



Drinking Water Quality in Northern Ireland, 2010

A Report by the Drinking Water Inspectorate for Northern Ireland



Northern Ireland
Environment
Agency



Northern Ireland Environment Agency

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Foreword

I am pleased to present our annual report on the quality of drinking water in Northern Ireland. It covers the 2010 calendar year for both public and private water supplies.

This year's report records the significant improvements made in providing good quality drinking water, marking an important stage in progressing compliance since the regulatory regime was first introduced in Northern Ireland in 1994, for both public and private water supplies. Since then there have been significant changes to the regulatory framework with new and amended regulations.

In relation to public water supplies, the successful application of regulatory processes over the last 15 years through the use of 'Authorised Departures', enforcement mechanisms and risk assessments, have enabled many improvements to be achieved. It is therefore satisfying to report for this year the continuing upward trend in public drinking water quality compliance. This is mainly a result of completing the essential upgrade of water treatment facilities across Northern Ireland to address potential water contamination issues, notably: *Cryptosporidium*; trihalomethanes; aluminium; iron; manganese; and colour.

Looking at the quality of water that consumers receive, we use an indicator statistic known as mean zonal compliance (MZC). The 99.81% achieved this year records the further improvements since we first introduced this comparator in 2004, when MZC was reported as 98.65%. Notwithstanding this overall high level of compliance, NI Water must continue to be vigilant as it goes about its daily operational business in providing safe, clean drinking water.

While overall statistics can be useful in providing information on trends or used as indicators from which comparisons can be made, high levels of compliance do not guarantee that events that have the potential to affect water quality, will not happen. In 2010, 36 events were reported, with 23 categorised as incidents which were determined to have affected drinking water quality. Of these incidents, 52% were related to treatment difficulties at 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 in place learning and appropriate

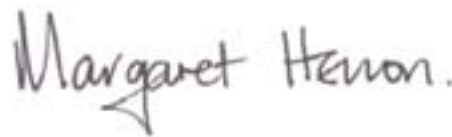
mitigation measures as part of its drinking water safety management approach, and to prevent the recurrence of drinking water quality incidents.

Consumers expect safe, clean drinking water supplies to be available at all times. The concerns that consumers have continue to be predominantly related to the appearance of their water and in particular its colour, NI Water must continue to address these concerns. We welcome that NI Water has a planned long term programme of work to rehabilitate its network of water mains which, as it completes, should address many of these consumers concerns around the appearance of their water.

In relation to private water supplies we have been monitoring their quality since 1999 and this year's report details some of the contamination risks (e.g. microbiological, iron and manganese) which can persist in some of these small supplies. The introduction of 'risk assessment' into the 2009 regulations will help us identify where improvements to ensure safe, clean supplies should be made.

We welcome the opportunities to continue to work constructively with other stakeholders as we continue to strive to sustain our high quality of public drinking water and to further improve the quality for the users of private water supplies across Northern Ireland.

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 for Northern Ireland
October 2011

Executive Summary

This is the 15th report in a series published by the Drinking Water Inspectorate, acting in its regulatory role in matters relating to drinking water quality. The Inspectorate acts 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). Our report also provides details of the quality of the private water supplies for which we have regulatory responsibility.

Overall public drinking water quality, which includes results of key tests carried out at water treatment works, service reservoirs and consumers' taps, continues to get better: 99.86% compliance in 2010 (99.79% in 2009). This continued improvement has been gained through the completion of a variety of planned capital infrastructure projects to rectify the major deficiencies in water quality. Further improvements are required to achieve and sustain compliance with the regulatory standards notably for iron, lead, and pesticides.

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 has significantly improved, with an overall high level of microbiological compliance of 99.95% being achieved in 2010, compared to 99.87% in 2009.

In considering the overall drinking water quality at consumers' taps we use 'mean zonal compliance', an index which is calculated using 39 parameters from the regulatory sampling programme. In 2010, 11 parameters failed to achieve full compliance: iron; trihalomethanes (THMs); odour; aluminium; lead; pesticides (MCPA and total pesticides); manganese; taste; turbidity; and *E. coli*.

Compared with last year, there has been a significant increase in the mean zonal compliance achieved at consumers' taps: 99.81% reported for 2010; and 99.74% reported for 2009. This is mainly attributed to improved compliance for THMs as the planned programme of investment to upgrade water treatment facilities across Northern Ireland completed.

We use a distribution maintenance index to assess the overall water quality of the distribution system. It is calculated using the percentage mean zonal compliance

of samples taken at consumers' taps for three parameters: turbidity; iron; and manganese. These parameters are used to reflect the causes of discoloured water in distribution systems. This distribution maintenance index is also referred to as the Operational Performance Index (Turbidity, Iron, Manganese), (OPI [TIM]). 2010 showed a marginal improvement in OPI (TIM) of 99.08%, compared to 98.90% in 2009. As with previous years, iron continues to be the parameter which contributes the highest non-compliance in the OPI (TIM) calculation.

We continue to use appropriate regulatory mechanisms (such as Authorised Departures (ADs) and accepting legal undertakings in relation to the 'enforcement process') to target issues of non-compliance with drinking water quality standards and other regulatory responsibilities. These regulatory processes place a requirement upon NI Water to undertake the remedial measures necessary to secure compliance. During 2010, a significant stage in the application of the regulatory regime completed. In 2003, specific programmes of work were identified with 54 ADs in place for THMs and/or aluminium, while the improvement work completed. By the end of 2010 all but one programme to address THM non-compliance at Lough Bradan WTWs had been completed: commissioning work at this location is currently underway.

During 2010, we accepted a series of undertakings received from NI Water to improve compliance for THMs, iron, aluminium and MCPA. The necessary remedial measures are either currently being implemented or have now been put in place by NI Water.

Notwithstanding the high quality of water reported this year, we record that 36 events which had the potential to affect drinking water quality were notified to us during 2010: we categorized 23 as incidents and 13 as non-incidents. Of the 23 incidents, 12 related to ineffective treatment, one of which was related to inadequate disinfection, with the remainder caused by a variety of factors, including: water quality problems caused by operational work and third-party events; a hydrogen ion exceedence due to cement-lined mains; back-siphonage from a private supply; disinfection problems; and the major freeze/thaw incident.

Towards the end of 2010 and into January 2011, many consumers experienced a loss of supply as a major incident developed across Northern Ireland due to adverse weather conditions associated with a rapid freeze/thaw. This also resulted in short term water quality problems at several water treatment works as NI Water increased production to cope with the extra demand on its supplies as significant leakage occurred through breaches in the distribution networks.

To secure the continuous provision of safe, clean drinking water, robust operational and maintenance practices need to be applied at every stage of water supply. It is imperative that good operational performance is achieved to ensure that the risks to public health are being robustly managed to prevent the potential contamination of drinking water supplies. This is particularly 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 make an assessment of consumer 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 during the year. As with previous years, we report for 2010 that the greatest number of all complaints and concerns relate to appearance (over 67%) of which nearly 64% are related to the colour of the water. NI Water must continue to address any concerns consumers may have. We welcome its planned long term program of work to upgrade its networks of water mains, which as it completes should help reduce many of these consumer concerns.

For private water supplies, overall compliance in 2010 is 97.41%; a significant decline in compliance on 2009 (98.62%). This was in part due to implementing the revised sampling programme required by the new regulations and also because of the additional investigative sampling that was undertaken in 2010. 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 is undertaken throughout 2011, compliance at private water supplies should improve.

Meeting Future Challenges

The new regulatory framework incorporates a risk based approach as 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.

This will enable us to focus and prioritise where additional remedial measures are required to secure high quality drinking water supplies.

For public water supplies this means that the work commenced by NI Water in 2010 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) is kept under review. Detailed analysis of every risk assessment to verify the methodology and adequacy of the control measures in place to mitigate risks continues to be ongoing by us. A similar process is also underway at all of our private water supplies with the assistance of the environmental health officers within the district councils.

Looking forwards we have a specific challenge in meeting the stricter European drinking water standard for lead (10 µg/l) in 2013. NI Water has been working towards this for several years now with the introduction of orthophosphate treatment at all major works since 2004. While there has been an improving trend in overall compliance with the current 25 µg/l standard over the last six years (99.53% in 2010; 94.92% in 2004), we note that there is still a significant amount of work required to comply with the 10 µg/l standard (95.77% in 2010). While effective water treatment is an important factor in achieving compliance, it alone cannot secure compliance with the new standard. We welcome the collaborative work that is ongoing with NI Water, the district councils, health professionals and other interested stakeholders to reduce consumer exposure to lead in drinking water, particularly, where lead pipe work and fittings remain in older buildings.

Planning for future investment needed to further safeguard the quality of our drinking water supplies continues to be a part of our role, as the water industry in Northern Ireland continues to identify and plan investment priorities as part on the ongoing 'Price Control' process. We constructively engaged with other stakeholders (the Utility Regulator in Northern Ireland for 'economic regulation'; the Department for Regional Development for 'drinking water policy and stakeholder business'; the Northern Ireland Environment Agency for 'environmental regulation'; and the Consumer Council for Northern Ireland for 'customer representation') to identify the key drinking water quality issues. Achieving compliance with drinking water quality standards will remain an important focus for setting priorities to safeguard public health. The improvements in drinking water quality that this will bring are to be welcomed.

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 also look at Authorised Departures, Consideration of Provisional Enforcement Orders, events affecting water quality and consumer contacts

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

Drinking Water Quality Testing

Throughout 2010, 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 that sampling programmes are 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 its prescribed concentration or value is available on our website: www.doeni.gov.uk/niea/water-home/drinking_water/public_water/regulations_guidance.htm

Overall Drinking Water Quality

Overall drinking water quality for the key parameters monitored at water treatment works, service reservoirs and consumers' taps continued to improve in 2010: of the 104,493 key tests undertaken, 149 (0.14%) failed to meet the standards (Table 1.1 refers). This was a significant improvement compared with the 243 (0.21%) tests which failed in 2009 (Figure 1.2 refers), and was mainly due to much improved microbiological compliance at water treatment works, service reservoirs and consumers' taps, together with enhanced trihalomethane (THM) compliance in water supply zones. We recognize that the focused investment made by NI Water in enhanced water treatment and rehabilitation of distribution systems, particularly over recent years, has resulted in a reduction in the number of failures of the drinking water standards.

While it is encouraging to note the overall improvement in 2010, this report highlights the parameters for which compliance with the regulatory standards still has to be achieved: iron; THMs; odour; aluminium; lead; pesticides (MCPA and total pesticides); manganese; taste; turbidity; and *E. coli*. NI Water must continue to address the issues which cause non-compliances and put the necessary corrective actions in place.

Figure 1.1: NI Water Supply Details



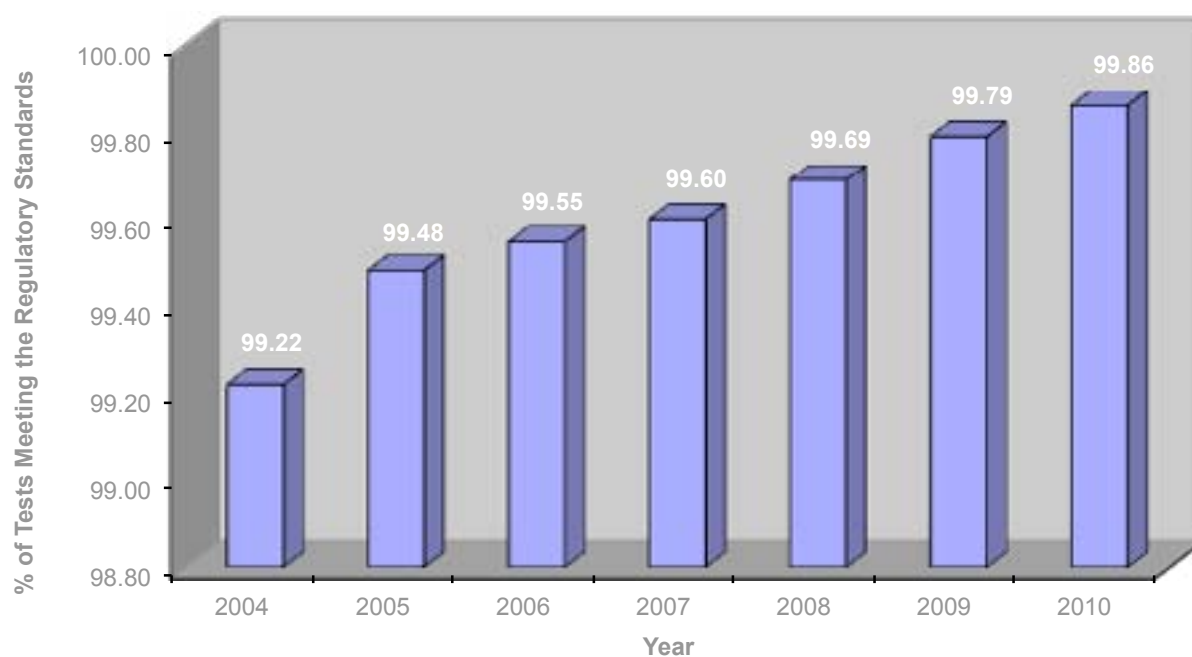
Table 1.1: Overall Drinking Water Quality in 2010

| Water Leaving Water Treatment Works | Number of Tests | Number of Tests not Meeting the Standards |
|---|-----------------|---|
| <i>E. coli</i> | 7,573 | 0 |
| Coliform bacteria | 7,573 | 1 |
| Microbiological Total | 15,146 | 1 |
| Nitrite | 278 | 0 |
| Turbidity* | 7,563 | 29 |
| Total | 22,987 | 30 |
| Water in Service Reservoirs | | |
| <i>E. coli</i> | 16,966 | 1 |
| Coliform bacteria** | 16,966 | 8 |
| Total | 33,932 | 9 |
| Water at Consumers' Taps or Authorised Supply Points | | |
| <i>E. coli</i> | 4,728 | 2 |
| Coliform bacteria* | 4,728 | 20 |
| Enterococci | 424 | 0 |
| <i>Clostridium perfringens</i> * | 2,891 | 0 |
| Microbiological Total | 12,771 | 22 |
| Zone Chemical Analysis | 21,054 | 86 |
| Supply Point Chemical Analysis | 13,749 | 2 |
| Total | 47,574 | 110 |
| Overall Microbiological Quality | 61,849 | 32 (0.05%) |
| Overall Drinking Water Quality | 104,493 | 149 (0.14%) |

* Indicator parameters included in the calculation of overall drinking water quality.

** All 330 SRs met the 95% compliance rule.

Figure 1.2: Overall Drinking Water Quality from 2004 - 2010



Regulatory Compliance at Consumers' Taps

Looking at the drinking water quality at consumers' taps, the water industry uses an index referred to as 'percentage mean zonal compliance' (% MZC). This is calculated using 39 parameters from the regulatory sampling programme and allows comparative assessments to be made (refer to Part 5 for further detail). Eleven parameters did not achieve full compliance in 2010 and these are listed in Table 1.2 below. Iron and trihalomethanes continue to report the lowest % MZC.

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

| Parameter | 2010 (%MZC) | 2009 (%MZC) |
|---------------------------------|-------------|-------------|
| Iron | 97.60 | 97.24 |
| Trihalomethanes | 98.33 | 96.39 |
| Odour | 99.19 | 99.93 |
| Aluminium | 99.47 | 99.17 |
| Lead | 99.55 | 99.17 |
| Pesticides - other substances* | 99.60 | 98.90 |
| Total pesticides | 99.60 | 100.00 |
| Manganese | 99.69 | 99.70 |
| Taste | 99.74 | 99.93 |
| Turbidity | 99.95 | 99.76 |
| <i>E. coli</i> | 99.97 | 99.95 |
| Overall % Mean Zonal Compliance | 99.81 | 99.74 |

*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. This is reflected in the significant increase reported for the overall % MZC of 99.81% in 2010, compared with 99.74% in 2009. Further drinking water quality improvements have been identified, particularly the need to deliver a significant programme of water mains rehabilitation across NI Water's distribution networks.

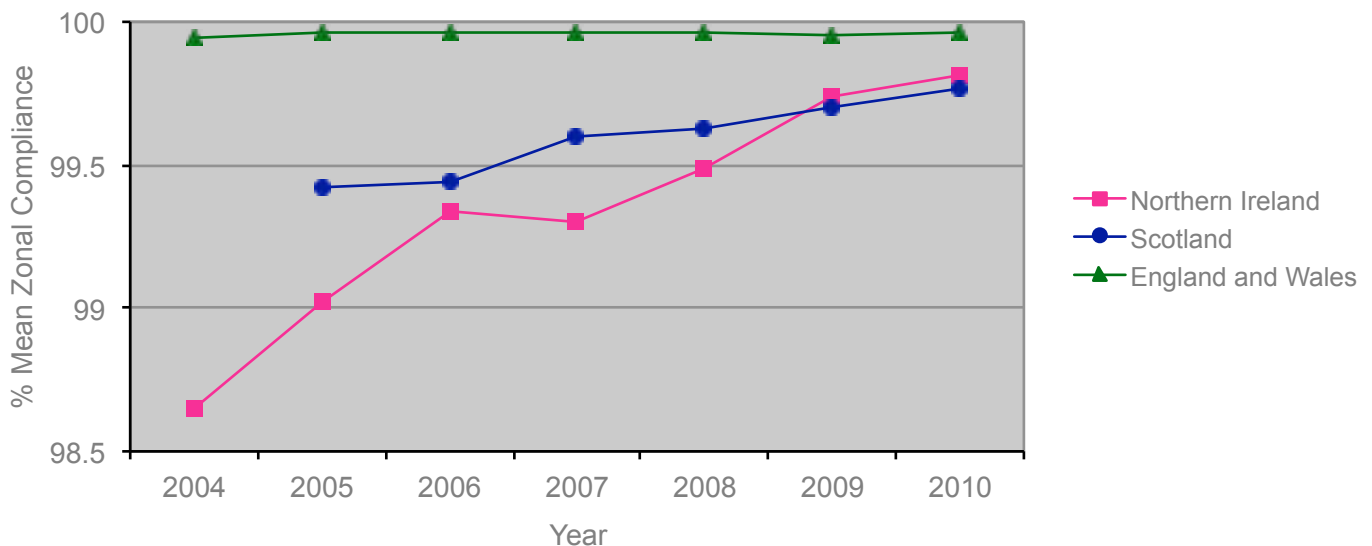
Completion of this work is fundamental to improving both compliance and the quality of water supplied to consumers.

Figure 1.3 further illustrates the improvement that has been achieved in Northern Ireland in the context of the UK over the last decade in terms of declining numbers of failures of drinking water standards at consumers' taps. The completion of investment programmes, which were planned to achieve compliance for aluminium and trihalomethanes, continues to indicate ongoing progress in delivering high quality drinking water. This is particularly evident in the % MZC for Northern Ireland from 2007 onwards as major schemes started to complete. Between 2007 and 2010, the MZC showed an increase of 0.51%.

Contraventions – Follow-up Action

Where NI Water supplies water that does not meet the drinking water standards, it must investigate the cause of the problem and notify us of its findings. It is incumbent upon NI Water to promptly provide substantive details and comments in its contravention reports. We recognize that the level of detail provided in these reports continues to improve.

Figure 1.3: Drinking Water Quality at Consumers' Taps from 2004 to 2010



We assess each notification and determine if the failure is likely to recur. If we consider this to be the case, NI Water is required to put a programme of remedial work in place to improve drinking water quality. We implement the appropriate statutory mechanism to secure or facilitate compliance. During this reporting period, the following statutory mechanisms have been in place: Authorised Departures; and Consideration of Provisional Enforcement Orders.

Authorised Departures

Where a water treatment works has been identified as being at risk of failing to meet the regulatory standards, and the existing water treatment is considered inadequate, we have agreed a water treatment improvement programme with NI Water which is stated within the terms and conditions of an Authorised Departure (AD). The Regulations recognize that a period of time may be required during which improvement work must be carried out to bring the drinking water into compliance with the standards.

In 2003, 54 ADs were in place for THMs and/or aluminium which resulted in planned investment to upgrade specific water treatment facilities. In August 2010, the last two ADs to remain in place for THMs ended. Part 3 of this report provides details of the improvements in water quality as a result of this investment. Annex 5 provides details of ADs for which we are awaiting completion of the compliance improvement schemes.

Consideration of Provisional Enforcement Orders

Where NI Water has failed to comply with its regulatory duty, the Regulations make provision for us to use an enforcement process. A 'Consideration of Provisional Enforcement Order' (CPEO) may be issued 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.

During 2010, for two CPEOs relating to THMs and iron, the required actions were completed; for three CPEOs relating to THMs and aluminium, completion of remedial actions remained ongoing; and four new CPEOs were issued for iron and the pesticide MCPA. For further details on these CPEOs, refer to Annex 6.

Events affecting Drinking Water Quality

We require NI Water to inform us of all events that have affected, or are likely to affect, drinking water quality or sufficiency of supplies, and, where as a result, there may be a risk to consumers' health. This information must be provided according to agreed guidance and reporting procedures. We also encourage NI Water to notify us of

events that may fall outside the criteria, but which could, nonetheless, impact on water quality or cause concern to consumers.

When notified of an event, we assess NI Water's provisional information to determine whether an incident or a non-incident has occurred. We define an incident as a situation where there has been a demonstrable deterioration in the quality of drinking water, giving rise to a significant potential risk to the health of consumers or a significant adverse aesthetic water quality change. Where no such deterioration has taken place, we classify the situation as a non-incident.

There is always the potential for incidents and non-incidents to happen. What matters is how well NI Water minimizes both the risks of occurrence and the consequences of incidents as it acts to protect public health at all times. We assess all the information available to determine:

- 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.

In 2010, 36 events were reported to us compared with 55 reported in 2009. Of the 36 events reported, 23 were categorized as incidents and 13 as non-incidents (Annex 7 provides more details). Of the 23 incidents, 12 (52%) were related to treatment difficulties or insufficient treatment at water treatment works which led to aluminium, iron, taste, odour, turbidity and pesticide exceedences, as well as a disinfection failure. The remaining 11 incidents were caused by a variety of factors, including: water quality problems caused by operational work and third-party events; a hydrogen ion exceedence due to cement-lined mains; back-siphonage from a private supply; disinfection problems and the major freeze/thaw incident.

Of the 13 events categorized as non-incidents, nine (69%) were due to unrepresentative sampling; two were due to short-term treatment difficulties; one was due to the internal plumbing in a single dwelling; and the remaining non-incident was due to an oil spill in a raw water source which was successfully contained before it could enter the water treatment works.

Towards the end of 2010 and into January 2011, a major incident developed across Northern Ireland due to adverse freeze/thaw weather conditions. As part of our normal drinking water quality investigations, we assessed

how NI Water complied with its regulatory obligations in dealing with the incident and, as a result, we made a number of recommendations regarding incident management, record keeping, risk management and the performance of water treatment works. We stipulated that NI Water review and update its operational procedures to provide the necessary assurance that it can robustly manage any risk to safeguard consumers, particularly where normal operational conditions do not prevail. We will continue to monitor NI Water to ensure that any outstanding follow-up action is completed.

Overview of Consumer Contacts

We asked NI Water to provide us with data on the contacts and concerns of its customers during 2010 as we are interested in consumer confidence in drinking water quality. The data we received for 2010 is presented in Figure 1.4 and shows that, like previous years, the highest percentage of contacts and concerns (67.3%) 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. Occasionally, water can be orange or brown in colour due to suspended particles of iron, or black due to suspended particles of manganese and this may cause dirty water concerns. Iron and manganese may be present in the raw water passing through inadequate treatment, from iron salts used in the treatment process, 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 - 2010

| | % of All Contacts Relating to Appearance | % of Appearance Category Relating to Colour |
|------|--|---|
| 2010 | 67.3 | 63.9 |
| 2009 | 65.6 | 62.3 |
| 2008 | 63.1 | 65.0 |
| 2007 | 66.0 | 74.1 |

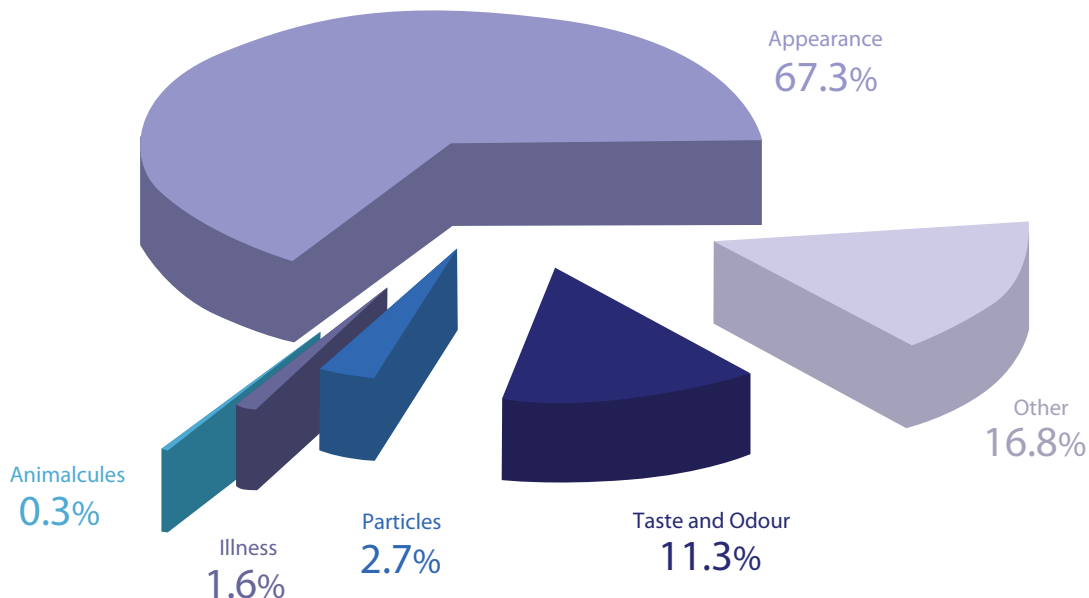
The Technical Audit Process

Technical audit process is the term used for the process by which we check that NI Water is complying with its statutory obligations. The audit process allows us to observe whether good practice is being followed. We operate a risk-based approach to technical audit which allows us to take into consideration factors such as water quality monitoring, incidents and previous audits, and enables us to prioritize and focus the technical audit work to have the most benefit. Any corrective action that follows on from our recommendations and suggestions, which form part of the audit process, is monitored by us to ensure satisfactory completion. A summary of the 2010 Technical Audit Programme is detailed in Annex 8.

Risk Management

The World Health Organization (WHO) recommends that a water safety plan is the most effective way of ensuring that a water supply is safe and clean for all. It is based on a comprehensive risk assessment and the adoption of a risk management approach for all parts of the water supply chain: from the catchment, through the water

Figure 1.4: Consumer Contacts and Concerns received by NI Water in 2010



treatment works and onwards through the distribution system to the consumer. This approach has been incorporated in amended regulatory requirements to further safeguard the supply of drinking water. NI Water must carry out a risk assessment, commonly referred to as a drinking water safety plan (DWSP), at every treatment works, associated catchment and supply system. The steps in the production of a DWSP include an assessment of the information gathered in relation to the four areas which make up a water supply, through a process of knowledge sharing, information gathering, and defining roles and responsibilities. The verification of drinking water quality would be through a combination of the ongoing implementation of actions from a DWSP and from statutory and non-statutory water quality testing of drinking water supplies. This approach is detailed in the schema shown in Figure 1.5.

At the end of 2010, in line with regulatory requirements, NI Water provided us with 26 summary risk assessment reports to cover all catchments, works and distribution systems from which it supplies water to consumers in Northern Ireland. The DWSPs aim to identify and quantify the inherent risks throughout individual water supply systems and to mitigate these risks through adopting effective controls to protect drinking water quality. This is carried out by looking to: minimize the potential contamination of source waters; reduce or remove contaminants through appropriate treatment processes; and prevent contamination of the distribution network and domestic water supply systems within buildings. These actions should assist in providing increased protection of human health and ensure good water supply practice.

Figure 1.5: Drinking Water Safety Plan



Part 2
Catchment



Image: Dorisland Water Treatment Works - NIEA

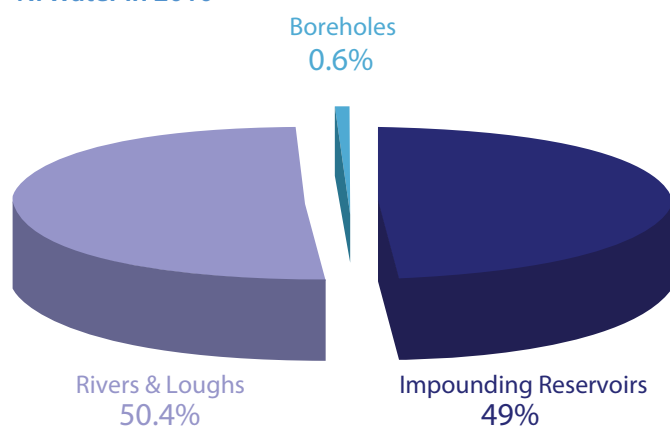
Part 2

The Catchment

This section of the report looks at the catchment: the start of the 'water supply chain' from which Northern Ireland Water Ltd (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 drinking water.

In Northern Ireland, public water supplies are mostly obtained from surface water sources (approximately 99.4 per cent), with the remainder being from boreholes. Historically the nature and structure of the landscape, together with the well distributed rainfall, has led to the development of upland and lowland reservoirs, and direct river abstractions to meet both urban and rural centres of water demand. Rationalisation of water sources has seen a significant reduction in the use of boreholes, from 8% in 1996 to 0.6% in 2010.

Figure 2.1: Sources of Drinking Water Used by NI Water in 2010



Surface water sources contain naturally occurring organic materials as well as other potential contaminants which are required to be removed by suitable water treatment processes.

Water quality can vary between sources due to many factors, such as the nature and structure of the rock types, soil, vegetation, land use and local weather. These are important factors that may have an impact on the properties of a drinking water supply, such as taste, hardness, acidity (pH), organic and mineral content.

Catchment Management

In the development of its drinking water safety plans (DWSPs), NI Water is required to assess all the potential risks within the catchments from where it abstracts water. It must then detail, where applicable, the arrangements in place to mitigate these risks to protect the catchment and preserve the quality of its source waters. As part of its risk management of these catchments, NI Water is required to undertake monitoring of the water quality within its catchment in response to the outcome of its risk assessments. NI Water is required to ensure that its surface waters monitoring programme meets the minimum sampling frequencies within the Regulations¹, which are based on the population served by the water treatment works. These monitoring programmes are necessary for the management of NI Water's treatment processes in the 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 is prevalent in upland peaty surface water sources. This information and data is used to provide input to the source and treatment sections of the DWSPs.

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

Drinking Water Protected Areas

The Water Framework Directive² sets out a requirement to identify drinking water protected areas (DWPAs). These are specific catchments where water is abstracted for the production of drinking water for both public and private drinking water supplies and are required to be identified and mapped within NIEA's river basin management plans³.

Potential Contaminants within Catchments

Within catchments there will be the potential for microbiological and physical/chemical contaminants. 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,

¹The Water Supply (Water Quality) (Amendment) Regulations (Northern Ireland) 2009 No. 246

²EU Water Framework Directive 2000/60/EC

³www.doeni.gov.uk/niea/water-home/wfd.htm

drinking water sources are also assessed for the risk of other pathogens such as *Cryptosporidium*. In other catchments the presence of undesirable contaminants arising from aquatic micro-organisms, such as algae, may have the potential to cause taste and odour issues. A well optimized treatment process, together with good liaison between NI Water and the key stakeholders in developing a shared approach to the protection of drinking water supplies, is a fundamental part of managing our catchments and reducing the potential for contaminants to enter our drinking water sources.

Within catchments many factors have the potential to influence the untreated water quality. In general, raw water quality is influenced by both natural and human factors. 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 runoff). Source protection provides the first barrier in the protection of drinking water quality. Where catchment management is beyond the control of NI Water, the planning and implementation of control measures require effective co-ordination with other 'agencies', and individuals.

Chemically Derived Contaminants - Pesticides

Pesticides are a group of substances that include insecticides, herbicides, fungicides and algicides that are commonly used as part of land management practices within catchments. The Regulations set standards for individual pesticides as well as a standard for the sum of

all pesticides, 'the total pesticide' standard. Sampling and analysis should be targeted for those pesticides used in significant amounts on catchments and those most likely to reach water supplies. Water sources may contain traces of pesticide residues as a result of agricultural use (pest control on crops) and non-agricultural use (herbicide for weed control on roads, etc). NI Water is required to assess the risk to drinking water from pesticides in use in its catchments and then develop an appropriate pesticide monitoring programme.

During 2010, 47 individual pesticides were monitored. Of the 11,825 determinations, one regulatory sample failed the standard of 0.1 µg/l for MCPA¹ in the Altmore water supply area. This contravention also failed the total pesticide standard of 0.5 µg/l. In addition to the regulatory compliance sampling programme, NI Water carries out operational monitoring for pesticides. From these operational samples, a failure was reported for MCPA at Ballinrees WTWs. MCPA is a herbicide used for controlling broad-leaved weeds in grass and cereal crops. Insufficient pesticide removal in the associated water treatment works was the cause for the MCPA failures. Table 2.1 provides a summary of the locations where pesticides have been detected above the regulatory standard during the last three years.

NI Water is required to undertake an investigation into pesticide failures which will include liaison with the NIEA's Pollution Control Team to carry out investigations regarding pesticide usage and control within the relevant catchments. The outcomes of such investigations are then used to review the risk categorization for pesticides in NI Water's DWSPs. It is through this process that NI Water must identify appropriate remedial measures to be put in place to mitigate against the risk of pesticides making their way into the drinking water supply.

There are Regulations and guidance² in place to ensure pesticides are used with care in the vicinity of water ways. NI Water has also been proactive by participating in workshops and in educating stakeholders within catchments on the potential for the misuse of pesticides near water ways and the subsequent impact such activities may have on drinking water quality. NI Water needs to continue to actively engage and educate stakeholders to try and reduce further the problems associated with pesticides within catchments.

Table 2.1: Pesticide Detections above the Regulatory Standards

| Water Treatment Works | 2010 | | 2009 | 2008 | |
|------------------------------------|------|------------------|------|------|------------------|
| | MCPA | Total Pesticides | MCPA | MCPA | Total Pesticides |
| Altmore | 1 | 1 | | 2 | 2 |
| Ballinrees | 1 | | | | |
| Carran Hill | | | 2 | | |
| Derg | | | 1 | | |
| Total Number of Exceedences | 2 | 1 | 3 | 2 | 2 |

¹ 2-methyl-4-chlorophenoxyacetic acid

² www.dardni.gov.uk/ppp-code

Following the MCPA exceedance at Altmore WTWs in 2010, we took further regulatory action and issued a Consideration of Provisional Enforcement Order (CPEO) to NI Water. As part of the enforcement process, NI Water gave an undertaking to operate the works to best effect until Altmore WTWs was removed from service. Altmore WTWs was removed from supply in April 2011, and the area is now supplied from Castor Bay WTWs.

The MCPA exceedance at Ballinrees WTWs instigated a review by NI Water of the risks of pesticides being present within the catchment and the current effectiveness of the treatment at the works. The outcome of this review will be used to inform the DWSP for the works and associated catchment, and provide NI Water with the necessary information to put appropriate remedial measures in place.

Chemically Derived Contaminants - Oil

Petroleum oils can give rise to the presence of certain hydrocarbons that have low odour thresholds in drinking water and, in certain circumstances, these may give rise to a very unpleasant “diesel-like odour” at concentrations of a few micrograms per litre. Catchment risk assessments, undertaken by NI Water, aim to identify those activities that have the potential to contaminate drinking water sources.

During 2010, NI Water notified us of an event relating to a diesel spillage (from illegal fuel laundering activity within the catchment) into a stream which then entered a raw water source (Lough Ross) near to the intake to Carran Hill WTWs. While there was a detectable odour present in some of the raw water samples, it was not detected in the final water. NIEA investigated the source of the oil spill and quickly deployed booms to contain the oil. NI Water increased monitoring at the water treatment works to ensure that the quality of drinking water supplies was not compromised. NI Water’s management of this event through proactive working with different stakeholders such as: NIEA; Ireland’s Environmental Protection Agency; and Monaghan County Council demonstrates the importance of having good liaison and working protocols in place to safeguard our drinking water supplies. NI Water will review and update the risk assessments following this event to evaluate if any additional control measures are needed in relation to this site.

Biologically Derived Contaminants

There are a number of diverse organisms that may be present in untreated water sources, some of which may have the potential to have a significant affect on the water quality that is supplied to consumers. While many of these organisms may have no direct public health significance they are, however, undesirable because they can taint the water through unacceptable taste and odours. Water treatment processes should effectively remove these organisms to ensure water supplies are not only safe but are also acceptable in odour, taste and appearance. Some water sources, such as loughs, have high levels of nutrients in which organisms such as algae can grow and if these are not effectively removed in the treatment process, they can give rise to taste and odour problems in distribution systems. The presence of certain types of algae such as the *Oscillatoria* species, a blue-green algae, have been associated with producing the chemicals geosmin and 2-methyl isoborneol (MIB) which give rise to strong grassy, musty odours.

Investigations into taste and odour continue to be ongoing at one site, Killyhevlin WTWs on Upper Lough Erne, where there has been excessive vegetation growth at the abstraction point. Increased chlorophyll levels (which are used to indicate algal growth) have been reported, and geosmin/MIB have been detected in the final waters leaving the works. A review of the DWSP for Killyhevlin is currently ongoing and will be used to identify what additional control measures are necessary to reduce the potential risk of taste and odour issues associated with this supply system.

Risk Management of Water Sources for Drinking Water Treatment

NI Water must continue to be vigilant in the management of its water sources, through dedicated catchment management plans and the implementation of a risk-based management approach through its DWSPs. This should include close liaison with all those involved in the management of the catchments around its water sources in the process of preventing potential contaminants entering the water source and impacting on drinking water quality.

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

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 the treatment processes. In this part of the report we have provided details on the key parameters, such as trihalomethanes, turbidity and aluminium which are used to monitor the effectiveness of the treatment processes.

Northern Ireland Water Ltd (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. These processes include the physical removal of potential contaminants using chemical coagulation/flocculation, sedimentation or floatation, and filtration to prepare the water for disinfection. The primary aim in water treatment is the elimination of any pathogenic micro-organisms and to provide a safe, clean drinking water supply.

The drinking water safety plan (DWSP) approach requires an assessment to be made between the source water and the type of treatment in place at water treatment works. This assessment should identify and quantify the risks within the source water and ensure that appropriate remediation measures are in place to remove these risks at each water treatment works. These measures would take the form of suitable water treatment processes being in place to deal with the specific risks within each source. They should take into account the wide variations in the quality of the source water caused by seasonal change and adverse weather. The risk assessment should also take account of the risks which may be encountered within the treatment processes and proper controls should be in place to mitigate these. One important measure of the effectiveness of treatment is the assessment of the water quality throughout the treatment process and the quality of the final water leaving the works into distribution. In Table 3.1, groupings of two sets of parameters are used to describe the effectiveness of water treatment processes: process control parameters; and disinfection parameters.

Table 3.1: Water Quality at Water Treatment Works, 2010

| Parameters | Place of Sampling | Total No. of Tests in 2010 | No. of Tests not Meeting Standards in 2010 | % of Tests not Meeting the Standards | |
|--|-------------------|----------------------------|---|--------------------------------------|-------------|
| | | | | 2010 | 2009 |
| Process Control Parameters | | | | | |
| Colour | WSZs | 1,736 | 0 | 0.00 | 0.00 |
| Nitrate | WSZs | 424 | 0 | 0.00 | 0.00 |
| Nitrite | WTWs | 424 | 0 | 0.00 | 0.00 |
| Aluminium | WSZs | 1,736 | 10 | 0.58 | 0.98 |
| Trihalomethanes | WSZs | 432 | 8 | 1.85 | 3.83 |
| Bromate | WSZs | 424 | 0 | 0.00 | 0.22 |
| Disinfection Parameters | | | | | |
| Coliform bacteria | WTWs | 7,573 | 1 | 0.01 | 0.12 |
| <i>E. coli</i> | WTWs | 7,573 | 0 | 0.00 | 0.05 |
| Turbidity | WTWs | 7,563 | 29 | 0.38 | 0.53 |
| Number of Water Supply Zones (WSZs) – 55 | | | Number of Water Treatment Works (WTWs) - 31 | | |

Process Control Parameters

Process control parameters are used to measure the effectiveness of water treatment, and are based on a selection of chemical parameters which are influenced, in general terms, by the process in place at the water treatment works. In 2010, results from the regulatory monitoring programme shown in Table 3.1 report non-compliance for some of the process control parameters, notably: THMs; aluminium; and turbidity.

The implementation of DWSPs highlights that good operational monitoring is fundamental to assess whether the control measures in a treatment works are operating properly. NI Water monitor critical parameters at stages of the water treatment process to ensure effective process control.

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. A history of inadequate treatment to remove this organic material at many of NI Water’s water treatment works, has resulted in previous high levels of THM non-compliance. Through ongoing targeted, planned investment in upgrading water treatment processes across Northern Ireland, the risk of THM non-compliance continues to decrease. Figure 3.1 illustrates how the percentage of THM failures has fallen significantly over the last nine years from 49.9% to 1.85%.

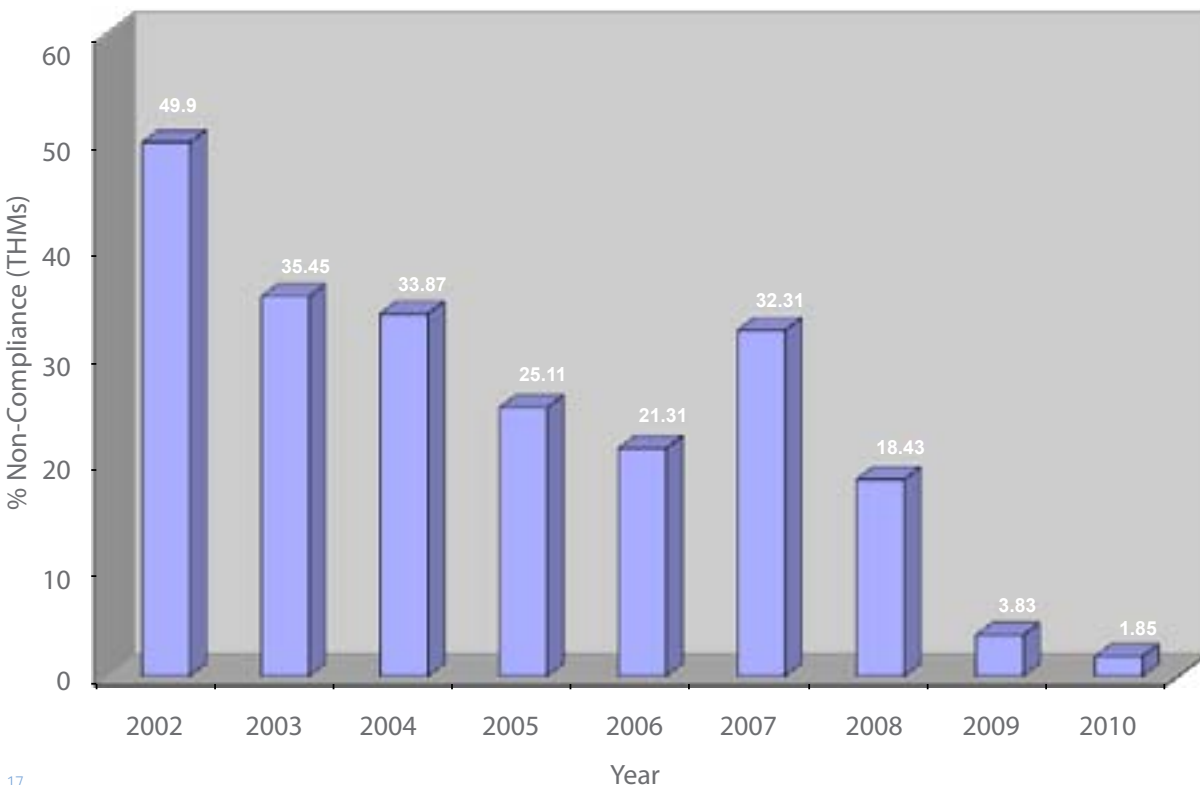
Aluminium

The risk of aluminium non-compliance has continued to decrease throughout Northern Ireland with half the number of samples failing in 2010 (10 failures) compared to 2009 (20 failures). One Consideration of Provisional Enforcement Order (CPEO) was in place during 2010 in relation to aluminium exceedences at Carmoney WTWs (refer to Annex 6 for further details). The majority of the work associated with the undertaking for this CPEO was completed during 2010 and no further regulatory exceedences for this works were reported during this period.

During 2010, ineffective treatment resulted in event notifications for aluminium due to elevated levels of this parameter being present in the final water leaving six water treatment works. Five of these notifications occurred during the major freeze/thaw incident towards the end of 2010. As part of the overall assessment of the adverse weather incident, a range of issues were identified at the water treatment works including: instrument faults; response to alarms; freeze/thaw damage, effects of low temperature on the coagulation process; and increased production.

The implementation of good operational practice at water treatment works during both normal operation and when normal operating circumstances do not prevail, is critical in ensuring a continuation in the supply of high quality drinking water and the further improvement in compliance with the aluminium standard.

Figure 3.1: Percentage Non-Compliance with the Regulatory Standard for THMs, 2002 - 2010



Disinfection Parameters

The disinfection parameters in Table 3.1 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.

The 2009 'Amendment' Regulations now require that NI Water, through undertaking disinfection, must carry out this process to keep disinfection by-products as low as possible without compromising the disinfection process, and must also have in place systems to verify the effectiveness of disinfection. This is a critical aspect of the water treatment process to ensure safe drinking water. Through the development and implementation of the DWSP approach, and in meeting its regulatory duty, NI Water must ensure that it has in place a disinfection policy. An important aspect of this is to provide assurance on the verification of disinfection along with ensuring appropriate control measures are fully documented, implemented and reviewed for sites where disinfection is practised. The Inspectorate issued Information Letter I/L 06/10¹ in October 2010 which provided guidance on implementation of this new regulatory requirement. NI Water continues to work towards delivering this requirement.

In 2010, there has been an increase in compliance with the three disinfection parameters: coliform bacteria; *E. coli*; and turbidity at water treatment works. 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 and the necessary mitigation measure 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 2010, *E. coli* was not detected in any of the 31 works in Northern Ireland, however, one site (Drumaroad WTWs) had a coliform bacteria contravention. Any failure of an *E. coli* or coliform

bacteria standard at a water treatment works is considered a notifiable event. This contravention was reported as a water quality event, but following investigation by NI Water was identified as an unrepresentative sample, and was subsequently classified by us as a non-incident, (refer to Annex 7 for further details on events).

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 exceedences occurred at 10 (32.3%) water treatment works in 2010. Of the 7,563 samples taken for turbidity analysis from water treatment works, 29 (0.38%) failed to meet the standard. Of these failures 16 (55%) were related to treatment problems and 13 (45%) were due to unrepresentative sampling. Of the exceedences related to treatment problems, 12 were due to treatment being inadequate to remove high levels of iron and manganese which are naturally present in the ground water at Gortlenaghan Borewell (11 exceedences) and Cabragh Borewell (1 exceedence). Gortlenaghan Borewell was removed from service in April 2011 as part of the planned infrastructure investment programme, and Cabragh Borewell was only in use intermittently for short periods during 2010 as an emergency supply and was removed from service in January 2011.

Other Key Parameters Monitored at Water Treatment Works

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 unfavorable conditions in the water environment: extremes of temperature and pH; and disinfection processes such as chlorination and ultraviolet light.

In 2010, 2,891 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.

¹ www.doeni.gov.uk/niea/ni_dwi_information_letter_06_10_reg_26_disinfection.pdf

Cryptosporidium

NI Water carries out an annual risk assessment for *Cryptosporidium* and during 2010, 31 water treatment works were assessed. No sites were identified as requiring a continuous monitoring programme for the detection of *Cryptosporidium* oocysts. NI Water carries out operational surveys to monitor for *Cryptosporidium* at all of its water treatment works. The results from these specific risk assessments and the sample results from the surveys are used to inform the drinking water safety plan (DWSP) for each individual WTWs.

Reporting arrangements were established for public health protection and incorporate a formal notification level of one or more oocysts per 10 litres and an alert level of 0.1 oocysts per 10 litres. Of the 1,961 tests carried out in 2010, all results were below both the formal notification level and the alert reporting level.

During 2010, there were no reports¹ of mains water supply related outbreaks of cryptosporidiosis in Northern Ireland.

Drinking Water Quality Improvement Programmes at Water Treatment Works

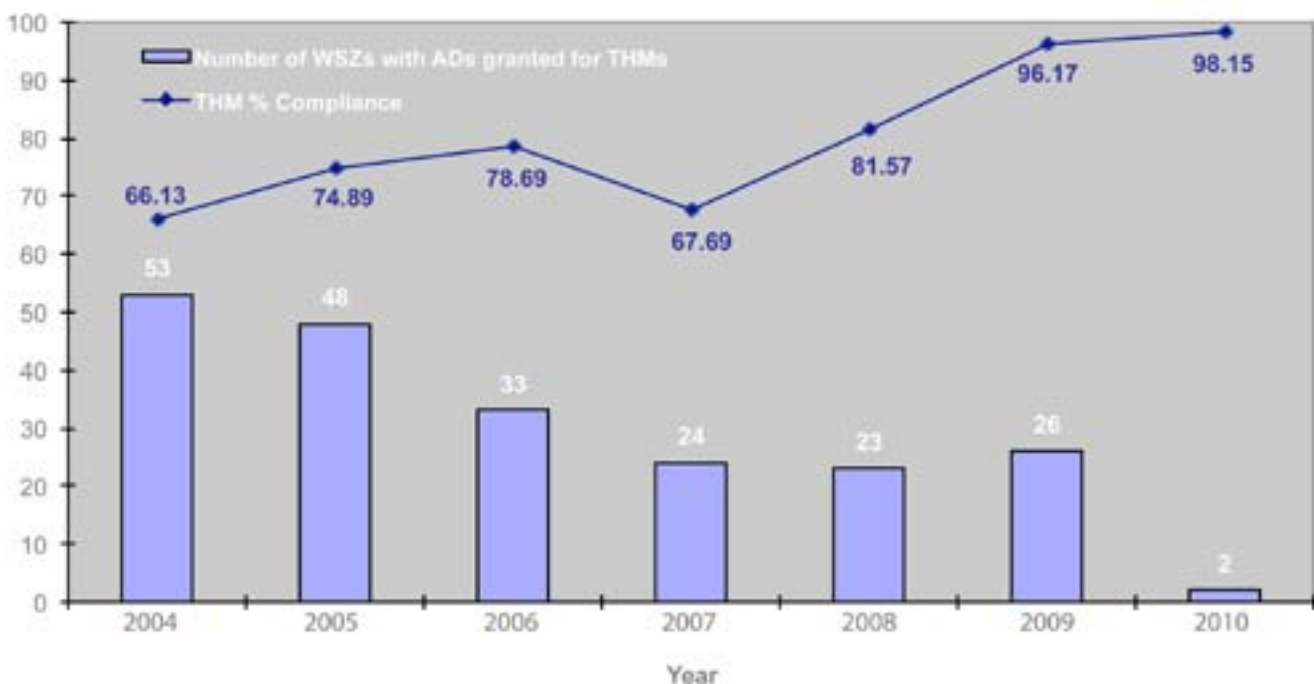
In order to protect, maintain and improve drinking water supplies, NI Water continues to complete infrastructure, treatment and distribution projects. Some of these programmes of work are driven by remedial actions relating to Authorised Departures (ADs), Enforcement Notices and other regulatory processes.

Authorised Departures and Compliance Programmes 2003-2010

One of the regulatory processes which we use to focus infrastructural and operational change to enhance drinking water compliance is referred to as 'Authorisation of Departures' (ADs). An AD specifies remedial action to be undertaken by NI Water within specified time periods. In consultation with the health authorities, we may consider an AD which allows NI Water to temporarily supply water exceeding a drinking water standard if there are no adverse health implications. Authorised Departures were first granted to Water Service (now NI Water) in 2003 to target improving THM and aluminium compliance.

NI Water has continued to complete major work programmes to build new or upgrade existing treatment facilities. As these complete, the number of ADs has significantly reduced as illustrated in Figure 3.2 below: 53 ADs were in place for THMs in 2003; this was reduced to 26 in 2009 as substantial work programmes continued to complete between 2007 and 2009. During 2010, the remaining AD work programme to improve THM compliance ended. For aluminium ADs, all associated work programmes were completed by 2007.

Figure 3.2: Number of WSZs with ADs for THMs and % of Tests Complying with the THM Standard, 2004 - 2010



¹Data source: Public Health Agency (Northern Ireland).

A further three ADs have been put in place since 2007 to improve pesticide compliance at two water treatment works (Lough Cowey and Altmore), covering three water supply zones. These works are no longer in service and the water supply to the affected areas is supplied from alternative compliant sources.

Upgrades at two WTWs (Seagahan and Derg) were completed during 2009/2010 where full regulatory compliance for THMs is now reported. In 2010 two ADs for THMs remained in place covering two Water Supply Zones supplied from Lough Bradan WTWs. The planned work to upgrade this water treatment facility was due to complete in August 2010, however delivery of this project was delayed and commissioning work continues to be ongoing.

NI Water continued to invest in water treatment during 2010 to further improve overall compliance of the quality of water leaving water treatment works:

- [Lough Bradan WTWs was being upgraded during 2010 to improve THM compliance and this work continues into 2011;](#)
- [Altmore WTWs was decommissioned in April 2011 following a major network upgrade. The water to this area is now supplied from Castor Bay WTWs;](#)
- [Killylane WTWs was undergoing investigations during 2010 into optimizing the treatment processes to improve THM compliance. This work was completed in 2011; and](#)
- [Carmoney WTWs was being upgraded during 2010 to improve aluminium compliance. This work was completed in 2011.](#)

Enforcement Action

When a contravention occurs, NI Water carries out an investigation and appropriate remedial action must be taken. As part of the technical assessment process we evaluate the significance of each contravention. This assessment process may result in us taking 'enforcement action' by issuing a regulatory requirement such as a 'Consideration of Provisional Enforcement Order' (CPEO). CPEOs request NI Water to put in place a programme of remedial work to ensure compliance with the regulatory requirements, thus improving drinking water quality. It may be that a treatment works has been identified as being at risk of failing to meet the regulatory standards, and the existing water treatment is considered inadequate. We can then agree a series of remedial actions with NI Water, through undertakings which must be completed within a specified time period.

Drinking Water Quality Improvements – Consideration of Provisional Enforcement Orders

During 2010, one CPEO was issued for the pesticide MCPA at Altmore WTWs. The undertakings provided by NI Water, which we accepted, were published on our website¹. The undertakings required NI Water to remove Altmore WTWs from service and supply the area from Castor Bay WTWs, as well as ensuring that in the interim, NI Water closely monitored the levels of MCPA within the catchment and the final water from the works. There were no breaches of the standard for MCPA during the duration of the CPEO and the works was eventually removed from service in 2011.

During 2010 a CPEO was in place for THMs at Seagahan WTWs. The work associated with the remedial actions to upgrade this treatment works were completed in September 2010.

Two CPEOs which were issued in 2008: one at Carmoney WTWs for aluminium; and one at the Derg WTWs for THMs, continued to be in place during 2010 while work was being completed.

Investment Planning - The Price Control Process

As part of the future investment planning process we have been involved in a partnership agreement, whereby, all interested stakeholders engage to identify investment priorities. This forms part of the Price Control Process by which NI Water bids for funding. Whilst we recognize that competing priorities exist, our primary objective during this process was to identify programmes of work that were necessary to secure compliance with drinking water quality standards.

To further protect drinking water quality, the requirement for NI Water to undertake risk assessments of all its water supply systems, through drinking water safety plans, will, as part of the investment planning process, assist in identifying and targeting infrastructure and operational improvements required to maintain and enhance its operations in delivering safe, clean water supplies.

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

Part 4 Distribution Systems



Part 4

Distribution Systems

In this part of the report we provide details about 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.

The water distribution system in Northern Ireland is an extensive and complex network, consisting of 330 service reservoirs and approximately 26,700 km of mains pipe, which facilitate the delivery of treated water from the water treatment works to the point of supply to the consumer. Service reservoirs provide storage close to the point of distribution to help ensure that sufficient water is available to meet the varying demands of consumers.

As water travels through the distribution system, the quality of the water may deteriorate depending on the structural integrity of the distribution system, the nature of the water and the materials it comes into contact with. For example, service reservoirs whose structural integrity has not been maintained are at risk from ingress of contaminants, and old cast iron pipes which have corroded over time may result in sediment being deposited under low flow conditions. An increase in flow rate can cause disturbance to the mains network, which may result in particles being re-suspended and transported through the system resulting in discoloured water at the tap.

Monitoring the quality of the water using indicator parameters is important for identifying potential deficiencies with the integrity of the service reservoirs, and within the distribution system. In Table 4.1, two measures are used which describe the water quality within a distribution system: reservoir integrity; and distribution maintenance. The selection of these distribution parameters is to reflect the age, condition and maintenance status both of the reservoirs and the pipes (water mains) which comprise the distribution networks.

Assessment of Reservoir Integrity

The assessment of reservoir integrity is based on the microbiological quality of the water, where the detection of microbial pathogens may suggest that the structure of the reservoir has been breached. Microbiological sampling takes place weekly at service reservoirs and the results for 2010 show a significant increase in compliance against the 2009 figures (Table 4.1 below refers). Maintaining good water quality in the distribution system depends on the design and operation of the system and on the maintenance and survey procedures. Control measures such as NI Water's inspection programme which is carried out to check service reservoir integrity, and its service reservoir cleaning and refurbishment programmes, must be maintained as these are integral to maintaining these systems to prevent contamination and to prevent and remove the accumulation of internal deposits.

Table 4.1 Water Quality Indicators within the Distribution System

| Parameters | Place of Sampling | Number of Tests in 2010 | Number of Fails in 2010 | % of Tests not Meeting the Standards in 2010 | % of Tests not Meeting the Standards in 2009 |
|---------------------------------|-------------------|-------------------------|-------------------------|--|--|
| Reservoir Integrity | | | | | |
| Coliform Bacteria | SR | 16,966 | 8 | 0.05 | 0.14 |
| <i>E. coli</i> | SR | 16,966 | 1 | 0.01 | 0.04 |
| Distribution Maintenance | | | | | |
| Turbidity | WSZ | 1,736 | 1 | 0.06 | 0.29 |
| Iron | WSZ | 1,736 | 35 | 2.02 | 2.11 |
| Manganese | WSZ | 1,736 | 6 | 0.35 | 0.39 |

Microbiological Quality in Distribution Systems

Water entering the distribution systems must be microbiologically safe. The distribution system itself must have sufficient controls in place to prevent contamination of drinking water supplies, as the water is delivered to the user. Service reservoirs should be fully enclosed and securely roofed with external drainage to prevent contamination. The prevention of stagnation in both storage reservoirs and distribution is also a way of controlling potential contamination. Control measures may also include maintaining a disinfectant residual throughout the distribution network to provide ongoing protection and limit the potential for microbial growth problems.

Within certain parts of the distribution system, NI Water carries out additional disinfection (often referred to as 'secondary disinfection') through chlorine boosting at selected service reservoirs, particularly those with long distribution networks. This additional disinfection is necessary to maintain the good water quality achieved at the water treatment works, thus ensuring that a 'disinfection residual' is achieved at the end of the distribution network.

It is imperative that this 'secondary disinfection' does not disguise a more fundamental problem such as compromised reservoir integrity because of the structural condition of the reservoir or the hydraulic flow of water through the system. NI Water must, in the process of implementing the DWSP approach, review its control measures to ensure that an adequate disinfection residual is effectively maintained and managed throughout the distribution network by assessing all factors which could affect this.

E. coli at Service Reservoirs

In 2010 a total of 16,966 samples for *E. coli* testing were collected at service reservoirs across Northern Ireland. *E. coli* was detected in one of these samples. On detecting *E. coli*, NI Water must act promptly to protect public health and ensure that the water being received by consumers is safe. Investigations are carried out to identify the cause of all failures. For this *E. coli* failure the investigation did not determine any specific reason and all subsequent samples met the microbiological standards.

Coliform Bacteria at Service Reservoirs

The national standard requires 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 330 service reservoirs sampled in 2010, all met the regulatory standard. Coliform bacteria were detected on eight occasions at eight (2.42%) service reservoirs. This is a significant improvement on the 24 coliform bacteria detected at 20 (5.88%) service reservoirs in 2009. Of the eight coliform bacteria detected in 2010, investigative work reported unrepresentative sampling on two occasions, due to contamination at the time of sampling. NI Water must have robust control measures in place to ensure the integrity of sample collection. For the other six samples, follow up investigations did not identify a cause for these failures.

An event was reported for one service reservoir (Redhills) following the detection of coliforms and associated resample failures in the distribution system. The service reservoir in question was subsequently removed from service as it was an old metal tank and new pipework allowed the area to be supplied directly from Magheraliskmisk SR.

Assessment of Distribution Maintenance

We use a distribution maintenance index to assess the overall water quality of the distribution system. It is calculated using the percentage mean zonal compliance (%MZC) of samples taken at consumers' taps for three parameters: turbidity; iron; and manganese. These parameters are used to reflect the causes of discoloured water in distribution systems. This distribution maintenance index is also referred to as the Operational Performance Index (Turbidity, Iron, Manganese), (OPI [TIM]). Figure 4.1 shows a marginal improvement in OPI (TIM) for 2010, this is further illustrated in Table 4.2 below for each of the parameters. As with previous years, iron continues to be the parameter which contributes the highest non-compliance in the OPI (TIM) calculation.

Comparing this index across the UK for 2010, Northern Ireland reports 99.08% (98.90% in 2009); Scotland reported 99.72% (99.13% in 2009), and England and Wales reported the same figure of 99.86% as in 2009.

Figure 4.1: OPI (TIM) and % MZC for Turbidity, Iron and Manganese, 2004-2010

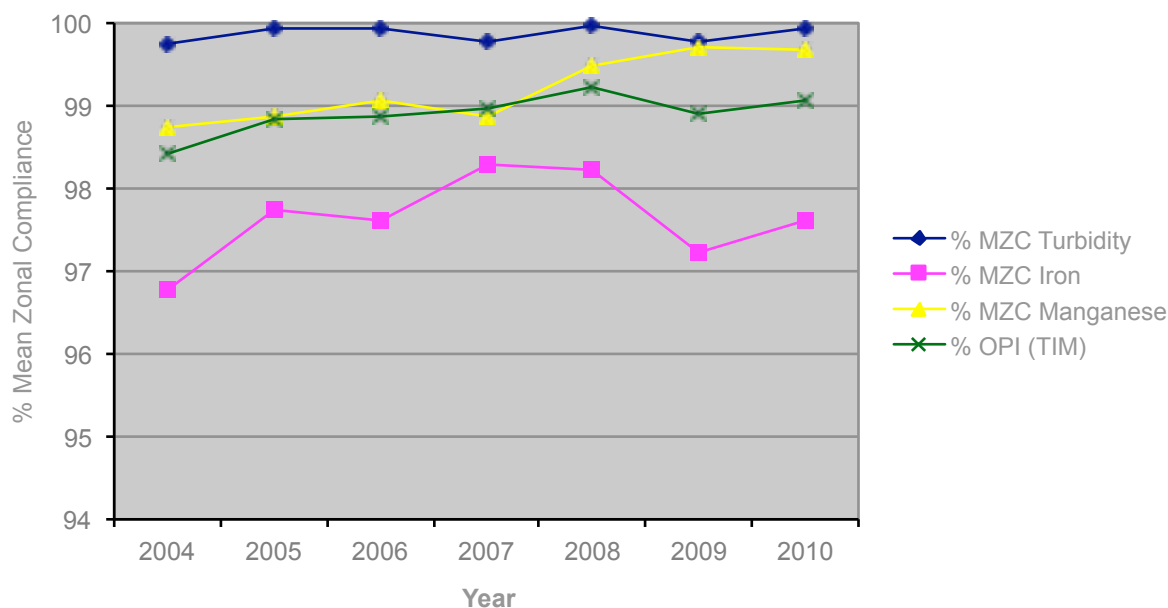


Table 4.2: Operational performance index (OPI[TIM])

| Parameter | 2010 (% MZC) | 2009 (% MZC) |
|-----------|--------------|--------------|
| Turbidity | 99.95 | 99.76 |
| Iron | 97.60 | 97.24 |
| Manganese | 99.69 | 99.70 |
| OPI (TIM) | 99.08 | 98.90 |

OPI (TIM) is calculated for each of the water supply zones to measure the overall water quality in distribution using the results of the regulatory compliance sampling programme. Failure to achieve 100% across the region varies and tends to reflect where the distribution network contains a large proportion of cast-iron mains. For 2010, 45% of water supply zones across Northern Ireland have OPI (TIM) values of less than 100%. While using the OPI (TIM) index can help to show those areas where more work is required to raise the quality of water at consumers' taps, NI Water also uses information obtained from: zonal studies; samples taken as part of operational activities; and consumer complaints information, to identify and prioritize where specific work is required at a more detailed level within the distribution systems.

Distribution Networks Mains Rehabilitation Programme

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

In Northern Ireland, there are approximately 26,700 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. Deposits of these naturally occurring substances have accumulated over many years in the distribution networks as a consequence of their presence in source waters, and a lack of effective water treatment. In other situations, where the distribution networks are comprised substantially of old unlined cast-iron water mains, iron and manganese can be released into the water main as a result of corrosion. Where these metals have accumulated in the distribution pipes, through any of the above routes, and these deposits are disturbed, this may cause orange-brown (iron) or black (manganese) discoloration of the water.

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 an ongoing scouring and cleaning programme to minimize water quality problems associated with these accumulations.

Water quality issues may cause localized concerns to be raised by consumers. In 2010 one such event was reported to us (Annex 7 refers) which related specifically to the condition of the water mains. Consumers in the Five Mile Straight area of Maghera had complained of discoloured water which, on investigation by NI Water, was found to be caused by corrosion of the cast iron main supplying the area. As a result, the main is to be replaced in 2011.

To ensure safe drinking water supplies within the distribution systems, we issue, when considered necessary, Consideration of Provisional Enforcement Orders (CPEOs) whereby NI Water agrees to remedial action. Details relating to the undertakings that we accepted from NI Water are published on the Inspectorate's website¹.

Four CPEOs regarding recurring iron contraventions were in place during 2010. The associated remedial action for one CPEO, which issued in November 2008, and covered specific undertakings for Dorisland Water Supply Zone, was completed in July 2010. The other three CPEOs, issued in August 2010, covered the following localized areas: Altmore Cabragh; Dorisland Whiteabbey / Dorisland Carrick; and Altnahinch Bushmills. NI Water continues to progress the work associated with the corrective action required to improve the drinking water quality in these areas.

As part of our ongoing discussions relating to priorities for the investment planning process with the Northern Ireland Utility Regulator (NIAUR) we highlighted the need for ongoing investment in the distribution network. We also drew attention to the high percentage of consumer complaints received by NI Water, over 60 per cent of which related to appearance, with the majority of complaints within this category, again over 60 per cent, related to discoloured water.

We are encouraged by NI Water's commitment in the investment planning process to improve the provision of safe, clean drinking water. We have highlighted that in the forthcoming planning process, there is further work required to better quantify the extent of water quality compliance problems. This should better inform the level of investment needed for mains replacement for the next investment period. We will work with NI Water and other stakeholders in carrying out prioritisation of this work.

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

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.

Once water has passed through NI Water's distribution network it will then come into contact with water systems within buildings. These systems can be those within individual domestic properties or within larger commercial or public premises. In the development of its Drinking Water Safety Plans (DWSPs), NI Water must take account of the potential for the water it supplies to become contaminated by these systems through, for example, the condition and maintenance of the pipe work or storage facilities. NI Water's sampling programme within water supply zones is randomly generated to take samples from within consumer's properties. NI Water must keep a record of the type of property the sample was taken from (e.g. a residential property or a public building).

The regulations require that sampling must take place at consumers' drinking water taps. Some of the parameters that are monitored for at consumers' taps may not be totally within NI Water's control. Certain parameters, such as lead, copper, and nickel, may be influenced by the nature and condition of water distribution systems within buildings.

In instances where water quality issues have been identified as being caused by the distribution system within a building, NI Water is required to investigate to determine the cause. Where this water quality issue is within a public building (such as a school, hospital or restaurant), following the introduction in 2010 of new domestic distribution systems regulations,¹ we have a responsibility to ensure that the necessary remedial action is taken by the owners, to ensure that the water supply is safe and clean.

Drinking Water Quality at Consumers' Taps

Drinking water quality at consumers' taps is assessed using percentage 'mean zonal compliance' (% MZC), an index which is calculated using 39 parameters from the regulatory sampling programme. Table 5.1 summarizes the percentage zonal compliance for each of the 39 parameters, as well as providing the overall % MZC. The 11 parameters which did not achieve full regulatory compliance are listed at the top of the table. Iron and THMs continue to report the lowest % MZC.

Iron compliance, although showing an improvement from last year (97.24% in 2009; 97.60% in 2010), has the greatest number of tests failing to comply with the regulatory standard. The mains rehabilitation programme of work, together with distribution maintenance programmes, is fundamental to improving both compliance and the quality of water supplied to consumers. Trihalomethanes (THMs) continue to report a significantly improved level of compliance.

The problems reflected by these parameters which have not achieved full compliance do not apply everywhere in Northern Ireland. Of the 55 water supply zones monitored, 18 zones achieved full compliance. Full detail of the water supply zone areas where each parameter standard has not been met is given in Annex 3. Annex 4 of this year's report presents compliance data at the local district council level. Variations in water quality compliance performance continue across Northern Ireland, reflecting the need for the completion of current and future planned improvement work.

Overall % MZC continues to show an upward trend as illustrated in Figure 5.1. Compared with last year, there has been a significant increase with 99.81% reported in 2010; and 99.74% in 2009. This increase is mainly due to the significant increase in compliance for THMs in 2010.

This index was first used in 2004, when MZC was reported as 98.65%. Substantial investment made by NI Water to improve drinking water quality, particularly to upgrade water treatment facilities is reflected in the overall significant increase of 1.16% to 99.81% reported for 2010 indicating the high quality of water that is available to consumers.

Comparing the overall percentage MZC across the UK for 2010:

- Northern Ireland reports 99.81%;
- England and Wales, 99.96%; and
- Scotland, 99.77%.

NI Water has continued to improve compliance through sustained investment particularly on water treatment and ongoing water mains rehabilitation. It is essential that this investment continues to maintain high levels of safe, clean drinking water and to comply with regulatory obligations.

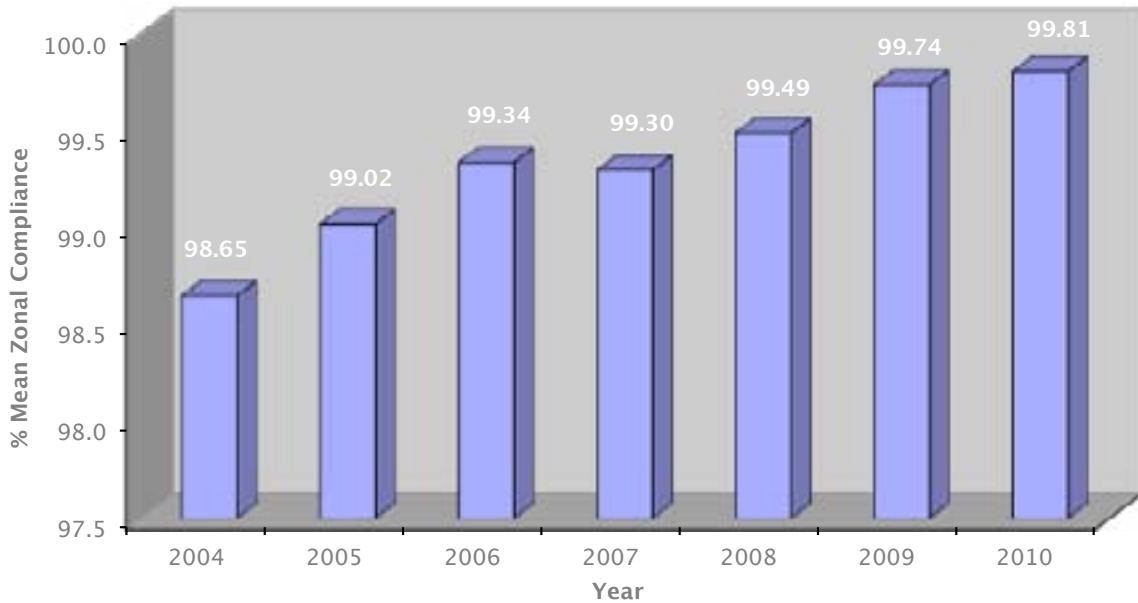
¹The Water Supply (Domestic Distribution Systems) Regulations (Northern Ireland) 2010.

Table 5.1: % Mean Zonal Compliance of Samples Taken at Consumers' Taps, 2010

| Parameter | Number of Samples | Number of Samples Not Meeting the Standards | % Zonal Compliance |
|---|-------------------|---|--------------------|
| Iron | 1,736 | 35 | 97.60 |
| Total Trihalomethanes | 432 | 8 | 98.33 |
| Odour | 1,736 | 17 | 99.19 |
| Aluminium | 1,736 | 10 | 99.47 |
| Lead | 424 | 2 | 99.55 |
| Total Pesticides | 275 | 1 | 99.60 |
| Pesticides - other substances* | 11,825 | 1 | 99.60 |
| Manganese | 1,736 | 6 | 99.69 |
| Taste | 1,734 | 7 | 99.74 |
| Turbidity | 1,736 | 1 | 99.95 |
| <i>E. coli</i> | 4,728 | 2 | 99.97 |
| Colour | 1,736 | 0 | 100.00 |
| Sodium | 424 | 0 | 100.00 |
| Nitrate | 424 | 0 | 100.00 |
| Nitrite | 424 | 0 | 100.00 |
| Nitrite/Nitrate Formula | 424 | 0 | 100.00 |
| Copper | 424 | 0 | 100.00 |
| Fluoride | 275 | 0 | 100.00 |
| Arsenic | 423 | 0 | 100.00 |
| Cadmium | 423 | 0 | 100.00 |
| Cyanide | 295 | 0 | 100.00 |
| Chromium | 423 | 0 | 100.00 |
| Mercury | 423 | 0 | 100.00 |
| Nickel | 423 | 0 | 100.00 |
| Antimony | 423 | 0 | 100.00 |
| Selenium | 423 | 0 | 100.00 |
| PAH - Sum of four substances | 424 | 0 | 100.00 |
| Enterococci | 424 | 0 | 100.00 |
| Boron | 423 | 0 | 100.00 |
| Benzo(a)pyrene | 424 | 0 | 100.00 |
| Tetrachloromethane | 424 | 0 | 100.00 |
| Tetrachloroethene/ Trichloroethene - Sum | 424 | 0 | 100.00 |
| 1,2 dichloroethane | 424 | 0 | 100.00 |
| Benzene | 424 | 0 | 100.00 |
| Bromate | 424 | 0 | 100.00 |
| Aldrin | 275 | 0 | 100.00 |
| Dieldrin | 275 | 0 | 100.00 |
| Heptachlor | 275 | 0 | 100.00 |
| Heptachlor epoxide | 275 | 0 | 100.00 |
| Total Number of Samples | 40,379 | 90 | |
| % Mean Zonal Compliance | | | 99.81 |

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

Figure 5.1: Overall Drinking Water Quality at Consumers' Taps, 2004-2010



Physical/Chemical Quality

Iron

The regulatory standard for iron has been set for aesthetic reasons because levels persistently above the standard can give rise to discoloured water. The presence of excessive iron may make the appearance and taste of the water unacceptable to consumers. There are various reasons why iron might be present in the water: it may be present in the raw water; iron compounds may be added as part of water treatment; or it can be released as a consequence of the corrosion of iron water mains.

In 2010, iron was the parameter for which there was the greatest number of tests failing to comply with the regulatory standard. Out of 1,736 samples taken, 35 (2.02%) failed to meet the 200 µg/l standard. These contraventions were mainly due to the condition of the distribution network. Following a number of recurring contraventions in 2010, we took enforcement action to improve drinking water quality and issued three Consideration of Provisional Enforcement Orders (CPEOs) for specific areas within the Dorisland Carrick / Dorisland Whiteabbey, Altnahinch Bushmills, and Altmore Cabragh water supply zones (Annex 6 provides more detail).

Trihalomethanes

Trihalomethanes (THMs) 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. Drinking water in Northern Ireland is predominantly obtained from surface waters, which contain naturally occurring organic materials. The leaching of this organic content into water supplies is affected by seasonal variations. Water

treatment is necessary to remove the organic material prior to disinfection, and optimization of these processes minimizes the production of THMs. Water treatment processes must be robust enough to remove the organic matter which may result from any change in raw water quality.

Due to investment to upgrade water treatment facilities across Northern Ireland, THM compliance has increased from 96.39% in 2009 to 98.33% in 2010. Of the 432 tests carried out, 8 (1.85%) exceeded the regulatory standard of 100 µg/l. NI Water continues to take remedial action to further improve this compliance. Work programmes associated with Authorised Departures (ADs) have delivered upgrades to Seagahan and Lough Bradan WTWs, and work has been completed relating to the specific undertakings given in CPEOs for Killylane and Derg WTWs.

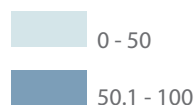
NI Water must continue to maintain a careful balance between maintaining good bacteriological quality through an adequate disinfection residual, and minimizing chlorine levels to limit the formation of THMs. Figure 5.2 illustrates the average THM values across Northern Ireland. NI Water must continue to assess the performance of the water treatment works and the quality of the water in the associated distribution systems as part of its ongoing work to review and update its risk assessments using the drinking water safety plan approach.

Odour

Naturally occurring substances which have odour properties are present in many sources used for drinking water. In the purification of water supplies, the treatment process may remove or introduce odour to the water supply. In addition, odour may develop during storage and in distribution due to microbiological activity.

Figure 5.2: Average THM Values in Water Supply Zones across Northern Ireland in 2010

Average THM values ($\mu\text{g/l}$)
(regulatory standard = $100 \mu\text{g/l}$)



In 2010, of the 1,736 samples taken for odour, 17 failed to comply with the Regulations due to their unacceptability to the consumer. Four of these contraventions were the result of insufficient treatment (and were reported as two water quality events); one was possible leaching of fuel on the consumers' property; one was localized to the pipe work supplying the tap; six were the result of operational work within the distribution (five of which were notified to the DWI as one water quality event); one was unrepresentative; and for the remaining four the cause was undetermined.

Aluminium

Aluminium can occur naturally in many water sources, particularly those derived from upland areas. Aluminium compounds are also used as an important part of the processes used in the treatment and purification of water, including the removal of harmful organisms. In addition to this primary role, aluminium-based water treatment removes naturally occurring aluminium from water. The regulatory standard for aluminium is based on aesthetic considerations because high concentrations in water may cause discoloration.

In 2010, a total of 1,736 samples were tested for aluminium; 10 (0.58%) exceeded the regulatory standard of $200 \mu\text{g/l}$. Inadequate treatment or poor control of the coagulation process may lead to aluminium passing through the treatment works and into the supply where it can accumulate in the distribution network. Of the 10 failures for this year, investigative work by NI Water reported five were due to disturbance of the mains; two were related to treatment problems; and three were undetermined. One of the exceedences caused by disturbance of the mains, and the two involving coagulation treatment problems (at Dunore Point and Lough Bradan WTWs) were reported as water quality events, (Annex 7 refers).

Lead

The regulatory requirements set an interim lead standard of $25 \mu\text{g/l}$ which was to be met by 25 December 2003, with a final standard of $10 \mu\text{g/l}$, 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. Some lead in drinking water may be due to the use of lead solder on copper pipes not owned by NI Water (the use of lead solder on copper pipes has been banned since the early seventies). Whether or not the lead standard is exceeded at a particular tap depends on a number of factors, an important one being the plumbosolvency of the water (the tendency for lead to dissolve in water).

NI Water has an ongoing programme of replacement of its part of lead service pipes, which is carried out during mains rehabilitation. NI Water will also replace, free of charge, any of its pipes which may be made of lead in the supply to a property, but only when a request is received from a consumer who has replaced the portion of lead service pipe for which the householder is responsible.

In 2010, of the 424 tests carried out for lead, two (0.47%) exceeded the standard. Both these exceedences occurred in water supply zones which have associated orthophosphate treatment programmes in place, and following further investigation, it was found that both these exceedences occurred at properties which had lead service pipes. When the sample has exceeded the standard, NI Water notifies the consumer (offering advice on what action they may take) and the local Environmental Health Officer. The responsibility and

cost for replacing lead pipes within the owner’s building is not a drinking water quality regulatory requirement: rather, it is a choice that the owner has to make.

Improving Compliance with Current and Future Lead Standards

The Regulations require NI Water to carry out a programme of measures (water treatment) to reduce the tendency of water supplies to pick up lead from pipes and fittings. A plumbosolvency strategy to deliver improved compliance for the interim lead standard of 25 µg/l introduced orthophosphate treatment at all the major water treatment works and this has been ongoing since 2004. Through the use of treatment and lead pipe replacement, the strategy aims to:

- optimize orthophosphate treatment throughout distribution networks to achieve compliance with the 10 µg/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.

Looking at the overall trend in lead compliance, it is encouraging to see how compliance with the interim 25 µg/l standard continued to improve since 2004 (Figure 5.3 refers). However, the graph shows that there has been a significant decrease in compliance with the 10 µg/l standard: 95.77% in 2010 compared with 97.39% in 2009. A significant amount of work is required to achieve compliance with the final lead standard of 10 µg/l by December 2013.

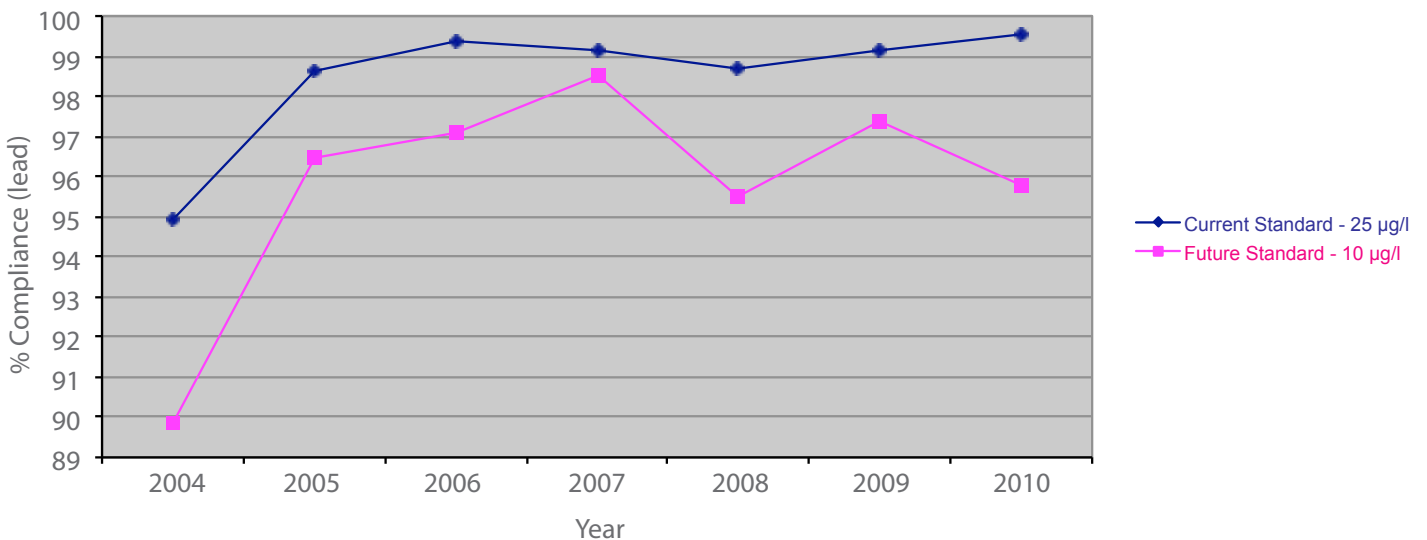
NI Water undertakes in addition to the compliance sampling requirements, a more extensive operational sampling programme for lead. Results from this sampling programme highlights those water supply areas which have not achieved a compliance target of 98% for 10 µg/l. Throughout 2009 and 2010, with the introduction of new water treatment works and treatment processes and the rezoning of water supply zones, the previous data held by NI Water on optimization of orthophosphate treatment within distribution systems is being reassessed to ensure correct optimization and stabilization of this treatment has been achieved.

Pesticides

Pesticides are a large group of chemicals used to control plant and animal infestations. There are several different types of pesticide, these include insecticides, herbicides, fungicides and algicides. The Regulations set standards for individual pesticides as well as a standard for the sum of all pesticides, ‘the total pesticide’ standard.

During 2010, 47 individual pesticides were monitored. Of the 11,825 determinations, one, in the Altmore water supply area, failed to comply with the regulatory standard of 0.1 µg/l for the individual pesticide MCPA (a herbicide used for controlling broad-leaved weeds in grass and cereal crops). This contravention also failed the total pesticide standard of 0.5 µg/l. As part of the planned work to improve water treatment facilities across Northern Ireland, Altmore WTWs was removed from service in April 2011 and the area supplied by Castor Bay WTWs.

Figure 5.3: Percentage of Tests Meeting the Current and Future Standards for Lead, 2004 – 2010



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 1,736 samples taken for manganese in 2010, the regulatory standard of 50 µg/l was not met on six (0.36%) occasions. Follow-up investigations indicated that four of these were due to disturbance of the mains, and two remain undetermined.

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 causes taste problems to arise.

Of the 1,734 samples taken in 2010, seven failed to comply with the regulations due to their unacceptability to the consumer. Two of these were the result of insufficient treatment and were notified to us as a water quality event; one was possible leaching of fuel restricted to the one property; and the remaining four were undetermined (two of these were reported to us as a water quality event).

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 1,736 samples taken in 2010, one failed to meet the turbidity standard of 4 NTU for consumers' taps. The cause of the exceedence was undetermined.

Microbiological Quality

To protect public health, microbiological standards have to be met at consumers' taps. The significance of the individual test results for each microbiological parameter cannot be interpreted without other information. Results confirm the general safety of drinking water supplies, with a high level of microbiological quality compliance (99.78%) being achieved in 2010 as shown in Table 5.2 below.

Enterococci and *E. coli* at Consumers' Taps

The presence of bacterium such as enterococci, and *E. coli*, is indicative of faecal contamination and neither should be found in any drinking water sample. In 2010, enterococci were not found in any of the 424 samples taken at consumer's taps by NI Water.

In 2010, a total of 4,728 samples were tested for the presence of *E. coli* and two tested positive. Investigation by NI Water concluded that the failure, on both occasions, was attributable to contamination at the consumers tap. There was no indication of a faecal contamination event affecting other properties in these zones. Further investigative samples were satisfactory.

Coliform Bacteria at Consumers' Taps

In 2010 there has been a significant increase in the number of samples complying with the coliform bacteria standard from samples taken from consumers' taps: 99.58% in 2010 compared with 99.36% in 2009. Of these non-compliant samples, follow-up investigations reported the condition of consumers' taps or contamination at the time of sampling as the reasons for 16 (80%) of the contraventions. NI Water advises the consumer where the contravention has been attributed to the domestic plumbing and what action, if any, they may take. Samplers used by NI Water are trained to collect samples from consumers' taps. We continue to stress the importance to NI Water regarding the collection of representative samples to prevent the integrity of the sample being compromised.

Table 5.2 Microbiological Quality at Consumers' Taps

| Parameter | Number of Tests in 2010 | Number of Fails in 2010 | % of Tests not Meeting the Standards in 2010 | % of Tests not Meeting the Standards in 2009 |
|--------------------------|-------------------------|-------------------------|--|--|
| Enterococci | 424 | 0 | 0 | 0 |
| <i>E. coli</i> | 4,728 | 2 | 0.04 | 0.03 |
| Coliform bacteria | 4,728 | 20 | 0.42 | 0.64 |
| Total | 9,880 | 22 | 0.22 | 0.32 |

NI Water Consumer Contacts

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

similar trend to that of 2009, when 65.6% were related to the appearance. In addition to the figures provided by NI Water, a significant level of consumer contacts (approximately an additional 33,350 consumer contacts) were received during the major Freeze/Thaw incident in December 2010 which resulted in loss of supply to large areas of Northern Ireland. These are not represented by the figures supplied by NI Water in the table below.

Table 5.3 Categories of Water Quality Contacts received by NI Water in 2010

| Contact Category | | Number of Contacts in 2010 |
|------------------|--|----------------------------|
| Appearance | Colour | 3,010 |
| | General | 86 |
| | Hardness | 30 |
| | Stained Washing | 7 |
| | White - Air | 1,219 |
| | White - chalk | 362 |
| Taste and Odour | Chlorinous | 268 |
| | Earthy / Musty | 146 |
| | Other | 329 |
| | Petrol / Diesel | 36 |
| | TCP | 13 |
| Illness | | 115 |
| Particles | | 192 |
| Animalcules | | 21 |
| Other | Water Quality Concern - Campaigns | 25 |
| | Water Quality Concern - Incident Related - General | 8 |
| | Water Quality Concern - Lifestyle | 6 |
| | Water Quality Concern - Pets/Animals | 16 |
| | Water Quality Concern - Sample | 843 |
| | Water Quality Concern - Lead | 90 |
| | Water Quality (No Concern) Fluoride | 4 |
| | Water Quality (No Concern) Other Information | 41 |
| | Water Quality (No Concern) Water Hardness | 103 |
| | Water Quality (No Concern) Water Quality Report | 38 |
| | Miscellaneous | 0 |
| TOTAL | | 7,008 |

Appearance

Colour

Within the appearance category, the main concern (67.3%) relates to discoloured water (see Figure 5.4). The most common cause of coloured water concerns is an orange, brown or black discoloration caused by suspended particles of iron (orange/brown) and manganese (black). Iron discoloration may occur through natural iron present in the raw water passing through inadequate treatment, or from corrosion of cast iron distribution mains. Manganese is present in some raw waters and may not be removed if treatment is inadequate. It is expected that the long-term mains rehabilitation programme of the distribution system will improve the appearance of water.

White Water - Air

Another appearance concern is 'white water'. The most common cause of 'white water' concerns is air dissolved in water. This causes a cloudy or milky white appearance because air is a gas and so it appears as a haze of tiny bubbles. These make the water appear white or grey and misty in appearance. A number of possible causes include burst mains, malfunctioning pumps and consumer stop taps. If air is the cause of white water, the cloudy appearance will clear in a glass of water from the bottom up.

White Water - Chalk

Chalk has a white powdery appearance and is made up of natural minerals found in water which form what is known as 'hardness'. A glass of water containing chalk will take up to an hour to clear from the top downwards, leaving fine white sediment in the bottom of the glass.

Hardness

Temporary water hardness, usually caused by dissolved calcium carbonate, can give rise to complaints as it causes scale to form in kettles and other household appliances.

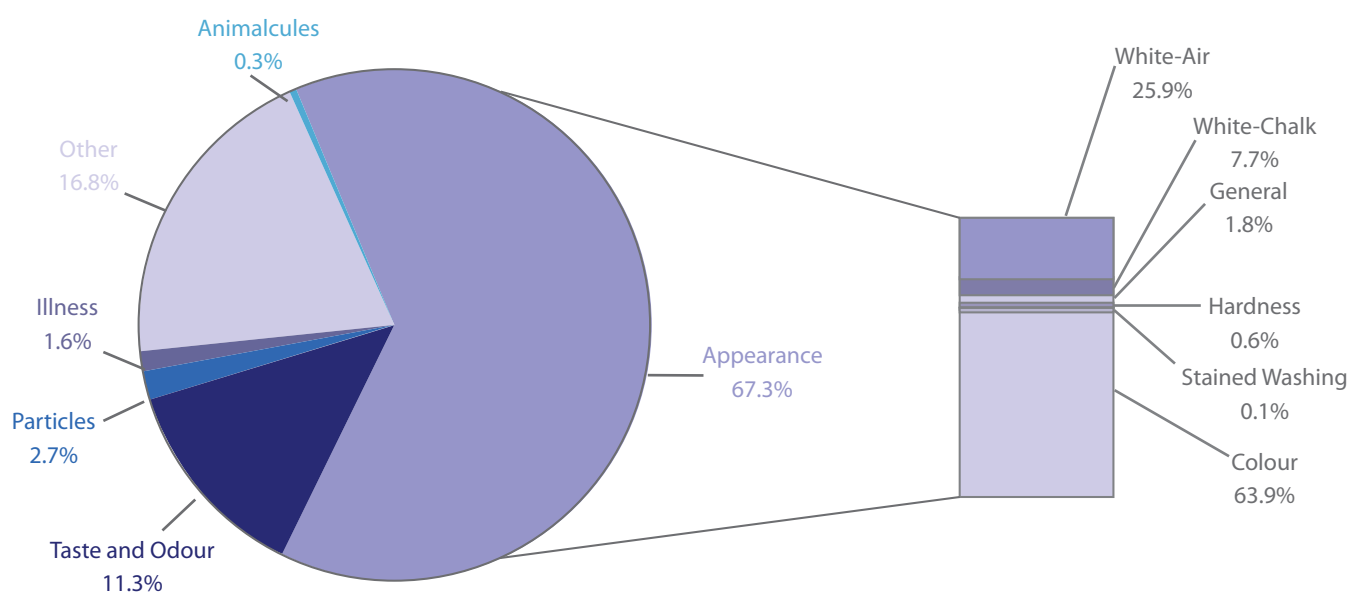
Stained Washing

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 a fault with the washing machine.

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

Figure 5.4: Consumer Contacts Showing a Breakdown for Appearance in 2010



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. Forty one percent 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 34% of all consumer contacts related to a chlorinous taste and odour in the water.

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.

Earthy/Musty

Musty or earthy tastes can arise due to naturally occurring compounds present in raw waters that have not been removed by the treatment process. Geosmin is one such compound commonly associated with earthy/musty tastes. Complaints are more common in the summer months when biological activity is highest; algal blooms in raw water sources are common causes of widespread musty tastes.

Petrol/Diesel

This is not a common problem and should be investigated immediately. Spillages of petrol, diesel or paraffin can percolate through the soil and penetrate plastic water mains.

TCP

Phenolic tastes can occur when chlorine reacts with components in household appliances or plumbing and can be more persistent. Descriptions used by consumers may include TCP, medicinal, swimming pool, bitter, and chemical. Common sources of phenol include washing machine hoses, tap washers and kettles. British Standard approved plumbing products, which do not contain phenol, should be used in all plumbing installations.

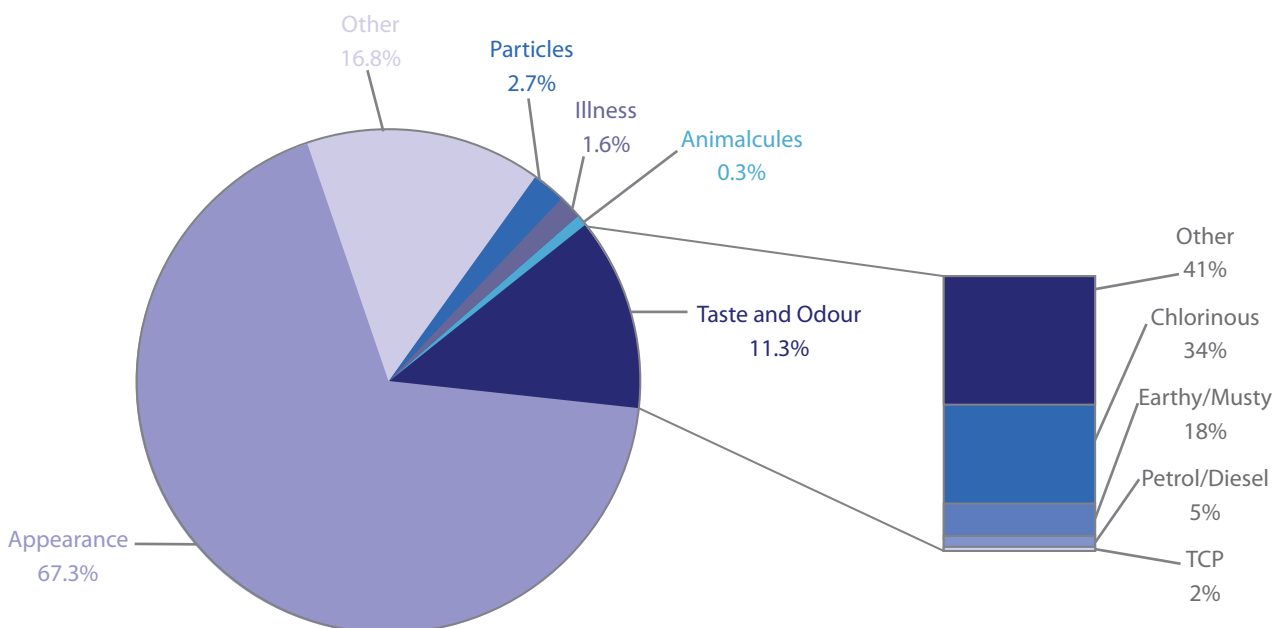
Particles

The presence of visible particulate matter in water which is otherwise not discoloured can be caused by corrosion of iron mains or deposits of sand, grit or other material present in the main. These may be re-suspended following a change in the flow of the main.

Animalcules

A small proportion of contacts received concern animalcules. This category includes complaints of insects or other animals in the water supply. Most complaints arise where an insect has crawled up a tap or is present in the sink. Very occasionally, water systems can contain animals which may arise from the raw water, treatment works or within the mains themselves.

Figure 5.5: Consumer Contacts Showing a Breakdown of Taste and Odour in 2010



Public Buildings

Of the 233 samples taken at taps in public buildings during 2010, five samples failed (two iron, one lead, one manganese, and one coliform bacteria). In carrying out its investigations, NI Water was able to determine that two of these failures (relating to iron and manganese) were due to disturbance of the mains. Two (relating to iron and lead) were attributable to internal plumbing in the public building and were notified to us by NI Water under the domestic distribution systems regulations. The remaining failure for coliform bacteria was due to contamination from the tap. As required, under the regulations, the owners of these buildings were notified by NI Water of the failures.

Water Quality Events

Water quality events may be notified to us where there is a risk or may be a potential risk that water quality is or is likely to be affected from within anywhere in the water supply chain: in the catchment, the water treatment process, the distribution system, or indeed by individual properties. Details of the events reported to us in 2010 are provided in Annex 7.

To illustrate that water quality events can be caused by internal plumbing arrangements within domestic properties we have given two examples:

- In June 2010, a sample taken at Salloon Road, Ballinamallard, failed the coliform bacteria standard. After investigation by NI Water, the problem was isolated to a single property and was caused by the internal plumbing at the property. A 'Boil Water Before Use' notice was issued to this property by NI Water on the advice of the Public Health Agency. The company installed a non-return valve to prevent potential contamination of the mains supply. After satisfactory resample results were obtained, the 'notice' was no longer required.
- In August 2010, a sample taken at Tullybroom Road, Clogher in response to a customer complaint regarding water quality, failed the turbidity standard. After investigation by NI Water, the problem was identified as being caused by back-siphonage from a private well used by premises in the area. These premises were temporarily isolated from the mains water supply to prevent further contamination. The owner isolated the well and NI Water returned the premises to mains supply. Resamples taken after the remedial work had been completed were satisfactory.

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. NI Water keeps its risk assessments under review. Where it is considered necessary NI Water will continue to invest to improve sustainable supplies of safe, clean drinking water.

Where there is a potential risk to the drinking water supplies from internal pipework 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.

Figure 5.6 Typical Water Supply Arrangements



Source of Image: Water UK - 'Looking after water in your home' guidance document

To prevent potential contamination the Water Fittings Regulations 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 0845 7 440088 (Further details can be found in Annex 9).

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) 90311575 (see Annex 9 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 the Inspectorate's website:

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

Section 2 Private Water Supplies



Image: Registered Private Water Supply from a Well Source - NIEA

Section 2 Private 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 the changes introduced with new regulations and the implementation of a more risk based approach to safeguard the quality of private water 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 water 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 water supplies (see Figure 1.1).

New Private Water Supplies Regulations

New regulations for private water supplies in Northern Ireland came into force in January 2010: The Private Water Supplies Regulations (Northern Ireland) 2009¹ (as amended in 2010). These new regulations transpose the 1998 Drinking Water Directive in respect of private supplies, revoking the previous 1994 regulations, and applying the same water quality standards as for the public water supply.

Under a new classification system for private supplies the sampling frequencies are, in most instances, reduced and there are also changes to the list of parameters for which samples will be tested. As with the 1994 regulations, private supplies to single dwellings are not required to be monitored under the 2009 Regulations, however, we continue to offer appropriate advice to all private water supply owners and users. The new regulations exclude bottled water suppliers, who are regulated under The Natural Mineral Water, Spring Water and Bottled Drinking Water Regulations (Northern Ireland) 2007.

The new regulations also require that a risk assessment is carried out at all registered private water supplies 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.

The introduction of new procedures in the event of a failure means 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 will apply more formal mechanisms to secure improvement (e.g. Authorised Departures or Notices). The regulations allow for 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.

The regulations also contain provision for the issuing of Notices which could be used to restrict or prohibit the use of a supply in circumstances where there is a risk to health from consuming or using the water.

Figure 1.1: Examples of Premises using a Private Water Supply



Caravan Park



Public Building



Food Manufacturer

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

There is a further requirement in the new regulations for any newly installed products or substances, used in the provision of a private water supply, to be approved for use with drinking water and not adversely affect the quality of the water supplied.

Roles and Responsibilities

The Drinking Water Inspectorate, acting on behalf of the Department of the Environment, has a regulatory responsibility for private water supplies which are used for drinking, cooking, food preparation or other domestic purposes (including personal hygiene); or those used in commercial food production: the manufacture, processing, preservation, or marketing of food or drink for sale for human consumption.

We implement these regulations with the support of staff from the Environmental Health Departments of local councils who collect samples, assist in follow-up investigations and carry out risk assessments at the private water supply sites.

During 2010, we delivered training workshops for Environmental Health staff on the sampling and risk assessment of private water supplies. In addition, we published the 'Private Water Supplies Sampling Manual – A Field Guide' to standardize sampling methods and issued sampling kits to all councils involved in the sampling of private water supplies¹. This manual has also been adopted as standard guidance throughout the UK (see Figure 1.2).

Persons involved in supplying water from a private water source to others, either as a shared domestic supply or through a supply to public premises or a food business, have a duty of care towards the population affected for the safety of the water being supplied. They are also required to take any appropriate remedial actions identified through the risk assessment of the supply or following an investigation into a failure of the supply to meet the drinking water quality standards.

We also offer advice to owners / users of all private water supplies, including those to single domestic dwellings, on action that can be taken to protect human health from the adverse affects of a contaminated water supply. An advice leaflet entitled – 'Is your private water supply safe' - published by us in December 2010 is available on our website² or by contacting us. This leaflet highlights the risks associated with private water supplies and how to protect against these risks (see Figure 1.2).

Register of Supplies

We are required to hold a register of private water supplies to which the regulations apply. The owners or users of private water supplies for commercial or domestic purposes, other than to single private dwellings, are required to register their supply with us by completing a Private Water Supplies Registration Form³.

Figure 1.2: Guidance produced in 2010



Sampling guidance

Advice leaflet

There were a total of 116 supplies on our register in 2010. It is estimated that there are a further 4,000 private supplies to single private domestic dwellings, which are not required to be registered under the regulations. The information held on the registered supplies is reviewed on an annual basis.

In previous years, private water supplies in use on dairy farms (i.e. within milking parlours) were included in the number of registered supplies held by us. The sampling at these sites was not undertaken during 2010, as the quality of water required within primary production is currently under consideration by the Foods Standards Agency.

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 (see Figure 1.3). The majority (98%) of private supplies in Northern Ireland are from groundwater sources, most commonly boreholes.

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

² www.doeni.gov.uk/niea/privatewatersuppliesleaflet.pdf

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

Private water 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 commercial/public supplies (irrespective of volume of water used); and
- (ii) Small domestic supplies (< 10 cubic metres or < 50 persons per day) to two or more private dwellings.

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.

Of the 116 private water supplies on our monitoring schedule for 2010: 82% are large or commercial/public supplies; and 18% are small domestic premises (groupings of two or more houses only). A breakdown of the number and types of private water supplies, together with the monitoring frequencies, is shown below in Table 1.1.

Figure 1.3: Sources of Private Water Supplies



Table 1.1: Number of Private Water Supplies by type and size in 2010

| 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 parameters* | 2 | 1.7 |
| > 100 ≤ 1000 | 4 | | 15 | 12.9 |
| > 10 ≤ 100 | 2 | | 43 | 37.1 |
| ≤ 10 | 1 | | 35 | 30.2 |
| (ii) Small Domestic Supplies (two or more dwellings) | | | | |
| < 10 | 1 | Limited suite of parameters** | 21 | 18.1 |
| Total Number of Registered Private Water Supplies | | | 116 | |

Note: There are no registered private water supplies in Northern Ireland with a volume of usage greater than 2000 m³ per day.

* Parameters listed in Scheduled 1 of The Private Water Supplies Regulations (Northern Ireland) 2009.

** Parameters listed in Regulation 10 of The Private Water Supplies Regulations (Northern Ireland) 2009.

A breakdown of private water supplies by district council area is shown below in Figure 1.4.

Figure 1.4: Distribution of Registered Private Water Supplies in 2010



 Number of private water supplies in each council area. Due to scale, not all sites are distinguishable on the map.

Note: Carrickfergus, Castlereagh, North Down, and Omagh Councils do not have private water supplies included in our 2010 sampling programme.

Overall Drinking Water Quality

Monitoring of private water supplies by the Drinking Water Inspectorate has been in place since June 1999, however, 2010 provides the first set of monitoring data under the new 2009 Regulations. Despite a similar number of private water supplies being registered with us as in previous years, there is a reduction in both the number of samples lifted and the number of tests performed under these new regulations.

In order 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 private water supply results to agreed standards by laboratories accredited for the testing of drinking water samples.

All the results of analysis are held by us and the owners/users of the private water supplies are informed of their test results on a regular basis. Table 1.2 on the following page provides an overview of the quality of water in private supplies in 2010.

The results show that out of a total of 7,754 tests carried out in 2010, 97.41% met the regulatory standards. The regulatory requirements were not met on 201 occasions; 99 of these occasions related to microbiological failures.

A direct year-on-year comparison of compliance information for private water supplies for 2010 is not possible because of changes to the sampling programme introduced with the new regulations.

Table 1.2: Overall Water Quality in Private Water Supplies in 2010

| Parameters | Determinations in 2010 | | | |
|-----------------------|------------------------|---------------|-------------|--------------|
| | Total No. | Exceeding PCV | | % Compliance |
| | | No. | % | |
| Coliform bacteria | 304 | 53 | 17.43 | 82.57 |
| <i>E. coli</i> | 304 | 35 | 11.51 | 88.49 |
| Enterococci | 127 | 11 | 8.66 | 91.34 |
| Manganese | 200 | 28 | 14.00 | 86.00 |
| Iron | 194 | 22 | 11.34 | 88.66 |
| Hydrogen ion (pH) | 210 | 19 | 9.05 | 90.95 |
| Odour (quantitative) | 169 | 7 | 4.14 | 95.86 |
| Trihalomethanes | 95 | 3 | 3.16 | 96.84 |
| Ammonium | 192 | 4 | 2.08 | 97.92 |
| Sodium | 97 | 2 | 2.06 | 97.94 |
| Colour | 193 | 2 | 1.04 | 98.96 |
| Sulphate | 96 | 1 | 1.04 | 98.96 |
| Turbidity | 210 | 2 | 0.95 | 99.05 |
| Taste (quantitative) | 141 | 1 | 0.71 | 99.29 |
| Aluminium | 193 | 1 | 0.52 | 99.48 |
| Individual pesticides | 1,263 | 1 | 0.08 | 99.92 |
| Nitrate | 193 | 0 | 0.00 | 100.00 |
| Nitrite | 193 | 0 | 0.00 | 100.00 |
| Total pesticides | 96 | 0 | 0.00 | 100.00 |
| Other parameters | 3,284 | 9 | 0.27 | 99.73 |
| Total | 7,754 | 201 | 2.59 | 97.41 |

Microbiological Quality

Microbiological failures of private water supplies, accounting for almost 50% of the overall failures, continue to be a major concern in addressing non-compliances of these supplies. The presence of *E. coli* or enterococci is indicative of faecal contamination of a supply, it can also highlight that there is a route for other microbiological pathogens to enter the supply. The results in Table 1.2 above show that 49% of the recorded non-compliances in 2010 were due to failure of the supplies to meet the microbiological standards of the regulations.

From a total of 116 supplies monitored during 2010, 17% failed to be microbiologically satisfactory. Not surprisingly, 45% of these unsatisfactory supplies were from small untreated domestic supplies in rural areas. Water supplies in the vicinity of farmed land, where animals graze or manure is spread, are most at risk and this risk is particularly high at times of heavy rainfall when water may run directly off farmland and carry micro-organisms into unprotected private supplies.

The remaining 55% of the supplies showing microbiological non-compliances were from larger commercial supplies. Although a proportion of these failures were as a result of sampling errors, which were found to be satisfactory on resampling, the majority were from commercial supplies where disinfection treatment was in use. These latter failures highlight an area of increasing concern among private water supplies serving larger, public premises whereby treatment is not being operated correctly, routinely checked or maintained as required. We will continue to work with the owners/users of these supplies to put procedures in place to address these concerns.

Physical/Chemical Quality

Contraventions of the physical/chemical standards have been reported for a range of parameters. As with previous years where the standards have not been met, they relate mainly to non-compliance for manganese (14%) and iron (11.34%).

Both iron and manganese can occur naturally in the water supply but may also enter the supply through old pipe work. High levels of these metals may affect the appearance, taste or smell of the water and could interfere with the disinfection process. There are effective treatments which can be installed to reduce the levels of these metals in private supplies. Further information on these treatment options is available in the technical manual on private water supplies¹.

Only one pesticide failure was noted for private water supplies in 2010. 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 sources². Where pesticides are of concern in the vicinity of a private water 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.

Follow-up Actions on Regulatory Exceedences

Exceedences of the regulatory standards at private supplies are reported to the relevant district councils who inform the owners/users of the supplies. 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 required.

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 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 from consuming or using the water. The PHA provides appropriate health advice in such incidents. Where required, the regulations contain a provision for the Inspectorate to issue notices which could be used to restrict or prohibit the use of a supply.

During 2010, a total of 17 microbiological and one chemical failure (for odour) were reported to the Public Health Agency. These resulted in advice being issued for nine supplies to boil their water before use and five supplies to switch to the public water supply, the remainder required no further action as resamples were satisfactory.

¹www.privatewatersupplies.gov.uk

²www.dardni.gov.uk/index/publications/pubs-dard-environment/content-codeofgoodagripractice.htm

³www.privatewatersupplies.gov.uk

Of the nine supplies advised to boil their water before use, one installed appropriate treatment. For the remaining eight supplies, all small domestic supplies to two or more dwellings, the advice to boil their water is still in place. We continue to work with the owners/users of these supplies through informal negotiations, providing advice and guidance and discussing an agreed action plan to obtain a safe supply of water.

Of the five supplies which switched to the public water supply, four were to commercial properties and one was to private domestic dwellings. Three out of the four commercial sites completed work on their private water supply system to allow them to return to using this supply.

We will continue to offer advice and guidance to the owners and users of these supplies to increase awareness of the potential risks posed by private water supplies and how to mitigate against these risks.

Risk Assessments

The 2009 regulations introduced the requirement for a risk assessment to be carried out on all private water supplies to which the regulations apply. The World Health Organization (WHO) recommends that the most effective means of consistently ensuring the safety of a drinking water supply is through a comprehensive risk assessment and risk management approach.

The risk assessment of all registered private water supplies is to be completed within 18 months of the regulations coming into force, i.e. by June 2011. In November 2010, we delivered training workshops to Environmental Health staff of local councils to allow them to carry out these risk assessments on our behalf.

This process of risk-based management is to be used to identify areas where remedial actions are required to safeguard the quality of a supply. It may also be used to reduce and focus the monitoring programme for private water supplies. We will engage with the owner/users of these supplies to realize these actions and bring about improved compliance for private water supplies.

Technical Guidance

A technical manual on private supplies is available online and provides comprehensive guidance for owners/users. It is a useful tool for those required to assess or work with these supplies. A copy of the manual and other general information relating to private supplies can be downloaded from the website³.

Further advice on private water supplies in Northern Ireland and general information on drinking water quality can be found on the Northern Ireland Environment Agency website¹.

The World Health Organization has also published a fourth edition of 'Guidelines in 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 quality² and a new document on 'Water Safety in Buildings' which provides guidance for managing water supplies in buildings³.

Acknowledgements

We acknowledge the ongoing cooperation and assistance of staff from the Environmental Health Departments of district councils in facilitating the Inspectorate in meeting the requirements of The Private Water Supplies Regulations (Northern Ireland) 2009. Also, the Public Health Agency on the guidance 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/dwq_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

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Annex 1 Glossary and Definition of Terms

| | | | |
|----------------------------------|---|--|--|
| Aesthetic | associated with the senses of taste, smell and sight. | Consideration of Provisional Enforcement Order (CPEO) | 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. |
| Aluminium | 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. | Contravention | a breach of the regulatory requirement. |
| Animalcule | a tiny or microscopic life form. | Cryptosporidiosis | the illness produced by infection with <i>Cryptosporidium</i> . |
| Aquifer | underground strata containing water. | Cryptosporidium | a protozoan parasite. |
| Authorised Departure (AD) | 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. | DEFRA | Department of the Environment, Food and Rural Affairs. |
| Authorised Supply Point | 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. | Determination | an analysis for a specific parameter. |
| Catchment | the area of land that drains into a watercourse. | Distribution Systems | NI Water's network of mains, pipes, pumping stations and service reservoirs through which treated water is conveyed to consumers. |
| Chlorine Residual | 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. | Drinking Water Directive | 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. |
| Coagulation | a process employed during drinking water treatment to assist in the removal of particulate matter. | Drinking Water Standards | the prescribed concentrations or values listed in the Regulations. |
| Coliforms | a group of bacteria which may be faecal or environmental in origin. | Enterococci | a sub-group of faecal streptococci commonly found in the faeces of humans and warm-blooded animals. |
| Colour | occurs naturally in some upland water sources. It is removed by conventional water treatment. | Escherichia Coli (E. coli) | a type of faecal coliform bacteria commonly found in the intestines of animals and humans. The presence of <i>E. coli</i> in water is a strong indication of recent sewage or animal waste contamination. |
| Communication Pipe | the connection from the water main to the consumer property boundary (normally at the outside stop tap). | Event | a situation affecting, or threatening to affect, drinking water quality. |
| Compliance Assessment | a comparison made by the Inspectorate of data (gathered by NI Water) against standards and other regulatory requirements. | Exceedence | relates to a contravention or breach of regulatory standards. |
| Compound | a compound consists of two or more elements in chemical combination. | Faecal Coliforms | a sub-group of coliforms, almost exclusively faecal in origin. |
| | | Filtration | the separation of suspended particulate matter from a fluid. |
| | | Flocculation | is a process where colloids come out of suspension in the form of floc or flakes. |
| | | Granular Activated Carbon (GAC) | an absorbent filtration media used to remove trace organic compounds from water. |

| | | | |
|----------------------|--|---|--|
| Groundwater | water from aquifers or other underground sources. | ml | millilitre. |
| Hydrogen ion (pH) | gives an indication of the degree of acidity of the water. A pH of 7 is neutral; values below 7 are acidic and above 7 are alkaline. A low pH water may result in pipe corrosion. This is corrected by adding alkali during water treatment. | MI/d | megalitres per day (one MI/d is equivalent to 1,000 m ³ /d or 220,000 gallon/d). |
| Incident | an event where there has been a demonstrable deterioration in the quality of drinking water. | ng/l | nanogrammes per litre (one billionth of a gramme per litre). |
| Indicator Parameter | something that is measured to check that the control measures, such as water treatment, are working effectively. | µg/l | microgrammes per litre (one millionth of a gramme per litre). |
| Inspectorate | the Drinking Water Inspectorate for Northern Ireland. | Non-Incident | an event where there has been no demonstrable deterioration in the quality of drinking water. |
| Investment Programme | investment in improvement works to water treatment works and distribution systems. | Oocyst | the resistant form in which <i>Cryptosporidium</i> occurs in the environment, and which is capable of causing infection. |
| Iron | is present naturally in many water sources. It is removed by treatment. Some iron compounds are used as water treatment chemicals. However, the greatest source of iron in drinking water is corrosion of iron water mains. | Orthophosphoric Acid | a chemical which is added in low concentrations at water treatment works to minimize the uptake of lead from old pipework. |
| Lead | its presence tends to reflect the existence of lead plumbing in older properties. If the water being supplied has a tendency to dissolve lead, then it is treated to reduce consumer exposure. | Parameters | the substances, organisms and properties listed in Schedules 1 and 2, and regulation 2 of the Regulations. |
| Leaching | to lose, or cause to lose, soluble substances by the action of a percolating liquid. | Pathogen | an organism which causes disease. |
| Mains Rehabilitation | restoration of water mains pipework to a proper condition. | Percentage Mean Zonal Compliance | a measure of compliance with drinking water standards - see zonal percentage compliance below. |
| Manganese | is present naturally in many water sources and is removed during water treatment. | Pesticides | any fungicide, herbicide, insecticide or related product (excluding medicines) used for the control of pests or diseases. |
| MCPA | (4-chloro-2-methylphenoxy) acetic acid. An aryloxyalkanoic acid herbicide used for controlling broad-leaved weeds in grass or cereal crops. | Plumbosolvency | the tendency for lead to dissolve in water. |
| Mecoprop (MCP) | 2-(4-chloro-2-methylphenoxy) propanoic acid. An aryloxyalkanoic acid herbicide used for controlling broad-leaved weeds in grass or cereal crops. | 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. |
| m ³ /d | cubic metres per day. | Private Water Supplies | any supplies of water provided otherwise than by the public supplier, NI Water. |
| mg/l | milligrammes per litre (one thousandth of a gramme per litre). | Protozoan Parasite | a single-celled organism that can only survive by infecting a host. |
| | | 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. | WHO | World Health Organization. |
| Sedimentation | is the tendency for particles in suspension to settle out of the water under the influence of gravity. | Wholesome/Wholesomeness | a concept of water quality which is defined by reference to standards and other requirements set out in the Regulations. |
| Service Connection Service Pipe | connection between the NI Water main to a consumer’s property. 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. | WRAS | Water Regulations Advisory Scheme. |
| Service Reservoir | a water tower, tank or other reservoir used for the storage of treated water within the distribution system. | WRc | Water Research Centre (1989) plc and/or, as the context may require, its predecessor body. |
| Supply Pipe | pipe connecting between the boundary of a consumer’s property and the inside stop tap. | Zonal Percentage Compliance | the percentage of results for a specific parameter which complied with the PCV. The mean zonal percentage compliance is the average of the zonal percentage compliances of all water supply zones in a region. |
| Supply Point | (see Authorised Supply point) | | |
| Surface Water | untreated water from rivers, impounding reservoirs or other surface water sources. | | |
| Technical Audit | the means of checking that NI Water is complying with its statutory obligations. | | |
| Time of Supply | the moment when water passes from NI Water’s pipework into a consumer’s pipework. | | |
| Treated Water | water treated for domestic use as defined in the Regulations. | | |
| 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. | | |
| Water Supply Zone | a pre-defined area of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available. | | |

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 in Northern Ireland 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 with 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 1 April 2007 and implement the requirements of the Drinking Water Directive. They define wholesomeness by setting standards for 39 parameters¹ and a further 11 indicator parameters; and they specify sampling requirements for samples taken within water supply zones (consumers' taps), at service reservoirs, and at water treatment works.

The 2007 Regulations were amended by the [Water Supply \(Water Quality\) \(Amendments\) 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 included the 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 groundwaters, 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](#) came into operation on 18 January 2010 and implement Council Directive 98/83/EC on the quality of water intended for human consumption in relation to private water supplies. They were amended by [The Private Water Supplies \(Amendment\) Regulations \(Northern Ireland\) 2010](#), which came into operation on 20 April 2010 and provide clarification of some aspects of the 2009 Regulations, including the requirement to use only specified products or substances for private water supplies and to limit disinfection by-products to residual levels. They complete the transposition of Council Directive 98/83/EC.

¹39 parameters following the introduction of the 2009 'Amendment' Regulations.

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 2010.

The '% zonal compliance' is calculated using the mean zonal compliance indicator. For further detail on how this is calculated, the reader should refer to Annex 4 of our 2007 report:

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

Water Quality in Water Supply Zones in 2010

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 | 47 | 1,452 | 0 | 100.00 |
| ZN0303, Dunore Point Ballymena | 1 | 24 | 1 | 95.83 |
| ZN0401, Dunore Point Antrim | 1 | 52 | 1 | 98.08 |
| ZN0402, Killylane Ballynure | 1 | 36 | 2 | 94.44 |
| ZN0704, Lough Bradan Drumquin | 1 | 24 | 1 | 95.83 |
| ZS0108, Belfast Purdysburn | 1 | 36 | 1 | 97.22 |
| ZS0403, Drumaroad Peninsula | 1 | 24 | 1 | 95.83 |
| ZS0501, Drumaroad Lisburn | 1 | 52 | 2 | 96.15 |
| ZS0602, Drumaroad Downpatrick | 1 | 36 | 1 | 97.22 |
| Total number of zones | 55 | 1,736 | 10 | |
| Mean Zonal Compliance | | | | 99.47 |

Table 3.2: % 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 | 53 | 4,475 | 0 | 100.00 |
| ZN0401, Dunore Point Antrim | 1 | 156 | 1 | 99.36 |
| ZS0602, Drumaroad Downpatrick | 1 | 97 | 1 | 98.97 |
| Total number of zones | 55 | 4,728 | 2 | |
| Mean Zonal Compliance | | | | 99.97 |

Table 3.3: % 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 | 31 | 932 | 0 | 100.00 |
| ZN0202, Altnahinch Bushmills | 1 | 24 | 3 | 87.50 |
| ZN0302, Dungonnell Glarryford | 1 | 36 | 1 | 97.22 |
| ZN0303, Dunore Point Ballymena | 1 | 24 | 1 | 95.83 |
| ZN0304, Glarryford Ahoghill | 1 | 24 | 3 | 87.50 |
| ZN0402, Killylane Ballynure | 1 | 36 | 1 | 97.22 |
| ZN0503, Unagh Cookstown | 1 | 24 | 1 | 95.83 |
| ZN0601, Ballinrees Limavady | 1 | 24 | 1 | 95.83 |
| ZN0802, Killyhevlin Enniskillen | 1 | 52 | 2 | 96.15 |
| ZN0901, Altmore Cabragh | 1 | 4 | 1 | 75.00 |
| ZS0101, Dunore Ballygomartin North | 1 | 36 | 1 | 97.22 |
| ZS0102, Dunore Ballygomartin South | 1 | 36 | 1 | 97.22 |
| ZS0108, Belfast Purdysburn | 1 | 36 | 1 | 97.22 |
| ZS0110, Dunore Point Glengormley | 1 | 24 | 1 | 95.83 |
| ZS0201, Dorisland Carrick | 1 | 36 | 4 | 88.89 |
| ZS0402, Drumaroad Comber | 1 | 52 | 2 | 96.15 |
| ZS0403, Drumaroad Peninsula | 1 | 24 | 1 | 95.83 |
| ZS0501, Drumaroad Lisburn | 1 | 52 | 2 | 96.15 |
| ZS0502, Forked Bridge Dunmurry | 1 | 52 | 1 | 98.08 |
| ZS0602, Drumaroad Downpatrick | 1 | 36 | 1 | 97.22 |
| ZS0804, Ballydougan Craigavon | 1 | 52 | 1 | 98.08 |
| ZS0805, Ballydougan Gilford | 1 | 36 | 1 | 97.22 |
| ZS0901, Camlough Newry West | 1 | 24 | 2 | 91.67 |
| ZS0904, Fofanny Mourne | 1 | 36 | 1 | 97.22 |
| ZS1001, Carran Hill Crossmaglen | 1 | 24 | 1 | 95.83 |
| Total number of zones | 55 | 1,736 | 35 | |
| Mean Zonal Compliance | | | | 97.60 |

Table 3.4: % 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 | 53 | 408 | 0 | 100.00 |
| ZS0104, Dunore Breda North | 1 | 8 | 1 | 87.50 |
| ZS0105, Dunore Breda South | 1 | 8 | 1 | 87.50 |
| Total number of zones | 55 | 424 | 2 | |
| Mean Zonal Compliance | | | | 99.55 |

Table 3.5: % 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 | 50 | 1,552 | 0 | 100.00 |
| ZN0402, Killylane Ballynure | 1 | 36 | 1 | 97.22 |
| ZN0706, Lough Macrory Killyclogher | 1 | 24 | 1 | 95.83 |
| ZS0108, Belfast Purdysburn | 1 | 36 | 1 | 97.22 |
| ZS0501, Drumaroad Lisburn | 1 | 52 | 1 | 98.08 |
| ZS0602, Drumaroad Downpatrick | 1 | 36 | 2 | 94.44 |
| Total number of zones | 55 | 1,736 | 6 | |
| Mean Zonal Compliance | | | | 99.69 |

Table 3.6: % 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 | 44 | 1,315 | 0 | 100.00 |
| ZN0604, Caugh Hill Dungiven | 1 | 36 | 2 | 94.44 |
| ZN0605, Creggan Derry | 1 | 24 | 1 | 95.83 |
| ZN0802, Killyhevlin Enniskillen | 1 | 52 | 4 | 92.31 |
| ZS0108, Belfast Purdysburn | 1 | 36 | 1 | 97.22 |
| ZS0109, Dorisland Whiteabbey | 1 | 36 | 1 | 97.22 |
| ZS0501, Drumaroad Lisburn | 1 | 52 | 1 | 98.08 |
| ZS0502, Forked Bridge Dunmurry | 1 | 52 | 1 | 98.08 |
| ZS0601, Drumaroad Ballynahinch | 1 | 24 | 1 | 95.83 |
| ZS0602, Drumaroad Downpatrick | 1 | 36 | 1 | 97.22 |
| ZS0902, Fofanny Dromore | 1 | 37 | 2 | 94.59 |
| ZS0904, Fofanny Mourne | 1 | 36 | 2 | 94.44 |
| Total number of zones | 55 | 1,736 | 17 | |
| Mean Zonal Compliance | | | | 99.19 |

Table 3.7: % Mean Zonal Compliance - Pesticides - Other Substances

| Sampling Location - Supply Points | Number of Supply Points | Number of Samples | No. of Tests >PCV per Supply Points | % Zonal Compliance |
|-----------------------------------|-------------------------|-------------------|-------------------------------------|--------------------|
| Number of compliant supply points | 30 | 11,817 | 0 | 100.00 |
| W2501, Altmore | 1 | 8 | 1 | 87.50 |
| Total number of supply points | 31 | 11,825 | 1 | |
| Mean Zonal Compliance | | | | 99.60 |

Table 3.8: % 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 | 51 | 1,541 | 0 | 100.00 |
| ZN0802, Killyhevlin Enniskillen | 1 | 52 | 4 | 92.31 |
| ZS0105, Dunore Breda South | 1 | 52 | 1 | 98.08 |
| ZS0502, Forked Bridge Dunmurry | 1 | 52 | 1 | 98.08 |
| ZS0902, Fofanny Dromore | 1 | 37 | 1 | 97.30 |
| Total number of zones | 55 | 1,734 | 7 | |
| Mean Zonal Compliance | | | | 99.74 |

Table 3.9: % Mean Zonal Compliance - Total Pesticides

| Sampling Location - Supply Points | Number of Supply Points | Number of Samples | No. of Tests >PCV per Supply Points | % Zonal Compliance |
|-----------------------------------|-------------------------|-------------------|-------------------------------------|--------------------|
| Number of compliant supply points | 30 | 267 | 0 | 100.00 |
| W2501, Altmore | 1 | 8 | 1 | 87.50 |
| Total number of supply points | 31 | 275 | 1 | |
| Mean Zonal Compliance | | | | 99.60 |

Table 3.10: % 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 | 49 | 380 | 0 | 100.00 |
| ZN0101, Ballinrees Coleraine | 1 | 8 | 1 | 87.50 |
| ZN0202, Altnahinch Bushmills | 1 | 8 | 1 | 87.50 |
| ZN0302, Dungonnell Glarryford | 1 | 8 | 2 | 75.00 |
| ZN0704, Lough Bradan Drumquin | 1 | 12 | 2 | 83.33 |
| ZN0902, Altmore Donaghmore | 1 | 8 | 1 | 87.50 |
| ZN1101, Clay Lake Keady | 1 | 8 | 1 | 87.50 |
| Total number of zones | 55 | 432 | 8 | |
| Mean Zonal Compliance | | | | 98.33 |

Table 3.11: % 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 | 54 | 1,700 | 0 | 100.00 |
| ZS0108, Belfast Purdysburn | 1 | 36 | 1 | 97.22 |
| Total number of zones | 55 | 1,736 | 1 | |
| Mean Zonal Compliance | | | | 99.95 |

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 |
|----------------------------------|-----------------|--------------------|
| ZN0304 Glarryford Ahoghill | Iron | 87.50 |
| ZN0401, Dunore Point Antrim | Aluminium | 98.08 |
| | <i>E. coli</i> | 99.36 |
| ZN0402, Killylane Ballynure | Aluminium | 94.44 |
| | Iron | 97.22 |
| | Manganese | 97.22 |
| ZN0501, Moyola Magherafelt | Full Compliance | |
| ZS0503, Forked Bridge Stoneyford | Full Compliance | |
| ZS0802, Castor Bay Lurgan | Full Compliance | |

Table 4.2: Ards Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|--------------------------------|-----------------|--------------------|
| ZS0108, Belfast Purdysburn | Aluminium | 97.22 |
| | Iron | 97.22 |
| | Manganese | 97.22 |
| | Odour | 97.22 |
| | Turbidity | 97.22 |
| ZS0401, Drumaroad Bangor | Full Compliance | |
| ZS0402, Drumaroad Comber | Iron | 96.15 |
| ZS0403, Drumaroad Peninsula | Aluminium | 95.83 |
| | Iron | 95.83 |
| ZS0501, Drumaroad Lisburn | Aluminium | 96.15 |
| | Iron | 96.15 |
| | Manganese | 98.08 |
| | Odour | 98.08 |
| ZS0601, Drumaroad Ballynahinch | Odour | 95.83 |

Table 4.3: Armagh City and District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|---------------------------------|-----------------|--------------------|
| ZN1001, Shanmoy Dungannon | Full Compliance | |
| ZN1101, Clay Lake Keady | Trihalomethanes | 87.50 |
| ZN1102, Seagahan Armagh | Full Compliance | |
| ZS0804, Ballydougan Craigavon | Iron | 98.08 |
| ZS0805, Ballydougan Gilford | Iron | 97.22 |
| ZS0902, Fofanny Dromore | Odour | 94.59 |
| | Taste | 97.30 |
| ZS1001, Carran Hill Crossmaglen | Iron | 95.83 |

Table 4.4: Ballymena Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|--------------------------------|-----------------|--------------------|
| ZN0202, Altnahinch Bushmills | Iron | 87.50 |
| | Trihalomethanes | 87.50 |
| ZN0302, Dungonnell Glarryford | Iron | 97.22 |
| | Trihalomethanes | 75.00 |
| ZN0303, Dunore Point Ballymena | Aluminium | 95.83 |
| | Iron | 95.83 |
| ZN0304, Glarryford Ahoghill | Iron | 87.50 |
| ZN0401, Dunore Point Antrim | Aluminium | 98.08 |
| | <i>E. coli</i> | 99.36 |
| ZN0402, Killylane Ballynure | Aluminium | 94.44 |
| | Iron | 97.22 |
| | Manganese | 97.22 |
| ZN0501, Moyola Magherafelt | Full Compliance | |

Table 4.5: Ballymoney Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|-------------------------------|-----------------|--------------------|
| ZN0101, Ballinrees Coleraine | Trihalomethanes | 87.50 |
| ZN0202, Altnahinch Bushmills | Iron | 87.50 |
| | Trihalomethanes | 87.50 |
| ZN0302, Dungonnell Glarryford | Iron | 97.22 |
| | Trihalomethanes | 75.00 |
| ZN0304, Glarryford Ahoghill | Iron | 87.50 |

Table 4.6: Banbridge District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|--------------------------------|-----------------|--------------------|
| ZS0601, Drumaroad Ballynahinch | Odour | 95.83 |
| ZS0802, Castor Bay Lurgan | Full Compliance | |
| ZS0805, Ballydougan Gilford | Iron | 97.22 |
| ZS0902, Fofanny Dromore | Odour | 94.59 |
| | Taste | 97.30 |
| ZS0904, Fofanny Mourne | Odour | 97.22 |
| | Taste | 94.44 |

Table 4.7: Belfast City Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|-------------------------------------|-----------------|--------------------|
| ZN0401, Dunore Point Antrim | Aluminium | 98.08 |
| | <i>E. coli</i> | 99.36 |
| ZS0101, Belfast Ballygomartin North | Iron | 97.22 |
| ZS0102, Belfast Ballygomartin South | Iron | 97.22 |
| ZS0103, Belfast Ballyhanwood | Full Compliance | |
| ZS0104, Belfast Breda North | Lead | 87.50 |
| ZS0105, Belfast Breda South | Lead | 87.50 |
| | Taste | 98.08 |
| ZS0106, Belfast North | Full Compliance | |
| ZS0107, Belfast Oldpark | Full Compliance | |
| ZS0108, Belfast Purdysburn | Aluminium | 97.22 |
| | Iron | 97.22 |
| | Manganese | 97.22 |
| | Odour | 97.22 |
| | Turbidity | 97.22 |
| ZS0109, Dorisland Whiteabbey | Odour | 97.22 |
| ZS0110, Dunore Point Glengormley | Iron | 95.83 |
| ZS0402, Drumaroad Comber | Iron | 96.15 |
| ZS0501, Drumaroad Lisburn | Aluminium | 96.15 |
| | Iron | 96.15 |
| | Manganese | 98.08 |
| | Odour | 98.08 |
| ZS0502, Forked Bridge Dunmurry | Iron | 98.08 |
| | Odour | 98.08 |
| | Taste | 98.08 |
| ZS0503, Forked Bridge Stoneyford | Full Compliance | |

Table 4.8: Carrickfergus Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------|-----------|--------------------|
| ZN0402, Killylane Ballynure | Aluminium | 94.44 |
| | Iron | 97.22 |
| | Manganese | 97.22 |
| ZS0109, Dorisland Whiteabbey | Odour | 97.22 |
| ZS0201, Dorisland Carrick | Iron | 88.89 |

Table 4.9: Castlereagh Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------------|--|---|
| ZS0102 Belfast Ballygomartin South | Iron | 97.22 |
| ZS0103, Belfast Ballyhanwood | Full Compliance | |
| ZS0104, Belfast Breda North | Lead | 87.50 |
| ZS0105, Belfast Breda South | Lead Taste | 87.50 98.08 |
| ZS0108, Belfast Purdysburn | Aluminium Iron Manganese Odour Turbidity | 97.22 97.22 97.22 97.22 97.22 |
| ZS0402, Drumaroad Comber | Iron | 96.15 |
| ZS0501, Drumaroad Lisburn | Aluminium Iron Manganese Odour | 96.15 96.15 98.08 98.08 |

Table 4.10: Coleraine Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------|-------------------------|--------------------|
| ZN0101, Ballinrees Coleraine | Trihalomethanes | 87.50 |
| ZN0202, Altnahinch Bushmills | Iron Trihalomethanes | 87.50 87.50 |
| ZN0501, Moyola Magherafelt | Full Compliance | |
| ZN0601, Ballinrees Limavady | Iron | 95.83 |
| ZN0604, Caugh Hill Dungiven | Odour | 94.44 |

Table 4.11: Cookstown District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------|---|-------------------------|
| ZN0501, Moyola Magherafelt | Full Compliance | |
| ZN0502, Lough Fea Cookstown | Full Compliance | |
| ZN0503, Unagh Cookstown | Iron | 95.83 |
| ZN0705, Lough Macrory Beragh | Full Compliance | |
| ZN0902, Altmore Donaghmore | Trihalomethanes Pesticide - MCPA Pesticides - Total | 87.50 87.50 87.50 |
| ZN1001, Shanmoy Dungannon | Full Compliance | |

Table 4.12: Craigavon Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|-------------------------------|-----------------|--------------------|
| ZN1001, Shanmoy Dungannon | Full Compliance | |
| ZS0802, Castor Bay Lurgan | Full Compliance | |
| ZS0804, Ballydougan Craigavon | Iron | 98.08 |
| ZS0805, Ballydougan Gilford | Iron | 97.22 |
| ZS0806, Ballyhannon Portadown | Full Compliance | |
| ZS0902, Fofanny Dromore | Odour | 94.59 |
| | Taste | 97.30 |

Table 4.13: Derry City Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|-----------------------------|-----------------|--------------------|
| ZN0603, Carmoney Eglinton | Full Compliance | |
| ZN0604, Caugh Hill Dungiven | Odour | 94.44 |
| ZN0605, Creggan Derry | Odour | 95.83 |
| ZN0701, Derg Strabane | Full Compliance | |

Table 4.14: Down District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|--------------------------------|----------------|--------------------|
| ZS0402, Drumaroad Comber | Iron | 96.15 |
| ZS0501, Drumaroad Lisburn | Aluminium | 96.15 |
| | Iron | 96.15 |
| | Manganese | 98.08 |
| | Odour | 98.08 |
| ZS0601, Drumaroad Ballynahinch | Odour | 95.83 |
| ZS0602, Drumaroad Downpatrick | Aluminium | 97.22 |
| | <i>E. coli</i> | 98.97 |
| | Iron | 97.22 |
| | Manganese | 94.44 |
| ZS0902, Fofanny Dromore | Odour | 94.59 |
| | Taste | 97.30 |
| ZS0904, Fofanny Mourne | Iron | 97.22 |
| | Odour | 94.44 |

Table 4.15: Dungannon and South Tyrone Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------------|--------------------|--------------------|
| ZN0501, Moyola Magherafelt | Full Compliance | |
| ZN0502, Lough Fea Cookstown | Full Compliance | |
| ZN0705, Lough Macrory Beragh | Full Compliance | |
| ZN0706, Lough Macrory Killyclogher | Manganese | 95.83 |
| ZN0802, Killyhevlin Enniskillen | Iron | 96.15 |
| | Odour | 92.31 |
| | Taste | 92.31 |
| ZN0901, Altmore Cabragh | Iron | 75.00 |
| | Pesticide - MCPA | 87.50 |
| | Pesticides - Total | 87.50 |
| ZN0902, Altmore Donaghmore | Trihalomethanes | 87.50 |
| | Pesticide - MCPA | 87.50 |
| | Pesticides - Total | 87.50 |
| ZN1001, Shanmoy Dungannon | Full Compliance | |
| ZN1102, Seagahan Armagh | Full Compliance | |
| ZS0804, Ballydougan Craigavon | Iron | 98.08 |

Table 4.16: Fermanagh District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------------|-----------------|--------------------|
| ZN0704, Lough Bradan Drumquin | Aluminium | 95.83 |
| | Trihalomethanes | 83.33 |
| ZN0706, Lough Macrory Killyclogher | Manganese | 95.83 |
| ZN0801, Belleek Garrison | Full Compliance | |
| ZN0802, Killyhevlin Enniskillen | Iron | 96.15 |
| | Odour | 92.31 |
| | Taste | 92.31 |

Table 4.17: Larne Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|--------------------------------|-----------------|--------------------|
| ZN0302, Dungonnell Glarryford | Iron | 97.22 |
| | Trihalomethanes | 75.00 |
| ZN0303, Dunore Point Ballymena | Aluminium | 95.83 |
| | Iron | 95.83 |
| ZN0402, Killylane Ballynure | Aluminium | 94.44 |
| | Iron | 97.22 |
| | Manganese | 97.22 |
| ZS0201, Dorisland Carrick | Iron | 88.89 |

Table 4.18: Limavady Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------|-----------------|--------------------|
| ZN0101, Ballinrees Coleraine | Trihalomethanes | 87.50 |
| ZN0501, Moyola Magherafelt | Full Compliance | |
| ZN0601, Ballinrees Limavady | Iron | 95.83 |
| ZN0603, Carmoney Eglinton | Full Compliance | |
| ZN0604, Caugh Hill Dungiven | Odour | 94.44 |
| ZN0701, Derg Strabane | Full Compliance | |

Table 4.19: Lisburn City Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|----------------------------------|--|---|
| ZN0401, Dunore Point Antrim | Aluminium <i>E. coli</i> | 98.08 99.36 |
| ZS0108, Belfast Purdysburn | Aluminium Iron Manganese Odour Turbidity | 97.22 97.22 97.22 97.22 97.22 |
| ZS0501, Drumaroad Lisburn | Aluminium Iron Manganese Odour | 96.15 96.15 98.08 98.08 |
| ZS0502, Forked Bridge Dunmurry | Iron Odour Taste | 98.08 98.08 98.08 |
| ZS0503, Forked Bridge Stoneyford | Full Compliance | |
| ZS0601, Drumaroad Ballynahinch | Odour | 95.83 |
| ZS0802, Castor Bay Lurgan | Full Compliance | |
| ZS0902, Fofanny Dromore | Odour Taste | 94.59 97.30 |

Table 4.20: Magherafelt District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------|-------------------------|--------------------|
| ZN0101, Ballinrees Coleraine | Trihalomethanes | 87.50 |
| ZN0202, Altnahinch Bushmills | Iron Trihalomethanes | 87.50 87.50 |
| ZN0304, Glarryford Ahoghill | Iron | 87.50 |
| ZN0501, Moyola Magherafelt | Full Compliance | |
| ZN0502, Lough Fea Cookstown | Full Compliance | |
| ZN0604, Caugh Hill Dungiven | Odour | 94.44 |
| ZN0701, Derg Strabane | Full Compliance | |

Table 4.21: Moyle District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|--------------------------------|-------------------------|--------------------|
| ZN0101, Ballinrees Coleraine | Trihalomethanes | 87.50 |
| ZN0202, Altnahinch Bushmills | Iron Trihalomethanes | 87.50 87.50 |
| ZN0204, Rathlin Island | Full Compliance | |
| ZN0302, Dungonnell Glarryford | Iron Trihalomethanes | 97.22 75.00 |
| ZN0303, Dunore Point Ballymena | Aluminium Iron | 95.83 95.83 |

Table 4.22: Newry and Mourne District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|---------------------------------|-----------------|--------------------|
| ZN1101, Clay Lake Keady | Trihalomethanes | 87.50 |
| ZN1102, Seagahan Armagh | Full Compliance | |
| ZS0805, Ballydougan Gilford | Iron | 97.22 |
| ZS0901, Camlough Newry West | Iron | 91.67 |
| ZS0902, Fofanny Dromore | Odour Taste | 94.59 97.30 |
| ZS0904, Fofanny Mourne | Iron Odour | 97.22 94.44 |
| ZS1001, Carran Hill Crossmaglen | Iron | 95.83 |

Table 4.23: Newtownabbey Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|----------------------------------|--------------------------------|-------------------------|
| ZN0401, Dunore Point Antrim | Aluminium <i>E. coli</i> | 98.08 99.36 |
| ZN0402, Killylane Ballynure | Aluminium Iron Manganese | 94.44 97.22 97.22 |
| ZS0106, Belfast North | Full Compliance | |
| ZS0109, Dorisland Whiteabbey | Odour | 97.22 |
| ZS0110, Dunore Point Glengormley | Iron | 95.83 |
| ZS0201, Dorisland Carrick | Iron | 88.89 |

Table 4.24: North Down Borough Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|----------------------------|-----------------|--------------------|
| ZS0108, Belfast Purdysburn | Aluminium | 97.22 |
| | Iron | 97.22 |
| | Manganese | 97.22 |
| | Odour | 97.22 |
| | Turbidity | 97.22 |
| ZS0401, Drumaroad Bangor | Full Compliance | |
| ZS0402, Drumaroad Comber | Iron | 96.15 |

Table 4.25: Omagh District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------------|--------------------|--------------------|
| ZN0501, Moyola Magherafelt | Full Compliance | |
| ZN0502, Lough Fea Cookstown | Full Compliance | |
| ZN0701, Derg Strabane | Full Compliance | |
| ZN0702, Glenhordial Omagh | Full Compliance | |
| ZN0703, Lenamore Greencastle | Full Compliance | |
| ZN0704, Lough Bradan Drumquin | Aluminium | 95.83 |
| | Trihalomethanes | 83.33 |
| ZN0705, Lough Macrory Beragh | Full Compliance | |
| ZN0706, Lough Macrory Killyclogher | Manganese | 95.83 |
| ZN0802, Killyhevlin Enniskillen | Iron | 96.15 |
| | Odour | 92.31 |
| | Taste | 92.31 |
| ZN0902, Altmore Donaghmore | Trihalomethanes | 87.50 |
| | Pesticide - MCPA | 87.50 |
| | Pesticides - Total | 87.50 |

Table 4.26: Strabane District Council Area

| Sampling Location - Zones | Parameter | % Zonal Compliance |
|------------------------------------|-----------------|--------------------|
| ZN0501, Moyola Magherafelt | Full Compliance | |
| ZN0603, Carmoney Eglinton | Full Compliance | |
| ZN0604, Caugh Hill Dungiven | Odour | 94.44 |
| ZN0701, Derg Strabane | Full Compliance | |
| ZN0703, Lenamore Greencastle | Full Compliance | |
| ZN0704, Lough Bradan Drumquin | Aluminium | 95.83 |
| | Trihalomethanes | 83.33 |
| ZN0706, Lough Macrory Killyclogher | Manganese | 95.83 |

Annex 5

Authorised Departures

The information contained in the following table lists by water supply zone, the water treatment works (WTWs) supplying the zone and a summary of the associated Authorised Departure (AD) compliance improvement schemes which the Inspectorate has agreed with NI Water. During 2010, two ADs remained in place for trihalomethanes (THMs).

Table 5.1: 2010 Authorised Departures (ADs) and Associated Improvement Schemes for THMs

| Zone Code | Zone Name | WTWs Supplying Water Supply Zone | THMs AD Value $\mu\text{g/l}$ | Population (to nearest 1,000) | AD End Date | Progress with WTWs Compliance Measures |
|-----------|----------------------------|----------------------------------|-------------------------------|-------------------------------|---------------|--|
| ZN0704 | Lough Bradan Drumquin | Lough Bradan | 150 | 20,000 | 6 August 2010 | The compliance improvement scheme to upgrade Lough Bradan WTWs is expected to complete following the commissioning phase which is due to commence in October 2011. |
| ZN0706 | Lough Macrory Killyclogher | | 150 | 20,000 | | |

Annex 6

Consideration of Provisional Enforcement Orders

The following table provides a summary of enforcement action taken under Section 31(3)(a) of The Water and Sewerage Services (Northern Ireland) Order 2006. Further details on the undertakings given by NI Water to carry out the necessary remedial action can be found on our website¹.

Table 6.1: A Summary of Consideration of Provisional Enforcement Orders (CPEOs) in Place in 2010

| Water Treatment Works (WTWs) and Associated Water Supply Areas | Parameter | Progress with Corrective Action |
|--|-----------|--|
| Altmore WTWs and associated supply area | MCPA | Altmore WTWs was permanently removed from service in April 2011. The area is now supplied by Castor Bay WTWs, and all undertakings related to the CPEO was completed in July 2011. |
| Dorisland Whiteabbey and Dorisland Carrick Water Supply Zones | Iron | Mains rehabilitation work to commence in July 2011 in the Newtownabbey area. Further areas identified for rehabilitation to be prioritized in the Mains Rehabilitation Work Programme for 2011/12. |
| Altnahinch Bushmills Water Supply Zone | Iron | Mains rehabilitation work commenced in September 2010, and is ongoing during 2011. |
| Altmore Cabragh Water Supply Zone | Iron | The zone is now supplied from Castor Bay WTWs. A mains flushing exercise and a zonal study for this area has commenced. Water Quality sampling was carried out in May 2011. |
| Carmoney Water Supply Area | Aluminium | All undertakings, including work to upgrade Carmoney WTWs, were completed in July 2011. |
| Killylane Water Supply Area | THMs | All undertakings, such as remedial measures relating to operation of works and refurbishment of service reservoirs, were completed by the end of June 2011. |
| Dorisland Water Supply Zone | Iron | All undertakings were completed by April 2010. |
| Derg Water Supply Area | THMs | All undertakings were completed in February 2011 with the exception of the requirement to undertake additional operational sampling for THMs. |
| Seagahan Water Supply Zone | THMs | The upgraded treatment facilities at Seagahan WTWs were brought into service in November 2009. Following completion of the commissioning period, all undertakings related to this CPEO were completed in September 2010. |

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

Annex 7 Events

Tables 7.1 and 7.2 below provide a full list of incidents and non-incidents (respectively) recorded in 2010.

Table 7.1: Drinking Water Quality Incidents in 2010

| Date of Incident | Area and Estimate of Population/ Properties Potentially Affected | Nature and Cause of Incident | Associated Council Area(s) |
|-------------------------------|--|---|--|
| 5 - 12 January 2010 | Lough Bradan WTWs (19,500 population) | Treatment difficulties led to an aluminium exceedence in the final water and related supply area. | Omagh, Fermanagh |
| 12 January - 2 February 2010 | Warren Gardens, Lisburn (Population unavailable) | Deterioration in water quality caused by a burst main and the necessary repair work. | Lisburn |
| 11 - 25 January 2010 | Belfast, Ballyward, Rostrevor (Population unavailable) | Widespread odour failures caused by operational work in distribution carried out in response to the freeze/thaw conditions. | Belfast, Lisburn, Castlereagh, Banbridge, Newry and Mourne |
| 26 January - 16 June 2010 | Derryork Road, Dungiven (1 property) | pH exceedences probably associated with cement-lined pipe work. | Limavady |
| June 2010 | Killyhevlin Enniskillen (63,000 population) | Taste and odour exceedences due to insufficient treatment at Killyhevlin WTWs. | Fermanagh |
| 23 July 2010 | Fracture of water main on Springfield Road (4,000 properties) | A Road Service contractor fractured a water main on the Springfield Road which led to loss of supply, reports of discoloured water from a number of customers, and subsequent media interest. | Belfast |
| 6 - 9 August 2010 | Cappagh SR (700 population) | Elevated levels of iron, manganese and aluminium were detected in the final water from Cappagh Service Reservoir. No cause was determined. | Dungannon and South Tyrone |
| 20 - 27 August 2010 | Rathlin BH WTWs (106 population) | Disturbance of particles led to turbidity exceedences in the final water. | Moyle |
| 18 August - 2 September 2010 | Tullybroom Road, Clogher (200 population) | Elevated levels of turbidity and iron were caused by external contamination. | Fermanagh |
| 11 - 26 August 2010 | Killyhevlin Enniskillen (63,000 population) | Taste and odour exceedences in the Killyhevlin WTWs supply area. Cause not determined. | Dungannon and South Tyrone, Fermanagh |
| 31 August - 1 September 2010 | Forked Bridge WTWs (76,000 population) | Disinfection problems occurred requiring emergency chlorination in distribution. | Belfast, Lisburn, Antrim |
| 7 September - 3 November 2010 | Altmore Donaghmore Zone (6,500 population) | Pesticide (MCPA) exceedences due to ineffective treatment. | Dungannon and South Tyrone |
| 7 - 27 September 2010 | Ballinrees WTWs (103,000 population) | Pesticide (MCPA) exceedences due to ineffective treatment. | Coleraine, Limavady, Ballymoney |

Table continued on the following page.

Table 7.1 continued

| Date of Incident | Area and Estimate of Population/Properties Potentially Affected | Nature and Cause of Incident | Associated Council Area(s) |
|-----------------------------------|---|---|---|
| 16 - 18 September 2010 | Redhills SR (365 population) | Coliform bacteria exceedences at Redhills Service Reservoir and related supply area. No cause was determined. | Lisburn, Banbridge, Craigavon |
| 5 October 2010 | Five Mile Straight, Maghera (395 properties) | Complaints of discoloured water and subsequent local media interest. | Magherafelt |
| 2 - 9 December 2010 | Altmore WTWs (8,900 population) | Treatment difficulties associated with extreme cold weather conditions led to aluminium exceedences in the final water and supply area. | Dungannon and South Tyrone |
| 29 December 2010 - 3 January 2011 | Caugh Hill WTWs (74,000 population) | Treatment difficulties led to turbidity and iron exceedences in the final water during a period of increased demand caused by the freeze/thaw. | Derry, Limavady, Strabane |
| 27 December 2010 - 6 January 2011 | All areas | Major interruption to water supply due to freeze/thaw. | All council areas |
| 29 December 2010 - 4 January 2011 | Dorisland WTWs (124,000 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. | Belfast, Newtownabbey, Carrickfergus |
| 29 December 2010 - 3 January 2011 | Lough Macrory WTWs (29,000 population) | Treatment difficulties led to an aluminium exceedence in the final water during a period of increased demand caused by the freeze/thaw. | Cookstown, Dungannon and South Tyrone, Fermanagh, Omagh, Strabane |
| 29 - 30 December 2010 | Ballinrees WTWs (105,000 population) | Treatment difficulties led to an aluminium exceedence in the final water during a period of increased demand caused by the freeze/thaw. | Coleraine, Ballymoney, Limavady |
| 5 - 10 December 2010 | Dunore Point WTWs (600,000 population) | Treatment difficulties led to an aluminium exceedence in the Dunore Point WTWs supply area. | Belfast, Antrim, Ballymena, Castlereagh, Lisburn, Newtownabbey, Larne, North Down, Ards |
| 28 December 2010 - 5 January 2011 | Cabragh/Gortlenaghan at Cabragh Final Water Outlet (2,600 population) | Iron and manganese exceedences occurred in this final water after Cabragh Borewell was brought in as an emergency supply due to sufficiency issues caused by the freeze/thaw. | Dungannon and South Tyrone |

Table 7. 2: Drinking Water Quality Non-Incidents in 2010

| Date of Non-Incident | Area and Estimate of Population/ Properties Potentially Affected | Nature and Cause of Non-Incident | Associated Council Area(s) |
|----------------------------------|--|--|---|
| 11 January 2010 | Lough Macrory WTWs (29,000 population) | Treatment difficulties led to short-term elevated turbidity levels, however, there was no significant impact on the final water quality. | Omagh |
| 29 January 2010 | Altmore WTWs (14,000 population) | pH exceedence in the final water due to unrepresentative sampling. | Dungannon |
| 31 May 2010 - 1 June 2010 | Dunore Point WTWs (600,000 population) | Short-term treatment difficulties led to a turbidity, aluminium & iron exceedences in the final water. Swift action to shutdown the works prevented water entering supply. | Belfast, Antrim, Ballymena, Castlereagh, Lisburn, Newtownabbey, Larne, North Down, Ards |
| 26 June - 3 July 2010 | Salloon Road, Ballinamallard (1 property) | Coliform bacteria exceedences caused by internal plumbing problems led to the issue of a 'Boil Water Before Use' notice* (notice in place for five days). | Fermanagh |
| 11 August 2010 | Dungonnell WTWs (68,000 population) | Turbidity exceedence due to unrepresentative sampling. | Ballymena |
| 3 September 2010 - 14 March 2011 | CamLough WTWs (21,500 population) | Turbidity exceedences due to unrepresentative sampling. | Newry and Mourne |
| 27 September and 8 October 2010 | Caugh Hill WTWs (49,500 population) | Turbidity exceedences due to unrepresentative sampling. | Limavady, Derry |
| 15 October and 21 October 2010 | Carmony WTWs (42,000 population) | Turbidity exceedences due to unrepresentative sampling. | Derry |
| 14 October 2010 | Carran Hill WTWs (12,000 population) | Oil Spill in the raw water source which was successfully contained before it had entered the WTWs. | Newry and Mourne |
| 20 - 21 October 2010 | Lough Bradan WTWs (20,000 population) | Turbidity exceedence due to unrepresentative sampling. | Omagh, Fermanagh |
| 22 - 23 October 2010 | Lough Macrory WTWs (11,500 population) | Turbidity exceedence due to unrepresentative sampling. | Omagh |
| 13 - 14 December 2010 | Drumaroad WTWs (385,641 population) | Coliform bacteria exceedence due to unrepresentative sampling. | Ards, Belfast, Castlereagh, Down, Lisburn, Newry and Mourne, North Down |
| 28 - 29 December 2010 | Carmony WTWs (42,000 population) | Turbidity exceedence due to unrepresentative sampling. | Derry |

* 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.

Annex 8

The Technical Audit Process

The following table provides a summary of the Inspectorate's findings from the 2010 Inspection Programme.

Table 8.1: Summary of the 2010 Inspection Programme

| Location | Audit Activity | Number of Recommendations* | Number of Suggestions** |
|---|---|----------------------------|-------------------------|
| Lough Fea WTWs | To check that good practice in water treatment is being operated. | 7 | 9 |
| Drumaroad WTWs | To check that good practice in water treatment is being operated. | 3 | 4 |
| Castor Bay WTWs and Forked Bridge Facility | To check that good practice in water treatment is being operated. | 10 | 9 |
| Sampling Arrangements (NI Water and Serco) | To check that good practice in the collection of water samples is being operated. | 7 | 7 |
| Laboratory Information Management System (LIMS) | To check that good practice of the 'Laboratory Information Management System' is being operated. | 5 | 2 |
| Consumer Contacts | To check that good practice in receiving, recording and following up on all calls to customer services is being operated. | 5 | 1 |

* Recommendations 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.

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

In 2010, 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 the audit reports.

Annex 9 Useful Contacts

Northern Ireland Water Ltd

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

Web address: www.niwater.com
 Tel: 0845 7 440088
 E-mail: waterline@niwater.com
 Address: Northern Ireland Water Ltd
 PO Box 1026
 Belfast
 BT1 9DJ

Utility Regulator in Northern Ireland

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

Web address: www.uregni.gov.uk/water_sewerage
 Tel: +44 (0) 28 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 Hollywood 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 (0) 28 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 (0) 28 9031 1611
 Address: Public Health Agency
 Ormeau Avenue Unit
 18 Ormeau Avenue
 Belfast BT2 8HS

Food Standards Agency Northern Ireland

The Food Standards Agency 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 (0) 28 9041 7700
 E-mail: infofsani@foodstandards.gsi.gov.uk
 Address: Food Standards Agency NI
 10c Clarendon Road
 Belfast BT1 3BG

Local District Councils

The Environmental Health Departments of local district councils can be contacted if you have a private water supply serving a single domestic dwelling. They are responsible for the administration of the regulations relating to bottled waters.

Web address: www.nidirect.gov.uk/local-councils-in-northern-ireland

Drinking Water Inspectorate for England and Wales

The Drinking Water Inspectorate (DWI) regulates public water supplies in England and Wales.

Web address: www.dwi.gov.uk
Tel: +44 (0)30 0068 6400
E-mail: dwi.enquiries@defra.gsi.gov.uk

Drinking Water Quality Regulator for Scotland

The role of the Drinking Water Quality Regulator for Scotland (DWQR) is to ensure that Scottish water is complying with the Drinking Water Quality Regulations.

Web address: www.dwqr.org.uk
Tel: +44 (0) 131 244 0190
Address: DWQR
PO Box 23598
Edinburgh
EH6 6WW

Environmental Protection Agency Ireland

Environmental Protection Agency Ireland (EPA) has responsibilities for a wide range of licensing, enforcement, monitoring and assessment activities associated with environmental protection.

Web address: www.epa.ie
Tel: +353 053 916 0600
E-mail: info@epa.ie

Water UK

Water UK is the industry association that represents all UK water and waste water service suppliers at national and European level.

Web address: www.water.org.uk/home
Tel: +44 (0)207 344 1844
Address: Water UK head office
1 Queen Anne's Gate
London
SW1H 9BT

UK Water Industry Research

UK Water Industry Research (UKWIR) facilitates collaborative research for UK water operators. The UKWIR programme generates sound science for regulation and practice.

Web address: www.ukwir.co.uk
Tel: +44 (0)207 344 1807
E-mail: mail@ukwir.org.uk

Foundation for Water Research

An independent non-profit-making organization, with charitable status, that shares and disseminates knowledge about water, waste water and research into related environmental issues.

Web address: www.fwr.org
Tel: +44 (0)162 889 1589
E-mail: office@fwr.org.uk

World Health Organisation

World Health Organisation (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 world-wide.

Web address: www.who.int/water_sanitation_health/dwg/en/
E-mail: info@who.int

Annex 10

Staffing

In organizational terms, the Inspectorate is one of four functional units within the Environmental Protection Directorate of the Northern Ireland Environment Agency (NIEA), an executive agency within the Department of the Environment.

The agency is headed by a Chief Executive and a board of Directors which spans three directorates: Natural Heritage, Built Heritage and Environmental Protection.

A list of the Inspectorate staff is given below.

| | |
|---------------------------|-----------------|
| Chief Inspector | Margaret Herron |
| Senior Inspector | David O'Neill |
| Senior Inspector | Colin Clements |
| Senior Inspector | Vacant |
| Higher Scientific Officer | Una Mailey |
| Higher Scientific Officer | Bernadette Corr |
| Higher Scientific Officer | Roger McBurney* |
| Scientific Officer | Elaine O'Rourke |
| Administrative Officer | Claire Shields |

* On a one year secondment.

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E: DWI@doeni.gov.uk

www.doeni.gov.uk/niea

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



An Agency within the Department of the
Environment
www.doeni.gov.uk



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