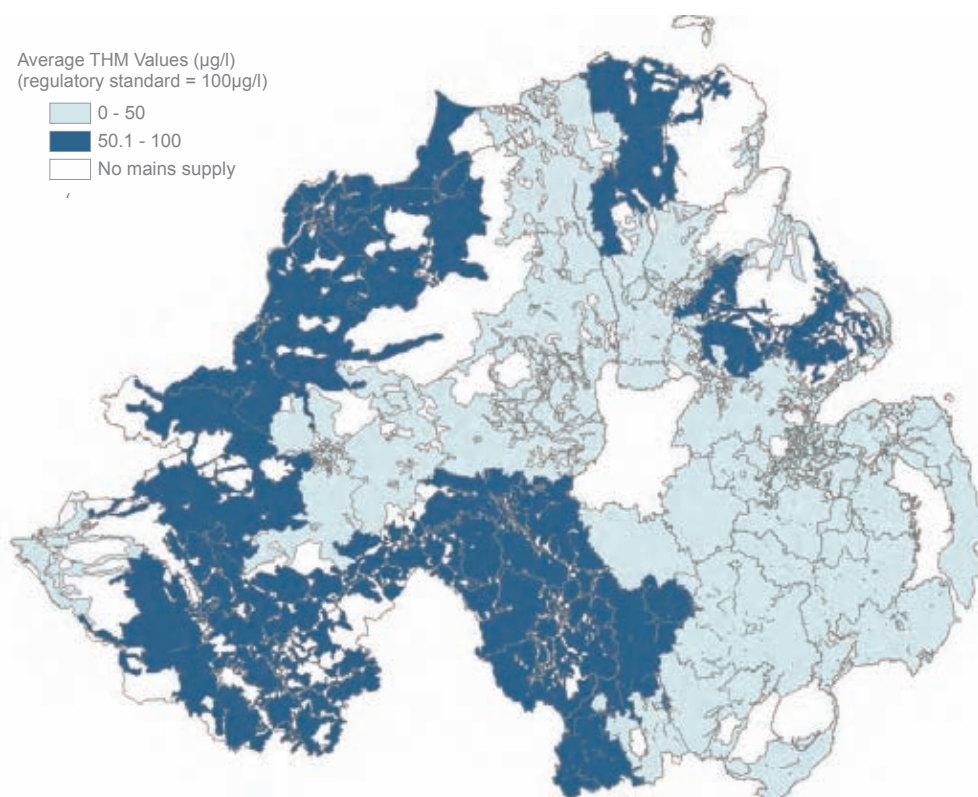
During 2011, of the 408 samples tested for bromate, one (0.25%) failed to meet the standard of 10µg/l. Ozonation is not used at the water treatment works supplying the area where this failure occurred, and the salt used to make the sodium hypochlorite solution was low in bromide. The resamples taken in response to this failure were all significantly below the regulatory limit.

Lead

The regulatory requirements are set as an interim lead standard of 25µg/l which was to be met by 25 December 2003, with a final standard of 10µg/l to be met by 25 December 2013.

Meeting the lead standard is a complex matter because although some lead pipes are owned by NI Water, most belong to consumers, i.e. building owners. Many older properties still have service pipes and internal plumbing, wholly or partly, comprised of lead (the use of lead pipes has been banned since the early seventies).

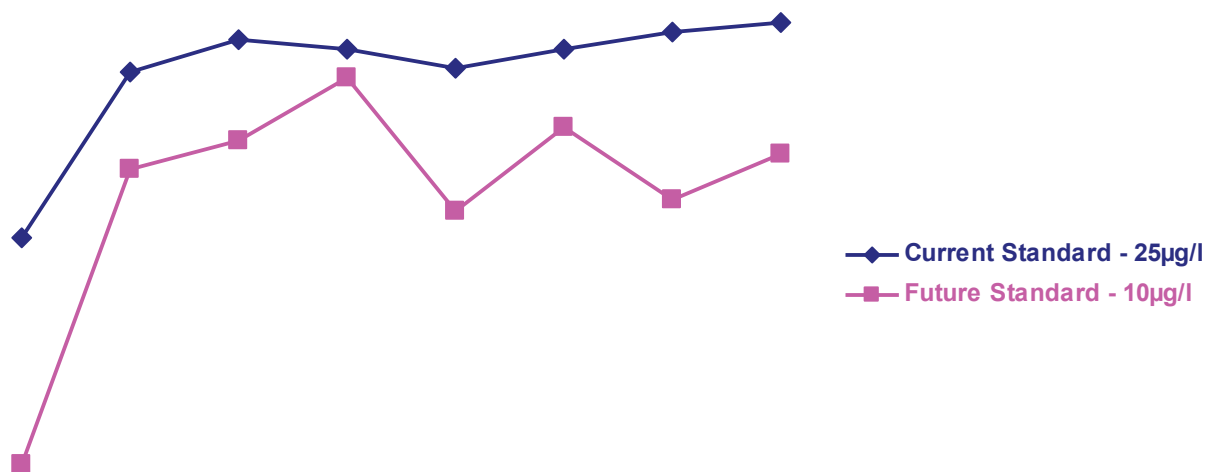
Figure 5.1: Average THM Values in Water Supply Zones across Northern Ireland in 2011



Improving Compliance with Current and Future Lead Standards

- optimize orthophosphate treatment throughout distribution networks to achieve compliance with the 10µg/l lead standard by December 2013;
- continue opportunistic replacement of lead service pipes;
- replace lead pipe work at the request of the consumer or due to a regulatory requirement; and
- replace lead pipe work as part of the mains rehabilitation programme.

Figure 5.2: Percentage of Tests Meeting the Current and Future Standards for Lead, 2004 - 2011



In addition to the compliance sampling requirements, NI Water undertakes a more extensive operational sampling programme for lead. Results from this sampling programme highlight those water supply areas which have not achieved a compliance target of 98 per cent for 10µg/l (Figure 5.3 refers). Following the introduction of new water treatment processes and the rezoning of water supply zones over recent years, NI Water need to keep its lead reduction strategy under review to ensure that it is able to demonstrate that treatment processes including orthophosphate dosing and pH control have been optimised.

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are a group name for several substances found in petroleum-based products such as coal tar. They can be found in water sources due to urban runoff and industrial activities or may be present in distribution systems where coal tar linings that were used in the past to protect water mains may still be in place.

In 2011, of the 408 tests for PAHs, one failed to meet the standard of 0.10µg/l. The property was supplied by a PVC main. The main was flushed and there were no PAHs detected in the resamples taken in response to this failure.

Manganese

The regulatory standard for manganese has been set for aesthetic reasons. Manganese occurs naturally in many of Northern Ireland's water sources and is removed by effective water treatment. Where treatment is inadequate, manganese and iron can accumulate in distribution pipes.

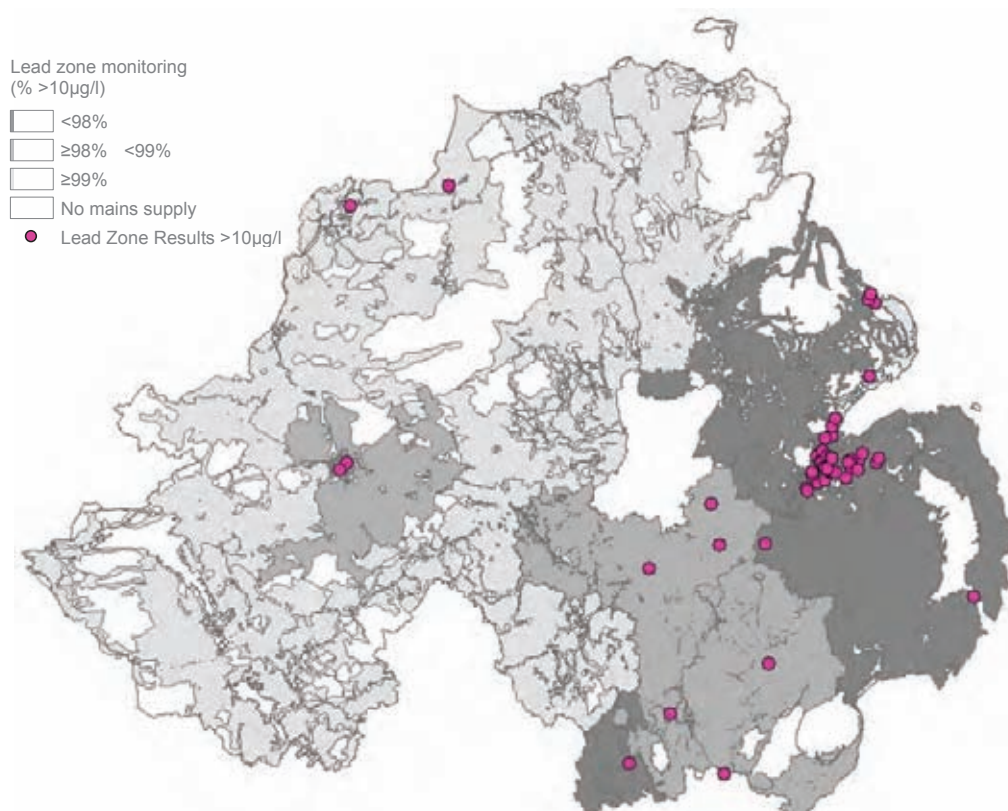
Of the 1,732 samples taken for manganese in 2011, the regulatory standard of 50µg/l was not met on two (0.12%) occasions. Follow up investigations were unable to determine the cause of these contraventions and all resamples were satisfactory.

Turbidity

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.

Of the 1,732 samples taken in 2011, one failed to meet the turbidity standard of 4NTU for consumers' taps, and was probably caused by disturbance of the mains.

Figure 5.3: Lead Zone Monitoring, 2011 - Results >10µg/l



Pesticides

Enterococci and *E. coli* at Consumers' Taps

Coliform Bacteria at Consumers' Taps

Microbiological Quality

Table 5.2 Microbiological Quality at Consumers' Taps

Parameter	Number of Tests	Number of Tests not Meeting the Standards	% of Tests not Meeting the Standards in 2011	% of Tests not Meeting the Standards in 2010
Enterococci	408	1	0.25	0.00
<i>E. coli</i>	4,764	2	0.04	0.04
Coliform bacteria	4,764	27	0.57	0.42
Total	9,936	30	0.30	0.22

Sampling at Public Buildings

Of the 66 samples taken at taps in public buildings during 2011 as part of NI Water's compliance monitoring programme, one sample failed for odour. In carrying out its investigations, it was determined that the failure was due to the quality of the water within distribution and was not related to the internal distribution system in the building.

For samples taken by NI Water at public buildings, outside of those taken as part of its compliance monitoring, these are reported on in Part 1 of this report under 'Water Quality Related to Domestic Distribution Systems'.

NI Water Consumer Contacts

To enable us to make an assessment of consumer confidence in the quality of drinking water at consumers' taps, NI Water provided us with information on the complaints and concerns of its customers during 2011 (Table 5.3 below refers). The information we received showed that while the overall number reported has reduced in 2011, 59.2 per cent of all complaints and concerns were related to appearance (see Figure 5.4), a similar trend to that of 2010, when 67.3 per cent were related to appearance.

Table 5.3: Categories of Water Quality Contacts Received by NI Water in 2011

Contact Category		Number of Contacts
Appearance	Colour	2,344
	General	136
	Hardness	38
	Stained Washing	19
	White - Air	795
	White - Chalk	342
Taste and Odour	Chlorinous	441
	Earthy/Musty	117
	Other	289
	Petrol/Diesel	41
	TCP	8
Illness		104
Particles		211
Animalcules		4
Boil Water Notice		158
Other	Water Quality Concern - Campaigns	19
	Water Quality Concern - Incident Related - General	75
	Water Quality Concern - Lifestyle	15
	Water Quality Concern - Pets/Animals	19
	Water Quality Concern - Sample	774
	Water Quality Concern - Lead	96
	Water Quality (No Concern) Fluoride	1
	Water Quality (No Concern) Other Information	42
	Water Quality (No Concern) Water Hardness	76
	Water Quality (No Concern) Water Quality Report	43
	Miscellaneous	0
TOTAL		6,207

Appearance

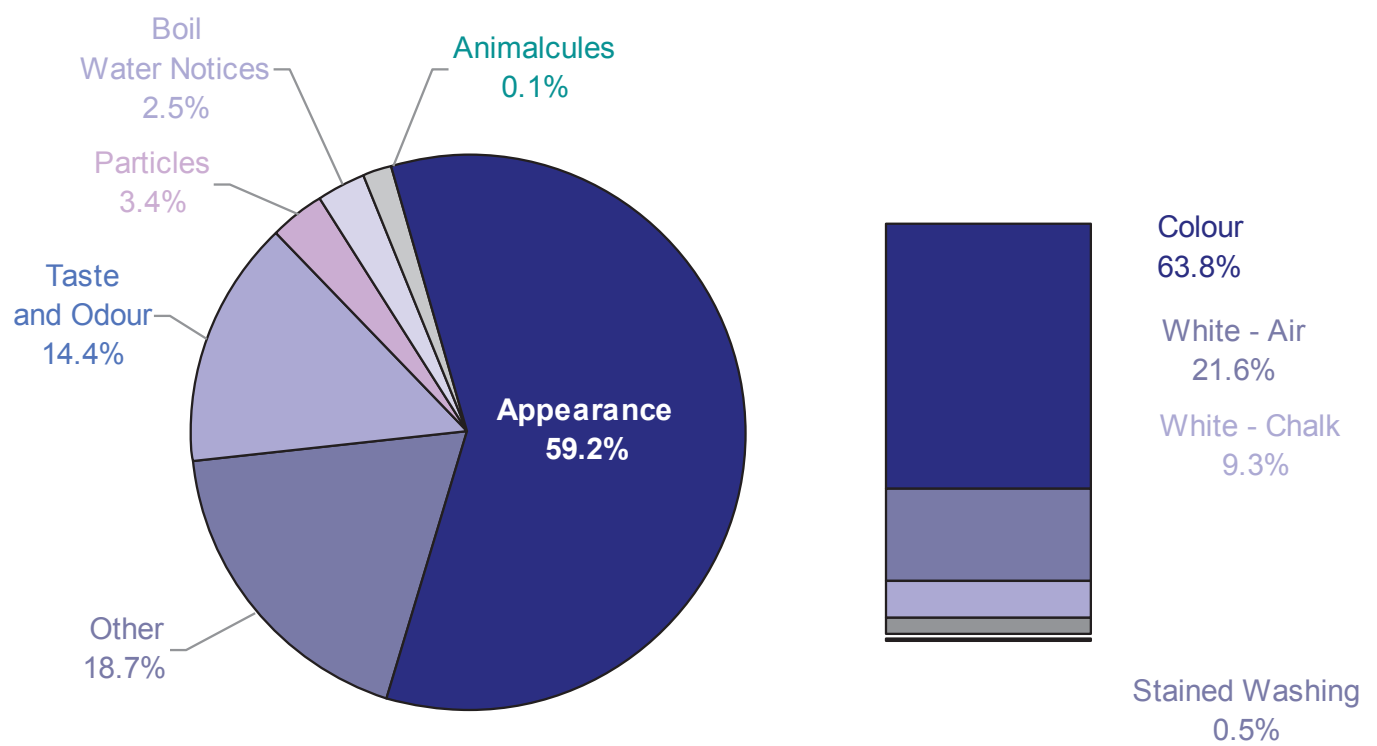
Colour

White Water - Chalk

Hardness

White Water - Air

Figure 5.4: Consumer Contacts, 2011 - Breakdown of Appearance Issues



Stained Washing

Brown or black staining of clothes can occur in clothes inadvertently washed in discoloured water. If clothes are kept damp, the staining can often be removed by gently acidifying with a suitable substance such as citric acid. However, staining may also arise from faults with washing machines.

Taste and Odour

All water sources contain naturally occurring minerals. The varying concentrations of these minerals can give rise to slightly different tastes that may be detected by people, especially when travelling or moving to different areas. Water also contains dissolved gases, such as oxygen and carbon dioxide, which give tap water a characteristic taste. Without these elements, water would taste flat and unappetizing. There may be other substances present in the water which can also cause consumer complaints. One such substance, which is intentionally added to drinking water, is chlorine. Other taste and odours should not be present in drinking water for aesthetic reasons (TCP or earthy/musty) or health reasons (petrol/diesel). Figure 5.5 below provides a breakdown of consumer concerns related to taste and odour.

Thirty-two per cent of these concerns fall under the sub-category 'other' which covers a range of complaints from grassy and fruity to rotten eggs. However, the main single concern, with 49 per cent of all consumer contacts, was related to a chlorinous taste and odour in the water. Figure 5.6 illustrates the number of customer complaints regarding taste and odour per 1,000 population. Also included on the map is a plot of all positive taste and odour detections reported throughout Northern Ireland in 2011.

Chlorinous

Some people are more sensitive to the taste and odour of chlorine which is used to maintain hygienic conditions within the water supply network. Chlorine taste and odours should dissipate if the water is left to stand in the fridge for a few hours. Boiling the water will also remove the chlorine.

Figure 5.5: Consumer Contacts, 2011 - Breakdown of Taste and Odour Issues

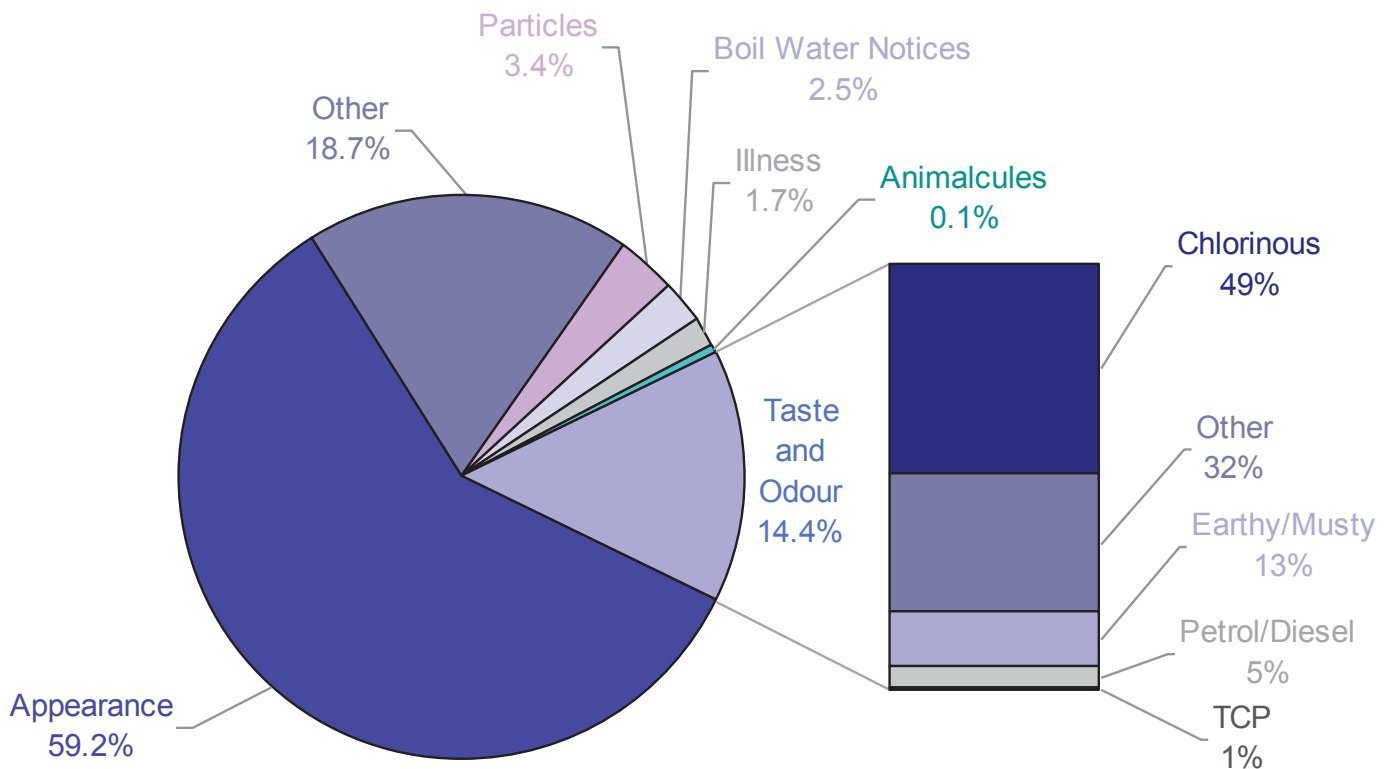
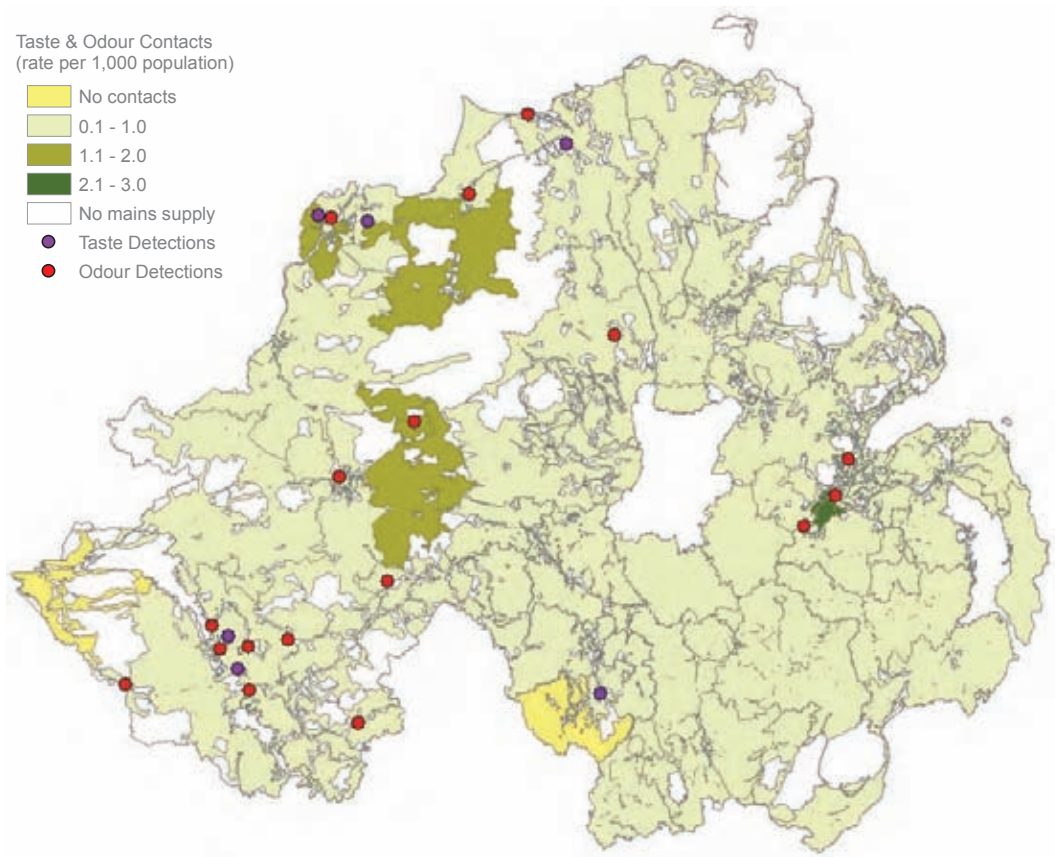


Figure 5.6: Rate of Consumer Contacts per 1,000 Population Reporting Taste and Odour in 2011



Earthy/Musty

Particles

Petrol/Diesel

Animalcules

TCP

Risk Management

The overall drinking water safety plan approach adopted by NI Water is to protect its drinking water supplies by identifying any potential risks of contamination and having appropriate control measures in place, to best ensure that water is safe and clean to be used by consumers. Some of these control measures are the responsibility of NI Water; others such as internal plumbing at domestic households are the responsibility of the owner.

Where there is a potential risk to the drinking water supplies from internal pipe work within domestic, industrial or other properties, NI Water offers advice as to what steps the property owner can take to safeguard their supply of drinking water.

To prevent potential contamination, the Water Fittings Regulations¹ ensure that all plumbing systems, water fittings and equipment connected to the public water supply are of an appropriate quality and standard. These regulations apply from the point where water leaves the water main and enters the property's service pipe. Owners and occupiers of premises and anyone who installs plumbing systems or water fittings must comply with these regulations. More information on the

Water Fittings Regulations is available from NI Water's website:

www.niwater.com/informationleaflets.asp.

Information on Drinking Water Quality Issues

If you want to find out about the quality of drinking water supplied to your home or workplace, or if you have a drinking water quality concern or complaint, then you should first contact NI Water at its Customer Service Unit on 08457 440088 (further details can be found in Annex 8).

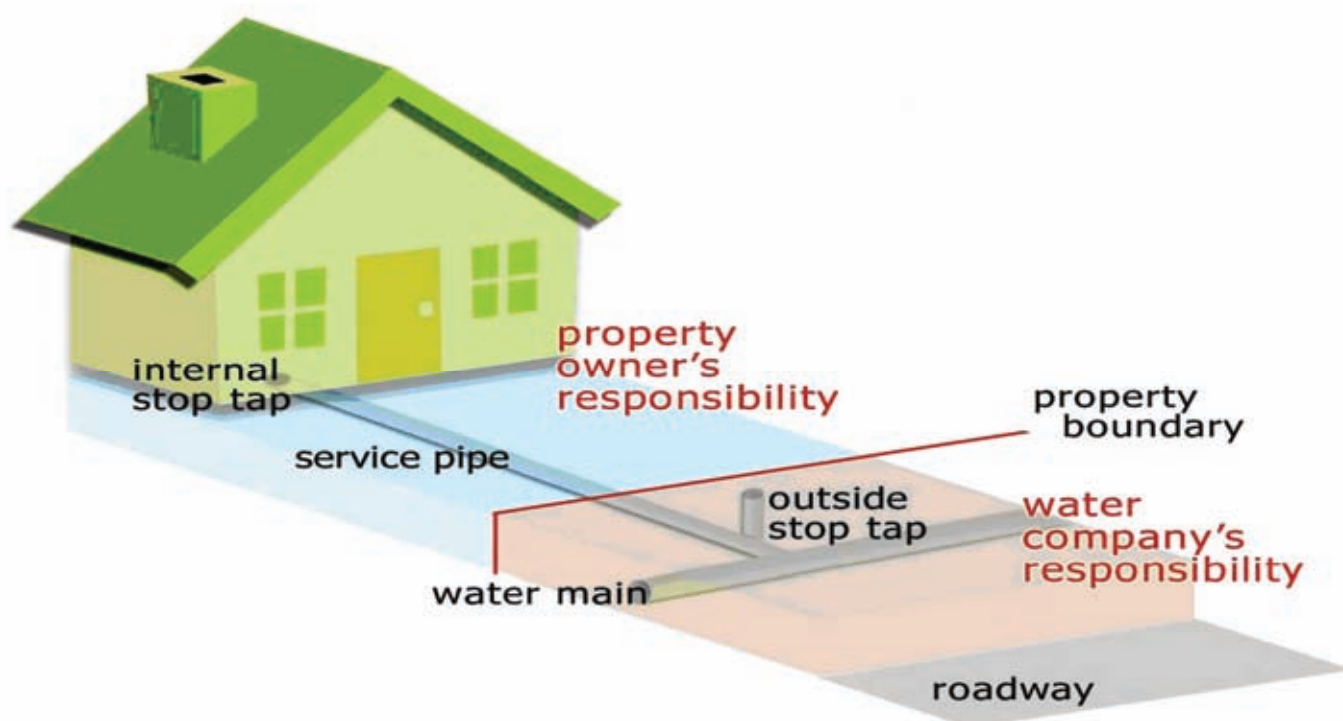
If you have discussed your concerns with NI Water and feel that the issue has not been satisfactorily resolved, you may contact the Consumer Council for Northern Ireland on (028) 9031 1575 (see Annex 8 for further details). For advice on how to maintain the quality of tap water in your home, a guide called 'Looking after WATER in your home' is available from NI Water's website:

www.niwater.com/informationleaflets.asp

General information on drinking water quality matters is also available on our website:

www.doeni.gov.uk/niea/water-home/drinking_water/consumer.htm

Figure 5.7: Typical Water Supply Arrangements



Source of picture: Water UK - 'Looking after WATER in your home' guidance document.

¹[The Water Supply \(Water Fittings\) Regulations \(Northern Ireland\) 2009](#)

Section 2 Private Water Supplies



Image: Borehole - NIEA

Section 2

Private Drinking Water Supplies

In this section of the report we give details of the private water supplies which we are required to regulate. We look at their water quality and the use of a risk-based approach to safeguard the quality of these supplies.

Private water supplies are defined in The Water and Sewerage Services (Northern Ireland) Order 2006 as any supplies of water provided otherwise than by Northern Ireland Water Ltd (NI Water). Private water supplies are diverse in nature and range from those which serve single domestic dwellings through to those supplying large commercial and public premises.

NI Water supplies water to over 99 per cent of the Northern Ireland population; the remainder of the population is served by private water supplies. Although the percentage of people directly served by a private supply may be small, many more people are exposed to them through holiday accommodation (e.g. hotels, Bed & Breakfast facilities), public buildings (e.g. hospitals, universities), and from the manufacture of foodstuffs and drinks, using private supplies (see Figure 1.1).

Private Water Supplies Regulations

The Private Water Supplies Regulations (Northern Ireland) 2009¹ (as amended in 2010) transpose the 1998 European Drinking Water Directive in respect of private supplies. Accordingly, the same drinking water quality standards are applied to private water supplies as for the public water supply.

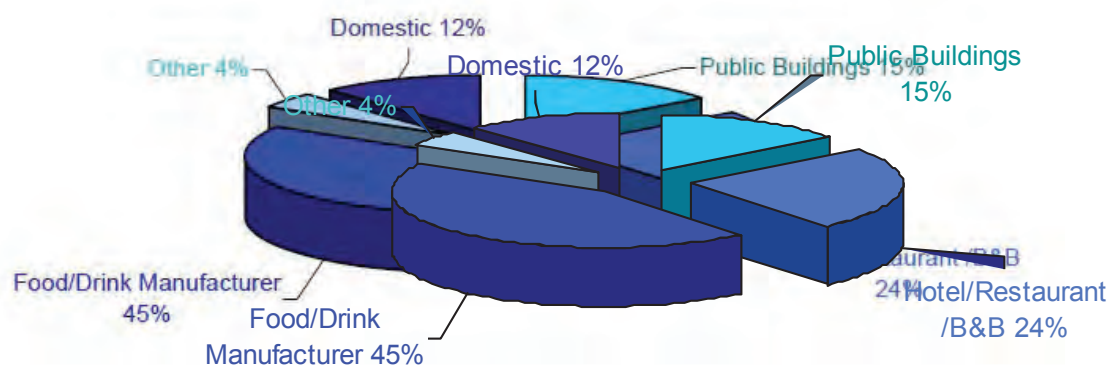
Private supplies to single domestic dwellings are not required to be monitored under the 2009 Regulations. We do, however, continue to offer appropriate advice to all private water supply owners and users. The regulations also exclude bottled water suppliers, who are regulated under The Natural Mineral Water, Spring Water and Bottled Water Regulations (Northern Ireland) 2007.²

As well as establishing a monitoring programme for all registered private water supplies, the regulations require that a risk assessment is carried out for each supply to identify areas where there may be potential risks of contamination. This assessment includes the whole private water supply system, from source to tap. These assessments are similar to the drinking water safety plans in place for the public water supply.

In the event of a failure, any breaches of the wholesomeness standards in the regulations must be investigated and followed up to ensure compliance. If compliance cannot be achieved through informal agreement, we can apply more formal mechanisms to secure the required improvement (e.g. Authorised Departures or Notices).

The regulations allow the owners/users to apply for Authorised Departures, whereby, for certain parameters a breach of the wholesomeness standards is permitted for a fixed period of time while corrective action is being undertaken. Authorised Departures will not be granted in circumstances where there could be a risk to human health.

Figure 1.1: Categories of Private Water Supplies in Northern Ireland



¹www.legislation.gov.uk/nisr/2009/413/contents/made

²www.legislation.gov.uk/nisr/2007/420/contents/made

Roles and Responsibilities

Register of Supplies

¹www.doeni.gov.uk/niea/private_water_supplies_sampling_manual_-_december_2009.pdf

²www.doeni.gov.uk/niea/water-home/drinking_water/public_water/regulations_guidance/technical_guidance.htm

³www.doeni.gov.uk/niea/privatewatersuppliesleaflet.pdf

⁴www.doeni.gov.uk/niea/pws_registration_form.pdf

Figure 1.2: Sources of Private Water Supplies



(a) Borehole



(b) Well



(c) Spring



(d) Surface

Although there are some (mainly commercial) private supplies in urban areas, the majority are situated in the more remote, rural parts of Northern Ireland. Private water supplies may be drawn from a variety of surface and groundwater sources. Surface sources include streams, rivers and reservoirs; groundwater sources include wells, boreholes and springs. The majority (98 per cent) of private supplies in Northern Ireland are from groundwater sources, most commonly, boreholes (see Figure 1.2).

Monitoring of Supplies

Private supplies are split into two main types for the purposes of monitoring under the regulations:

- (i) large supplies (≥ 10 cubic metres or ≥ 50 persons per day) or any commercial/public supplies (irrespective of volume used); and
- (ii) small domestic supplies to two or more private dwellings (< 10 cubic metres or < 50 persons per day).

An annual sampling programme is put in place for each registered private supply. The frequency of the sampling and the range of parameters tested for are determined by the type of the supply and the volume of water used or population served. Currently the costs for the sampling and testing of private water supplies are covered by the Department of the Environment.

To meet the requirements of the regulations, we have a contract in place for the collection of samples from the council offices and subsequent analysis and reporting of the results by laboratories accredited for the testing of drinking water samples.

Of the 116 private water supplies on our monitoring schedule for 2011, 84 per cent are large or commercial/public supplies; and 16 per cent are small domestic premises (groupings of two or more houses only). A breakdown of the numbers and types of private water supplies, together with the monitoring frequencies, is shown below in Table 1.1.

Table 1.1: Number of Private Water Supplies by Type and Size in 2011

Types of Private Water Supplies - Volume (m ³ /day)	Monitoring Frequency (per Annum)	Parameters Analysed	Number of Supplies	% of Supplies
(i) Large or Commercial/Public Supplies				
>1000 ≤2000	10	Full suite of all regulatory parameters	2	1.7
>100 ≤1000	4		15	12.9
>10 ≤100	2		43	37.1
≤10	1		38	32.8
(ii) Small Domestic Supplies (two or more dwellings)				
≤10	1	Limited suite of regulatory parameters	18	15.5
			116	

Note: There are no registered private water supplies in Northern Ireland with a volume of usage greater than 2,000 m³ per day.

Figure 1.3: Distribution of Registered Private Water Supplies by Council Area in 2011



Note: Carrickfergus, Castlereagh, and North Down Councils do not have private water supplies included in our 2011 sampling programme.

Overall Drinking Water Quality

We have been monitoring private water supplies since 1999, and 2011 provides the second year of monitoring data under the 2009 Regulations. While a similar number of private water supplies are registered with us as in previous years, there were changes within the 2009 Regulations resulting in a reduction in both the number of samples lifted and the number of tests performed.

The results of analysis are held by us within a database and the owners/users of the private water supplies are informed of their results following the completion of tests. Table 1.2 provides an overview of the quality of water in private supplies in 2011.

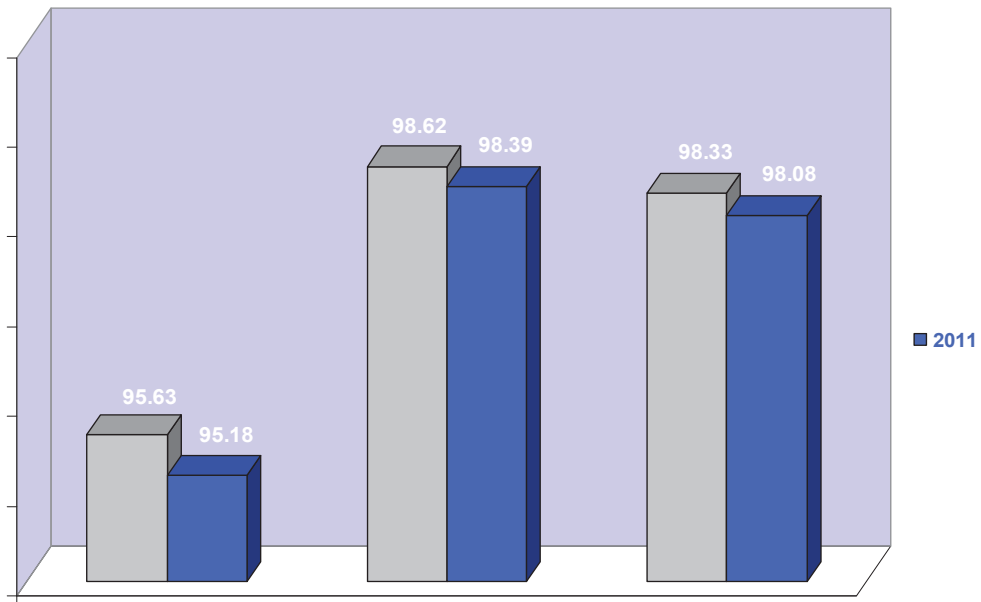
The results show that out of a total of 7,867 tests carried out in 2011, 98.08% met the regulatory standards. The regulatory requirements were not met on 151 occasions; 37 of these occasions related to microbiological failures.

Previous reports contained summary water quality data that included follow up operational samples. This year we have adjusted our reporting assessment to reflect only those samples taken from the compliance sampling programme. A comparison of this data shows a drop in the overall compliance: 98.33% in 2010; 98.08% in 2011 (Figure 1.4 refers). Trends in the levels of compliance will continue to be monitored in subsequent years.

Table 1.2: Overall Water Quality in Private Water Supplies in 2011

Parameters	Determinations in 2011			
	Total No.	Contraventions		% Compliance
		No.	%	
Coliform bacteria	223	17	7.62	92.38
Enterococci	119	9	7.56	92.44
<i>E. coli</i>	223	10	4.48	95.52
<i>Clostridium perfringens</i>	203	1	0.49	99.51
Microbiological Total	768	37	4.82	95.18
Iron	203	24	11.82	88.18
Manganese	203	23	11.33	88.67
Hydrogen ion (pH)	222	23	10.36	89.64
Odour (quantitative)	201	10	4.98	95.02
Arsenic	99	3	3.03	96.97
Colour	203	5	2.46	97.54
Trihalomethanes	99	2	2.02	97.98
Nickel	99	2	2.02	97.98
Aluminium	203	4	1.97	98.03
Turbidity	222	4	1.80	98.20
Ammonium	167	3	1.80	98.20
Taste (quantitative)	189	1	0.53	99.47
Nitrate	192	1	0.52	99.48
Individual pesticides	1,283	1	0.08	99.92
Nitrite	203	0	0.00	100.00
Total pesticides	99	0	0.00	100.00
Other parameters	3,212	8	0.34	99.66
Non microbiological Total	7,099	114	1.61	98.39
Overall Total	7,867	151	1.92	98.08

Figure 1.4: Comparison of Compliance in 2010 and 2011



Microbiological Quality

Non-microbiological Quality

¹www.privatewatersupplies.gov.uk

Hydrogen ion (pH), an indicator parameter in the 2009 Regulations, is also reported with a high level of non-compliance (10.36%) for 2011. These all relate to hydrogen ion values less than the regulatory limit of 6.5. Over 50 per cent of these are due to the treatment processes in place at sites for the manufacture of soft drinks. The remainder are largely as a result of the peaty nature of the land in the catchment of the source water for some rural supplies. Levels of this parameter will continue to be monitored in these supplies.

As in 2010, only one pesticide contravention was noted for private supplies in 2011. This was a failure for MCPA in a surface water supply to a food manufacturer where the supply was being used for the washing down of surfaces and equipment within the site. Pesticides should not be stored or sprayed within the vicinity of drinking water sources. Where pesticides are of concern in the vicinity of a private supply, appropriate measures should be put in place to reduce the risk of them entering the water supply through better management of the catchment area, improved source protection or treatment for their removal.¹

Follow-up Actions on Regulatory Contraventions

Contraventions of the regulatory standards at private supplies are reported to the relevant district councils who inform the owners/users. All contraventions are followed up in conjunction with the appropriate Environmental Health Department to establish the cause, resample the supply and identify any remedial actions needed.

The owners/users of the supply are provided with practical advice on source protection and treatment options to reduce the potential risks of contamination, and depending on the nature and level of the failures, it may be necessary for us to carry out a site visit.

We have protocols in place to inform the Public Health Agency (PHA) in instances where it is considered that a failure at a private supply could be a risk to human health. The PHA provides appropriate health advice in such cases. Where necessary, the regulations contain a provision to issue Notices which could be used to restrict or prohibit the use of a supply.

During 2011, a total of 19 microbiological and eight chemical failures were reported to the Public Health Agency. The chemical parameters notified

included health exceedences for arsenic, turbidity, odour, nitrate, and tetrachloromethane. The notifications resulted in 12 supplies which had ongoing microbiological contraventions being advised to boil their water before use. A further eight supplies were recommended to switch to the public supply. The remaining sites took timely action to address their non-compliances.

In conjunction with Environmental Health staff, we have worked with the relevant persons responsible for these supplies to, where possible, improve their water quality and bring about compliance. A varied range of actions were required by the owners/users of these supplies to achieve this, including: improvements to source protection; installation of disinfection; installation of specialist treatment; and introduction of both record keeping and maintenance procedures.

Levels of arsenic above the regulatory limit were found in three private supplies during 2011. Using groundwater monitoring data obtained from within the Northern Ireland Environment Agency, and geochemical maps held by Geological Survey for Northern Ireland², the location of these supplies were identified as having naturally occurring arsenic present. Corrective action taken at two of these sites involved the installation of specialist arsenic removal filters (see Figure 1.5). The third site, which had access to the public water supply, opted to blend their private and public water supplies at a set ratio so that the levels of arsenic, at point of use within the site, were compliant with the drinking water quality standards.

Figure 1.5 Specialist Arsenic Removal Filters



¹www.dardni.gov.uk/index/publications/pubs-dard-environment/content-codeofgoodagripractice.htm

²www.bgs.ac.uk/gsni/tellus/overview/index.html

**Figure 1.6 Removal of Cross-connection
Between Public and Private Water Supply**



Technical Guidance

Risk Assessments

¹www.legislation.gov.uk/nisr/2009/255/contents/made
²www.privatewatersupplies.gov.uk

Further advice on private water supplies in Northern Ireland and general information on drinking water quality can be found on the DWI web pages.¹

The World Health Organization has published a fourth edition of 'Guidelines for drinking water quality' which provides detail on the occurrence and removal of microbial and chemical hazards in drinking water, and the preventive risk management approach for ensuring drinking water quality.²

A new document on 'Water Safety in Buildings', published by WHO, is also available and provides guidance for managing water supplies in buildings.³

Acknowledgements

We acknowledge the ongoing co-operation and assistance of staff from the Environmental Health Departments of district councils in helping us meet the requirements of The Private Water Supplies Regulations (Northern Ireland) 2009. We also recognize the Public Health Agency for the guidance it provided on the health significance of failures of private water supplies.

¹www.doeni.gov.uk/niea/water-home/drinking_water/private_water.htm

²www.who.int/water_sanitation_health/publications/2011/dwg_guidelines/en/index.html

³www.who.int/water_sanitation_health/publications/2011/9789241548106/en/

Annexes

Annex 1 - Glossary and Definition of Terms

Annex 2 - The Regulatory Framework

Annex 3 - Drinking Water Quality Look-up Tables

Annex 4 - Drinking Water Quality in Council Areas

Annex 5 - Events

Annex 6 - Technical Audit and Research Programmes

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Enforcement Notices**

Annex 8 - Useful Contacts

Annex 9 - Staffing



Annex 1

Glossary and Definition of Terms

<p>Aesthetic</p>	<p>associated with the senses of taste, smell and sight.</p>	<p>Colour</p>	<p>occurs naturally in some upland water sources. It is removed by conventional water treatment.</p>
<p>Aluminium</p>	<p>occurs naturally in some water sources. It is removed by conventional water treatment (coagulation and filtration). Aluminium sulphate and polyaluminium chloride may be used as water treatment chemicals at some water treatment works.</p>	<p>Communication Pipe</p>	<p>the connection from the water main to the consumer property boundary (normally at the outside stop tap).</p>
<p>Animalcule</p>	<p>a tiny or microscopic life form.</p>	<p>Compliance Assessment</p>	<p>a comparison made by the Inspectorate of data (gathered by NI Water) against standards and other regulatory requirements.</p>
<p>Aquifer</p>	<p>underground strata containing water.</p>	<p>Compound</p>	<p>a compound consists of two or more elements in chemical combination.</p>
<p>Authorised Departure (AD)</p>	<p>authorisation granted by the Inspectorate, in consultation with the health authorities, for NI Water to temporarily supply water exceeding a drinking water standard, 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.</p>	<p>Consideration of Provisional Enforcement Order (CPEO)</p>	<p>the means, as set out in The Water and Sewerage Services (Northern Ireland) Order 2006, by which the Department for Regional Development requires NI Water to comply with certain regulatory requirements.</p>
<p>Authorised Supply Point</p>	<p>a sampling point within the distribution system authorised for certain parameters by the Inspectorate 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 consumers' taps.</p>	<p>Contravention</p>	<p>a breach of the regulatory requirement.</p>
<p>Catchment</p>	<p>the area of land that drains into a watercourse.</p>	<p>Cryptosporidiosis</p>	<p>the illness produced by infection with <i>Cryptosporidium</i>.</p>
<p>Chlorine Residual</p>	<p>the small amount of chlorine present in drinking water to maintain its quality as it passes through NI Water's network of pipes and consumers' household plumbing.</p>	<p><i>Cryptosporidium</i></p>	<p>a protozoan parasite.</p>
<p>Coagulation</p>	<p>a process employed during drinking water treatment to assist in the removal of particulate matter.</p>	<p>DEFRA</p>	<p>Department of the Environment, Food and Rural Affairs.</p>
<p>Coliforms</p>	<p>a group of bacteria which may be faecal or environmental in origin.</p>	<p>Determination</p>	<p>an analysis for a specific parameter.</p>
		<p>Distribution Systems</p>	<p>NI Water's network of mains, pipes, pumping stations and service reservoirs through which treated water is delivered to consumers.</p>
		<p>Drinking Water Directive</p>	<p>European Council Directive (98/83/EC), relating to the quality of water intended for human consumption setting out drinking water standards to be applied to member states.</p>
		<p>Drinking Water Standards</p>	<p>the prescribed concentrations or values listed in the Regulations.</p>

Enterococci

Iron

Escherichia coli
(*E. coli*)

Leaching

Event

Lead

Exceedence

Faecal Coliforms

Mains
Rehabilitation

Filtration

Manganese

Flocculation

MCPA

Granular Activated
Carbon (GAC)

Groundwater

Mean Zonal
Compliance (%)

Hydrogen ion (pH)

Mecoprop (MCPPE)

Incident

Microbiological

m³/d

Indicator
Parameter

mg/l

ml

Investment
Programme

MI/d

µg/l

Non-Incident	an event where there has been no demonstrable deterioration in the quality of drinking water.	Service Pipe	pipe that connects the consumer's property to NI Water's main. It comprises two parts: the communication pipe which is the connection from the water main to the consumer's property boundary (normally at the outside stop tap); and the supply pipe which runs from the boundary of the property to the consumer's inside stop tap.
Oocyst	the resistant form in which <i>Cryptosporidium</i> occurs in the environment, and which is capable of causing infection.		
Orthophosphoric Acid	a chemical which is added in low concentrations at water treatment works to minimize the uptake of lead from old pipework.	Service Reservoir	a water tower, tank or other reservoir used for the storage of treated water within the distribution system.
Parameters	the substances, organisms and properties listed in Schedules 1 and 2, and regulation 2 of the Regulations.	Supply Pipe	pipe connecting between the boundary of a consumer's property and the inside stop tap.
Pathogen	an organism which causes disease.	Supply Point	a point, other than a consumer's tap, authorised for the taking of samples for compliance with the Regulations.
Pesticides	any fungicide, herbicide, insecticide or related product (excluding medicines) used for the control of pests or diseases.	Surface Water	untreated water from rivers, impounding reservoirs or other surface water sources.
Plumbosolvency	the tendency for lead to dissolve in water.	Technical Audit	the means of checking that NI Water is complying with its statutory obligations.
Prescribed Concentration or Value (PCV)	the numerical value assigned to drinking water standards, defining the maximal or minimal legal concentration or value of a parameter.	Time of Supply	the moment when water passes from NI Water's pipework into a consumer's pipework.
Private Water Supplies	any supplies of water provided otherwise than by the public supplier, NI Water.	Treated Water	water treated for domestic use as defined in the Regulations.
Protozoan Parasite	a single-celled organism that can only survive by infecting a host.	Trihalomethanes (THMs)	a group of organic substances comprising, for the purposes of the Regulations, four substances: trichloromethane (also known as chloroform), tribromomethane (also known as bromoform), dibromochloromethane and dichlorobromomethane.
Public Supplies	water supplied by NI Water.		
Raw Water	water prior to receiving treatment for the purpose of drinking.		
Remedial Action	action taken to improve a situation.		
Residual Disinfectant	the small amount of chlorine present in drinking water to maintain its quality as it passes through NI Water's network of pipes and consumers' household plumbing.	Water Supply Zone	a pre defined area of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available.
Sedimentation	the tendency for particles in suspension to settle out of the water under the influence of gravity.	WHO	World Health Organization.

Wholesome/
Wholesomeness

WRAS

WRc

Zonal Percentage
Compliance

Annex 2

The Regulatory Framework

In Northern Ireland, the primary legislative powers for transposition of the Council Directive (98/83/EC) ([the Drinking Water Directive](#)) relating to the quality of water intended for human consumption are contained in [The Water and Sewerage Services \(Northern Ireland\) Order 2006](#).

The Drinking Water Inspectorate is a statutory appointee, acting on behalf of the Department for Regional Development in respect of public water supplies, and on behalf of the Department of the Environment in relation to private water supplies. The Order confers enforcement powers on us in matters arising from both public and private water supplies.

Public Water Supplies

Northern Ireland Water Ltd (NI Water) began to operate as a government-owned company from 1 April 2007, and is the sole supplier of public drinking water in Northern Ireland. [The Water Supply \(Water Quality\) Regulations \(Northern Ireland\) 2007](#) have been in operation since that date and implement the requirements of the Drinking Water Directive. They define wholesomeness by setting standards for 39 parameters and a further 11 indicator parameters; and they specify sampling requirements for samples taken at taps, within water supply zones, at service reservoirs and water treatment works.

Regulation 30 controls the application and introduction of products and substances. The Drinking Water Inspectorate for England and Wales provides a technical resource to facilitate this approval in the United Kingdom. The current "[List of Approved Products for use in Public Water Supply in the United Kingdom](#)" can be obtained from the Drinking Water Inspectorate for England and Wales.

The 2007 Regulations were amended by the [Water Supply \(Water Quality\) \(Amendment\) Regulations \(Northern Ireland\) 2009](#), which came into operation on 15 July 2009 and included new requirements in relation to disinfection, risk assessment and monitoring of drinking water abstraction points. In addition to implementing the Drinking Water Directive (DWD), they implement parts of Council Directive 2000/60/EC ("the Water Framework Directive") and

Council Directive 2008/99/EC ("the Environmental Crime Directive").

They were further amended by [The Water Supply \(Water Quality\) \(Amendment\) Regulations \(Northern Ireland\) 2010](#), which came into operation on 20 April 2010, and include clarification of the Department's responsibilities and powers of enforcement in respect of implementation of the Regulations.

[The Water Supply \(Domestic Distribution Systems\) Regulations \(Northern Ireland\) 2010](#), which came into operation on 20 April 2010, require NI Water to report [to us] instances of water quality failures caused by the internal distribution system occurring within public buildings. It would then be our responsibility to assess the significance of these failures and, where required, ensure remedial action is undertaken by the person responsible for the building.

[The Water Supply \(Water Fittings\) Regulations \(Northern Ireland\) 2009](#) came into operation on 3 August 2009. These regulations make provisions for preventing contamination of drinking water by ensuring that all plumbing systems, water fittings and equipment connected to the public water supply are of an appropriate quality and standard. These regulations apply from the point where water leaves the water main and enters the property's service pipe. Owners and occupiers of premises and anyone who installs plumbing systems or water fittings must comply with these regulations.

[The EU Water Framework Directive](#) (WFD 2000/60/EC) came into force on 22 December 2000. Its aim is to protect all surface waters and ground waters and prevent any deterioration in quality. In the protection of drinking water sources, the WFD sets out a requirement to identify points for drinking water abstraction to be included in river basin management plans.

Private Water Supplies

[The Private Water Supplies Regulations \(Northern Ireland\) 2009](#)

[The Private Water Supplies \(Amendment\) Regulations \(Northern Ireland\) 2010](#)

Annex 3

Drinking Water Quality Look-up Tables

The following tables provide more detail of where the standards have not been met in the individual water supply zones. The tables present, by parameter, all the contraventions and the ‘% zonal compliance’ that occurred in water supply zones and at supply points at water treatment works during 2011.

Water Quality in Water Supply Zones in 2011

The ‘% zonal compliance’ is calculated using the mean zonal compliance index. For further detail on how this is calculated, the reader should refer to Annex 4 of our 2007 report.¹

Table 3.1: % Mean Zonal Compliance - Aluminium

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	35	1,116	0	100.00
ZN0502, Lough Fea Cookstown	1	24	1	95.83
ZN0604, Caugh Hill Dungiven	1	36	1	97.22
ZN0605, Creggan Derry	1	24	1	95.83
ZN0705, Lough Macrory Beragh	1	12	1	91.67
ZS0101, Dunore Ballygomartin North	1	36	1	97.22
ZS0102, Dunore Ballygomartin South	1	36	1	97.22
ZS0103, Belfast Ballyhanwood	1	52	2	96.15
ZS0106, Dunore Belfast North	1	36	1	97.22
ZS0107, Belfast Oldpark	1	36	1	97.22
ZS0109, Dorisland Whiteabbey	1	36	2	94.44
ZS0401, Drumaroad Bangor	1	52	1	98.08
ZS0403, Drumaroad Peninsula	1	24	1	95.83
ZS0502, Forked Bridge Dunmurry	1	52	1	98.08
ZS0503, Forked Bridge Stoneyford	1	24	1	95.83
ZS0601, Drumaroad Ballynahinch	1	24	1	95.83
ZS0602, Drumaroad Downpatrick	1	36	1	97.22
ZS0802, Castor Bay Lurgan	1	24	1	95.83
ZS0807, Castor Bay Loughall	1	52	1	98.08
Total number of zones	53	1,732	20	
Mean Zonal Compliance				98.77

¹www.doeni.gov.uk/niea/drinking_water_quality_in_northern_ireland_2007.pdf

Table 3.2: % Mean Zonal Compliance - Bromate

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	52	400	0	100.00
ZS0201, Dorisland Carrick	1	8	1	87.50
Total number of zones	53	408	1	
Mean Zonal Compliance				99.76

Table 3.3: % Mean Zonal Compliance - *E. coli*

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	51	4,536	0	100.00
ZN0401, Dunore Point Antrim	1	144	1	99.31
ZS0902, Fofanny Dromore	1	84	1	98.81
Total number of zones	53	4,764	2	
Mean Zonal Compliance				99.96

Table 3.4: % Mean Zonal Compliance - Enterococci

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	52	400	0	100.00
ZS0109, Dorisland Whiteabbey	1	8	1	87.50
Total number of zones	53	408	1	
Mean Zonal Compliance				99.76

Table 3.5: % Mean Zonal Compliance - Iron

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	28	808	0	100.00
ZN0202, Altnahinch Bushmills	1	24	1	95.83
ZN0302, Dungonnell Glarryford	1	24	1	95.83
ZN0305, Dungonnell Ahoghill	1	24	1	95.83
ZN0401, Dunore Point Antrim	1	52	1	98.08
ZN0402, Killylane Ballynure	1	36	1	97.22
ZN0501, Moyola Magherafelt	1	36	1	97.22
ZN0601, Ballinrees Limavady	1	24	1	95.83
ZN0604, Caugh Hill Dungiven	1	36	1	97.22
ZN0902, Altmore Donaghmore	1	12	1	91.67
ZS0103, Belfast Ballyhanwood	1	52	1	98.08
ZS0105, Dunore Breda South	1	52	1	98.08
ZS0107, Belfast Oldpark	1	36	1	97.22
ZS0109, Dorisland Whiteabbey	1	36	1	97.22
ZS0110, Dunore Point Glengormley	1	24	1	95.83
ZS0201, Dorisland Carrick	1	36	1	97.22
ZS0401, Drumaroad Bangor	1	52	1	98.08
ZS0402, Drumaroad Comber	1	52	1	98.08
ZS0403, Drumaroad Peninsula	1	24	1	95.83
ZS0501, Drumaroad Lisburn	1	52	1	98.08
ZS0502, Forked Bridge Dunmurry	1	52	1	98.08
ZS0802, Castor Bay Lurgan	1	24	1	95.83
ZS0807, Castor Bay Loughgall	1	52	1	98.08
ZS0902, Fofanny Dromore	1	36	2	94.44
ZS0904, Fofanny Mourne	1	52	1	98.08
ZS1001, Carran Hill Crossmaglen	1	24	5	79.17
Total number of zones	53	1,732	30	
Mean Zonal Compliance				98.15

Table 3.6: % Mean Zonal Compliance - Lead

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	52	400	0	100.00
ZN0702, Glenhordial Omagh	1	8	1	87.50
Total number of zones	53	408	1	
Mean Zonal Compliance				99.76

Table 3.7: % Mean Zonal Compliance - Manganese

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	51	1,672	0	100.00
ZN0604, Caugh Hill Dungiven	1	36	1	97.22
ZS0802, Castor Bay Lurgan	1	24	1	95.83
Total number of zones	53	1,732	2	
Mean Zonal Compliance				99.87

Table 3.8: % Mean Zonal Compliance - Odour

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	41	1,305	0	100.00
ZN0101, Ballinrees Coleraine	1	76	2	97.37
ZN0501, Moyola Magherafelt	1	36	1	97.22
ZN0601, Ballinrees Limavady	1	24	1	95.83
ZN0604, Caugh Hill Dungiven	1	36	2	94.44
ZN0605, Creggan Derry	1	24	1	95.83
ZN0703, Lenamore Greencastle	1	4	1	75.00
ZN0706, Lough Macroy Killyclogher	1	24	1	95.83
ZN0802, Killyhevlin Enniskillen	1	52	11	78.85
ZN1102, Seagahan Armagh	1	36	1	97.22
ZS0102, Dunore Ballygomartin South	1	36	1	97.22
ZS0503, Forked Bridge Stoneyford	1	24	1	95.83
ZS0904, Fofanny Mourne	1	52	1	98.08
Total number of zones	53	1,729	24	
Mean Zonal Compliance				98.47

Table 3.9: % Mean Zonal Compliance - PAH - Sum of Four Substances

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant supply points	52	400	0	100.00
ZS0802, Castor Bay Lurgan	1	8	1	87.50
Total number of zones	53	408	1	
Mean Zonal Compliance				99.76

Table 3.10: % Mean Zonal Compliance - Pesticides - Other Substances

Sampling Location - Supply Points	Number of Supply Points	Number of Samples	Number of Tests >PCV per Supply Point	% Zonal Compliance
Number of compliant supply points	26	10,261	0	100.00
W3317, Dorisland	1	344	1	99.71
W4701, Killyhevlin	1	344	1	99.71
Total number of supply points	28	10,277	2	
Mean Zonal Compliance				99.98

Table 3.11: % Mean Zonal Compliance - Taste

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	49	1,529	0	100.00
ZN0101, Ballinrees Coleraine	1	76	1	98.68
ZN0604, Caugh Hill Dungiven	1	36	2	94.44
ZN0802, Killyhevlin Enniskillen	1	52	2	96.15
ZN1102, Seagahan Armagh	1	36	1	97.22
Total number of zones	53	1,729	6	
Mean Zonal Compliance				99.75

Table 3.12: % Mean Zonal Compliance - Total Trihalomethanes

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	50	384	0	100.00
ZN0603, Carmoney Eglinton	1	8	1	87.50
ZN0604, Caugh Hill Dungiven	1	8	1	87.50
ZN0605, Creggan Hill	1	8	1	87.50
Total number of zones	53	408	3	
Mean Zonal Compliance				99.29

Table 3.13: % Mean Zonal Compliance - Turbidity

Sampling Location - Zones	Number of Zones	Number of Samples	Number of Tests >PCV per Zone	% Zonal Compliance
Number of compliant zones	52	1,708	0	100.00
ZS0802, Castor Bay Lurgan	1	24	1	95.83
Total number of zones	53	1,732	1	
Mean Zonal Compliance				99.92

Annex 4

Drinking Water Quality in District Council Areas

The following tables provide a summary of public drinking water quality data for each local district council area.

Table 4.1: Antrim Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0305, Dungonnell Ahoghill	Iron	95.83
ZN0401, Dunore Point Antrim	<i>E. coli</i>	99.31
	Iron	98.08
ZN0402, Killylane Ballynure	Iron	97.22
ZN0501, Moyola Magherafelt	Iron	97.22
	Odour	97.22
ZS0503, Forked Bridge Stoneyford	Aluminium	95.83
	Odour	95.83

Table 4.2: Ards Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZS0103, Belfast Ballyhanwood	Aluminium	96.15
	Iron	98.08
ZS0401, Drumaroad Bangor	Aluminium	98.08
	Iron	98.08
ZS0402, Drumaroad Comber	Iron	98.08
ZS0403, Drumaroad Peninsula	Aluminium	95.83
	Iron	95.83
ZS0501, Drumaroad Lisburn	Iron	98.08
ZS0601, Drumaroad Ballynahinch	Aluminium	95.83

Table 4.3: Armagh City and District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN1101, Clay Lake Keady	Full Compliance	
ZN1102, Seagahan Armagh	Odour	97.22
	Taste	97.22
ZS0807, Castor Bay Loughgall	Aluminium	98.08
	Iron	98.08
ZS0808, Castor Bay Craigavon	Full Compliance	
ZS1001, Carran Hill Crossmaglen	Iron	79.17

Table 4.4 Ballymena Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0202, Altnahinch Bushmills	Iron	95.83
ZN0302, Dungonnell Glarryford	Iron	95.83
ZN0303, Dunore Point Ballymena	Full Compliance	
ZN0305, Dungonnell Ahoghill	Iron	95.83
ZN0401 Dunore Point Antrim	<i>E. coli</i>	99.31
	Iron	98.08
ZN0402, Killylane Ballynure	Iron	97.22

Table 4.5: Ballymoney Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0101, Ballinrees Coleraine	Odour	97.37
	Taste	98.68
ZN0202, Altnahinch Bushmills	Iron	95.83
ZN0302, Dungonnell Glarryford	Iron	95.83
ZN0305, Dungonnell Ahoghill	Iron	95.83

Table 4.6: Banbridge District Council Area

Sampling Location – Zones	Parameter	% Zonal Compliance
ZS0601, Drumaroad Ballynahinch	Aluminium	95.83
	Iron	95.83
ZS0802, Castor Bay Lurgan	Aluminium	95.83
	Iron	95.83
	Manganese	95.83
	PAHs	87.50
	Turbidity	95.83
ZS0807, Castor Bay Loughgall	Aluminium	98.08
	Iron	98.08
ZS0808, Castor Bay Craigavon	Full Compliance	
ZS0902, Fofanny Dromore	<i>E. coli</i>	98.81
	Iron	94.44
ZS0904, Fofanny Mourne	Iron	98.08
	Odour	98.08

Table 4.7: Belfast City Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0401, Dunore Point Antrim	<i>E. coli</i>	99.31
	Iron	98.08
ZS0101, Dunore Ballygomartin North	Aluminium	97.22
ZS0102, Dunore Ballygomartin South	Aluminium	97.22
	Iron	97.22
	Odour	97.22
ZS0103, Belfast Ballyhanwood	Aluminium	96.15
	Iron	98.08
ZS0104, Dunore Breda North	Full Compliance	
ZS0105, Dunore Breda South	Iron	98.08
ZS0106, Dunore Belfast North	Aluminium	97.22
ZS0107, Belfast Oldpark	Aluminium	97.22
	Iron	97.22
	MCPA	99.71
ZS0108, Belfast Purdysburn	Full Compliance	
ZS0109, Dorisland Whiteabbey	Aluminium	94.44
	Enterococci	87.50
	Iron	97.22
	MCPA	99.71
ZS0110, Dunore Point Glengormley	Iron	95.83
ZS0402, Drumaroad Comber	Iron	98.08
ZS0502, Forked Bridge Dunmurry	Aluminium	98.08
	Iron	98.08
ZS0501, Drumaroad Lisburn	Iron	98.08
ZS0503, Forked Bridge Stoneyford	Aluminium	95.83
	Odour	95.83

Table 4.8: Carrickfergus Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0402, Killylane Ballynure	Iron	97.22
ZS0109, Dorisland Whiteabbey	Aluminium	94.44
	Enterococci	87.50
	Iron	97.22
	MCPA	99.71
ZS0201, Dorisland Carrick	Bromate	87.50
	Iron	97.22
	MCPA	99.71

Table 4.9: Castlereagh Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZS0103, Belfast Ballyhanwood	Aluminium	96.15
	Iron	98.08
ZS0104, Dunore Breda North	Full Compliance	
ZS0105, Dunore Breda South	Iron	98.08
ZS0108, Belfast Purdysburn	Full Compliance	
ZS0402, Drumaroad Comber	Iron	98.08
ZS0501, Drumaroad Lisburn	Iron	98.08

Table 4.10: Coleraine Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0101, Ballinrees Coleraine	Odour	97.37
	Taste	98.68
ZN0202, Altnahinch Bushmills	Iron	95.83
ZN0501, Moyola Magherafelt	Aluminium	91.67
	Iron	97.22
	Odour	97.22

Table 4.11: Cookstown District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0501, Moyola Magherafelt	Aluminium	91.67
	Iron	97.22
	Odour	97.22
ZN0502, Lough Fea Cookstown	Aluminium	95.83
ZN0503, Unagh Cookstown	Full Compliance	
ZN0705, Lough Macrory Beragh	Aluminium	91.67
ZN0902, Altnore Donaghmore	Iron	91.67
ZS0807, Castor Bay Loughgall	Aluminium	98.08
	Iron	98.08

Table 4.12: Craigavon Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZS0802, Castor Bay Lurgan	Aluminium	95.83
	Iron	95.83
	Manganese	95.83
	PAHs	87.50
	Turbidity	95.83
ZS0807, Castor Bay Loughgall	Aluminium	98.08
	Iron	98.08
ZS0808, Castor Bay Craigavon	Full Compliance	
ZS0902, Fofanny Dromore	<i>E. coli</i>	98.81
	Iron	94.44

Table 4.13: Derry City Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0603, Carmoney Eglinton	Trihalomethanes	87.50
ZN0604, Caugh Hill Dungiven	Aluminium	97.22
	Iron	97.22
	Manganese	97.22
	Odour	94.44
	Taste	94.44
	Trihalomethanes	87.50
ZN0605, Creggan Derry	Aluminium	95.83
	Odour	95.83
	Trihalomethanes	87.50

Table 4.14: Down District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZS0402, Drumaroad Comber	Iron	98.08
ZS0501, Drumaroad Lisburn	Iron	98.08
ZS0601, Drumaroad Ballynahinch	Aluminium	95.83
ZS0602, Drumaroad Downpatrick	Aluminium	97.22
ZS0902, Fofanny Dromore	<i>E. coli</i>	98.81
	Iron	94.44
ZS0904, Fofanny Mourne	Iron	98.08
	Odour	98.08

Table 4.15: Dungannon and South Tyrone Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0502, Lough Fea Cookstown	Aluminium	95.83
ZN0705, Lough Macrory Beragh	Aluminium	91.67
ZN0706, Lough Macrory Killyclogher	Odour	95.83
ZN0802, Killyhevlin Enniskillen	MCPA	99.71
	Odour	78.85
	Taste	96.15
ZN0901, Altmore Cabragh	Full Compliance	
ZN0305, Dungonnell Ahoghill	Iron	95.83
ZN1102, Seagahan Armagh	Odour	97.22
	Taste	97.22
ZS0807, Castor Bay Loughgall	Aluminium	98.08
	Iron	98.08

Table 4.16: Fermanagh District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0704, Lough Bradan Drumquin	Full Compliance	
ZN0706, Lough Macrory Killyclogher	Odour	95.83
ZN0801, Belleek Garrison	Full Compliance	
ZN0802, Killyhevlin Enniskillen	MCPA	99.71
	Odour	78.85
	Taste	96.15

Table 4.17: Larne Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0303, Dunore Point Ballymena	Full Compliance	
ZN0402, Killylane Ballynure	Iron	97.22
ZS0201, Dorisland Carrick	Bromate	87.50
	Iron	97.22
	MCPA	99.71

Table 4.18: Limavady Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0101, Ballinrees Coleraine	Odour	97.37
	Taste	98.68
ZN0601, Ballinrees Limavady	Iron	95.83
	Odour	95.83
ZN0603, Carmoney Eglinton	Trihalomethanes	87.50
ZN0604, Caugh Hill Dungiven	Aluminium	97.22
	Iron	97.22
	Manganese	97.22
	Odour	94.44
	Taste	94.44
	Trihalomethanes	87.50

Table 4.19 Lisburn City Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0401, Dunore Point Antrim	<i>E. coli</i>	99.31
	Iron	98.08
ZS0501, Drumaroad Lisburn	Iron	98.08
ZS0502, Forked Bridge Dunmurry	Aluminium	98.08
	Iron	98.08
ZS0503, Forked Bridge Stoneyford	Aluminium	95.83
	Iron	95.83
	Odour	95.83
ZS0601, Drumaroad Ballynahinch	Aluminium	95.83
ZS0802, Castor Bay Lurgan	Aluminium	95.83
	Iron	95.83
	Manganese	95.83
	PAHs	87.50
	Turbidity	95.83
ZS0902, Fofanny Dromore	<i>E. coli</i>	98.81
	Iron	94.44

Table 4.20: Magherafelt District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0101, Ballinrees Coleraine	Odour	97.37
	Taste	98.68
ZN0501, Moyola Magherafelt	Aluminium	91.67
	Iron	97.22
	Odour	97.22
ZN0502, Lough Fea Cookstown	Aluminium	95.83

Table 4.21: Moyle District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0101, Ballinrees Coleraine	Odour	97.37
	Taste	98.68
ZN0202, Altnahinch Bushmills	Iron	95.83
ZN0204, Rathlin Island	Full Compliance	
ZN0302, Dungonnell Glarryford	Iron	95.83

Table 4.22: Newry and Mourne District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN1101, Clay Lake Keady	Full Compliance	
ZS0807, Castor Bay Loughgall	Aluminium	98.08
	Iron	98.08
ZS0901, Camlough Newry West	Full Compliance	
ZS0902, Fofanny Dromore	<i>E. coli</i>	98.81
	Iron	94.44
	Odour	98.08
ZS0904, Fofanny Mourne	Iron	98.08
	Odour	98.08
ZS1001, Carran Hill Crossmaglen	Iron	79.17

Table 4.23: Newtownabbey Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0401, Dunore Point Antrim	<i>E. coli</i>	99.31
	Iron	98.08
ZN0402, Killylane Ballynure	Iron	97.22
ZS0106, Dunore Belfast North	Aluminium	97.22
ZS0109, Dorisland Whiteabbey	Aluminium	94.44
	Enterococci	87.50
	Iron	97.22
	MCPA	99.71
ZS0110, Dunore Point Glengormley	Iron	95.83
ZS0201, Dorisland Carrick	Bromate	87.50
	Iron	97.22
	MCPA	99.71

Table 4.24: North Down Borough Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZS0108, Belfast Purdysburn	Full Compliance	
ZS0401, Drumaroad Bangor	Aluminium	98.08
	Iron	98.08
ZS0402, Drumaroad Comber	Iron	98.08

Table 4.25: Omagh District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0502, Lough Fea Cookstown	Aluminium	95.83
ZN0701, Derg Strabane	Full Compliance	
ZN0702, Glenhordial Omagh	Lead	87.50
ZN0703, Lenamore Greencastle	Odour	75.00
ZN0704, Lough Bradan Drumquin	Full Compliance	
ZN0705, Lough Macrory Beragh	Aluminium	91.67
ZN0706, Lough Macrory Killyclogher	Odour	95.83
ZN0802, Killyhevlín Enniskillen	MCPA	99.71
	Odour	78.85
	Taste	96.15
ZN0902, Altmore Donaghmore	Iron	91.67

Table 4.26: Strabane District Council Area

Sampling Location - Zones	Parameter	% Zonal Compliance
ZN0603, Carmoney Eglinton	Trihalomethanes	87.50
ZN0604, Caugh Hill Dungiven	Aluminium	97.22
	Iron	97.22
	Manganese	97.22
	Odour	94.44
	Taste	94.44
	Trihalomethanes	87.50
	ZN0701, Derg Strabane	Full Compliance
ZN0703, Lenamore Greencastle	Odour	75.00
ZN0704, Lough Bradan Drumquin	Full Compliance	
ZN0706, Lough Macrory Killyclogher	Odour	95.83

Annex 5

Events

Tables 5.1 and 5.2 below provide a full list of incidents and non-incidents (respectively) recorded in 2011.

Table 5.1: Drinking Water Quality Incidents in 2011

Date of Incident	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Incident	Associated Council Area(s)
2 - 4 January 2011	Dunore Point WTWs (500,000 population)	Treatment difficulties led to aluminium exceedences in the final water and related supply area during a period of increased demand caused by the 'freeze/thaw'.	Antrim, Ards, Ballymena, Belfast, Castlereagh, Larne, Lisburn, Newtownabbey, and North Down
4 January 2011	Lenamore Springs WTWs (1,000 population)	Disturbance of particles led to a turbidity exceedence in the final water during a period of increased demand caused by the 'freeze/thaw'.	Omagh
6 January 2011	Killylane WTWs (47,000 population)	Treatment difficulties led to a turbidity exceedence in the final water and elevated aluminium levels in the supply area during a period of increased demand caused by the 'freeze/thaw'.	Ballymena, Larne, and Newtownabbey
10 - 16 January 2011	Lough Macrory WTWs (30,000 population)	Treatment difficulties led to aluminium exceedences in the final water and related supply area.	Cookstown, Dungannon and South Tyrone, Fermanagh, Omagh, and Strabane
25 January 2011	Tully Road, Portglenone (1,700 population)	Discoloured water due to elevated levels of iron led to local media interest.	Ballymena
2 February 2011	Crocknafeola Trunk Main (2,600 properties)	Technical difficulties during a trunk main repair led to a loss of supply to properties in the Kilkeel, Annalong and Ballymartin areas. Bottled water was distributed, and there was significant local political and media interest.	Newry and Mourne
17 February 2011	Inishmore Road, Lisbellaw (35 - 40 properties)	Complaints of discoloured water, and subsequent local media interest. Bottled water was supplied until mains rehabilitation was completed in April 2011.	Enniskillen, and Omagh
8 March 2011	Rathlin WTWs (120 population)	A final water sample failed for trihalomethanes. It is likely to have been related to increased bromide in the raw water.	Moyle
21 March 2011	Caugh Hill WTWs (74,500 population)	Treatment difficulties led to an iron failure in the final water.	Derry, Limavady, and Strabane
23 March 2011	Dernawilt Road, Rosslea (62,500 population)	An odour exceedence was reported but the cause was not determined.	Enniskillen

Date of Incident	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Incident	Associated Council Area(s)
28 March 2011	Upper Dromore Road, Warrenpoint (two properties)	A hydrogen ion exceedence was caused by a cement-lined main. Bottled water was provided to the affected properties until remedial actions were completed.	Newry and Mourne
25 - 26 April 2011	Castor Bay WTWs (293,000 population)	Treatment difficulties led to aluminium exceedences in the final water.	Armagh, Craigavon, Dungannon, Lisburn, Newry and Mourne
23 May 2011	Caugh Hill WTWs (50,000 population)	Aluminium exceedences in the final water and related supply area. The cause was not determined.	Derry, Limavady, and Strabane
24 May 2011	Carmony WTWs (67,000 population)	Treatment difficulties led to aluminium and THM exceedences in the final water.	Derry
1 June 2011	Belleek WTWs (4,000 population)	MCPA exceedence as there was no treatment in place for the reduction of pesticides.	Enniskillen
3 June 2011	Ballinrees WTWs (105,000 population)	Operational problems led to a turbidity exceedence in the final water.	Ballymoney, Coleraine, and Limavady
6 June 2011	Killyhevlin WTWs (62,500 population)	MCPA exceedence as there was no treatment in place for the reduction of pesticides.	Dungannon and South Tyrone, and Enniskillen
6 June 2011	Derg WTWs (35,000 population)	MCPA exceedence as there was insufficient treatment in place for the reduction of pesticides.	Strabane
9 June 2011	Altnahinch WTWs (28,000 population)	Operational problems led to an aluminium exceedence in the final water.	Ballymoney, Coleraine, and Limavady
15 June 2011	Killyhevlin Zone (62,500 population)	Odour and taste exceedences due to inadequate treatment.	Enniskillen, and Dungannon and South Tyrone
4 July 2011	Dorisland WTWs (120,000 population)	MCPA exceedence as there was insufficient treatment in place for the reduction of pesticides.	Belfast, Carrickfergus, and Newtownabbey
18 July 2011	Caugh Hill WTWs (68,500 population)	Treatment difficulties led to iron, THM, turbidity and aluminium exceedences in the final water.	Derry, Limavady, and Strabane
20 July 2011	Orange Hall, Hilltown (one property)	A significant iron exceedence was detected in a sample taken from a consumer tap. It was caused by an old iron main. Bottled water was provided to the property while remedial actions were undertaken.	Newry and Mourne
16 August 2011	Carmony WTWs (67,000 population)	Treatment difficulties led to aluminium and THM exceedences in the final water.	Derry
19 August 2011	Rathkeel SR (47,000 population)	Coliform bacteria were found in a final water sample taken from Rathkeel SR. The cause was not determined.	Ballymena
2 September 2011	Glenvale Road, Newry (four properties)	Significant levels of aluminium, iron, manganese and turbidity were detected in a sample taken from a consumer tap.	Newry and Mourne

Date of Incident	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Incident	Associated Council Area(s)
5 - 7 September 2011	Drumaroad WTWs (386,000 population)	Treatment difficulties led to aluminium exceedences in the final water and related supply area.	Ards, Banbridge, Belfast, Castlereagh, Lisburn, and North Down
19 September 2011	Caugh Hill WTWs (74,500 population)	Treatment difficulties led to THM exceedences in the final water and related supply area.	Derry, Limavady, and Strabane
26 September 2011	Dungonnell WTWs (30,500 population)	Treatment difficulties led to a Hydrogen ion exceedence in the final water, and Hydrogen ion and iron exceedences in the related supply area.	Antrim, and Ballymena
28 September 2011	Glenhordial WTWs (10,000 population)	Aluminium and manganese exceedences occurred in final water samples. The cause was not determined.	Omagh
30 September 2011	Connswater Mews, Belfast (two properties)	Coliform bacteria were detected at two consumer taps. 'Boil Water Before Use' * notices were issued (notices in place for six days). The cause was not determined.	Belfast
2 October 2011	Drumaroad WTWs (386,000 population)	Operational problems caused treatment difficulties which led to a turbidity and an aluminium exceedence in the final water, and an aluminium exceedence in the related supply area.	Ards, Banbridge, Belfast, Castlereagh, Down, Lisburn, and North Down
5 October 2011	Poleglass SR (56,000 population)	A technical difficulty led to increased chlorine dosing at Poleglass SR and chlorine odour and taste complaints in the related supply area. There was subsequent local media interest.	Belfast, and Lisburn
12 October 2011	Rathlin WTWs (120 population)	'Boil Water Before Use' * notices were issued (notices in place for 17 days) after <i>Cryptosporidium</i> oocysts were detected. THM and turbidity exceedences were also reported.	Moyle
17 October 2011	Caugh Hill WTWs (74,500 population)	Treatment difficulties led to Hydrogen ion and aluminium exceedences in the final water.	Derry, Limavady, and Strabane
20 October 2011	Springhill SR (2,342 properties)	<i>E. coli</i> and coliform bacteria were detected in the final water following disinfection problems.	Derry
2 November 2011	Ballinrees WTWs (105,000 population)	Technical difficulties caused problems with the treatment process and led to an aluminium exceedence in the final water.	Ballymoney, Coleraine, and Limavady
4 November 2011	Ballymoney area (3,500 population)	'Boil Water Before Use' * notices were issued (notices in place for nine days) following numerous bacteriological failures. Bottled water was provided to schools and known vulnerable consumers. The problem occurred after a new mains connection.	Ballymoney

* A **'Boil Water Before Use'** notice is issued when there is a temporary deterioration in drinking water quality and boiling the water is sufficient to make it safe to drink.

Date of Incident	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Incident	Associated Council Area(s)
14 November 2011	Lough Fea WTWs (29,500 population)	Operational work led to significant aluminium exceedences in the final water and related supply area.	Cookstown, Dungannon and South Tyrone, Magherafelt, and Omagh.
27 November 2011	Altnahinch WTWs (28,000 population)	Operational problems led to significant Hydrogen ion and aluminium exceedences in the final water, and aluminium exceedences in the related supply area.	Ballymoney, Coleraine, and Limavady
30 November 2011	Lenamore Springs WTWs (1,000 population)	<i>Cryptosporidium</i> oocysts detected in final water. Lenamore Springs now removed from service.	Omagh
16 December 2011	Nursery Road, Ahoghill (one property)	Following a number of mains bursts during operational work, a consumer complaint sample failed bacteriologically. A 'Boil Water Before Use' * notice was issued to a single property (notice in place for three days). There was subsequent media interest.	Ballymena
28 October 2011	Donegall Park Avenue, Belfast (nine properties)	After a mains replacement was carried out, bacteriological failures occurred at a number of properties.	Belfast
29 December 2011	Camlough WTWs (21,000 population)	Technical difficulties led to aluminium exceedences in the final water.	Newry and Mourne

* A **'Boil Water Before Use'** notice is issued when there is a temporary deterioration in drinking water quality and boiling the water is sufficient to make it safe to drink.

Table 5.2: Drinking Water Quality Non-Incidents in 2011

Date of Non Incident	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Non-Incident	Associated Council Area(s)
10 January 2011	Seagahan WTWs (30,000 population)	Treatment difficulties led to a pH below the limit in the final water, but it did not affect the related supply area.	Armagh
1 February 2011	Seagahan WTWs (30,000 population)	Treatment difficulties resulted in short-term increases in final water turbidity which did not affect the related supply area.	Armagh
8 February 2011	Shanmoy at Mullaghanagh WTWs (41,000 population)	Turbidity exceedences due to unrepresentative sampling.	Dungannon and South Tyrone
10 March 2011	Altmore WTWs (9,000 population)	Turbidity exceedence due to unrepresentative sampling.	Dungannon and South Tyrone
14 March 2011	Foyle Fold, Londonderry (one property)	An odour and a taste exceedence were reported from a single property. No cause was determined.	Derry
31 March 2011	Glenhordial WTWs (10,000 population)	Aluminium exceedences due to unrepresentative sampling.	Omagh
18 April 2011	Lough Bradan WTWs (20,000 population)	Turbidity exceedences due to unrepresentative sampling.	Fermanagh, and Omagh
22 April 2011	Carmony WTWs (67,000 population)	Turbidity exceedence due to unrepresentative sampling.	Derry
3 May 2011	Caugh Hill WTWs (50,000 population)	Turbidity exceedence due to unrepresentative sampling.	Derry, Limavady, and Strabane
6 May 2011	Coolmillish Road, Armagh (one property)	Odour and taste exceedences at a single property due to internal plumbing issues.	Armagh
7 May 2011	Killylane WTWs (47,000 population)	Turbidity exceedences due to unrepresentative sampling.	Ballymena, Larne, and Newtownabbey
7 May 2011	Ballinrees WTWs (105,000 population)	Short-term loss of disinfection resulted in reduced levels of chlorine in the final water.	Ballymoney, Coleraine, and Limavady
25 May 2011	Camlough WTWs (21,300 population)	Aluminium, iron and manganese exceedences due to unrepresentative sampling.	Newry and Mourne
2 June 2011	Dorisland Carrick Zone (124,000 population)	Bromate exceedence reported - unrepresentative of water quality in the area.	Belfast, Carrickfergus, and Newtownabbey
3 June 2011	Carran Hill WTWs (11,000 population)	There was potential for pollution from a fuel laundering plant to contaminate Lough Ross. There were no related water quality failures.	Newry and Mourne
16 June 2011	Dungonnell WTWs (30,500 population)	Technical issues led to short-term treatment problems. There were no related water quality failures.	Antrim, and Ballymena
29 June 2011	Clay Lake WTWs (7,500 population)	Incorrect coagulant delivery had the potential to adversely affect the treatment process. There were no related water quality failures.	Armagh

Date of Non Incident	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Non-Incident	Associated Council Area(s)
8 July 2011	Rathlin WTWs (120 population)	Iron, manganese and turbidity exceedences due to unrepresentative sampling.	Moyle
11 August 2011	Killyhevlin WTWs (62,500)	An oil spill in Lough Erne had the potential to cause problems at Killyhevlin WTWs. There were no related water quality failures.	Dungannon and South Tyrone, and Enniskillen
26 August 2011	Carmony WTWs (67,000 population)	Turbidity exceedence due to unrepresentative sampling.	Derry
3 October 2011	Caugh Hill WTWs (74,500 population)	Turbidity exceedence due to unrepresentative sampling.	Derry, Limavady, and Strabane
7 November 2011	Killylane WTWs (47,000 population)	Aluminium exceedence reported - the cause was not determined and the related supply area was not affected.	Ballymena, Larne, and Limavady
9 November 2011	Lough Fea WTWs (29,500 population)	Turbidity exceedence due to unrepresentative sampling.	Cookstown, Dungannon and South Tyrone, Magherafelt, and Omagh.
5 December 2011	Fofanny WTWs (86,500 population)	Aluminium exceedences due to unrepresentative sampling.	Cookstown, Dungannon and South Tyrone, Magherafelt, and Omagh
27 December 2011	Ballinrees WTWs (103,000 population)	An odour and a taste exceedence were reported from a final water sample. No cause could be identified and it did not affect the related supply area.	Ballymoney, Coleraine, and Limavady

Annex 6

Technical Audit and Research Programmes

The Technical Audit Programme

The following table provides a summary of our 2011 Inspection Programme.

Table 6.1: Summary of the 2011 Inspection Programme

Location	Audit Activity	Number of Recommendations ¹	Number of Suggestions ²
Caugh Hill WTWs	To check that good practice in water treatment is being operated.	5	0
Lough Macrory WTWs	To check that good practice in water treatment is being operated.	16	7
Rathlin WTWs	To check that good practice in water treatment is being operated.	16	5
'Laboratory Information Management System' (LIMS)	To check that good practice of the Laboratory Information Management System is being operated.	2	1

¹Recommendations are made where, in our opinion, action is required to avoid a foreseeable risk or a breach of a regulatory duty. If such a breach occurs, then we may consider 'enforcement action'. A formal written response from NI Water is required.

²Suggestions are made in relation to matters which relate to an aspect of best practice.

In 2011, the technical audit programme was satisfactorily undertaken and we acknowledge NI Water's continued co-operation. NI Water has implemented or provided substantive comment on the recommendations and suggestions we provided in our audit reports.

Drinking Water Quality and Health Research Programme

The Department of the Environment, Food and Rural Affairs (DEFRA) in England funds a wide range of research into drinking water quality and health. On DEFRA's behalf, the Drinking Water Inspectorate for England and Wales manages the national Drinking Water Quality and Health Research Programme (DWQH) with input from relevant stakeholders, including the drinking water quality regulators for Scotland and Northern Ireland.

The objective of the DWQH is to provide the science base for policy on drinking water quality, encompassing both health and consumer acceptability issues.

Further information on current and future research is available from the Drinking Water Inspectorate for England and Wales' website.¹

¹<http://dwi.defra.gov.uk/research/index.htm>

Annex 7

Consideration of Provisional Enforcement Orders

Table 7.1: A Summary of CPEOs in Place in 2011

CPEO No.	Water Treatment Works (WTWs) and Associated Water Supply Areas	Parameter	Progress with Undertaking
CPEO/11/02	Killyhevlin WTWs and Associated Supply Area	Taste and odour	Part of the remediation measures associated with this Undertaking includes NI Water completing a feasibility study into treatment arrangements at this works, along with the refurbishment of filters, and additional sampling. These actions are due for completion during 2012.
CPEO/11/01	Not Applicable	Breach of regulation 9(3)	As part of the remediation measures associated with this Undertaking, NI Water now has new internal procedures and reporting arrangements to ensure an appropriate spread of samples are taken throughout the year. There is one outstanding action to be completed for this Undertaking.
CPEO/10/04	Altmore WTWs and Associated Supply Area	MCPA	Altmore WTWs was permanently removed from service in April 2011 and the area is now supplied by Castor Bay WTWs. We are content that all other actions required under the Undertaking have been completed.
CPEO/10/03	Altnahinch Bushmills Water Supply Zone	Iron	The mains rehabilitation work which was to be commenced or completed during 2010/11 was completed, as required by the Undertaking.
CPEO/10/02	Altmore Cabragh Water Supply Zone	Iron	The zone is now supplied from Castor Bay WTWs from April 2011. Other work associated with this Undertaking was also completed during 2011.
CPEO/10/01	Dorisland Whiteabbey and Dorisland Carrick Water Supply Zones	Iron	The mains rehabilitation work which was to be prioritized or commenced during 2011 was completed, as required by the Undertaking.
CPEO/08/04	Derg Water Supply Area	THMs	All remedial measures associated with this Undertaking were completed in 2011.
CPEO/08/02	Killylane Water Supply Area	THMs	All remedial measures associated with this Undertaking, including those relating to the operation of works and refurbishment of service reservoirs, were completed by the end of June 2011.
CPEO/08/01	Carmony Water Supply Area	Aluminium	All remedial actions associated with this Undertaking, including work to upgrade Carmony WTWs, were completed in July 2011.

¹www.doeni.gov.uk/niea/water-home/drinking_water/public_water/enforcement_and_legal_action-2.htm

Annex 8

Useful Contacts

Northern Ireland Water Ltd

Northern Ireland Water Ltd (NI Water) is responsible for providing all public and sewerage services in Northern Ireland.

Web address: www.niwater.com

Tel: 08457 440088

E-mail: waterline@niwater.com

Address: Northern Ireland Water Ltd
PO Box 1026
Belfast BT1 9DJ

Northern Ireland Authority for Utility Regulation

The 'Utility Regulator' has a responsibility to protect the interests of water and sewerage consumers with regard to price and quality of services, by promoting effective competition in the supply of water and the provision of sewerage services.

Web address: www.uregni.gov.uk/water

Tel: +44 (028) 9031 1575

E-mail: info@uregni.gov.uk

Address: Queens House
14 Queen Street
Belfast BT1 6ED

Consumer Council for Northern Ireland

The Consumer Council for Northern Ireland is a statutory body whose aims are to promote and safeguard the interests of all consumers in Northern Ireland.

Web address: www.consumercouncil.org.uk

Enquiries Tel: +44 (0) 28 9067 2488

Complaints Tel: 0800 121 6022

E-mail: info@consumercouncil.org.uk or
complaints@consumercouncil.org.uk

Address: The Consumer Council
116 Holywood Road
Belfast BT4 1NY

Northern Ireland Environment Agency Water Management Unit

The Northern Ireland Environment Agency has a duty to promote the conservation of the water resources of Northern Ireland and the cleanliness of water in waterways and underground strata. Water Management Unit protects the aquatic environment.

Web address: www.doeni.gov.uk/niea/water-home

Tel: +44 (028) 9262 3100

E-mail: waterInfo@doeni.gov.uk

The Public Health Agency for Northern Ireland

The Public Health Agency (PHA) has responsibility for a range of functions, including: improvement in health and social wellbeing; health protection; and supporting commissioning health and social care services.

Web address: www.publichealth.hscni.net

Tel: +44 (028) 9032 1313

Address: Public Health Agency
Linenhall Street Unit
12-22 Linenhall Street
Belfast BT2 8BS

Food Standards Agency Northern Ireland

The Food Standards Agency (FSA) is an independent government department set up to protect the public's health and consumer interests in relation to food, including the use of water in food production.

Web address: www.food.gov.uk/northernireland

Tel: +44 (028) 9041 7700

E-mail: infofsani@foodstandards.gsi.gov.uk

Address: Food Standards Agency NI
10c Clarendon Road
Belfast BT1 3BG

Local District Councils

www.nidirect.gov.uk/index/contacts/local-councils-in-northern-ireland

Drinking Water Inspectorate England and Wales

www.dwi.gov.uk

dwi.enquiries@defra.gsi.gov.uk

Drinking Water Quality Regulator for Scotland (DWQR)

www.dwqr.org.uk

Environmental Protection Agency

www.epa.ie

info@epa.ie

Water UK

www.water.org.uk/home

UK Water Industry Research

www.ukwir.co.uk

mail@ukwir.org.uk

Foundation for Water Research

www.fwr.org

office@fwr.org.uk

Water Regulations Advisory Scheme

www.wras.co.uk

info@wras.co.uk

World Health Organization

World Health Organization (WHO) produces international norms on water quality and human health in the form of guidelines that are used as the basis for regulation and standard setting, in developing and developed countries worldwide.

Web address:

www.who.int/water_sanitation_health/dwq/en/

E-mail: info@who.int

Annex 9

Staffing

Chief Inspector	Margaret Herron
Senior Inspector	David O'Neill
Senior Inspector	Colin Clements
Senior Inspector	Bernadette Corr
Higher Scientific Officer	Una Mailey
Higher Scientific Officer	Michael Lyons
Scientific Officer	Elaine O'Rourke
Administrative Officer	Claire Shields
Casual Administrative Officer	Kevin Corr



Our aim is to protect, conserve and promote the natural environment and built heritage for the benefit of present and future generations.

Drinking Water Inspectorate for Northern Ireland
Environmental Protection
Northern Ireland Environment Agency
Klondyke Building
Cromac Avenue
Gasworks Business Park
Malone Lower
Belfast BT7 2JA
T. 028 9056 9282 - F. 028 9056 9263
E: DWI@doeni.gov.uk

www.doeni.gov.uk/niea

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