



Drinking Water Quality in Northern Ireland, 2013

A Report by the Drinking Water Inspectorate for Northern Ireland





Northern Ireland Environment Agency

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Foreword

I am pleased to present our 18th annual report on the quality of drinking water in Northern Ireland. This report provides the Drinking Water Inspectorate's assessment of how the regulatory requirements have been met during 2013.

The provision of a safe, clean drinking water supply is an essential service that contributes to the health and well being of the community; whether water is provided through the public supplier, NI Water, or through the owners of private water supplies.

Over 99% of the population in Northern Ireland receives its drinking water from NI Water. The remainder of the population is served by private water supplies.

Overall compliance of the public water supply in 2013 with the standards set by the European Union Drinking Water Directive, and as required by our National legislation, is reported as 99.81%. This is overall good news, as NI Water continues to improve compliance with its statutory obligations (from 99.78% in 2012). It must be noted this compliance figure is calculated based on the regulatory requirements; it is not a 'business performance target'. The Directive sets minimum standards that must be achieved, and this means that for the 0.19% where compliance was not achieved, it is mandatory that action is taken to address these contraventions. The necessary corrective action varied; some actions were completed shortly after the occurrence, in other situations more substantive remedial action was needed that required funding and delivery through NI Water's business plans.

To enable us to uphold consumer confidence regarding the quality of their water supplies, we also look at other information sources to help us assess how well NI Water carries out its responsibilities to supply safe, clean drinking water. This includes the reporting of events and the number of consumer contacts made from those who have experienced problems with their drinking water quality.

Once again, I must highlight the number of events that have arisen, particularly, due to operational issues relating to the ineffective performance of water treatment works. During this reporting year I also note a significant increase in the number of contacts made by consumers' which continue to

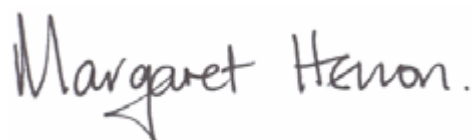
relate mainly to the appearance of their water, particularly where it is discoloured.

Our report also provides information relating to our regulatory responsibilities regarding private water supplies. These supplies are used for a range of purposes (from domestic dwellings to those supplying large commercial and public premises). The quality of some of these supplies is highly variable. During this reporting year, 128 supplies were routinely monitored. I can report that overall compliance with the regulatory standards in 2013 for private supplies achieved an improved level of compliance of 99.05% (from 97.66% in 2012). While this improvement is to be welcomed, it must be noted that this compliance level is still notably lower than that for public supplies. We will continue to work with private water supply owners to further improve the quality of their supplies.

In managing both public and private water supplies, the completion and ongoing review of risk assessments, together with putting in place any mitigation measures, is paramount in ensuring the safety of our water supplies through all parts of the water supply chain. Risk management and the ongoing review of drinking water safety plans are an integral part of the regulations. I continue to be fully supportive of proactive planning to build contamination risk resilience strategies, to secure high quality drinking water supplies.

I continue to embrace and support the opportunities to work with other stakeholders as we aim to maintain and further improve the quality of our drinking water supplies. This work begins at the start of the supply chain in the catchments whereby improving the quality of the untreated water at the point of abstraction, will reduce the subsequent level of treatment required. The collaborative working needs to continue right to the point where the water is used. Increased awareness is needed to help users understand how internal plumbing in houses and premises can affect the quality of their water supply.

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



Margaret Herron
Chief Inspector of Drinking Water
July 2014

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Executive Summary

This is the 18th report in a series published by the Drinking Water Inspectorate, acting in our regulatory role in matters relating to drinking water quality. We act on behalf of the Department for Regional Development (DRD) in respect of public water supplies, and on behalf of the Department of the Environment (DoE) in relation to private water supplies.

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

Public Water Supplies

Comprehensive monitoring is undertaken to assess public drinking water quality, and compliance is based on the results of a number of key tests carried out throughout the water supply chain: from water treatment works; service reservoirs; and consumers' taps.

Overall public drinking water quality, which includes results of key tests carried out at water treatment works, service reservoirs and consumers' taps, remains of a high quality with 99.81% compliance reported in 2013.

While high levels of compliance have been achieved at consumers' taps for many parameters, of the 47 parameters tested, 14 did not achieve full compliance: iron; trihalomethanes (THMs); lead; coliform bacteria; aluminium; odour; manganese; nickel; turbidity; *E. coli*; *Clostridium perfringens*; taste; hydrogen ion; and the pesticide MCPA.

Compliance with microbiological standards is important as contraventions may indicate a breach in the integrity of the water supply system or a failure in the treatment process. Results confirm that the general safety of drinking water supplies is good, with overall microbiological quality at 99.83%. Microbiological quality as measured at consumers' taps has improved from last year: 99.55% in 2013; compared to 99.42% in 2012.

Overall compliance with the EU and national standards was assessed for 2013, with 193 (0.19%) of the tests failing to meet them. This is an improvement on the figure reported for 2012 of 217 (0.22%) tests failing. Compared to 2012 there has been an increase in the number of tests achieving compliance at samples taken from consumers' taps;

notably: THMs; iron; pesticides; turbidity; coliform bacteria and *Clostridium perfringens*.

Following investigation of each contravention by NI Water to identify the cause, the necessary corrective action is required to be put in place to prevent recurrence. The scale of this work varies: it may be that planned investment in the water infrastructure is necessary; or that changes to operational practices are required.

Where necessary, particularly for persistent contraventions of the regulations, we take enforcement action to ensure delivery of the required corrective action. In 2013, enforcement action was required to address issues of non-compliance for: the pesticide MCPA at two water treatment works (Clay Lake and Dorisland); iron in two localised distribution systems within the Caugh Hill and Fofanny Mourne supply areas; and for microbiological contraventions in the Dunore supply area.

The reporting of data from the regulatory monitoring programmes is required for compliance monitoring purposes, not only at a regional level but also at the national level, to meet the reporting requirements of the European Union. In addition to these regulatory sampling programmes, NI Water undertakes operational monitoring aimed at ensuring a comprehensive understanding of water quality from the abstraction sources, through its treatment processes, and onward through its distribution systems. This is integral to ensuring that NI Water keeps its risk assessment process sufficiently informed, and that appropriate contamination control measures are put in place throughout the water supply chain.

The high levels of compliance reported do not guarantee that events that have the potential to affect water quality will not happen. Of the 57 events reported in 2013, 2 were categorized as 'Serious'; 24 as 'Significant'; 17 as 'Minor'; and 14 as 'Not Significant'. Of these 57 events, 42 occurred at water treatment works. These events at water

treatment works were primarily related to a lack of effective treatment or caused by operational activity.

As part of the event assessment process, it is essential that NI Water continues to put learning and appropriate mitigation measures in place as part of its drinking water safety plan approach to prevent the recurrence of drinking water quality events. Vigilance is required and good operational practice and management should be applied at every stage in the water supply process.

Consumers expect safe, clean, drinking water supplies. To enable us to evaluate consumers' confidence in the quality of drinking water at their taps, we receive information from NI Water on the complaints and concerns expressed by consumers. The overall number of these reported in 2013 was 7,087. Compared to the 6,188 reported in 2012, this is a significant increase of 14.5%. As with previous years, the highest percentage of concerns and contacts made relate to the appearance of their drinking water (69.1% in 2013; 63.6 % in 2012). These concerns primarily relate to discoloured water which is mainly attributed to the presence of suspended iron particles. This highlights that the samples taken for regulatory compliance purposes (which have indicated an improving compliance for iron in 2013) are insufficient on their own, to reflect what the consumer experiences at their tap.

NI Water has undertaken detailed studies of its distribution network which looks at multiple factors which reflect water quality such as the results from sampling, consumers' contacts, together with the age and type of pipe material. This has enabled NI Water to put in place a prioritized and planned long-term programme of work to rehabilitate or replace its water mains, which, as it completes, should assist in addressing many of these consumers' concerns relating to discoloured water.

Private Water Supplies

To improve the quality and safety of private water supplies, an updated regulatory framework was put in place with the introduction of new regulations in 2009. This is our fourth year of reporting under the new regulations. The same drinking water quality standards are applied to private water supplies as for the public water supply

Although the number of people directly served by a private water supply may be small, many more people are exposed to them through their use in both commercial and public activities. In Northern Ireland, private water supplies are often used as an

alternative to, or in conjunction with, the public supply for a range of activities such as: holiday accommodation (hotels, bed and breakfast facilities); public buildings (hospitals, care homes, or universities); or food processors (manufacturers of food and drink products).

For 2013, our private water supply sampling programme monitored 128 sites. Notwithstanding that overall compliance has improved to 99.05% in 2013, from 97.66% in 2012, full compliance was not achieved for 19 parameters: coliform bacteria; Enterococci; iron; manganese; turbidity; *E. coli*; trihalomethanes; total pesticides; ammonium; hydrogen ion; tetrachloroethene and trichloroethene; colour; aluminium; *Clostridium perfringens*; individual pesticides (phenanthrene, glyphosate, mecoprop, MCPA); sulphate; bromate; sodium; and chloride.

Full compliance was achieved for 79 (62%) of all our sampling sites. Of the 49 sites which did not comply with the regulatory standards: 30 used their private supply as the primary source of drinking water; 12 supplies were used for washing equipment and surfaces in contact with food or drink; six used the supply as an ingredient in food and drink; and one is used solely for personal hygiene (showers, wash hand basins).

All contraventions are investigated and addressed through: restrictions on the use of the supplies; the implementation of corrective action such as improved source protection; or installation of, or improvement to treatment systems and maintenance programmes.

We will carry on working with supply owners and the local councils, with the aim of reducing the contamination risks at these sites to improve their water quality. Owners and users of private water supply sites have a responsibility to provide a safe supply of water that complies with the regulatory standards. We continue to provide technical guidance on the steps necessary to achieve this.

Risk Assessments

Risk assessment is an integral part of our public and private water supplies regulation. The adoption of a drinking water safety plan approach is an effective way of protecting human health and ensuring good water supply practice through: minimization of contamination of source waters; reduction or removal of contamination through effective treatment processes; and prevention of contamination of the distribution systems.

As part of managing the risk of contamination through the water supply chain from 'source to tap' water providers, whether from public or private supplies are required to ensure that all current and potential contamination risks are assessed and that the associated drinking water safety plans are kept under review. In addition, these plans must detail the arrangements that need to be put in place to mitigate these contamination risks.

At the start of the water supply chain pesticides and manganese were two specific parameters which challenged processes at certain water treatment works during 2013. In relation to public water supplies we can report that there was a significant reduction in the number of sites where pesticide contraventions occurred in this reporting year: five in 2013; compared to nine in 2012. Five catchments were identified in 2013 at risk from the presence of elevated pesticide levels: Clay Lake; Derg; Killyhevlin; Dorisland; and Seagahan. Mitigation measures have or are currently being put in place to reduce the levels of pesticides in drinking water at these supplies.

The presence of elevated manganese was detected in the water being abstracted at two locations in 2013: Castor Bay and Camlough water treatment works. Investigations suggested that changes in the temperature profile of the water bodies led to increased levels of manganese within the raw water supplying these water treatment works and this significantly challenged the works capability to remove manganese below the regulatory limit. Remedial measures have subsequently been put in place and longer term measures are also being considered in relation to Camlough.

For other parts of the supply chain we have also asked NI Water to continue to develop its risk assessment tools in particular in relation to distribution systems. We welcome the ongoing work being undertaken by NI Water to: develop a lead strategy including prioritized replacement of its lead pipes (with a particular focus on the five lead treatment zones which have not achieved 98% compliance with the 10µg/l lead standard); the recent refinement of its mains rehabilitation programme with a more focused approach to addressing consumers' concerns on discoloured water; and the development of a disinfection policy to include ways to further reduce the levels of disinfection by-product (DBP) formation. To evaluate how NI Water keeps DBPs as low as possible we look at the average concentrations of THMs across water supply zones. For 2013 we can

report an overall THM average value of 48.1µg/l, with 44% of zones identified where the annual average exceeded 50µg/l; this is an improvement compared to 2012 where 60% of zones had an average above 50µg/l.

In relation to private water supplies we continue to work with private water supply owners with the assistance of local councils to address non-compliance issues at these supplies. We expect to see further improvements as the necessary remedial action to remove identified contamination risks at individual private supplies, is undertaken.

Looking Forwards

Looking forwards we have specific challenges to ensure the continuing provision of safe, clean, sustainable drinking water supplies. Managing the pressures that can arise in the water supply chain from the risk of contamination will remain at the heart of our work.

We continue our advocacy for improving the quality of our abstraction sources particularly with the Northern Ireland Environment Agency who through its responsibilities for the Water Framework Directive, seek to enhance the protection of sources used for abstraction through the identification of drinking water protected areas. Protecting the water in areas from which water is abstracted not only improves the untreated water quality but it can also mitigate against the potential for additional treatment and purification processes.

Exposure to lead in drinking water has reduced significantly through orthophosphate treatment and communication pipe replacement, by NI Water. There has been an improving trend in overall compliance with the interim 25µg/l lead standard since orthophosphate treatment began in 2004 with 98.99% reported for 2013 compared to the 94.92% reported in 2004. However, there is still a significant amount of work required to comply with the final 10 µg/l standard which came into effect in December 2013. Based on the 10µg/l standard, 97.22% compliance was achieved in 2013.

For the portion of lead pipes that are not the responsibility of NI Water, we welcome the integrated work that is ongoing with NI Water, DRD, the district councils, health professionals, the Department of Education, the Housing Executive, and ourselves to further reduce consumer exposure to lead in drinking water, particularly, where lead pipe work and fittings remain in older buildings.

To sustain the delivery of high quality public drinking water supplies, we uphold a 'Partnership Agreement' to achieve this commonly shared goal.

We will continue to engage with NI Water, the Northern Ireland Authority for Utility Regulation (Utility Regulator), the Department for Regional Development, the Consumer Council for Northern Ireland, and the Northern Ireland Environment Agency as part of the investment planning process to identify funding priorities.

We recognize that competing priorities exist, and our primary objective is to progress programmes of work that are necessary to secure compliance with drinking water quality standards across Northern Ireland, thereby ensuring safe, clean drinking water.



Section 1
Public Water Supplies

Part 1

Drinking Water Quality

- Overall drinking water quality remains high
- 14 parameters did not achieve full compliance with the regulatory standards
- Increased number of discoloured water consumer contacts made to NI Water
- 57 events reported: 74% occurred at water treatment works
- Enforcement action taken to improve regulatory compliance for pesticides, iron and microbiological parameters
- Contamination risks continued to be identified within drinking water safety plans

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

Drinking Water Quality Testing

Throughout 2013, NI Water sampled drinking water across Northern Ireland to test for compliance with the standards in The Water Supply (Water Quality) Regulations (Northern

Ireland) 2007 (as amended). The Regulations require sampling programmes to be in place to ensure that water quality is monitored at; water treatment works (WTWs), service reservoirs (SRs), water supply points, and consumers' taps in water supply zones (WSZs).

In 2013, 103,155 tests were carried out for a range of different parameters. A description of each and the regulatory limits (or prescribed concentration or value [PCV]) is available on our website: www.doeni.gov.uk/niea/water-home.htm

Figure 1.1: NI Water Supply Details, 2013



Overall Drinking Water Quality

Compliance with the standards is important as contraventions may indicate a failure in the treatment process or a breach in the integrity of the water supply system. The overall results confirm that the general safety of drinking water supplies remains good.

Overall drinking water quality in 2013, for the key parameters monitored at water treatment works, service reservoirs and consumers' taps remains high (99.81%). Of the 103,155 tests we used to

assess overall compliance, 193 (0.19%) failed to meet the standards (217; 0.22% in 2012), (Table 1.1 refers).

Compared to 2012 there has been an increase in the overall number of tests achieving full compliance in 2013 (Figure 1.2 refers). This is mainly attributed to improved compliance reported at consumers' taps. Compliance at service reservoirs remained similar to 2012 but compliance at water treatment works deteriorated with seven coliform bacteria contraventions including three for *E. coli* reported.

Table 1.1: Overall Drinking Water Quality in 2013

	No. of Tests	No. of Tests not Meeting the Standards
Water Leaving Water Treatment Works (WTWs)		
<i>E. coli</i>	6,617	3
Coliform Bacteria	6,617	7
Microbiological Total	13,234	10
Turbidity	6,617	18
Chemical Total	6,617	18
Total (Microbiological and Chemical)	19,851	28 (0.14%)
Water in Service Reservoirs (SRs)		
<i>E. coli</i>	16,118	4
Coliform Bacteria	16,118	26
Total	32,236	30 (0.09%)
Water at Consumers' Taps or Supply Points (WSZs)		
<i>E. coli</i>	5,196	7
Coliform Bacteria	5,196	50
Enterococci	396	0
<i>Clostridium perfringens</i>	2,261	2
Microbiological Total	13,049	59
Zone Chemical Analysis	25,036	73
Supply Point Chemical Analysis*	12,983	3
Chemical Total	38,019	76
Total (Microbiological and Chemical)	51,068	135 (0.26%)
Overall Water Quality		
Overall Microbiological Quality	58,519	99 (0.17%)
Overall Chemical Quality	44,636	94 (0.21%)
Overall Drinking Water Quality	103,155	193 (0.19%)

*Collected at WTWs as no significant changes occur during distribution.

Assessment of overall microbiological quality is important as it looks at water quality throughout the supply chain from the water treatment works, the service reservoirs and at the consumers' taps. Overall, the microbiological quality reported in 2013 is similar to that reported for 2012.

Water Quality at Consumers' Taps

Fourteen parameters did not achieve full compliance at consumers' taps in 2013: iron, trihalomethanes (THMs), lead, coliform bacteria, aluminium, odour, manganese, nickel, turbidity, *E. Coli*, *Clostridium perfringens*, taste, hydrogen ion and pesticides – other substances (MCPA). A summary is provided in table 1.2.

The parameter with the lowest reported compliance is iron at 98.08% (97.25% in 2012). The presence of iron is mainly related to the condition of the water mains system. NI Water has 26,600kms of water mains supplying water across Northern Ireland. NI Water has a water mains rehabilitation programme in which water quality issues are considered as part of how the rehabilitation work is prioritised to deliver improved compliance notably with the iron parameter and to also reduce the number of consumer complaints/concerns regarding the appearance of their water.

Information on the other parameters is provided in Part 5 of this report.

Water Quality Related to Domestic Distribution Systems

Domestic Dwellings

NI Water is required to investigate all contraventions of the drinking water quality standards, including those due to the internal distribution system within buildings. Where these failures are within domestic dwellings, NI Water must inform the owner with the details of the failure and provide appropriate advice in relation to what actions the owner may take to rectify the contravention and, to protect public health.

Following notification to the owner, NI Water is not required to take any further action where the contravention has been caused by the owner's internal plumbing and distribution systems within the boundary of the premises. If the failure is related to a breach of The Water Fittings Regulations, then NI Water must take appropriate action under these regulations. There were 24 contraventions reported to us in 2013 which NI Water determined to be due to the internal plumbing within domestic properties and these were related to the following parameters: 21 coliform bacteria; two *E. coli* and one lead.

Figure 1.2: Overall Drinking Water Quality, 2009 - 2013

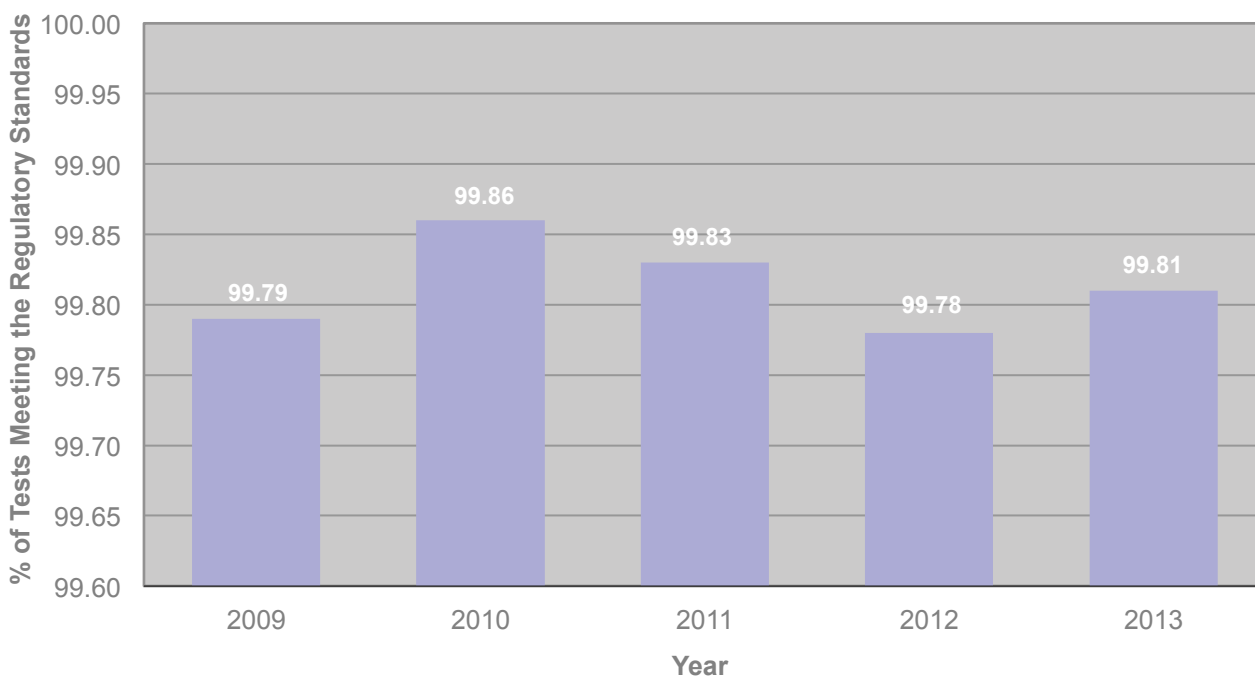


Table 1.2: Parameters Not Meeting Full Compliance at Consumers' Taps, 2012 – 2013

Parameter	No. of Samples Taken in 2013	No. of Tests not Meeting the Standards in 2013	% Compliance in 2013	% Compliance in 2012
Iron	1,876	36	98.08	97.25
Total trihalomethanes	396	6	98.48	97.45
Lead	396	4	98.99	99.49
Coliform bacteria	5,196	50	99.04	98.75
Aluminium	1,876	9	99.52	99.53
Odour	1,800	6	99.67	99.82
Manganese	1,876	5	99.73	99.82
Nickel	396	1	99.75	100
Turbidity	1,876	4	99.79	99.65
<i>E. coli</i>	5,196	7	99.87	99.87
<i>Clostridium perfringens</i>	2,261	2	99.91	99.74
Taste	1,788	1	99.94	99.88
Hydrogen ion	1,876	1	99.95	99.94
Pesticides – other substances*	8,584	3	99.97	99.85
All other analysed parameters	15,675	0	100	99.98**
% Compliance at Consumers' taps	51,068	135	99.74	99.62

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

**Bromate and Pesticides (Total substances) failures in 2012 but full compliance in 2013.

The Domestic Distribution System Regulations

In premises where water is made available to members of the public (such as schools, hospitals or restaurants), NI Water is required to investigate contraventions to determine if the cause of the failure is attributed to the internal plumbing. If this is the case, then they are required to notify us under The Domestic Distribution Systems Regulations. If we assess the failure as likely to recur or if it constitutes a potential danger to human health, we may serve a notice in writing to the owner of the premises or establishment. A notice would require the owner to undertake the necessary actions to protect public health and bring the supply back into compliance. Where the premises' owner fails to comply with a notice, the regulations allow for us to undertake these actions and recover any costs incurred.

In 2013, outside of the compliance sampling programme, we received twelve notifications where

compliance with the water quality standards was not achieved for the following parameters: ten for lead; one for taste and odour; and one for copper. No notices were required to be served under these Regulations as full and timely co-operation was received from the owners enabling the remedial measures to be put in place to bring the water supplies into compliance.

We acknowledge the ongoing assistance and co-operation afforded to us by NI Water, local council staff, and the premises owners in investigating and bringing these contraventions into compliance.

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.

There is always the potential for events to happen. What matters is how well NI Water minimizes both the risks of occurrence and the consequences of events 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 contraventions of the Regulations.

In 2013, 57 events were reported to us; 74% of which occurred at 22 WTWs and these were mostly related to lack of effective treatment or operational activities. While the total number of events has limited use as a meaningful indicator, what is important is the significance of each event. Of the 57 events reported, two (3.5%) were categorized as Serious; 24 (42.1%) were categorized as Significant; 17 (29.8%) were categorized as Minor; and 14 (24.6%) were categorized as Not Significant (Annex 4 provides more details). A summary of the 2012 and 2013 event categorisations is provided in Table 1.3.

The two **Serious** events were:

- Drumaroad WTWs – treatment difficulties led to elevated levels of aluminium in the works final water and related supply area, causing a significant increase in consumer complaints; and

- Castor Bay WTWs – treatment difficulties occurred after a significant change in the quality of the source water led to manganese and turbidity contraventions in the works final water and related supply area, causing a significant increase in consumer complaints.

The 24 **Significant** events:

- 20 (83%) occurred at water treatment works and were related to: difficulties with the performance of the coagulation processes; lack of adequate treatment at the water treatment works; or operational problems. These led to aluminium, iron, manganese, pesticide, THM and turbidity contraventions. There were also two *E. coli* contraventions which were both attributed to unrepresentative sampling by NI Water; and
- four (17%) were caused by issues in the distribution system: one failure was caused after contamination occurred during the installation of a new section of water mains; one significant odour occurred after there was contamination of the public water supply from a commercial borehole; and two contraventions of the iron standard which were related to water quality complaints from consumers.

A breakdown of the nature of each category of water quality event in 2013 is provided in Table 1.4.

We recognize the operational nature of water treatment and supply, and that events will occur which require immediate corrective action to be taken by NI Water. What is important is that lessons are learnt and any necessary remedial action is undertaken by NI Water and is reflected in its risk assessments as part of its drinking water safety plan approach to prevent recurrence of drinking water quality events.

Table 1.3: Comparison of Water Quality Events 2012 and 2013

Year	DWI Risk Assessment Category					Total
	Not significant	Minor	Significant	Serious	Major	
2013	14 (24.6%)	17(29.8%)	24(42.1%)	2 (3.5%)	-	57
2012	10 (14.5%)	21 (30.4%)	38 (55.1%)	-	-	69

Table 1.4: Nature of Water Quality Events 2013

Nature of Event	DWI Risk Assessment Category				
	Not Significant	Minor	Significant	Serious	Major
Chemical	6	4	3	-	-
Inadequate treatment / Treatment Issues	-	1	14	2	-
Loss of supplies/poor pressure	2	-	-	-	-
Microbiological	5	11	3	-	-
Taste/Odour	-	-	1	-	-
Health concern	1	1	1	-	-
Public concern	-	-	1	-	-
Other	-	-	1	-	-
Total	14	17	24	2	0

Overview of Consumer Contacts

Every year NI Water provides us with consumer contact information to help us understand consumers' concerns (Table 1.5 refers). The total number of consumer contacts reported in 2013 was 7,087, compared to 6,188 in 2012. This is a significant increase of 14.5%.

As with previous years, the highest percentage of contacts and concerns continues to relate to the appearance of drinking water, with 69.1% in 2013. This is in contrast with the improving iron compliance reported earlier in this section and demonstrates that the consumer experience does not necessarily concur with regulatory compliance.

Looking more closely at the number of consumer contacts made relating to the appearance of drinking water Figure 1.3 illustrates the high percentage of contacts relating to colour. Discoloured water can arise when the water appears orange or brown due to suspended particles of iron, or black due to suspended particles of manganese. Iron and manganese may be

present due to inadequate treatment or from corrosion of cast-iron distribution mains.

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

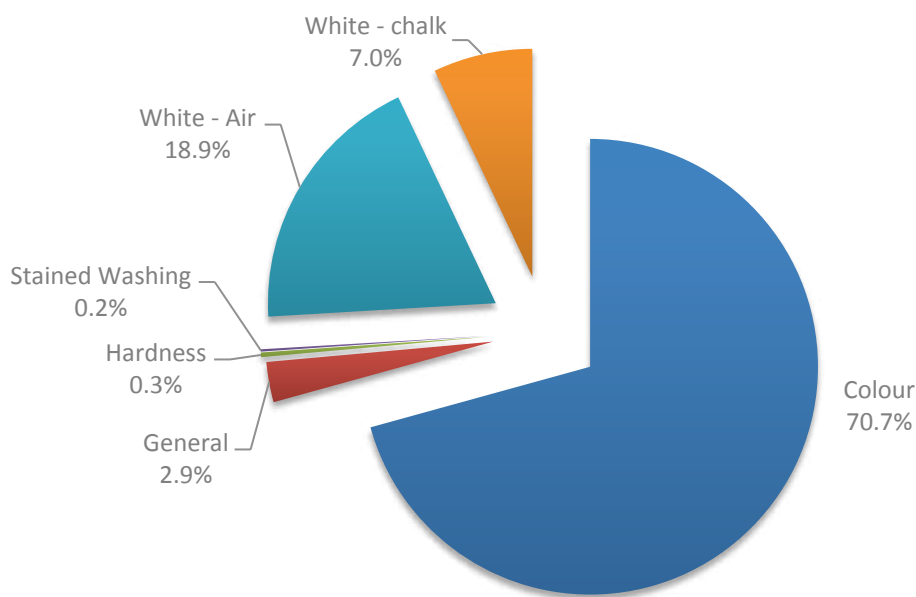
The Technical Audit Process

Technical audit process is the term used to describe how 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, events 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 following the audit process is monitored by us to ensure satisfactory completion. A summary of the 2013 Technical Audit Programme is detailed in Annex 5.

Table 1.5: Consumer Contacts Relating to Appearance, 2011 - 2013

	Overall Number of Contacts	% of all Contacts Relating to Appearance	% of Appearance Category Relating to Colour
2013	7,087	69.1	70.7
2012	6,188	63.6	62.6
2011	6,207	59.2	63.8

Figure 1.3: Percentage of Consumer Contacts in the Appearance Category, 2013



Drinking Water Testing Accreditation

Drinking water sampling and testing is controlled by the legislative requirements of the Drinking Water Directive; the objective of which is to protect public health by making sure sampling and analysis is independently checked by a competent authority.

Through a Memorandum of Understanding, the United Kingdom Accreditation Service (UKAS) and the UK Drinking Water Quality Regulators have an agreed Drinking Water Testing Specification (DWTS) and the competency and compliance of those laboratories which carry out analysis of drinking water is independently verified through the maintenance of accreditation, to this specification.

During 2013 not all samples taken for taste and odour analysis were analysed to the quality standards required by UKAS under DWTS. This meant that some tests undertaken during 2013 for these parameters were not accredited and led to a sampling shortfall. We are currently assessing the impact of this in relation to the quality systems within the laboratory and in relation to the sampling shortfalls. We will consider if regulatory action is required to secure compliance.

Drinking Water Quality Contraventions

Where NI Water supplies water that does not meet the drinking water standards, it must investigate the cause of the problem and notify us and, where appropriate, the health authorities of its findings. It is incumbent upon NI Water to promptly provide substantive details and comments in its investigation reports.

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 and bring it back in line with the regulatory standards.

In 2013, the guidance document, 'Drinking water and health: a guide for public and environmental health professionals and for those in the water industry in Northern Ireland', was revised. This guidance highlights the importance of collaborative working across Departments and sets out the roles and responsibilities of the different organizations with an involvement in the safety of drinking water and in their roles in the management of water quality contraventions.

Risk Management

In fulfilling its regulatory requirements, 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. This process is required to be kept under regular review in relation to NI Water's ongoing assessment of risk; for example, NI Water is required to review the level of risk following an investigation into a water quality event.

These assessments identify and quantify the inherent risks throughout individual water supply systems and detail mitigation measures, and the adoption of effective controls to protect drinking water quality.

These control measures may involve actions relating to: minimizing the potential for contamination of source waters; reducing or removing contaminants through appropriate treatment processes; and measures preventing contamination within the distribution network and domestic water systems within buildings.

NI Water's quantification of the risks within every aspect of the production and supply of drinking water must be sufficiently informed and utilized by the company. This is fundamental to ensuring that NI Water identifies its current and future investment planning needs to secure high quality drinking water through the Price Control (PC) programmes of work.

The individual sections that follow in this report provide more detail on how the risk assessment process is undertaken in the specific parts of the water supply chain. This covers from catchment through to treatment, and onward within the distribution system, and finally within supply systems to the consumer.

Regulatory Processes - Enforcement Orders

Where NI Water has failed to comply with its regulatory duties, there are a range of statutory processes to ensure that compliance is achieved.

Details of our Enforcement and Prosecution Policy are available on the NIEA website (refer to References). The enforcement process may be initiated with the issue of a 'Consideration of Provisional Enforcement Order' (CPEO), whereby, NI Water is requested 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.

If NI Water fails to either, comply with the requirements of an Undertaking accepted in response to a CPEO or, we determine that it is important that NI Water should undertake or comply with a remedial measure or action, then we may move to the next stage of enforcement and issue a Provisional Enforcement Order (PEO). A PEO would require NI Water to undertake certain remedial measures or actions; failure to comply with a PEO would result in the issuing of an Enforcement Order.

During 2013, we initiated four CPEOs and one PEO:

- two CPEOs related to iron contraventions within the distribution system;
- one CPEO related to MCPA (pesticide) contraventions at a WTWs;
- one CPEO was in response to microbiological contraventions within a distribution system; and
- one PEO was issued relating to MCPA (pesticide) contraventions at a WTWs.

A number of Undertakings relating to five CPEOs and one PEO issued in 2012/13 were completed during 2013:

- two CPEOs for iron contraventions within the distribution system issued in 2013;
- one CPEO relating to MCPA (pesticide) contraventions at a WTWs issued in 2012;
- one CPEO relating to aluminium, iron, pH, THMs, and turbidity contraventions at a WTWs issued in 2012;
- one CPEO relating to THMs contraventions at a WTWs issued in 2012; and
- one PEO relating to THMs contraventions at a WTWs issued in 2012.

Full details on these enforcement actions and details of the remedial measures undertaken by NI Water are contained within Annex 6 of this report.

Investment Planning – Price Control (PC) Process

The Price Control (PC) process is a mechanism by which NI Water secures its funding and investment priorities for the coming years. We continued to actively engage with NI Water; the Utility

Regulator; the Department for Regional Development; the Consumer Council; and the Northern Ireland Environment Agency as part of the investment planning process to identify funding priorities in the current and future PC processes.

The funding priorities for drinking water quality for NI Water during the period of our report form part of the PC10 process. This initially covered the period 2010-2013 but has subsequently been extended until 2015. A change control protocol was initiated by NI Water in 2013 to ensure that remedial measures associated with our enforcement action, to undertake necessary compliance improvement measures at Dorisland WTWs, were put in place. This work had not previously been identified as part of this price control investment programme, but is now being funded through this process. This has ensured that the scheme to install treatment for pesticide removal at this WTWs was reprioritized. The scheme is now scheduled for completion by April 2015.

Through our ongoing involvement in PC15 (the next price control process which covers the six year period 2015-2021), we recognize that competing priorities exist. As the drinking water quality regulator our primary objective is to identify programmes of work that are necessary to secure compliance with drinking water standards. This work assists in identifying and targeting infrastructure and operational improvements required by NI Water to maintain and enhance its operations in delivering safe, clean water supplies.

Part 2
Catchment



Image: Fofanny Catchment - NI Water

Part 2

Catchment

- Ongoing review of catchment risk assessments
- Improved pesticide compliance for 2013 in water quality going into supply
- Five supplies had pesticide levels above the regulatory limit in 2013
- Elevated manganese in raw water sources caused treatment issues in two supplies
- NI Water's ongoing engagement with key stakeholders

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

In Northern Ireland, public water supplies are obtained from surface water sources, with the exception of the water supply to Rathlin Island, which is supplied from a borehole. The nature and structure of the landscape, together with a well distributed rainfall pattern, have meant upland and lowland reservoirs and direct river abstractions are the primary water sources used to meet both urban and rural water needs.

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

Water quality can vary between sources due to factors such as, the nature and structure of the rock types, soil, vegetation, and land use. 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. These factors will also determine the level of treatment required within the water treatment works.

Water Abstraction

In Northern Ireland the abstraction of raw water from rivers, reservoirs, and loughs is controlled by Abstraction Licensing Regulations which require major water abstractors to obtain a licence from the Northern Ireland Environment Agency (NIEA).

NI Water is authorised to abstract up to 1,075 MI/d under license from NIEA and, in 2013, water was abstracted from 34 sources across Northern Ireland.

NI Water has in place a strategic plan to ensure that appropriate resources are in place to maintain drinking water supplies for predicted usage up to the year 2035. This is detailed in the Water Resource Management Plan (WRMP) and takes account of population changes, housing and water usage, as well as predicted changes to our climate.

Catchment Risk Assessment

As part of managing the risk of contamination through the water supply chain from 'source to tap', NI Water is required to ensure that it has assessed all current and potential risks within the catchments and keep its drinking water safety plans (DWSPs) under review, as necessary. The DWSPs must then detail the arrangements NI Water is putting in place to mitigate these risks to protect the catchment and preserve the quality of its source waters.

In the management of the risks within these catchments, NI Water is required to undertake a monitoring programme to determine the raw water quality throughout the year. The frequency and range of parameters to be tested should be in line with the level of risk as identified within its regulatory risk assessments.

If NI Water in undertaking its risk assessments, identifies the potential for contaminants as listed under EU priority substances being present in the raw water. Where such substances are detected then NI Water is required to monitor for these. There are minimum raw water sampling frequencies set within the Regulations for such substances, and

these are based on the population served by the water treatment works.

Monitoring is also important for the day to day operational management of water treatment works. Changes in the raw water quality can require adjustments to be made to the treatment process to ensure the effective removal of contaminants and the production of safe, clean drinking water. This is particularly important in relation to establishing baseline information, for example in monitoring for seasonal changes in natural organic matter which can be prevalent in upland peaty surface water sources, to ensure appropriate levels of treatment are in place at all times.

To protect catchments and to keep informed of potential contamination and associated risks, NI Water must liaise closely with a number of stakeholders, such as the environmental regulator NIEA, the Department of Agriculture and Rural Development (DARD), and Forestry Service to ensure appropriate lines of communication are in place.

Figure 2.1 Raw Water Abstraction Point



Potential Contaminants

Both natural and human factors have the potential to influence the raw water quality in catchments:

- Natural factors include wildlife, climate, topography, geology, vegetation; and
- Human factors include point sources (e.g. waste water treatment discharges) and non-point sources (e.g. surface run-off from agricultural activities such as pesticide usage).

There is therefore the potential for significant numbers of harmful bacteria to be present within drinking water sources, so it is important that adequate treatment to prepare water for effective disinfection is in place to make it safe to drink. In some catchments the presence of undesirable biologically derived contaminants arising from aquatic micro-organisms such as algae may have the potential to cause taste and odour issues, and in such cases specific treatment would be required at the water treatment works to ensure the water is acceptable to consumers.

NI Water must also consider the impact of other changes in raw water quality such as climatic changes for example increased run-off from the surrounding catchment from heavy rainfall or snow melt, or from temperature rises in the water body which can affect the characteristics of the water which is being abstracted for producing drinking water. In dealing with such catchment issues, NI Water is required to have robust monitoring and controls in place to enable treatment processes to be adapted quickly to deal effectively with changes in raw water quality. This ability to adapt to changing water quality within the catchment provides the first barrier in the provision of safe, clean drinking water.

As the potential list of contaminants within catchments is diverse, NI Water must risk assess each individual catchment to determine the individual risks and ensure appropriate mitigation is in place. The two main contaminants, noted within drinking water sources, which were identified as being an issue during 2013, were the pesticide MCPA, and manganese.

Pesticides

Pesticides are a group of substances that include insecticides, herbicides, fungicides and algicides that are commonly used as part of land management practices in catchments. The Regulations set standards for individual pesticides as well as a standard for the sum of all pesticides, 'the total pesticide' standard. Monitoring is required to be undertaken for those pesticides, as identified within NI Water's risk assessments, and there is evidence through records of them being used on catchments. Water sources may contain traces of pesticide residues as a result of agricultural use (e.g. pest control on crops) and non-agricultural use (e.g. herbicide for weed control on roads). During 2013, five water treatment works reported the presence of the pesticide (MCPA) above the regulatory limit. This is a pesticide widely used in Northern Ireland as a herbicide for controlling

broadleaved weeds in grass and cereal crops, as well as being used in the clearing of rushes.

Compliance Sampling Programme

During 2013, 41 individual pesticides were monitored for under the regulatory compliance programme at consumers’ taps and authorised supply points. This resulted in a total of 9,512 pesticide determinations, with 232 samples being taken for each individual pesticide under this sampling programme. From the 232 regulatory samples taken for MCPA, three samples breached the standard of 0.1 µg/l for MCPA: these occurred at Clay Lake WTWs, Derg WTWs and Killyhevlin WTWs. This is a significant reduction from the 13 pesticide contraventions reported in 2012. For the contraventions reported in 2013, these have occurred in catchments which range in size from 5km², for Clay Lake WTWs to 1,520km² for Killyhevlin WTWs.

Operational Sampling Programme

In addition to the regulatory compliance sampling programme for pesticides, NI Water also undertakes an operational monitoring programme for investigative purposes and also to inform its risk

assessments to ensure that appropriate treatment and catchment control measures are put in place. This operational monitoring programme for 2013 also identified pesticide detections above the regulatory limit in the water going into supply from Dorisland WTWs and Seagahan WTWs.

All water treatment works with pesticide detections, both regulatory and operational from 2011 to 2013 are summarized within Table 2.1 below.

Investigations and Remedial Measures

NI Water is required to investigate and report all pesticide contraventions. The investigation will include liaison with the NIEA’s Pollution Control Team regarding pesticide usage and control within the relevant catchments, along with reassessing its identified control measures within the catchment, and for the treatment processes. The outcomes from these investigations are then used to review the risk categorization for pesticides in NI Water’s DWSPs. NI Water must have in place appropriate remedial measures to mitigate against the risk of elevated pesticide levels in the catchment making their way through its treatment processes and into the drinking water supply.

Table 2.1: Pesticides Detected above the Regulatory Standard in Treated Water between 2011 - 2013

Water Treatment Works		2013	2012				2011	
		MCPA	Linuron	MCPA	Mecoprop	Metoxuron	Total Pesticides	MCPA
W1302	Lough Fea			✓				
W1701P	Ballinrees			✓				
W2509	Clay Lake	✓		✓		✓		
W2514	Seagahan	✓		✓	✓			
W2802	Carran Hill			✓				
W3317	Dorisland	✓		✓				✓
W4306	Caugh Hill		✓				✓	
W4501	Derg	✓		✓				✓
W4701	Killyhevlin	✓		✓				✓
W4722	Belleek							✓

NI Water, where required, uses granular activated carbon (GAC) filters within its water treatment processes to reduce the levels of pesticides in drinking water, to ensure the water being supplied to consumers complies with the limits set for pesticides within the regulations. As part of its operational practices, NI Water has a programme of GAC regeneration that is based both, on the use of iodine number analysis, along with other analytical data to determine when a GAC filter is required to be taken out of service to allow for carbon renewal or regeneration. The testing programme on the filters is scheduled to take place in March and September each year to help ensure that they are operating to their maximum effectiveness, and within their design capacity, especially at periods of high risk within the catchment.

Catchments Identified at Risk from Pesticides in 2013

Clay Lake WTWs and Catchment

Clay Lake WTWs abstracts its raw water from Clay Lake Impounding Reservoir, abstracting approximately 3.9 ML/day. The catchment covers an area of about 5km², where the main activity is from farming practices and the risk assessment indicates a high risk from pesticide contamination. This supplies drinking water to Clay Lake Keady Water Supply Zone with a population of 9,000. In June 2013, at the time of the MCPA detection, Clay Lake WTWs was undergoing an upgrade which included extending the number of GAC filters from two to three. During the upgrade, the treatment process was not fully effective in reducing the levels of the pesticide MCPA found in the raw water to below the regulatory limit.

Figure 2.2: Clay Lake Catchment



In July 2013, we issued a Consideration of Provisional Enforcement Order (CPEO) in relation to ongoing MCPA contraventions at Clay Lake WTWs. This required NI Water to make commitments

through Undertakings to ensure that priority was given to the upgrade work to improve the treatment capability at Clay Lake WTWs; in particular the refurbishment of the two existing GAC filters and the installation of a third GAC filter. This works upgrade was completed in November 2013.

Derg WTWs and Catchment

The River Derg has an extensive river catchment covering an area greater than 320km², with the upper reaches of the catchment found in the Republic of Ireland. The catchment area is used predominantly for pasture, with areas of forest, bogs and heath land. The Derg WTWs abstracts on average 16.9ML/day from the River Derg, supplying a population of 39,000 within the Derg Strabane Water Supply Zone.

Figure 2.3: Derg Catchment



The Derg WTWs has a history of pesticides being present, mainly MCPA, in the raw water supply. The high risk period appears to be April to June following heavy rainfall and wash off from the catchment coinciding with the pesticide application land use practices.

The Drinking Water Safety Plan (DWSP) has identified pesticides as high risk in the catchment for the Derg WTWs and as medium risk following treatment. There are five GAC filters at the WTWs for the removal of pesticides and NI Water has in place operational best practice to ensure that they operate at maximum efficiency. This is reviewed on the basis of, monitoring pesticide levels in the raw and final water, and through investigation work into pesticide contraventions. NI Water has an enhanced pesticide sampling programme at this treatment works, along with a 6 monthly testing programme of the GAC filters to inform the regeneration programme.

NI Water is actively engaged with stakeholders within this catchment through a pesticide working group which has put in place a three to five year programme to look at ways of controlling pesticide usage through enhanced education and information provision. It also liaises closely with NIEA who, as part of its surface water monitoring programme, have put in place passive samplers for pesticide monitoring, to better identify any feeder streams which may pose a higher risk of pesticide presence within the catchment.

Killyhevlin WTWs and Catchment

Killyhevlin WTWs uses Upper Lough Erne as its raw water source which is fed from a number of streams and rivers. The lough has a large catchment area of 1,521km² consisting predominantly of pasture with areas of forest, bogs, marshland and extensive water bodies. The treatment works abstracts, on average, 26 ML/day serving a population of 77,000 within the Killyhevlin Enniskillen Water Supply Zone.

Figure 2.4: Killyhevlin Catchment



The DWSP risk assessment for Killyhevlin WTWs and catchment have identified that pesticides are a high risk in the raw water, and are identified as a medium risk in the final water from the treatment works. The final water filters are dual media, which includes a GAC layer but this is only partially effective at reducing the pesticide levels in the final water.

Through our enforcement process a CPEO was issued in relation to taste and odour contraventions in 2011, and an Undertaking was accepted from NI Water which required the installation of additional treatment using GAC filters at Killyhevlin WTWs during the PC13 investment period. The GAC filters will include a capability to mitigate against the risk of pesticides, along with the taste and odour issues, and are due to be operational by April 2015.

Dorisland WTWs and Catchment

Dorisland WTWs abstracts water from Dorisland Impounding Reservoir which in turn is fed from three other reservoirs. The catchment surrounding these reservoirs is a mixture of pasture, mixed land use, forest, grassland and heath, covering an area of approximately 30km². Dorisland WTWs supplies water to a population of more than 130,000 within the Dorisland Whiteabbey, Dorisland Carrick and Belfast Oldpark Water Supply Zones.

The recurring presence of pesticides within the catchment for Dorisland WTWs is identified as a high risk within the DWSP. There is powdered activated carbon (PAC) dosing as a treatment option at the treatment works but this is ineffective at reducing the levels of pesticide below the regulatory limit, and the risk assessment for the Water Treatment Works is also high risk for pesticides.

Through our enforcement process a Provisional Enforcement Order (PEO) was issued in 2013 and an undertaking was subsequently accepted from NI Water which requires them to install additional treatment in the form of GAC filters at Dorisland WTWs during the PC13 investment period. This work has commenced and is planned to be operational by March 2015.

Seagahan WTWs and Catchment

Seagahan WTWs abstracts its raw water source from Seagahan Dam, taking on average 9.9 ML/day. The catchment, an area of 12.9km², is mostly forest, with some sheep grazing. The treatment works provides drinking water to Seagahan Armagh Water Supply Zone which supplies a population of 35,000.

Following the completion of the upgrade work to Seagahan WTWs in 2010, the six GAC filters, for the removal of pesticides, were replaced with new carbon during 2012/13. NI Water's investigation into the contraventions in 2013 concluded that following a heavy rainfall event levels of pesticide above that normally found, were washed into the catchment. The treatment process, in particular the GAC filters, were unable to fully treat these elevated levels of pesticide in the raw water. The risk assessment for the Water Treatment Works and the associated catchment categorizes the pesticide risk as medium, and NI Water has an enhanced monitoring programme in place, and identified that one of the GAC filters required regeneration.

Reducing the Levels of Pesticides

Through NI Water's ongoing review of its risk assessments, it continues to identify the potential risks from:

- pesticides being present within catchments; and
- inadequate treatment being in place for the removal of pesticides at WTWs.

Although the number of detections in 2013 has reduced from the numbers reported in 2012, there are still catchments and water treatment works where NI Water have identified pesticides as a high or medium risk within the catchment and treatment sections of its risk assessments.

There are a range of remedial measures which NI Water has in place to help in ensuring levels of pesticide remain below the regulatory standard in water leaving a water treatment works, these can include:

- measures to influence the usage/application and disposal of MCPA within the catchment (e.g. land use management, liaison with stakeholders through local working groups);
- developing Catchment Management Plans and implementing sustainable catchment management (SCaMP) solutions;
- use of monitoring data and risk assessments in balancing flows and abstraction points to reduce the risks of increased pesticides during periods of high risk (e.g. following heavy rainfall); and
- maintaining, optimizing, and where required installing treatment for the removal of pesticides (e.g. GAC).

Regulatory Requirements in Relation to the Use of Pesticides

There are regulations and guidance in place to ensure pesticides are used with care in the vicinity of water ways for example DARD's Code of Practice for using Plant Protection Products to farmers.

NI Water continues to work proactively 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 the quality of their drinking water supplies.

In July 2012 new legislation came into force throughout the UK, The Plant Protection Products (Sustainable Use) Regulations 2012. These regulations contain provisions aimed at achieving the sustainable use of pesticides, by reducing risks and impacts on human health and the environment, which includes measures on protecting water, and promotion of low pesticide usage regimes.

Manganese

Elevated levels of manganese can be present within raw water sources obtained from surface water bodies, such as lakes, and impounding reservoirs. This normally occurs as a consequence of changes in the temperature profile within the body of water which can lead to turnover movement within the water body thus raising raw water manganese levels. Where the treatment processes have insufficient capability to remove the elevated levels within the source water, contraventions of the regulatory standard for manganese from water leaving the treatment works may occur. In such cases, NI Water is required to review its operational practices and water treatment processes and put in place appropriate remedial measures.

In 2013, elevated levels of manganese within the raw water sources to two water treatment works at Castor Bay and Camlough led to contraventions of the manganese standard from the water leaving those treatment facilities. Following investigations, NI Water has put in place, or is planning to put in place, appropriate remedial measures to ensure that water supplied from these treatment works will meet the regulatory standard for manganese. The presence of manganese above the regulatory limit can lead to an increase in the risk of NI Water receiving dirty water complaints from consumers within the associated water supply zones. During the period of the event at Castor Bay there was an increase in baseline levels of consumers' complaints recorded by NI Water relating to dirty/discoloured water.

Catchment Protection

The protection of the catchments from which our drinking water supplies are abstracted is key to both reducing the risks from contamination from within them and ensuring the delivery of safe, clean drinking water. There are a number of key measures which influence how catchments are protected and managed, as illustrated in Figure 2.5.

The Water Framework Directive (WFD) has provisions for having in place River Basin Management Plans (RBMPs) and also for establishing Drinking Water Protected Areas (DWPAs) which are undertaken by the Water Management Unit within NIEA. These provisions help protect catchments through putting in place programmes of measures to ensure there is no deterioration in the quality of our water bodies along with measures to improve the quality where it falls below standards. It also provides for a monitoring regime to establish baselines and to monitor for changes in water quality. Protecting the water in areas from which it is abstracted not only improves the untreated water quality but can also mitigate against the potential for additional water treatment and purification processes.

NI Water has in place a series of measures to help protect and improve the water quality within its catchments, which includes; Drinking Water Safety Plans (DWSPs); Catchment Management Plans (CMPs); and Sustainable Catchment Management Plans (SCaMP). In gathering the evidence to support its DWSPs, NI Water is required to risk assess each abstraction source and to have in place a monitoring programme to reflect the level of risk within the associated catchment. NI Water also has in place CMPs for each treatment works. These assess the condition of its catchments and identify actions to maintain and enhance water quality.

Some of these measures will form part of its SCaMP programme, which includes long term sustainable solutions to improve catchment water quality.

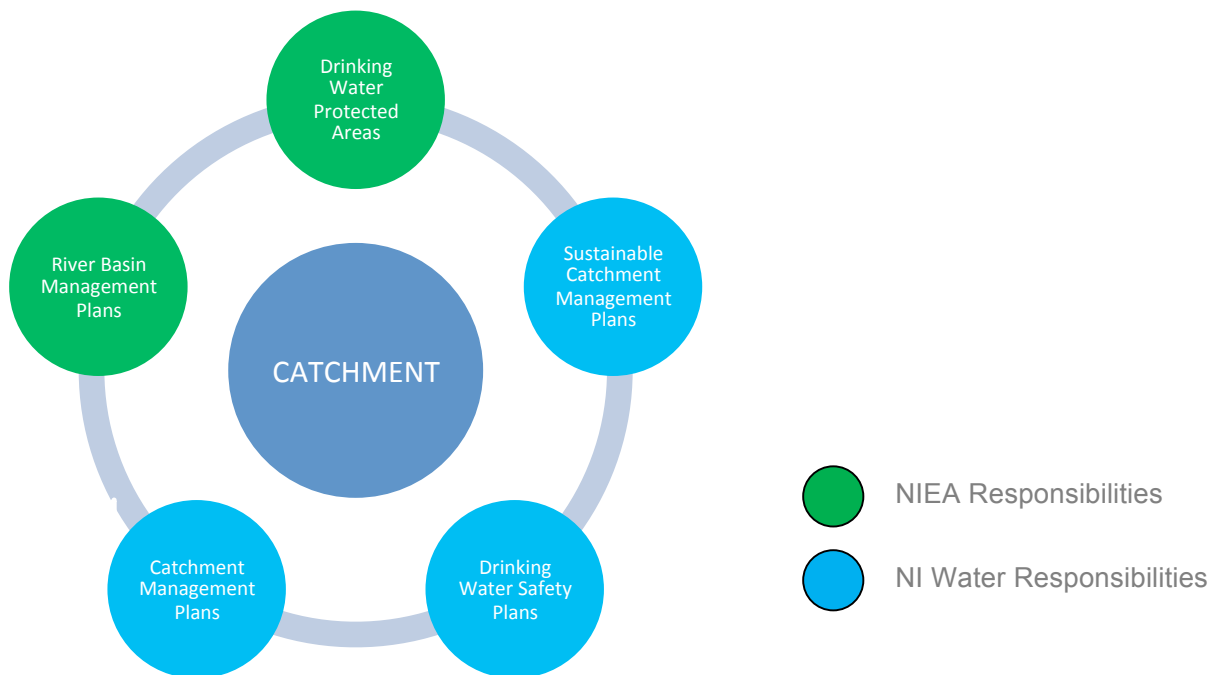
NI Water and NIEA work together in developing their plans in protecting drinking water catchments, they also actively engage with other key stakeholders through working groups to ensure a collaborative approach in bringing forward catchment protection measures.

Drinking Water Protected Areas (DWPAs)

Surface waters which are abstracted for the production of drinking water for both public and private drinking water supplies are required to be identified and mapped, as DWPAs, within NIEA’s river basin management plans. Under Article 8 of the Water Framework Directive (WFD), there is a requirement to put in place an appropriate sampling programme to monitor substances discharged within DWPAs that may cause deterioration in the status of the water body

As part of the WFD requirements, NIEA has in place three River Basin Management Plans (RBMPs) which cover Northern Ireland: the North Eastern; the North Western; and the Neagh Bann. These plans detail the water environment within each area.

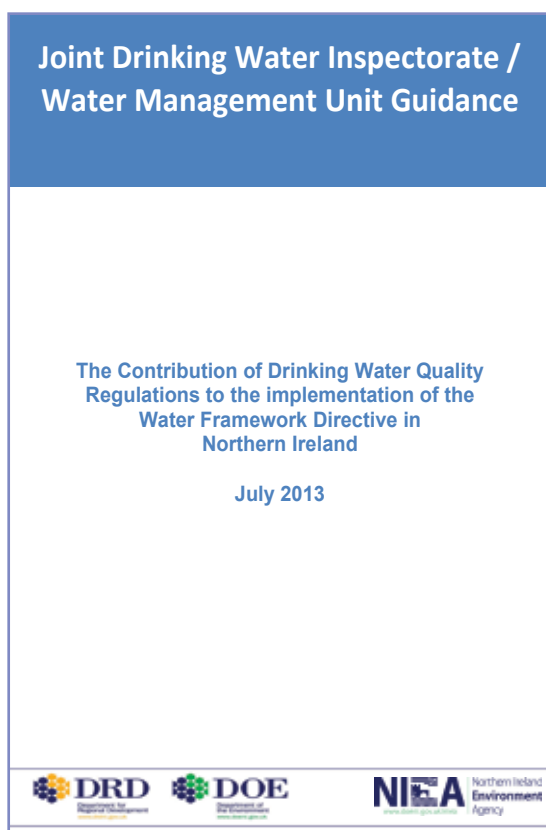
Figure 2.5 - Key Measures Influencing Catchment Protection



They also provide information on the measures referred to as the Programme of Measures (POMs) that are required to be put in place to monitor and improve the status of the water environment. The designation and monitoring of water quality within DWPA is an integral part of the River Basin Management Planning Cycle which ensures appropriate measures are put in place and monitored. There are nine surface water bodies and 48 river systems designated as DWPA in Northern Ireland. NIEA may designate safeguard zones within a DWPA as part of its cycle of monitoring and review, to address specific identified contamination risks. We welcome this ongoing work to further protect and improve the quality of Northern Ireland's drinking water sources.

NI Water has a regulatory requirement to have an up to date risk assessment (DWSP) in place for each water supply system, The DWSP's are reviewed as part of the cycle of assessing the monitoring data from the raw water source, along with the ongoing assessment of risks within the catchment. In relation to water sources, it is important that NI Water's drinking water safety plans, associated catchment management plans, and raw water sampling programmes are closely aligned with the requirements in the WFD to have clearly defined and monitored DWPA. The relationship and transfer of information between NIEA and NI Water is detailed within guidance issued by us in July 2013 (Figure 2.6).

Figure 2.6 – Guidance on Establishing and Monitoring DWPA



Sustainable Catchment Management

In managing its catchments and water treatment processes, NI Water along with the other measures outlined in this section, has identified a programme of work to pursue sustainable solutions within its catchments, called Sustainable Catchment Management Planning Northern Ireland (SCaMP NI). This type of work looks at sustainable solutions as a way to improve land management practices within catchments to improve the quality of raw water being used for abstraction purposes. Such improvements should provide more cost-effective treatment options, with potential cost savings and environmental benefits associated with a reduction in energy and chemical usage in water treatment. During 2013, NI Water has been engaging with a wide range of key stakeholders including:

- Northern Ireland Environment Agency (NIEA);
- Forestry Service;
- NI Fire and Rescue Service;
- DARD and College of Agriculture Food and Rural Enterprise (CAFRE);
- Ulster Farmers Union (UFU);
- Mourne Heritage Trust;
- Royal Society for Protection of Birds (RSPB);
- Woodland Trust; and
- Ulster Wildlife Trust.

This engagement has led to SCaMP projects being delivered on: land management; woodland creation; blanket bog restoration; heath land management; invasive species control; wildfire prevention; and pesticide control.

As NI Water moves forward with this programme of work, it will look to engage with DARD to influence agricultural policy particularly in how it impacts on pesticide usage in Northern Ireland. It also intends to extend the current remit of the Water Catchment Partnership to bring this approach to other catchments outside of the initial trial within the Derg catchment. The co-operation and engagement with the key stakeholders within drinking water catchments will be key in the future in bringing about a more sustainable and cost effective water supply chain.

Key Processes in the Protection of the Derg WTWs Catchment

NI Water works alongside NIEA, and other stakeholders in implementing its plans, and in assisting others, in bringing forward a range of measures within catchments. Key stakeholders, including NI Water, are working together to educate and promote best practice within catchments through the establishment of The Water Catchment Partnership Groups.

The management of our drinking water supplies starts at the catchment and the processes outlined below helps to ensure that the water supplied to consumers as the end product is safe and clean.

Figure 2.7 is an example of how this working together with stakeholders is being implemented in the River Derg catchment. In working towards improving the quality of this major river water source, various stakeholders are collaborating together through regulatory and voluntary arrangements to protect and improve the quality of this water source.

The Derg catchment has in place an associated programme of measures as detailed within the North Western River Basin Management Plans. It has also been identified as a Drinking Water Protected Area. Risk assessments relating to water being abstracted for production purposes within the catchment have been undertaken by NI Water and the key risk identified is pesticides. On identifying its key risks and the required remedial measures, NI Water must then plan for future investment programmes through the cycles of the price control (PC) process. A number of options for improvement work to be undertaken for the Derg Water Supply System is being developed for consideration within the next price control process to commence in 2015 (PC15).

Figure 2.7 – Catchment Protection for the Derg Water Supply System



Part 3
Water Treatment



Image: Clay Lake Water Treatment Works - NIEA

Part 3

Water Treatment

- 25 water treatment works (WTWs) were in operation producing high quality drinking water
- Of the 19,851 WTWs compliance tests, 99.86% met the required standards
- 42 events occurred at WTWs: these were categorised as two serious; 20 significant; and 20 minor or not significant
- Ineffective treatment remain the primary reason for contraventions from WTWs;
- Additional treatment required at two WTWs to address pesticide non-compliance: Clay Lake and Dorisland WTWs.

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

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

Water treatment processes include the physical removal of potential contaminants by using chemical coagulation/flocculation, sedimentation or flotation, and filtration to prepare the water for disinfection. Figure 3.1 shows water after the coagulation and flotation stage, and Figure 3.2 shows water at the primary filtration stage of the treatment process. The primary aim of water treatment is to eliminate any pathogenic micro-organisms and 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 water treatment in place at each 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 reduce these risks. These measures involve 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 and entering 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.

Figure 3.1: Water after Coagulation and Flotation Stage



Figure 3.2: Primary Filtration Stage



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 processes in place at the water treatment works.

In 2013, results from the regulatory monitoring programme shown in Table 3.1 report non-compliance occurred for two of the process control parameters, trihalomethanes (THMs) and aluminium.

The implementation of good operational practice at water treatment works during both routine operation and when normal operating circumstances do not prevail, is critical in ensuring a continuation in the supply of high quality drinking water and improvement in compliance for the process control parameters. It is important that there is appropriate monitoring and control of the treatment processes in place in order to deal effectively with changes in the quality of the water being abstracted from within the catchment.

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 monitors critical parameters at different stages of the water treatment process to ensure process control is effective.

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.

In 2013, six samples contravened the standard (100µg/l), which represents a marginal improvement on 2012 compliance, but is a lower level of compliance than for 2011. Figure 3.3 displays the levels of THM compliance at consumers' taps over the last four years. NI Water must fully consider the formation of THMs and other disinfection by-products as part of its overall disinfection policy. Where possible, without compromising disinfection, NI Water must continue to keep all disinfection by-products, including THMs, to as low a level as possible.

Aluminium

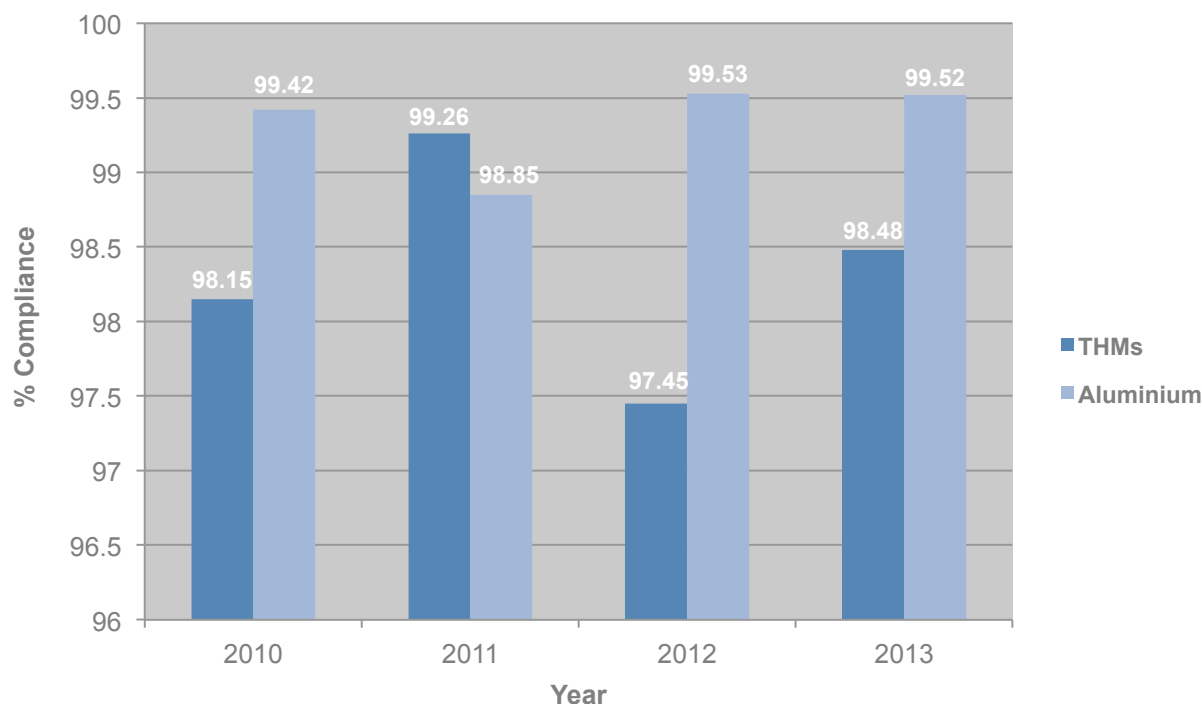
We note that aluminium compliance, which is measured at the consumers' taps, was maintained in 2013: there were nine contraventions (0.48%) compared with the eight (0.47%) that occurred in 2012. One of the contraventions was directly related to the serious event at Drumaroad WTWs (Annex 4 refers); one was due to operational work; and NI Water attributed the remaining seven contraventions to disturbance of mains deposits. However, problems with the treatment processes are not always discovered through the compliance sampling programme.

Operational sample results and traces from on-line monitors often highlight elevated aluminium levels at WTWs before they become apparent in distribution. In many cases the remedial measures taken by NI Water in response to these earlier detections limit the impact of a water quality event on the public drinking water supply. Figure 3.3 demonstrates the levels of aluminium compliance at consumers' taps over the last four years.

Table 3.1: Water Quality at Water Treatment Works, 2013

Parameters	Place of Sampling	Total No. of Tests in 2013	No. of Tests not Meeting the Standards in 2013	% of Tests Meeting the Standards	
				2013	2012
Process Control Parameters					
Trihalomethanes	WSZ	396	6	98.48	97.45
Aluminium	WSZ	1,876	9	99.52	99.53
Disinfection Parameters					
Coliform bacteria	WTWs	6,617	7	99.89	99.95
<i>E. coli</i>	WTWs	6,617	3	99.95	100
Turbidity	WTWs	6,617	18	99.73	99.83

Figure 3.3: Percentage of Tests Meeting the Regulatory Standards for THMs and Aluminium at Consumers' Taps, 2010 – 2013



Disinfection Parameters

The disinfection parameters of coliform bacteria, *E. coli* and turbidity (Table 3.1 refers) look at the effectiveness of disinfection and pathogen removal. To safeguard drinking water from the risk of microbiological organisms being present, effective disinfection is fundamental to treatment works' operation. NI Water must achieve its primary duty of disinfecting drinking water before it is supplied to consumers.

E. coli and Coliform Bacteria

Testing for *E. coli* and coliform bacteria at water treatment works provides a level of assurance that water is being treated adequately to remove bacterial and viral pathogens. However, NI Water must not rely solely on its testing programme but should also be assured through monitoring and reviewing its operational practices and other control measures that its disinfection processes are adequately maintained and are effective.

In 2013, NI Water reported 99.95% compliance for *E. coli* and 99.89% compliance for coliform bacteria at water treatment works (*E. coli* were detected at two and coliform bacteria were detected at five of the 25 water treatment works). *E. coli* should not be present in a potable drinking

water supply and following NI Water investigations no cause could be determined for the reported failures.

Turbidity

The regulatory standard for turbidity leaving a water treatment works is 1NTU. 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 transmission and 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 1NTU is achieved post treatment to ensure effective disinfection.

There was a marginal deterioration in compliance with the turbidity standard in 2013 (99.73% in 2013; 99.83% in 2012). Turbidity contraventions occurred at fourteen (56%) water treatment works in 2013. Of the 6,617 samples taken for turbidity analysis from water treatment works, 18 (0.27%) failed to meet the standard.

Of these failures, NI Water's subsequent investigations indicated that: eight were due to unrepresentative sampling; six were related to treatment problems; two occurred after works maintenance; one was caused by a burst water-main (third party damage); and after investigation by NI Water no cause could be determined for the final contravention. Figure 3.4 shows on-line turbidity monitors at a water treatment works.

Figure 3.4: On-line Turbidity Monitors



NI Water has in place individual disinfection statements for each of its WTWs. These statements should inform and be linked into NI Water's risk-based approach within its DWSPs and provide an assurance that the disinfection process has appropriate controls in place to verify the disinfection process. NI Water should ensure that its disinfection statements are periodically reviewed and that any identified risk factors are highlighted in their risk assessment process and the necessary mitigation measures put in place. NI Water, during 2013, has been investigating the development of its disinfection statements to extend them to cover the individual distribution system related to each WTWs. These extended statements should consider where NI Water carries out booster chlorination within the distribution system and operational practices in relation to retention times and cleaning regimes within the distribution system.

Indicator Parameters

Clostridium perfringens

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

In 2013, 2,261 tests were carried out for *Clostridium perfringens* on samples collected from water treatment works. Two (0.09%) contravened the standard: one at Ballinrees WTWs; and the other at Clay Lake WTWs. Investigations by NI Water were unable to identify the cause of the contravention at Ballinrees WTWs. There were no issues identified with the water treatment processes and all follow-up samples were satisfactory. The contravention at Clay Lake WTWs was likely to have been related to a short-term treatment issue early on the morning of the contravention. All re-samples taken the following day were compliant.

Events

During 2013, 42 events were notified to us that related to water quality going into supply from water treatment works: these were categorised as 2 serious; 20 significant; and 20 minor or not significant.

The two serious events occurred at Drumaroad WTWs and Castor Bay WTWs in 2013. At Drumaroad WTWs, treatment difficulties led to aluminium contraventions in the works final water and related supply area. There was a significant increase in consumer contacts relating to water quality. At Castor Bay WTWs, the treatment process was challenged by a significant increase in the manganese level in the raw water source (Lough Neagh) which led to manganese and turbidity contraventions in the works final water and related supply area. There was a significant increase in consumer complaints relating to water quality.

There were 20 significant events at 14 (56%) water treatment works in 2013: Altnahinch; Camlough; Carran Hill; Caugh Hill; Clay Lake; Derg; Dorisland; Dungonnell; Forked Bridge; Killyhevlin; Lough Fea; Lough Macrory; Moyola; and Seagahan. The majority of these were related to difficulties with the performance of the coagulation processes, or deficiencies at the water treatment works which led to: aluminium; iron; manganese; pesticide; THMs; and turbidity contraventions.

Two significant events were caused by *E. coli* contraventions being reported, and following NI Water investigations no cause could be determined for the reported failures.

Details of all water quality events in 2013 are provided in Annex 4.

Drinking Water Quality Improvements

Enforcement Action at WTWs

During 2013, for enforcements issued during 2012, NI Water completed the remedial actions associated with three Consideration of Provisional Enforcement Orders (CPEO's) and two Provisional Enforcement Orders (PEO's) to address specific non-compliances at WTWs.

In 2013, one CPEO and one PEO were issued to NI Water to address specific non-compliances. These related specifically to the presence of elevated levels of the pesticide MCPA, and inadequate treatment being in place at the WTWs

- one CPEO– to seek remedial measures relating to MCPA contraventions from Clay Lake WTWs; and
- one PEO– to require remedial measures to be put in place relating to MCPA contraventions from Dorisland WTWs.

Further details on our enforcement action are provided within Annex 6.

In order to protect, maintain and improve drinking water supplies, NI Water continues to complete infrastructure, treatment and distribution projects. These programmes of work may be driven by remedial actions relating to, Enforcement Orders, Notices and other regulatory processes.

An example of implementing enforcement action can be illustrated with Clay Lake WTWs where remedial action was necessary to improve compliance for recurring MCPA pesticide contraventions. In 2013 we issued an enforcement order to ensure that the necessary remedial action would be taken to have effective pesticide removal at this works. NI Water, as part of the regulatory process, gave an Undertaking to ensure that priority was given to improve the treatment capability within the works. In particular, this required work to refurbish the two existing GAC filters and the installation of an additional GAC filter. This work was undertaken and completed in November 2013. Figure 3.5 shows the new GAC filter in operation.

Figure 3.5: New Granular Activated Carbon Filter at Clay Lake



In 2013, NI Water commissioned a series of treatability studies to be undertaken at six water treatment works which had been prioritized through its risk assessment process. The six works were: Dorisland WTWs; Carmoney WTWs; Glenhordial WTWs; Killyhevlin WTWs; Ballinrees WTWs; and Caugh Hill WTWs. As the studies complete NI Water are considering the outcomes, and where improvements to treatment processes have been identified, and these can then be taken forward through its investment planning process.

Part 4 Water Distribution Systems



Image: Water Mains Pipe Laying - NI Water

Part 4

Water Distribution Systems

- Service Reservoir water quality remains high: overall microbiological compliance of 99.91%
- Iron continues to be the parameter that reports the highest level of non-compliance at 98.08%
- Enforcement action taken to improve drinking water quality: iron in the Caugh Hill and Fofanny Mourne supply areas; and microbiological quality in the Dunore system
- NI Water continues to deliver its mains rehabilitation programme to improve its distribution network

The water distribution system in Northern Ireland is an extensive and complex network, consisting of 316 service reservoirs (SRs) and approximately 26,600km 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.

The water quality in the distribution system depends on the structural integrity of the distribution system, the materials it comes into contact with and the nature of the water itself. 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 or operational activity 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 networks. 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.

Microbiological Quality

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. A typical service reservoir is shown in Figure 4.1.

Service reservoir integrity should be maintained at all times. The prevention of stagnation throughout the distribution system is also a way of controlling potential contamination. A disinfectant residual is maintained throughout the distribution network to provide ongoing protection against recontamination and limit the potential for microbial growth problems.

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, but NI Water must ensure its disinfection policy limits the formation of disinfection by-products e.g. trihalomethanes (THMs), without compromising the microbiological quality of the water.

Figure 4.1: Service Reservoir



Table 4.1: Water Quality Indicators within the Distribution System

Parameters	Place of Sampling	No. of Tests in 2013	No. of Tests not Meeting the Standards in 2013	% of Tests Meeting the Standards in 2013	% of Tests Meeting the Standards in 2012
Reservoir Integrity					
Coliform bacteria	SR	16,118	26	99.84	99.84
<i>E. coli</i>	SR	16,118	4	99.98	99.96
Distribution Networks					
Turbidity	WSZ	1,876	4	99.79	99.65
Iron	WSZ	1,876	36	98.08	97.25
Manganese	WSZ	1,876	5	99.73	99.82

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 should have in place appropriate control measures to ensure that an adequate disinfection residual is effectively maintained throughout the distribution network. This has been incorporated by NI Water within its drinking water safety plans which has in place disinfection statements for individual WTWs.

NI Water is committed to extending the use of disinfection statements to cover secondary disinfection within its distribution systems. In response to enforcement being initiated by us in relation to elevated levels of disinfection by-products within the Lough Bradan distribution system, the first disinfection statement covering secondary disinfection within this distribution system was completed in 2013. Following enforcement action taken by us in relation to ongoing microbiological failures within the Dunore Water Supply System in 2013, NI Water is developing a disinfection statement to cover this distribution system which is to be in place in 2014.

E. coli at Service Reservoirs

In 2013, a total of 16,118 samples for *E. coli* testing were collected at service reservoirs across Northern Ireland. *E. coli* was detected in four of these samples at four different service reservoirs. This is an improvement on 2012 when *E. coli* was detected in seven 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. After investigation, NI Water was unable to determine the reason for these

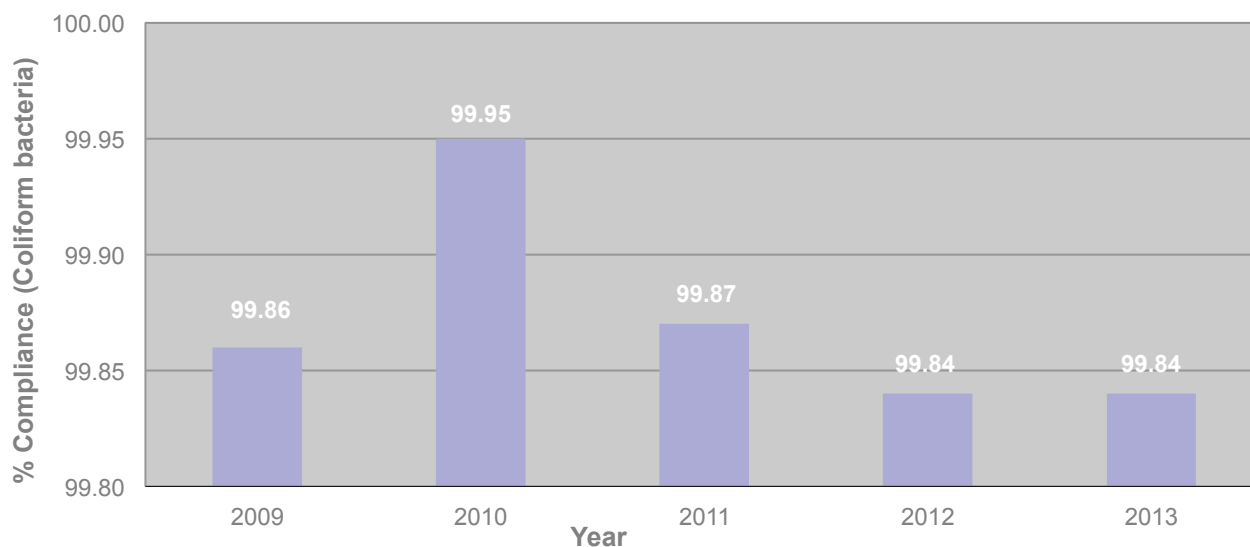
contraventions. No evidence of contamination was identified and all re-samples were satisfactory.

Coliform Bacteria at Service Reservoirs

The Regulations require that at least 95% of samples collected weekly from each service reservoir throughout the year are free from all coliform bacteria. All 316 service reservoirs sampled in 2013 met this regulatory standard. However, coliform bacteria were detected on 26 occasions at 24 (7.4%) service reservoirs. This is consistent with 2012, when coliform bacteria were detected on 27 occasions at 24 service reservoirs (see Figure 4.2).

Of the 26 occasions coliform bacteria were detected in 2013, *E. coli* was also detected on four occasions (as noted in previous section on *E. coli*). Of the other 22 samples where coliform bacteria were detected: five were related to inadequate disinfection; eight attributed to unrepresentative sampling; and no cause could be determined on the other nine occasions. NI Water must ensure that a disinfectant residual is maintained throughout the distribution network to provide ongoing protection against recontamination and must have robust control measures in place to ensure the integrity of sample collection.

In October 2013, NI Water notified us of an event at Corlea SR, following the recurrence of a coliform bacteria contravention. Our assessment was that it was caused by inadequate secondary disinfection at an upstream reservoir. Following this event a repair was carried out to chlorine boosting equipment at the upstream reservoir and there have been no further contraventions to date. The event was categorized as minor. Details of all water quality events in 2013 are provided in Annex 4.

Figure 4.2: Percentage Compliance of Coliform Bacteria at Service Reservoirs 2009 - 2013

Reservoir Integrity

We assess reservoir integrity based on the microbiological quality of the water. The detection of microbial pathogens may suggest that the structure of the reservoir has been breached and these instances should be investigated further by NI Water. NI Water must have a programme in place to ensure all service reservoirs are cleaned and checked for integrity on a regular basis. NI Water must also have a disinfection policy in place that ensures a residual disinfection is maintained throughout the distribution system for the protection of human health.

Figure 4.3 Protective cover on access point to Service Reservoir



Distribution Networks - Iron

In 2013 a total of 1,876 samples taken from consumers' taps were tested for iron. Of these, 36 (1.92%) contravened the iron standard. This is an improvement on 2012 when 2.75% contravened

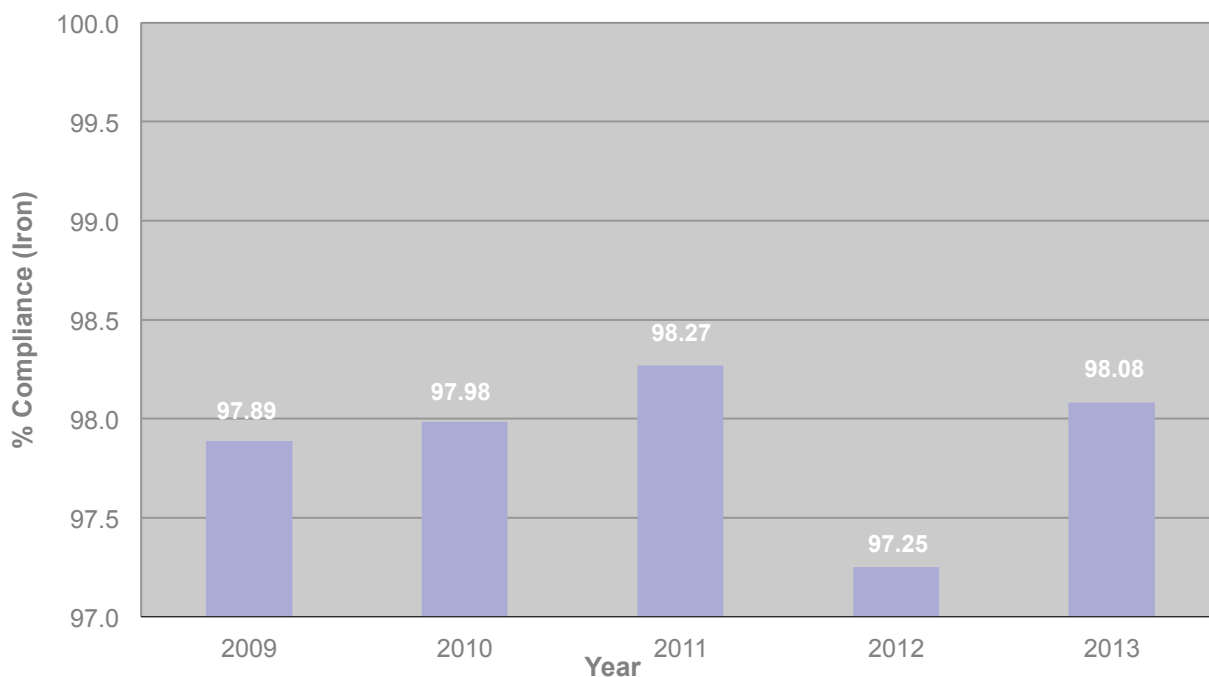
the standard (see Figure 4.4). NI Water has an extensive network of iron water mains across Northern Ireland.

NI Water also uses a distribution maintenance index referred to as the Operational Performance Index (OPI [TIM]) to assist in assessing the overall water quality of its distribution system. It is calculated based on samples taken at consumers' taps for three parameters: turbidity; iron; and manganese. For 2013, the OPI (TIM) was 99.30%. As with previous years, iron continues to be the parameter which contributes the highest non-compliance in the OPI (TIM) calculation.

Water quality issues frequently arise in the network due to problems caused by the corrosion of older iron water mains. There is an ongoing proactive programme of flushing and cleaning of the distribution system to minimize the problem. In addition, NI Water has an ongoing Water Mains Rehabilitation Programme in which water supply zones that experience water quality and other supply problems are subjected to detailed studies to enable prioritized corrective action to be taken to improve the water quality being supplied to consumers.

Unfortunately water quality events can sometimes occur during Mains Rehabilitation work. In August 2013, NI Water notified us of an event in the Derrychara Park and Gardens area of Enniskillen following the installation of a new section of main. A number of coliform bacteria contraventions occurred in samples taken to check the water quality after the work was completed.

Figure 4.4: Percentage Compliance of Iron in Distribution 2009 – 2013



Our assessment is that contamination occurred during the installation of the new section of mains. The event was categorized as significant. Details of all water quality events in 2013 are provided in Annex 4.

Drinking Water Quality Improvements

Mains Rehabilitation Programme

NI Water’s mains rehabilitation programme restores or replaces the existing water mains pipe work (see Figure 4.5). The criteria by which pipe work is prioritized for replacement under this programme takes into consideration many factors, including water quality, water pressure, leakage, bursts, consumer complaints and sufficiency of supply. Many of the mains delivering water to consumers’ taps are made of cast iron and the deterioration of older water mains may result in consumers receiving discoloured drinking water due to the presence of iron or manganese.

Enforcement Action

In order to protect, maintain and improve drinking water supplies, NI Water continues to complete infrastructure, treatment and distribution projects. These programmes of work although mainly driven by NI Water’s assessment of need may also be driven by remedial actions relating to, Enforcement Orders, Notices and other regulatory processes.

During 2013, we issued three Consideration of Provisional Enforcement Orders (CPEOs). Two of these were for iron contraventions within the distribution systems serving the Caugh Hill and Fofanny Mourne water supply areas and the third was for microbiological contraventions within the water distribution system supplied from Dunore Point WTWs (refer to Annex 6 for more detail).

Figure 4.5: New Mains Installation



Part 5
Consumers' Taps



Part 5

Consumers' Taps

- Overall quality of 'consumers' taps' water remains high. Of 51,068 samples: 99.74% complied
- 14 parameters did not achieve full compliance at consumers' taps
- Microbiological quality at consumers' taps reports a marginal improvement to 99.55%
- Iron continues to be the parameter with the lowest level of compliance at 98.08%
- THM compliance improves: 98.48% achieved
- Five lead treatment zones did not achieve 98% compliance with the 10 µg/l standard
- Consumer contacts on drinking water quality increased by 15%; discoloured water remains the main issue of concern to consumers

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 in individual domestic properties or in 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 consumers' 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 are influenced by the nature and condition of water distribution systems in 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. Under the Domestic Distribution Systems Regulations, where this water quality issue is within a building where water is available to the public (such as a school, hospital or restaurant), 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

To assess the overall quality of water that is being supplied to consumers' we look at the results of samples taken by NI Water from the regulatory sampling programme for consumers' taps. In Table 5.1 we record the percentage compliance for 38 Schedule 1 (mandatory) parameters and nine Schedule 2 (indicator) parameters. For 2013, overall drinking water quality at consumers' taps has significantly improved from 99.62% in 2012 to 99.74%. This statistical improvement is contrary to the significant increase in consumer contacts made regarding drinking water quality for 2013. These are the recorded contacts that consumers made to NI Water based on the experience they have regarding the quality of the water that was supplied to them. The number of consumer contacts increased by 15% in 2013 compared to 2012. The appearance of discoloured water remains as the main water quality issue of concern.

In addition to the regulatory compliance assessment, NI Water uses for its business reporting purposes, an operational performance target measure referred to as percentage 'mean zonal compliance' (% MZC) as an indicator index, to assess water quality at consumers' taps. This is not a regulatory requirement; it is a calculation using 39 parameters from the regulatory sampling programme which makes a statistical adjustment to take into account the number of samples collected in each specific water supply zone. The overall % MZC for 2013 was 99.85%; this has marginally improved compared to 99.80% in 2012.

Table 5.1: Consumer Tap Compliance

	Number of Samples	Number of Samples not Meeting the Standards	% Compliance
Schedule 1 (Mandatory parameters)			
Iron	1,876	36	98.08
Total trihalomethanes	396	6	98.48
Lead	396	4	98.99
Aluminium	1,876	9	99.52
Odour	1,800	6	99.67
Manganese	1,876	5	99.73
Nickel	396	1	99.75
Turbidity	1,876	4	99.79
<i>E. coli</i>	5,196	7	99.87
Taste	1,788	1	99.94
Other pesticides	8,584	3	99.97
<i>Enterococci</i>	396	0	100
Antimony	396	0	100
Arsenic	396	0	100
Benzene	396	0	100
Benzo(a)pyrene	396	0	100
Boron	396	0	100
Bromate	396	0	100
Cadmium	396	0	100
Chromium	396	0	100
Colour	1,876	0	100
Copper	396	0	100
Cyanide	232	0	100
1,2 Dichloroethane	396	0	100
Fluoride	232	0	100
Mercury	396	0	100
Nitrate	396	0	100
Nitrite	396	0	100
PAH - sum of four substances	396	0	100
Selenium	396	0	100
Sodium	396	0	100
Tetrachloroethene/Trichloroethene - sum	396	0	100
Tetrachloromethane	396	0	100
Pesticides - total substances	232	0	100
Aldrin	232	0	100
Dieldrin	232	0	100
Heptachlor	232	0	100
Heptachlor epoxide	232	0	100
Total (Schedule 1)	37,084	82	99.78
Schedule 2 (Indicator parameters)			
Coliform Bacteria	5,196	50	99.04
<i>Clostridium perfringens</i>	2,261	2	99.91
Hydrogen ion	1,876	1	99.95
Ammonium	1,876	0	100
Chloride	232	0	100
Conductivity	2,261	0	100
Sulphate	232	0	100
Total Indicative Dose	25	0	100
Tritium	25	0	100
Total (Indicator Parameters)	13,984	53	99.62
Overall Total	51,068	135	99.74

Chemical/Physical 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 2013, iron was the parameter for which there was the greatest number of tests failing to comply with the regulatory standard. Of the 1,876 samples taken, 36 (1.92%) failed to meet the 200 µg/l standard. This is an improvement on 2012 when 2.75% contravened the standard (see Part 4 for more details). These contraventions were mainly due to the condition of the distribution network.

Following enforcement action taken by us relating to recurring iron contraventions, NI Water gave a series of Undertakings to put in place the necessary corrective action to improve the condition of the distribution network in the Foffany Mourne and Caugh Hill Water supply areas. Remedial measures related to these Undertakings, to address the localised discoloured water quality issues in these two areas, were completed during 2013. (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 changes in the raw water quality.

NI Water must fully consider the formation of THMs and other disinfection by-products (DBPs) as part of its overall disinfection policy. Where possible, without compromising disinfection, it has a regulatory responsibility to maintain disinfection processes so as to keep the presence of disinfection by-products, including THMs, as low as possible.

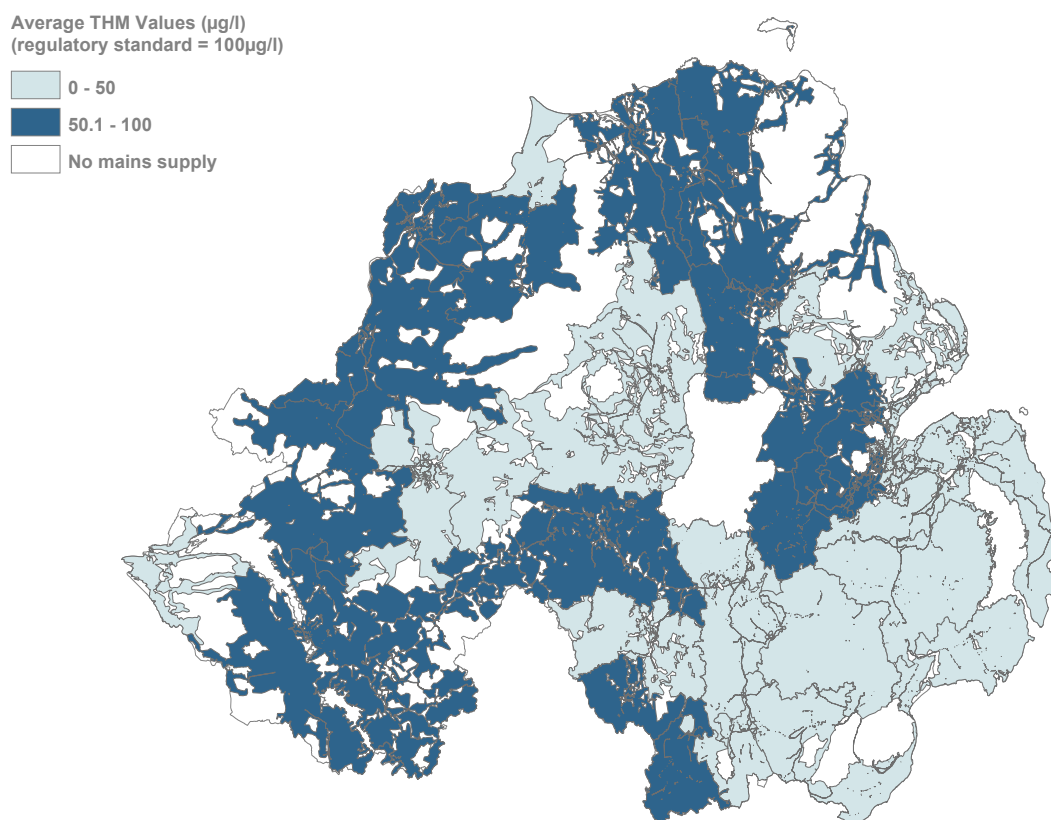
We note that there has been an improvement in THM compliance reported this year (98.48% in 2013 compared to 97.45% in 2012) for our public supplies. Of the 396 tests carried out, six (1.52%) exceeded the regulatory standard of 100µg/l.

To further improve THM compliance remedial measures were completed during 2013 relating to enforcement action taken in two supply areas: Lough Bradan, and Caugh Hill Water supply areas (Annex 6 provides more detail).

To further evaluate how NI Water is meeting its regulatory requirement to keep the disinfection by-products as low as possible through controlling THM formation, we report that in 2013 the average concentration of THMs was 48.1 µg/l (the highest zonal average being 70.8µg/l) with 44% of zones identified where the annual average exceeds 50µg/l (Figure 5.1 refers). This is an improvement compared to 2012, where 60% had an annual average above 50µg/l (and where the highest zonal average was 87.26µg/l), but is still higher than 2011 when 30% of zones had an annual average above 50µg/l. We will continue to use this annual average value to assess how NI Water is controlling the level of these disinfection by-products.

NI Water is required to have appropriate control measures in place to ensure that in the design, operation and maintenance of its disinfection processes the formation of DBPs is minimized. In doing so it must continue to assess the performance of its 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. NI Water has in place individual disinfection statements for each WTWs and is now working towards a similar approach being adopted within all its distribution systems.

Figure 5.1: Average THM Values in Water Supply Zones across Northern Ireland in 2013



Lead

The regulatory requirements set an interim lead standard of $25\mu\text{g/l}$ from 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 (the use of lead pipes has been banned since the early seventies).

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 used for drinking water has been banned since the eighties).

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).

In 2013, of the 396 tests carried out for lead, four (1%) contravened the standard. In two of these cases there was a lead supply pipe, in one case there was no lead from the main to the property boundary, but almost certainly lead on the consumer side and in one case there was no evidence of lead pipes and the re-samples were all satisfactory. When a sample has contravened the standard and investigations show the property's service pipe contains lead, NI Water notifies the consumer, offering advice on what action they may take, and also notifies 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 to meet the Final Lead Standard

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 25µg/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, NI Water continues to develop its lead strategy to;

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

Looking at the overall trend in lead compliance in the graph below (Figure 5.2), while it is encouraging to see how compliance with the interim 25µg/l standard has significantly improved since 2004 since orthophosphate treatment was introduced

(94.92% in 2004, 98.99% in 2013), however a significant amount of work is required to further improve compliance with the final lead standard of 10µg/l in 2014 and beyond. This is the last time we will assess the 25µg/l standard, as the 10µg/l standard applies from 25 December 2013.

The graph below shows that there has also been no significant change in compliance with the 10 µg/l standard: 97.22% in 2013 compared with 97.19% in 2012.

In addition to the sampling requirements required under the Regulations, NI Water undertakes a more extensive operational sampling programme for lead. Results from this sampling programme highlight those water supply areas which have not achieved a compliance target of 98% for 10µg/l (Figure 5.3 refers). Five of the 25 lead zones (20%) did not achieve the 98% target: Clay Lake and Seagahan in County Armagh; and Dunore, Dunore/Drumaroad and Killylane in County Antrim. NI Water needs to keep its lead reduction strategy under review to ensure that it is able to demonstrate that treatment processes including orthophosphate dosing and pH control have been optimized and are effective.

Figure 5.2: Percentage of Tests Meeting the Interim and Final Standards for Lead, 2004 - 2013

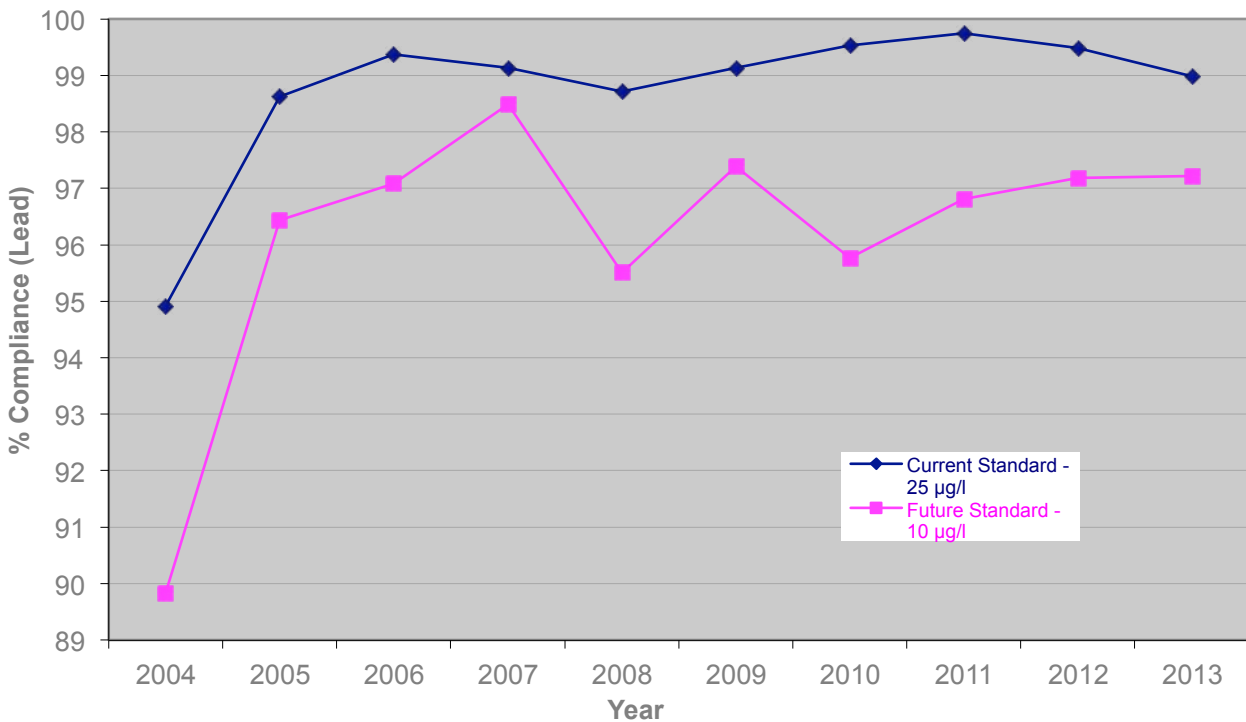
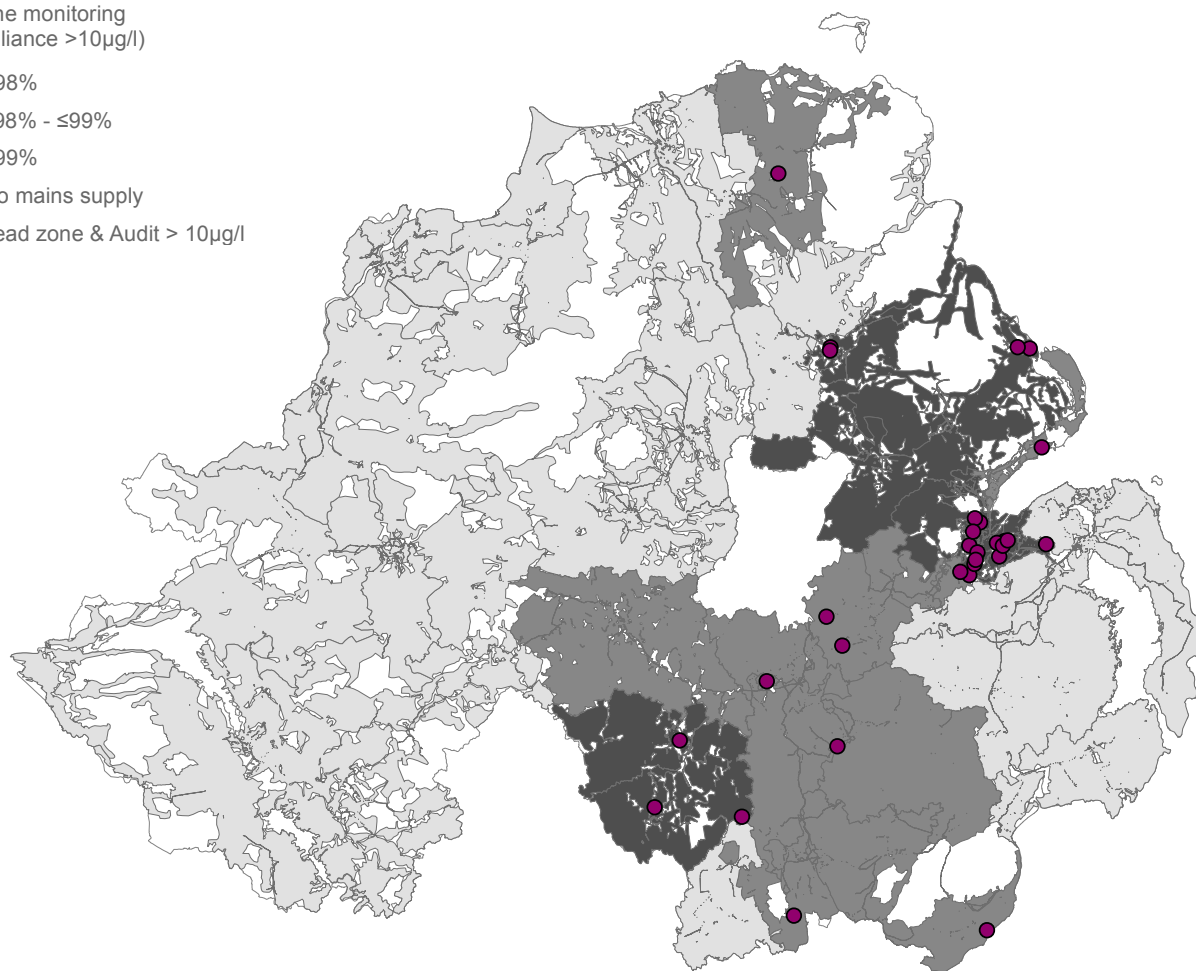
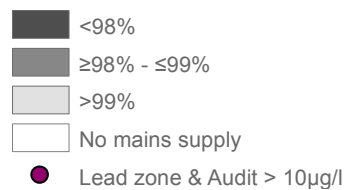


Figure 5.3: Lead Zone Monitoring, 2013 - Results >10µg/l

Lead zone monitoring
(% compliance >10µg/l)



Aluminium

Aluminium can occur naturally in many water sources, particularly those derived from upland areas. Aluminium compounds may also be used as part of the water treatment processes used in the 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 2013, a total of 1,876 samples were tested for aluminium: nine (0.48%) contravened the regulatory standard of 200 µg/l. This means the compliance level has been maintained from 2012 when 0.47% contravened the regulatory standard. One contravention was directly related to the serious event at Drumaroad WTWs in April 2013; two occurred in areas supplied from Drumaroad WTWs and were probably due to the disturbance of

residual aluminium in the distribution system following the event; three were related to disturbance of mains deposits; and after investigation the cause of the other three contraventions could not be determined. These mains deposits result from previous water quality events where inadequate treatment or poor control of the coagulation process has led to aluminium passing through the treatment works and into the supply, where it may have accumulated in the distribution network. NI Water must ensure that good operational performance is achieved at its water treatment works to ensure a continuous provision of safe, clean drinking water.

Odour

Naturally occurring substances which have odour properties are present in many water sources. 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.

In 2013, of the 1,800 samples taken for odour, six (0.33%) failed to comply with the regulations, marking a deterioration from 2012 (0.18%). One contravention was the recurrence of a local issue and the area has been put on a flushing programme; one was attributed to unrepresentative sampling; and after investigation, NI Water was unable to determine a reason for the other four contraventions. All follow-up samples were satisfactory.

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 normally removed by effective water treatment. Where treatment is inadequate, manganese and iron can accumulate in distribution pipes. A serious event occurred at Castor Bay Water Treatment Works in July 2013 when a significant increase in manganese levels at the raw water intake led to manganese contraventions in the works final water and in the related supply area (see Annex 4 for more detail). Manganese may also be present in old iron mains due to corrosion.

Of the 1,876 samples taken for manganese in 2013, the regulatory standard of 50µg/l was not met on five (0.27%) occasions, a marginal deterioration from 2012 (0.18%). On investigation, NI Water reported that the cause for four of these contraventions was most likely related to a disturbance of mains deposits. This was evidenced by aluminium, iron and turbidity contraventions for the same samples. The cause for the other contravention was not determined. All follow-up samples were satisfactory.

Nickel

The presence of nickel in drinking-water would indicate leaching from pipes and fittings within domestic distribution systems. Nickel may also be present in some ground waters as a consequence of dissolution from nickel ore-bearing rocks.

During 2013, one (0.25%) of the 396 samples tested for nickel contravened the 20µg/l regulatory standard. The cause of this contravention was not determined by NI Water. Follow-up samples, taken in response to this contravention, were all satisfactory.

Turbidity

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

Of the 1,876 samples taken in 2013, four (0.21%) failed to meet the turbidity standard of 4NTU for consumers' taps, a marginal improvement on 2012 (0.35%). NI Water reported that the cause for three of these contraventions was most likely related to a disturbance of mains deposits. This was evidenced by aluminium, iron and manganese contraventions for the same samples. The other turbidity contravention had a related lead contravention and after flushing was completely satisfactory. This area has been put on a flushing programme.

Taste

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

In 2013, of the 1,788 samples taken for taste, one (0.06%) failed to comply with the regulations. This contravention was the recurrence of a local issue and the area has been put on a flushing programme.

Other Pesticides

Of the 8,584 determinations, three (0.03%) contravened the regulatory standard of 0.1µg/l for the individual pesticide, MCPA. These occurred in the water being supplied from Clay Lake, Derg and Killyhevlin WTWs. More detail on pesticides can be found in Part 2 of this report.

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 fully interpreted without information being assessed from other monitoring data related to the contravention.

Results confirm the general safety of drinking water supplies, with a high level of microbiological quality compliance (99.55%) being achieved in 2013 as is shown in Table 5.2. This is a marginal improvement in compliance from the 99.43% reported in 2012.

NI Water was unable to determine the reason for 28 (56%) of these contraventions after its investigations. 21 (42%) of contraventions were attributed to unrepresentative sampling. It is important that sampling is representative and NI Water should thoroughly investigate the reasons for the high level of non-compliance due to unrepresentative sampling. The remaining contravention was due to cross contamination from an un-disinfected private water supply. The Inspectorate issued a Consideration of Provisional Enforcement Order (CPEO) regarding microbiological contraventions specifically within the Dunore Point WTWs distribution area in November 2013 (Refer to Annex 6 for more details).

Coliform Bacteria

In 2013 there has been an improvement in compliance with the coliform bacteria standard at consumers' taps. The level of compliance has marginally improved from 98.75% in 2012 to 99.04% in 2013. Of the 50 occasions coliform bacteria were detected in 2013, *E. coli* was also detected on seven occasions (see following section on *E. coli*).

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 to collect samples from consumers' taps are trained and accredited to ISO 17025 and DWTS (Drinking Water Testing Standard).

Clostridium perfringens, *E. coli* and Enterococci

The presence of bacterium such as, *Clostridium perfringens*, and *E. coli* is indicative of faecal contamination and they should not be found in any drinking water sample. Enterococci were not detected in any of the 396 samples taken at consumers' taps by NI Water in 2013.

There were 2,261 samples tested for *Clostridium perfringens* and two (0.09%) tested positive.

NI Water's investigation was unable to identify a reason for these contraventions. The water treatment works involved appeared to be operating normally at the time and all follow-up samples were satisfactory. All re-samples taken in response to these contraventions were compliant.

A total of 5,196 samples were tested for the presence of *E. coli* and seven (0.13%) tested positive. Investigation by NI Water were unable to determine a cause for four of these contraventions; two were attributable to consumers' taps or contamination at the time of sampling; and one was due to cross contamination from an un-disinfected private water supply. The level of *E. coli* compliance (99.87%) has been maintained. (Table 5.2 refers).

Table 5.2: Microbiological Quality at Consumers' Taps

Parameter	Number of Tests	Number of Tests not Meeting the Standards	% of Tests Meeting the Standards in 2013	% of Tests Meeting the Standards in 2012
Coliform bacteria	5,196	50	99.04	98.75
<i>Clostridium perfringens</i>	2,261	2	99.91	99.74
<i>E. coli</i>	5,196	7	99.87	99.87
Enterococci	396	0	100	100
Total	13,049	59		
% Compliance			99.55	99.43

NI Water Consumer Contacts

To enable us to make an assessment of consumer confidence in the quality of drinking water at consumers' taps, NI Water provided us with information on the complaints and concerns of its customers during 2013 (Table 5.3 refers). The total number of consumer contacts reported in 2013 was 7,087, compared to 6,188 in 2012. This is a significant increase of 14.5%.

As with previous years, the highest percentage of contacts and concerns continues to relate to the

appearance of drinking water, with 69.1% of the contacts in 2013 related to appearance (Figure 5.4 refers).

Appearance

Within the overall appearance categories we look closer at the reasons for the contact from consumers. A breakdown of consumer contacts regarding appearance from 2009 to 2013 is provided in Figure 5.5.

Table 5.3: Categories of Water Quality Contacts Received by NI Water in 2013

Contact Category		Number of Contacts
Appearance	Colour	3,465
	General	140
	Hardness	16
	Stained Washing	8
	White - Air	926
	White - Chalk	345
Taste and Odour	Chlorinous	383
	Earthy/Musty	196
	Other	423
	Petrol/Diesel	38
	TCP	31
Illness		81
Particles		261
Animalcules		2
Boil Water Notice		0
Other	Water Quality Concern - Campaigns	5
	Water Quality Concern - Incident Related - General	22
	Water Quality Concern - Lifestyle	10
	Water Quality Concern - Pets/Animals	5
	Water Quality Concern - Sample	463
	Water Quality Concern - Lead	149
	Water Quality (No Concern) Fluoride	1
	Water Quality (No Concern) Other Information	30
	Water Quality (No Concern) Water Hardness	75
	Water Quality (No Concern) Water Quality Report	12
TOTAL		7,087

Figure 5.4: Consumer Contacts and Concerns Received by NI Water in 2013

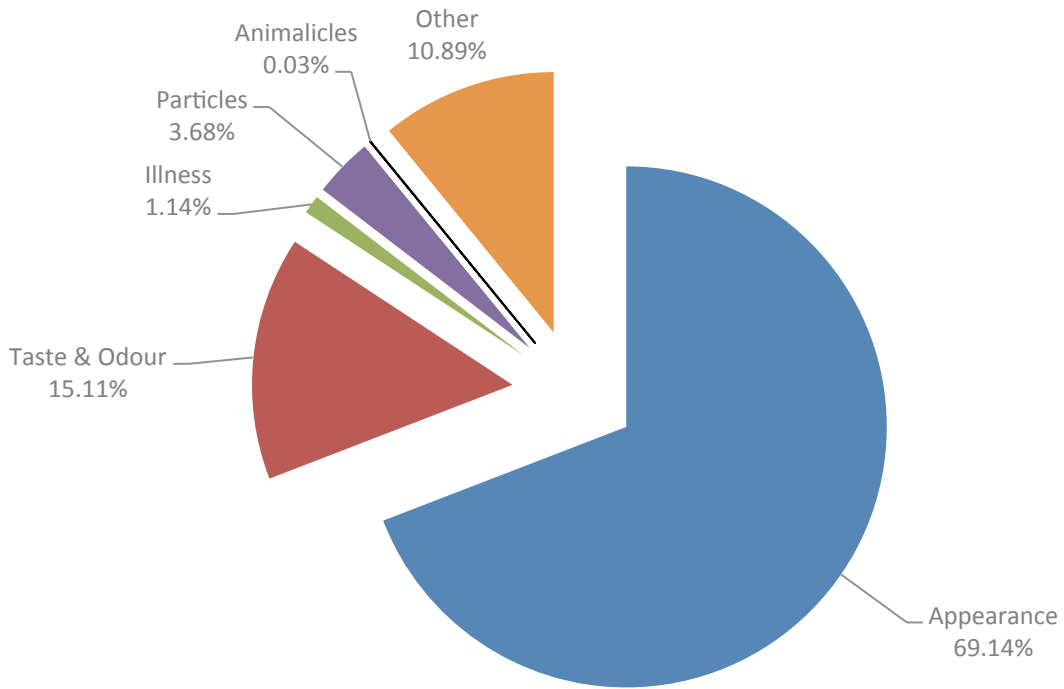
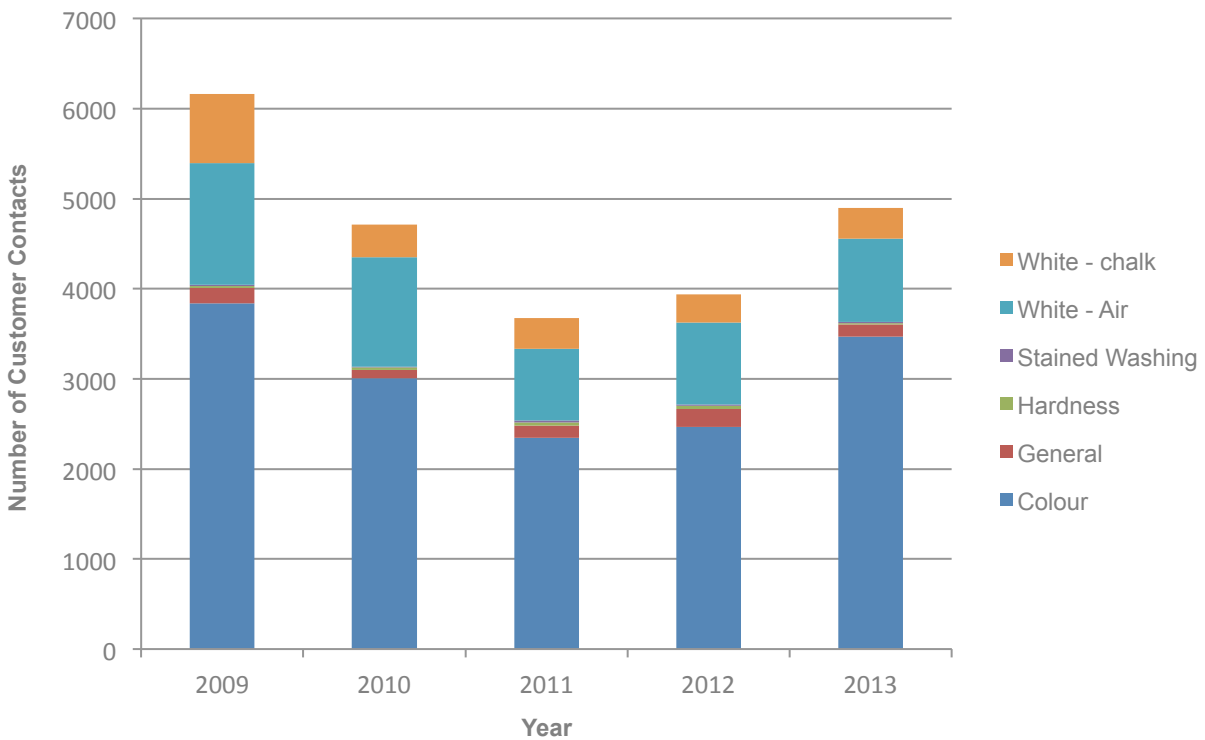


Figure 5.5: Number of Appearance Contacts by Categories, 2009 – 2013.



Colour

Within the appearance category, the main concern relates to discoloured water. 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). In 2013, consumer contacts regarding colour showed a very significant 41% increase from 2012.

The most likely cause for the discoloured water was operational work on the mains network in connection with the upgrade to the roads system in the area. NI Water has carried out a monthly flushing programme to minimise the problem.

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 the water being

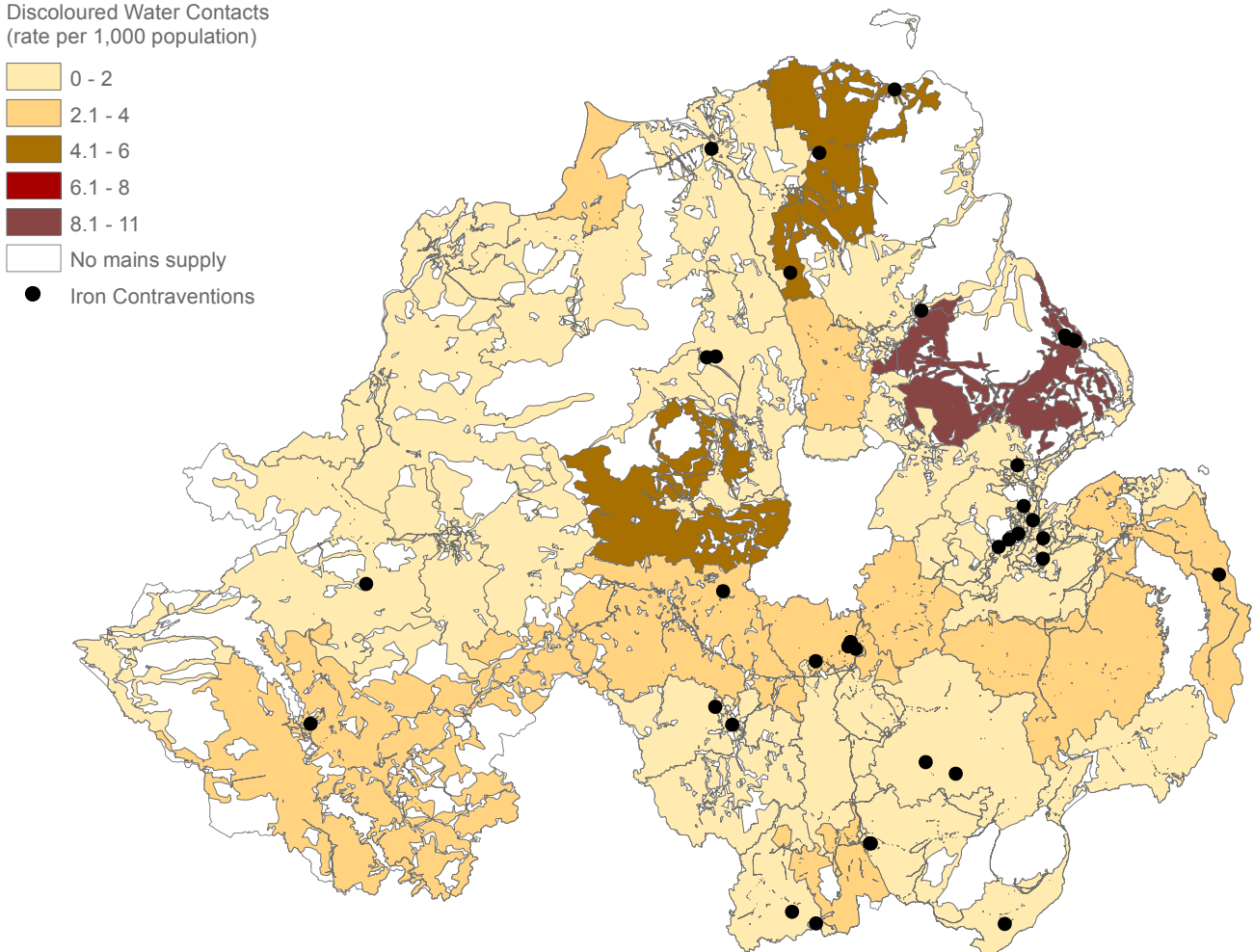
provided to consumers.

Figure 5.6 graphically illustrates the rate of consumer contacts per 1,000 population in water supply zones throughout Northern Ireland for 2013. Also included in the map is a plot of regulatory contraventions of the iron standard (>200µg/l). The map shows the highest rate of contacts was in the Killylane Ballynure Water Supply Zone. This high level of contacts can be partially attributed to a water quality event in the Mill Road area of Larne from April to September 2013 when residents' complained about the appearance of their drinking water.

White Water - Air

Another appearance concern is 'white water'. This is most commonly caused by air dissolved in the water, causing it to appear cloudy or milky white. 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.

Figure 5.6: Consumer Contacts per 1,000 Population Reporting Discoloured Water in 2013



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.

A map showing water hardness throughout Northern Ireland can be found in the DWI section of the NIEA website.

NI Water has recently updated their website to include a section on water hardness and water quality. To find out the water hardness in your area just follow the link www.niwater.com/water-hardness/ and enter your postcode. The water hardness results and a link to the latest public register will be displayed for the water supply zone in question.

Stained Washing

Brown or black staining of clothes can occur in clothes inadvertently washed in discoloured water. However, staining may also arise from faults with washing machines

Taste and Odour

All water sources contain naturally occurring minerals. Water also contains dissolved gases, such as oxygen and carbon dioxide, which give tap water a characteristic taste. There may be other substances present in the water which can also cause consumer complaints. One such substance, which is intentionally added to drinking water, is chlorine.

Other taste and odours should not be present in drinking water for aesthetic reasons (TCP or earthy/musty) or health reasons (petrol/diesel). Thirty-nine per cent of these concerns fall under the sub-category 'other', which covers a range of complaints from grassy and fruity to rotten eggs. Thirty-six per cent of taste and odour consumer

contacts in 2013 were related to a chlorinous taste and odour in the water.

Figure 5.7 illustrates the number of consumer complaints regarding taste and odour per 1,000 population reported throughout Northern Ireland in 2013. Clay Lake Keady Water Supply Zone had the highest rate of contacts where the majority of calls were received by NI Water during September and October 2013. These contacts occurred during the upgrade at Clay Lake WTWs when only one Granular Activated Carbon (GAC) filter was in operation. This resulted in inadequate taste and odour removal from the final water. The works upgrade is now complete with three GAC filters in operation. Also included on the map is a plot of the six odours and one taste detection reported from the compliance sampling programme.

Chlorinous

Some people are sensitive to the taste and odour of chlorine which is used to maintain hygienic conditions within the water supply network.

Petrol/Diesel

Spillages of petrol, diesel or paraffin can percolate through the soil and penetrate plastic water mains.

Earthy/Musty

Earthy and musty tastes can arise due to naturally occurring compounds present in raw waters that have not been removed by the treatment process

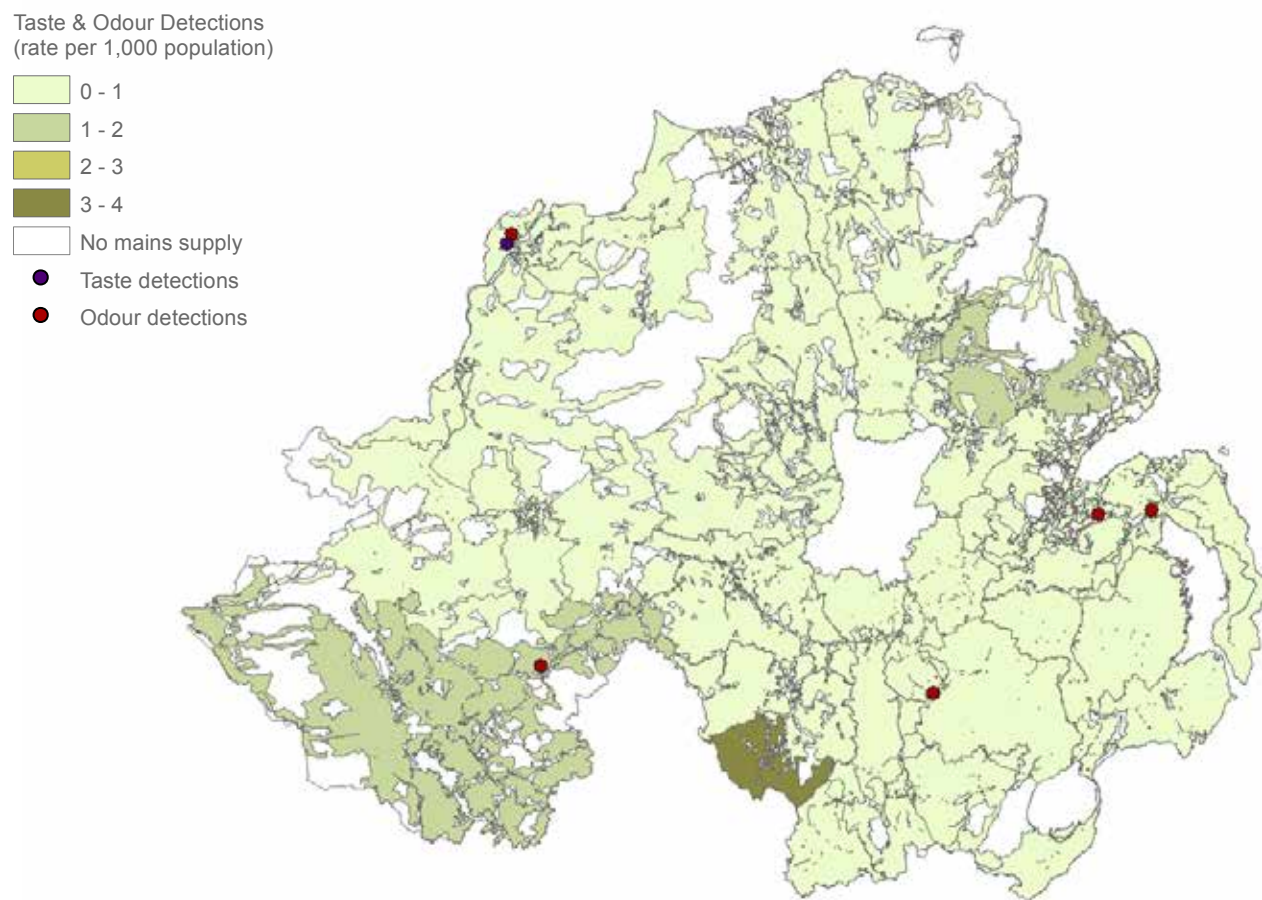
TCP

Phenolic tastes can occur when chlorine reacts with components in household appliances or plumbing. 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.

Figure 5.7: Rate of Consumer Contacts per 1,000 Population Reporting Taste and Odour in 2013



Animalcules

A small proportion of contacts received concern animalcules. Very occasionally, water systems can contain animals which may arise from the raw water, treatment works or within the mains themselves.

Samples at Public Buildings

NI Water, in undertaking its compliance monitoring programme, is required to randomly select addresses throughout Northern Ireland from which to take samples; some of these locations will be public buildings. In 2013, 189 samples were identified by NI Water as being taken from taps within public buildings.

From the 189 samples taken as part of its compliance monitoring programme, five contravened the drinking water quality standards for the following parameters:

- two for coliform bacteria: investigations report the most likely cause of these contraventions to be due to contamination from the tap at the time of sampling. All resamples were satisfactory;
- one for *E. coli*: investigations report the most likely cause of the contraventions to be due to contamination from the tap at the time of sampling;
- one for iron: investigations concluded that the cause of the contravention was due to the condition of the mains. The area is currently awaiting mains replacement and is on a monthly flushing programme until this has been completed; and
- one for odour (fuel): investigations were unable to determine a reason for this contravention. No customer complaints were received regarding fuel/hydrocarbon odours within the area and all resamples were satisfactory.

There were no instances where it was determined that the contraventions reported under the compliance monitoring programme were due to the internal distribution system in the building and thus required to be reported under the Water Supply (Domestic Distribution System) Regulations. There were, however, four failures notified to us under these regulations from NI Water's operational and survey sampling programme. The details of these notifications are reported on in Part 1 under 'Water Quality Related to Domestic Distribution Systems'.

Sampling and Analysis Frequencies

The regulations set out sampling and parameter analysis requirements which demonstrate the wholesomeness of drinking water supplies. We undertake an assessment of these regulatory requirements throughout the water supply chain: at water treatment works; at service reservoirs; and in water supply zones.

For any water supply zone that has a standard annual sampling frequency for a parameter set below 50, then we assess any shortfall in the sampling programme for that parameter as non-trivial. Where the annual sampling frequency is set for 50 samples or more, a shortfall of the regulatory sampling requirements of 2% or more of the total will be assessed as non-trivial.

Based on the compliance assessment of the regulatory requirements for sampling and analysis, which is made on an individual parameter basis, NI Water has generally met the requirements. Notwithstanding this, during 2013, out of the 51,068 determinations carried out on samples taken from consumers' taps, we identified a shortfall of 164

determinations. This deficiency in the requirements was attributed to the two parameters: taste, and odour. Tables 5.4 and 5.5 detail the number of water supply zones where the shortfall was considered as non-trivial.

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. These plans also require NI Water to undertake a risk assessment of potential issues within the distribution system which also includes general risks which may be identified within properties.

Some of these control measures are the responsibility of NI Water; others such as internal plumbing at domestic households are the responsibility of the owner.

Where there is a potential risk to the drinking water supplies from internal pipe work within domestic, industrial or other properties, NI Water are required to advise the owner what steps the property owner can take to safeguard their supply of drinking water, and, where required, to protect public health.

To prevent potential contamination, the Water Fittings Regulations require 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.

Table 5.4: Summary of Non-Trivial Sampling Shortfalls for Taste

Number of Water Supply Zones	Water Supply Zones with Sampling Shortfalls for Taste		Water Supply Zones with Non-Trivial Sampling Shortfalls for Taste	
	Number	%	Number	%
50	44	88	43	86

Table 5.5: Summary of Non-Trivial Sampling Shortfalls for Odour

Number of Water Supply Zones	Water Supply Zones with Sampling Shortfalls for Odour		Water Supply Zones with Non-Trivial Sampling Shortfalls for Odour	
	Number	%	Number	%
50	42	84	39	78

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/information-leaflets

Further Sources of Information for consumers


If you want to find out about the quality of drinking water supplied to your home or workplace, or if you have a drinking water quality concern or complaint, then you should first contact NI Water at its Customer Service Unit on 08457 440088 (further details can be found in Annex 10).

If you have discussed your concerns with NI Water and feel that the issue has not been satisfactorily resolved, you may contact the Consumer Council for Northern Ireland on (028) 9031 1575 (see Annex 10 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/information-leaflets

Looking for a plumber - WaterSafe is the new online search facility and assurance scheme for sourcing a qualified plumber (see Annex 9 for more details).

General information on drinking water quality matters is also available on the DWI section of the NIEA website

The image shows three large, blue, cylindrical water storage tanks. They are mounted on a blue steel structure. The tanks have a corrugated metal texture and are secured with horizontal metal bands. The background is a clear, bright sky. In the foreground, there is a blue steel walkway or platform with a railing. Below the tanks, there are various pipes and mechanical components, including a large blue cylindrical tank and a white rectangular unit.

Section 2

Private Water Supplies

Section 2

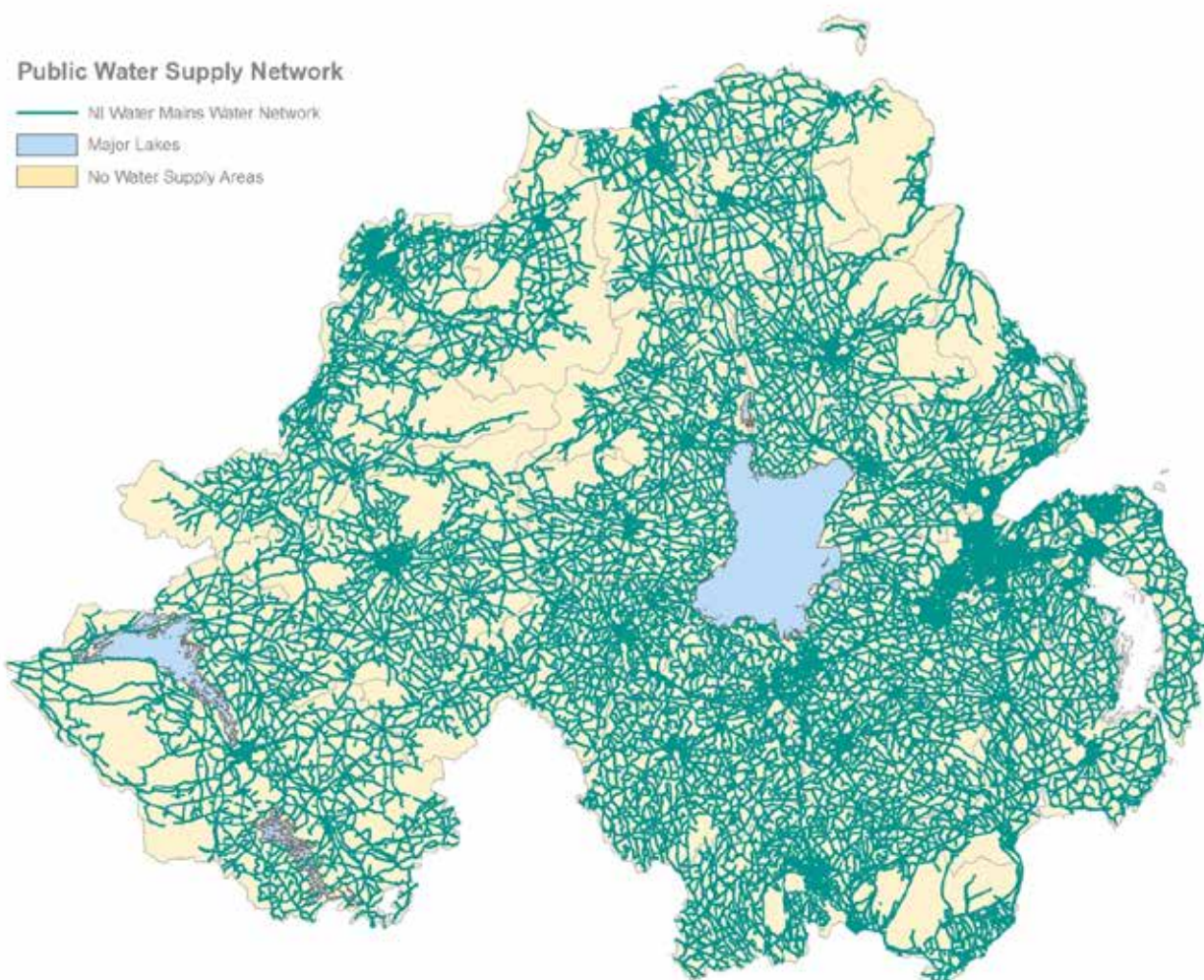
Private Drinking Water Supplies

- 128 registered private water supplies in 2013, including 12 new sources
- 86% are large or commercial / public supplies; and 14% are small domestic supplies
- 99% of the supplies are from groundwater sources: 1% from surface sources
- Of the 10,669 samples taken, 99.05% complied with the regulatory standards
- Full compliance was achieved for 62% of registered private water supplies
- 19 parameters did not achieve full compliance with the regulatory standards
- Corrective actions completed for 16 supplies to remove the restrictions on their use

NI Water supplies water to over 99% of the Northern Ireland population; the remainder of the population is served by private water supplies. The extent of the NI Water mains network in Northern

Ireland is shown in Figure 1.1. The areas of no water supply are those areas where domestic properties are most likely to be served by a private water supply.

Figure 1.1: NI Water Mains Network (and no water supply areas) in 2013



Consumers often assume the water they are drinking is the public water supply. Although the number of people directly served by a private supply may be small, many more people are exposed to them through their use in both commercial activities and public buildings. In Northern Ireland, private water supplies are often used as an alternative to or in conjunction with the public water supply for a range of activities (see Figure 1.2):

- holiday accommodation such as hotels or bed & breakfast facilities;
- public buildings such as hospitals, care homes or universities; and
- food processors i.e. in the manufacture of food and drink products.

Register of Supplies

There were a total of 128 supplies on our register in 2013. A review of the extent of the NI Water mains network, undertaken by the Department of Regional Development (DRD) in 2010, identified properties potentially not connected to the public water supply. Based on this, it is estimated that there are approximately a further 1,200 private supplies to single private dwellings. These single private dwellings are not required to be monitored under The Private Water Supplies Regulations (Northern Ireland) 2009. The Environmental Health departments of local councils may test these supplies on request. The quality of water required within primary production (including dairy farms) is under consideration by the Food Standards Agency.

The information held on registered supplies is required to be kept up-to-date and reviewed on at least an annual basis. During 2013, the private water supplies sampling programme required adjustment where: the nature or purpose of supplies changed; sites switched to the public water supply; and new supplies were notified to us.

The larger commercial / public premises using private water supplies tend to be located in urban areas or in rural locations where access to the public water supply is also available. Many of these sites maintain a connection to the public water supply as a contingency or operate a dual supply whereby the public water supply is used for certain activities at the site or blended with the private water supply to supplement it. Private water supplies to small domestic properties are usually situated in the more remote, rural parts of Northern Ireland where access to the public water supply is not a feasible option.

Private water supplies may be drawn from either surface or groundwater sources. Surface sources can include streams, rivers and reservoirs; groundwater sources include wells, boreholes and springs. The majority (99%) of private supplies in Northern Ireland are from groundwater sources, most commonly, boreholes.

Photographic examples of registered supplies are shown in Figure 1.3. These demonstrate some aspects of good and bad practice in the positioning, construction and completion of private water supplies

Figure 1.2: Categories of Private Water Supplies in Northern Ireland in 2013

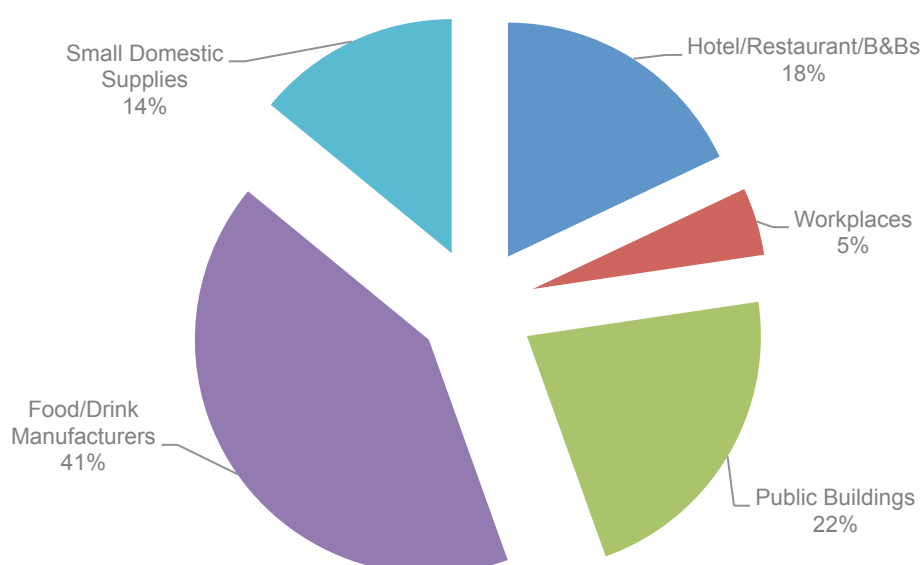


Figure 1.3: Sources of Private Water Supplies

Good Practice

Secure borehole sited in restricted area of car park



Stock-proof fence around sealed well-head



Water-tight, lockable cover; sloping concrete apron



Capped liner; vermin-proof chamber, drain fitted



Bad Practice

Unsecure borehole located under parked cars



Gaps in chamber around well-head; no fence



Loose metal cover; flush with surrounding area



Uncapped liner; unsealed chamber; no drain



Monitoring of Supplies

An annual sampling programme is 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.

Of the 128 private water supplies on our monitoring schedule for 2013, 86% are large or commercial/public supplies; and 14% are small domestic supplies (groupings of two or more houses). A breakdown of the numbers and types of private water supplies and the number of compliance samples collected for each in 2013 is shown in Table 1.1.

A total of 12 new sources registered with us in 2013, these included:

- four large public supplies;
- three hotel/catering facilities;
- one food/drink manufacturer;
- a small caravan park; and
- three small domestic supplies serving two or more properties.

Although the sampling frequency for compliance sampling is set within the 2009 Regulations, many additional samples are lifted throughout the year during follow-up investigations into non-compliances. In addition, where necessary, sites can be put on an increased sampling frequency for a set period of time to monitor any parameters identified as a risk in the supply. During 2013, a total of 113 ancillary samples were collected. These investigative and increased frequency samples are not included in the calculation of the overall compliance for private water supplies.

A breakdown of registered private water supplies in Northern Ireland in 2013, categorised by size, is shown in Figure 1.4. All district councils, with the exception of Banbridge, Carrickfergus and North Down, had private water supplies included in our 2013 sampling programme.

Risk Assessment

The Private Water Supplies Regulations (Northern Ireland) 2009 require a risk assessment to be carried out for each supply, within six months of registration, to identify areas where there may be potential risks to the water quality. This assessment includes the whole private water supply system, from source to the point where the water is used. These assessments are similar to the drinking water safety plans in place for the public water supply.

A total of 13 risk assessments were undertaken in 2013 for newly registered supplies. The information gathered through this process is used to determine any actions needed to reduce or mitigate against the risks identified. The risk assessment is required to be updated where there have been significant changes made to the supply.

The risk assessments have also been used to adjust the monitoring programme at private supplies. In 2013 where the risk assessment and previous results indicated that specific parameters were unlikely to be present, and were of low risk, the monitoring for these parameters was removed or reduced. Equally, where a risk was identified additional monitoring was undertaken to quantify the risk.


Table 1.1: Numbers and Types of Private Water Supplies in 2013

Types of Private Water Supplies - Volume (m ³ /day)	Number of Supplies	Number of Compliance Samples Collected
(i) Large or Commercial/Public Supplies		
>1000 ≤2000	2	20
>100 ≤1000	19	66
>10 ≤100	51	98
≤10	38	36
(ii) Small Domestic Supplies (two or more dwellings)		
≤10	18	18
TOTAL	128	238

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

Figure 1.4: Distribution of Registered Private Water Supplies by Council Area in 2013



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

We revised the suite of pesticides we tested for in the 2013 monitoring programme. This new suite was based on a review of the historical monitoring data from both our sampling and that of the groundwater monitoring carried out under the Water Framework Directive; pesticide monitoring results for the public water supply (NI Water); and pesticide usage data from the Department of Agriculture and Rural Development (DARD).

Overall Drinking Water Quality

We have been monitoring the quality of private water supplies since 1999, and 2013 provides the fourth year of monitoring data under the 2009 Regulations. These regulations apply equivalent drinking water quality standards to private water supplies as to the public water supply. While a

similar number of private water supplies are registered with us as in previous years, following a review of the sampling programme, individual risk assessments and historical monitoring data, there was an overall increase in the number of parameters analysed for at each supply in 2013.

The results in Table 1.2 show that, out of a total of 10,669 tests carried out in 2013, 99.05% met the regulatory standards. The regulatory requirements were not met on 101 occasions for 19 parameters, namely: coliform bacteria; Enterococci; iron; manganese; turbidity; *E.coli*; trihalomethanes; total pesticides; ammonium; hydrogen ion; tetrachloroethene and trichloroethene; colour; aluminium; *Clostridium perfringens*; individual pesticides (phenanthrene, glyphosate, Mecoprop, MCPA); sulphate; bromate; sodium; and chloride.

Table 1.2: Overall Water Quality in Private Water Supplies in 2013

Parameters	Determinations in 2013		
	Total No. of Tests	No. of Tests not Meeting the Standards	% Compliance
Coliform bacteria	237	27	88.61
Enterococci	125	9	92.80
<i>E. coli</i>	237	5	97.89
<i>Clostridium perfringens</i>	219	1	99.54
Microbiological Total	818	42 (5.13%)	94.87
Iron	220	12	94.55
Manganese	220	12	94.55
Turbidity	238	7	97.06
Trihalomethanes	106	3	98.11
Total pesticides	107	2	98.13
Ammonium	220	4	98.18
Hydrogen ion (pH)	238	4	98.32
Tetrachloroethene and Trichloroethene	98	1	98.98
Colour	220	2	99.09
Aluminium	220	2	99.09
Individual pesticides	6766	5	99.93
Nitrite	219	0	100.00
Nitrate	219	0	100.00
Other parameters	654	0	100.00
Sulphate*	10	1	90.00
Bromate*	28	2	92.86
Sodium*	34	2	94.12
Chloride*	34	1	97.06
Chemical Total	9,851	59 (0.60%)	99.40
Overall Total	10,669	101 (0.95%)	99.05

*Parameters on reduced monitoring frequency

The low compliance figures for sulphate, bromate, sodium and chloride are a consequence of the low number of tests performed for these parameters as they were not routinely tested for in all supplies in 2013. Apart from newly registered supplies where all four parameters were included: bromate was only tested for at sites where chlorination was in use; sodium was only included where softening was practised; chloride and sulphate were only included where a supply had a history of contraventions for these parameters.

Full compliance was achieved for 62% (79 sites) of the private water supplies tested. Of the 38% (49 sites) which did not comply with the regulatory standards:

- 30 use the private water supply as the primary source of drinking water;
- 12 use the water for the washing of equipment and surfaces in contact with food or drink;
- six use the supply as an ingredient in food or drink; and
- one is used solely for personal hygiene (showers, wash hand basins).

These contraventions are investigated and addressed through: restrictions on the use of the supplies; the implementation of corrective action such as better source protection or installation of, or improvement to treatment systems; and improved maintenance programmes.

A comparison of the monitoring data since the introduction of the regulations in 2010 shows a variability in compliance: 98.33% in 2010; 98.08% in 2011; 97.66% in 2012; and 99.05% in 2013 (Figure 1.5 refers). No trends can be taken from these figures as they are not comparing like with like due to changes in the number and types of supplies and the year-on-year revisions to the sampling programme. In particular, the number of compliance tests in 2013 was substantially greater at 10,669 compared with only 6,121 in 2012; 7,867 in 2011; and 7,411 in 2010. This is contributed to by the increased number of pesticides tested for in private water supplies in 2013.

For microbiological results, the number of tests undertaken, although small, is comparable with previous years, with 733 in 2010; 768 in 2011; 822 in 2012; and 818 in 2013. Though there has been an increase in the level of microbiological compliance in 2013 with 94.87% reported, compared to 93.80% in 2012, this is not considered to be significant. The increased compliance was due, in some part, to a number of supplies with a poor level of microbiological compliance being taken out of service.

Microbiological contraventions account for 42 (41.6%) of the 101 contraventions at private water supplies in 2013. These contraventions occurred at 27 out of 128 sites and continue to be a concern with 10 (37%) supplying domestic properties and 17 (63%) serving commercial or public premises.

Priority was given to advancing improvements to the water quality through:

- provision of advice and guidance;
- agreeing action plans (particularly at the larger commercial / public sites); and
- promotion of water safety plans for the ongoing management of these supplies.

Contraventions of the chemical standards have been reported for a range of parameters listed in Table 1.2. Although there has been a significant increase in chemical compliance in 2013 (see Figure 1.5), this is enhanced to some extent by the increased number of compliant pesticides tested for in 2013 compared with 2012.

Overall, the number of chemical contraventions has decreased from 92 in 2012 to 59 in 2013. Food or drink manufacturing sites account for 19 out of the 28 sites showing chemical contraventions. As with previous years, where the standards have not been met, they relate mainly to contraventions for iron (5.45%) and manganese (5.45%). A comparison of the levels of compliance for iron and manganese in private water supplies over the last four years is shown in Figure 1.6. The significant increase in compliance for these parameters, rising from 87.67% for both in 2012 to 94.55% in 2013, is influenced by sites with a history of contraventions for iron and manganese no longer being used as a private water supply.

Figure 1.5: Comparison of Compliance in Private Water Supplies, 2010 - 2013

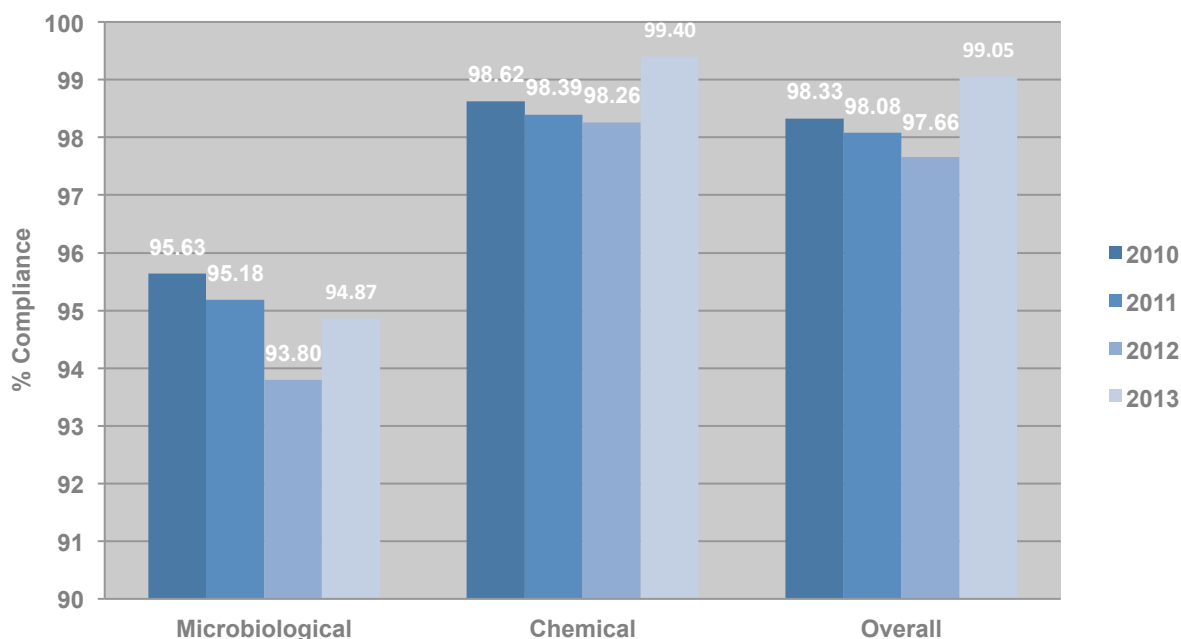
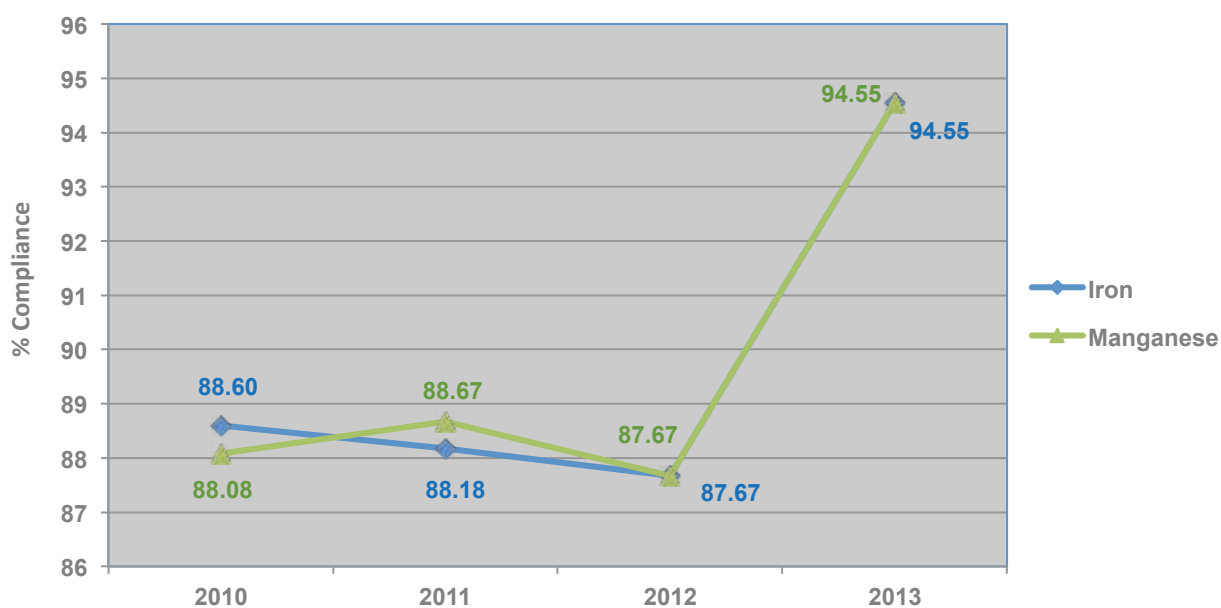


Figure 1.6: Compliance for Iron and Manganese at Private Water Supplies in 2010 - 2013



Factors Affecting Drinking Water Quality

A summary of the aspects of the water supply chain contributing to the 42 microbiological and 59 chemical contraventions reported in 2013 is presented in Figure 1.7. The categories are divided into catchment (including source protection), treatment, distribution and sampling point (tap) issues.

Catchment

Inadequate source protection was identified as the cause of 79% of microbiological contraventions at private water supplies in 2013. From a total of 128 supplies monitored during 2013, 27 sites failed to be microbiologically satisfactory: 17 (63%) of these were from untreated supplies mainly in rural areas with poor levels of source water protection.

Water supplies in the vicinity of farmland, where animals graze or manure is spread, are most at risk. This is particularly noticeable at times of heavy rainfall, when water may run directly off farmland and carry micro-organisms into unprotected private supplies. Guidance on source protection is available in the Private Water Supplies Technical Manual (see Annex 9 for details).

Microbiological contraventions were reported for seven commercial sites with poor source protection. These were supplies to small business operators where no disinfection treatment was present. In these instances, adequate source protection is crucial, however, where there is a known risk of

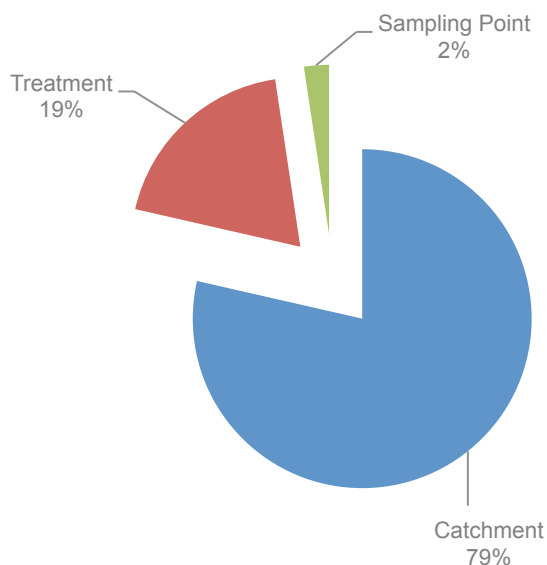
microbial contamination, the installation of appropriate disinfection treatment is recommended. Of the seven sites, ultra-violet disinfection treatment was put in place at two; three sites switched to using an alternative supply of drinking water; and the remaining two sites reassessed their source protection.

There were five pesticide contraventions noted at four private supplies in 2013. These pesticide failures occurred for a river abstraction supply, where the water is used for washing down only, and three borehole supplies, where the water is used as drinking water. Trace levels of pesticides below the regulatory limit of 0.10µg/l for individual pesticides, and 0.030µg/l for heptachlor epoxide, were also detected at 22 other sites in 2013. A summary of the pesticide detections in 2013 is presented in Table 1.3; the individual pesticides which were non-compliant with the regulatory standards in 2013 are highlighted in bold. Pesticides should not be stored or sprayed within the vicinity of drinking water sources. Where pesticides are of concern in the vicinity of a private supply, appropriate measures should be put in place to reduce the risk of them entering the water supply through good practice in the management of the catchment area and improved source protection.

DARD is responsible for the implementation of legislation on agricultural pesticides and plant protection products in Northern Ireland. The Plant Protection Products (Sustainable Use) Regulations (Northern Ireland) 2012 has a number of provisions

Figure 1.7: Aspects of Water Supply Chain Affecting Compliance at Private Water Supplies in 2013

(a) Microbiological Contraventions



(b) Chemical Contraventions

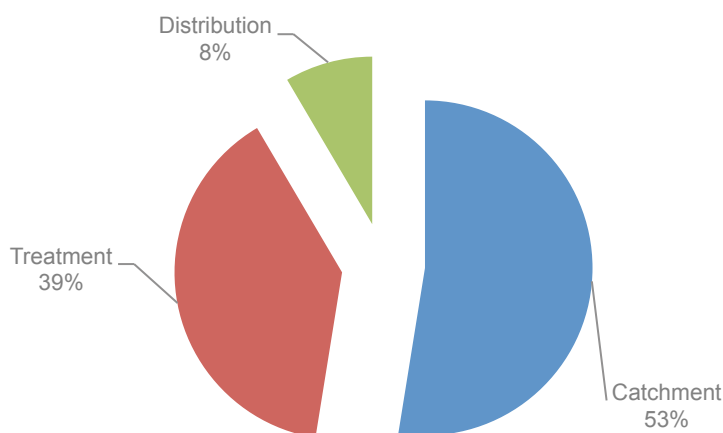


Table 1.3: Pesticide Detections in Private Water Supplies in 2013

Pesticide	No. of Supplies	Maximum Value Detected (µg/l)
Simazine	8	0.046
Atrazine	7	0.047
MCPP	5	0.660
Phenanthrene	5	0.115
MCPA	3	0.466
Glyphosate	2	0.128
2,4-D	2	0.048
Hexachlorobenzene (HCB)	2	0.005
Clopyralid	1	0.026
Asulam	1	0.023
Linuron	1	0.021
Pentachlorophenol	1	0.020
Bentazone	1	0.018
Diuron	1	0.014
Heptachlor epoxide	1	0.005

aimed at achieving the sustainable use of pesticides, by reducing risks and impacts on human health and the environment, which includes measures on protecting water, and promotion of low pesticide usage regimes. A Code of Practice for using Plant Protection Products published by DARD provides practical advice on how to use pesticides and plant protection products safely and so meet the legal conditions which cover their use.

Some groundwaters can contain high levels of naturally occurring iron and manganese. Of the 24 contraventions reported for these metals in 2013, 22 were due to the quality of the source water. High levels of iron and manganese may affect the

appearance, taste or smell of the water resulting in turbidity, colour, taste and odour contraventions. Their presence at high levels can interfere with the disinfection process. There are effective treatments which can be installed to reduce the levels of these metals in private supplies. Five sites currently using these technologies failed to meet the standards for iron and/or manganese due to the treatment not being maintained or operated effectively. Further information on these treatment options is available in the Private Water Supplies Technical Manual (see Annex 9 for details).

The private water supplies regulations require the monitoring of supplies for radioactivity with

parametric values set for Total Indicative Dose (TID) at 0.10mSv/year (excluding tritium, potassium-40, radon and radon decay products) and tritium at 100Bq/l. The requirement to undertake this radiochemical monitoring can be excluded where no potential risk is identified. A survey of all registered private water supplies, commenced in 2012 to inform the assessment of the potential risk, was completed in 2013.

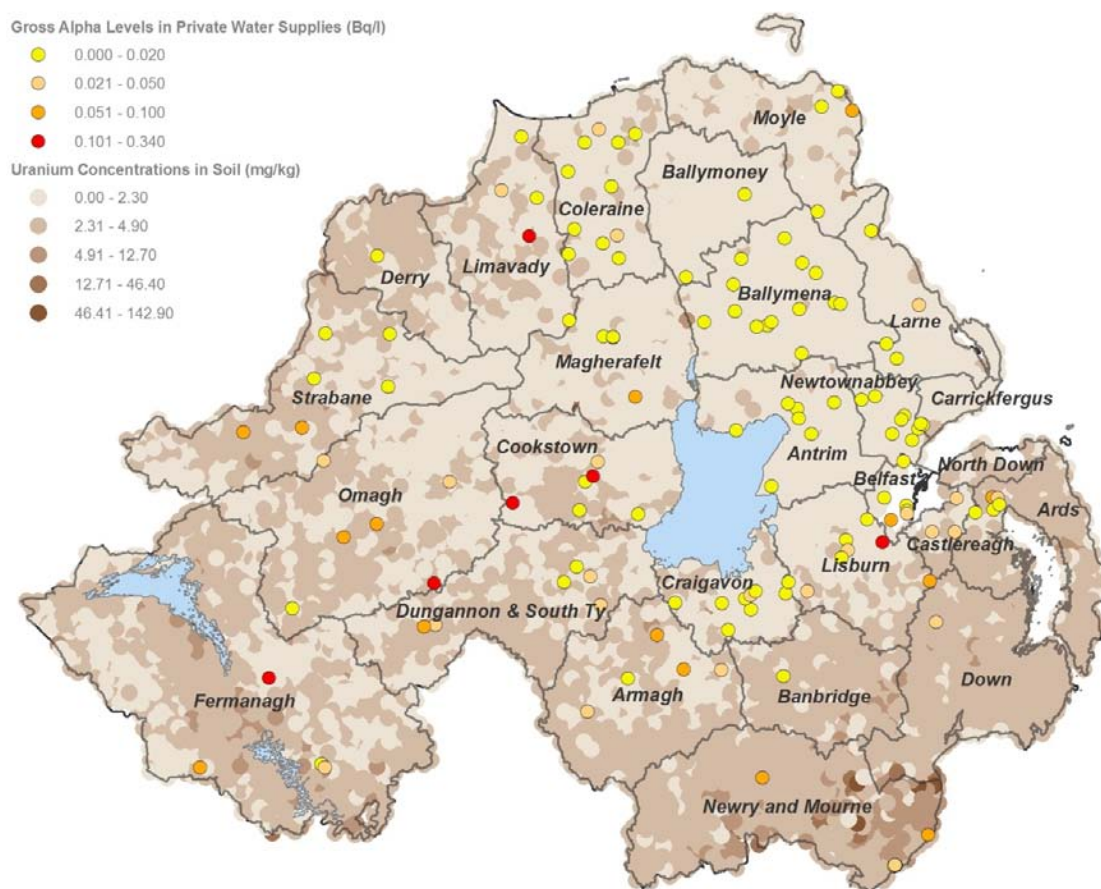
A total of 134 supplies over the two year period were screened for gross alpha and beta activity (used for the calculation of TID) and tritium. All supplies were found to be compliant with the regulatory standards for TID and tritium however, six sites required follow up sampling due to the level of gross alpha activity being reported above the trigger level of 0.1 Bq/l in the initial samples. These follow up samples confirmed slightly elevated levels of gross alpha activity, between 0.11 and 0.34 Bq/l, in the water supply at five of these sites.

For most sources of drinking water in the UK, most if not all of the radioactivity is expected to be of natural origin. Most gross alpha activity can be

accounted for by such naturally-occurring radionuclides as uranium-234, -238, -235 and radium-226. Radiochemical speciation and measurement of the level of chemical uranium was used to determine the source of the gross alpha activity in these five supplies. The results indicated that natural uranium in the rocks from which the groundwater is drawn was the primary contributor to the gross alpha activity. Following consultation with the Public Health Agency it was concluded that there was no associated health risk from drinking these water supplies.

The map in Figure 1.8 shows soil concentrations for uranium in Northern Ireland overlaid with the levels of gross alpha activity recorded for the 134 private water supplies tested. It can be seen that the higher levels of gross alpha activity were primarily found in private water supplies to the south and west which correlates with the areas showing higher soil concentrations for uranium, whereas lower levels of gross alpha activity were reported for supplies in the north-eastern area where the soil concentrations for uranium are lower.

Figure 1.8: Gross Alpha Activity Levels for Private Water Supplies in 2012-2013



Soil data reproduced from the Tellus data with the permission of the Director of the Geological Survey for Northern Ireland.
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A new Directive was published by the European Union in November 2013, Council Directive 2013/51/Euratom. This Directive, which is to be transposed into national legislation by November 2015, sets out new requirements for the monitoring of radioactive substances in waters under the scope of the Drinking Water Directive. In particular, it introduces a new standard for radon in drinking water supplies of 100 Bq/l. Member States may however set a parametric limit for radon between 100 and 1000 Bq/l based on historical data, representative surveys and an assessment of the risk of radon in water supplies. Work to determine the appropriate parametric value for radon in Northern Ireland is underway and is to be completed in advance of any legislative changes being introduced to the monitoring programme in 2015.

Treatment

During 2013, a significant number of microbiological contraventions, 19%, were due to a failure to appropriately maintain existing treatment systems. These contraventions highlight an ongoing area of concern for private supplies serving larger premises where treatment is not being operated correctly, routinely checked, or maintained. We continue to work with the owners/users of these supplies to put procedures in place to address these issues and encourage sites to develop 'Water Safety Plans' for the management of their water supplies.

We continued our monitoring programme during 2013 for disinfection by-products (DBPs) at 26 sites where chlorination is used as the means of primary disinfection of their water supply. Non-compliances were reported for the DBP, trihalomethanes, at two food manufacturing sites, where the water is used for the washing of surfaces and equipment. These contraventions were determined to be due to inadequate treatment of the source water and poor management of their chlorination process. An additional two food manufacturing sites reported non-compliances for bromate due to the inappropriate storage and use of poor quality hypochlorite.

A total of nine sites using chlorine dioxide treatment were monitored for the DBPs, chlorite and chlorate. Four of these sites are food manufacturers where the water is used for the washing down of equipment and surfaces used in the manufacturing process. The other five sites are used as a supply to which the public has access: three healthcare facilities; and two educational institutions. Raised levels of chlorite were detected at four sites – three public sites and one food manufacturer. The public

supply sites were kept on increased frequency with monthly sampling. The information gathered through this increased monitoring is used to assess the risk associated with DBPs at these sites and determine what action may be required.

It is a requirement of the regulations that any product or substance introduced to a private water supply must be approved for use. A list of products approved for use in the public water supply is published. This list equally applies to private water supplies and provides national conditions of use for chlorine dioxide disinfection. It requires that the dosing of chlorine dioxide should be controlled so that the combined concentration of total oxidants does not exceed 0.5 mg/l. It is the responsibility of owners to demonstrate that the design, operation and maintenance of the disinfection process ensures that disinfection by-products are as low as possible without compromising its effectiveness for the disinfection of drinking water.

Distribution

A small number of iron contraventions, 3 out of 12 (25%), reported for private water supplies in 2013 were due to cast iron pipe work and/or storage tanks within the distribution system. High levels of iron in a water supply can cause aesthetic problems including a metallic taste and discoloration. Staining of water fittings, such as ultra-violet lamps, due to metal deposits can lead to a reduction in their effectiveness for disinfection. Sites are encouraged to clean out storage tanks and flush through pipe work or, where required, replace parts of their distribution network to reduce the levels of iron in their supplies.

The levels of lead detected in private water supplies in 2013 were in the range 0.4-14 µg Pb/l. Only one site was identified as needing to take corrective actions to replace old lead pipe work in order to comply with the 10 µg/l standard for lead which applies from December 2013.

Another issue which can arise through lack of maintenance of distribution systems is raised levels of colony counts in supplies. This occurred at four out of 128 sites in 2013. Colony counts are useful in assessing the cleanliness and integrity of distribution systems. High levels of background bacterial growth can often lead to an increase in taste and odour complaints. Owners are advised to flush and disinfect their distribution network to rectify this problem. Guidance on carrying this out is available in BS 8558:2011: Guide to the design, installation, testing and maintenance of services

supplying water for domestic use within buildings and their curtilages. A document on ‘Water Safety in Buildings’, published by WHO, is also available and provides guidance for managing water supplies in buildings (see Annex 9 for details).

Sampling Point

The compliance sample point for private water supplies is post any treatment and should be representative of the water supply at the point of use. To prevent contamination being introduced when samples are being collected, Environmental Health staff use approved sampling procedures.

Samplers are trained to collect the samples required as part of the regulatory monitoring programme to help ensure the integrity of the sample is not compromised. Guidance on sampling of water supplies is available in the ‘Private Water Supplies Sampling Manual: A Field Guide’. In 2013, one out of 42 microbiological contraventions was attributed to unrepresentative sampling.

There were no contraventions, such as for nickel, reported in 2013 due to the use of inappropriate fixtures and fittings. It is however important to remember that only products and substances approved for use with drinking water supplies should be used in contact with the water. In addition, plumbing systems should be designed and installed to reduce the risk of contamination of water supplies through inappropriate cross connections or misuse of fittings. The Water Regulations Advisory Scheme web site provides guidance on this.

Reporting and Health Risks

All contraventions of the regulatory standards at private supplies are reported to the owners and users of the supplies through the relevant district council who have been involved in the sampling of the supply. We work closely with local Environmental Health departments in the investigation of contraventions to establish the cause and identify any remedial actions needed to restore a wholesome water supply.

Where the contravention has occurred at a private water supply used in primary food production, such as meat processing, or in a workplace as drinking water for staff, we also liaise with Veterinary Officers from DARD and Health and Safety Executive staff respectively.

Contraventions are investigated through site visits conducted by Environmental Health staff and the collection of follow up samples. Depending on the nature and significance of the contraventions, it may also be necessary for us to carry out a site inspection. The owners/users of the supply are provided with practical advice on source protection and treatment options and best practice for the continual management of their water supply to reduce the potential risks of contamination.

Any contraventions at private water supplies where the water is used as an ingredient in food production or as drinking water which are considered as a risk to health are reported to the Public Health Agency (PHA) for appropriate health advice. Where necessary, the regulations contain a provision to issue Notices which can be used to restrict or prohibit the use of a supply. The World Health Organization (WHO) publication ‘Guidelines for drinking-water quality’ (fourth edition) provides detail on the significance, occurrence and removal of microbial and chemical hazards in drinking water, and the preventive risk management approach for ensuring drinking water quality.

In 2013, 33 contraventions were notified to PHA: 21 microbiological (coliform bacteria, *E. coli*, Enterococci) and 12 chemical (manganese, turbidity, trihalomethanes, tetrachloroethene, iron, chlorate, chlorite and odour). As a consequence, restrictions in the use of the private water supply were put in place at 18 sites to protect public health. These restrictions included switching to, or blending with, the public water supply (where this was available), boil water before use notifications, and do not use instructions.

Following investigations of these contraventions corrective actions were successfully completed to clear 28 of the 33 contraventions and remove the restrictions in place at 16 sites. A further two sites remain on a boil water notice. Three contraventions, for chlorate, chlorite, and manganese, are still under investigation. We continue to work with the owners and users of private water supplies and Environmental Health staff at local councils to bring supplies into compliance.

Collaborative Working

DARD has in place a Rural Borewells Grant Scheme which provides financial assistance towards the installation of a private borehole (and/or appropriate treatment) in isolated rural areas. This scheme enables applicants to obtain a wholesome

water supply where this is not currently available and where accessing the public water mains network is not technically or financially possible. This scheme has been in operation since 2012 and we interact with DARD, the DRD, Geological Survey of Northern Ireland, and local consultants to provide technical advice on the provision of these wholesome drinking water supplies.

Work has been ongoing with the University of Ulster to provide Environmental Health students with research projects on private water supplies. The aim of this collaborative working is to help develop their understanding and knowledge of this area of public health.

Acknowledgements

We acknowledge the ongoing co-operation and assistance of staff from the Environmental Health Departments of district councils in helping us meet the regulatory requirements for private water supplies.

We also recognize the Public Health Agency for the guidance and advice it continues to provide on the health significance when the water quality standards have been contravened at private water supplies.

Annexes

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Annex 4 - Events

Annex 5 - Technical Audit Programme

Annex 6 - Enforcement Orders

Annex 7 - Research Programme

Annex 8 - Private Water Supplies

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Annex 10 - Useful Contacts



Annex 1

Glossary and Definition of Terms

Aesthetic	associated with the senses of taste, smell and sight.	Event	a situation affecting, or threatening to affect, drinking water quality.
Animalcule	a tiny or microscopic life form.	Faecal Coliforms	a sub-group of coliforms, almost exclusively faecal in origin.
Catchment	the area of land that drains into a watercourse.	Filtration	the separation of suspended particulate matter from a fluid.
<i>Clostridium perfringens</i>	a spore-forming bacterium which is exceptionally resistant to unfavourable conditions in the water environment.	Flocculation	a process where colloids come out of suspension in the form of floc or flakes.
Coagulation	a process employed during drinking water treatment to assist in the removal of particulate matter.	Granular Activated Carbon (GAC)	an absorbent filtration media used to remove trace organic compounds from water.
Coliforms	a group of bacteria which may be faecal or environmental in origin.	Groundwater	water from aquifers or other underground sources.
Communication Pipe	the connection from the water main to the consumer property boundary (normally at the outside stop tap).	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.
Compound	a compound consists of two or more elements in chemical combination.		
Contravention	a breach of the regulatory requirement.	Incident	an event where there has been a demonstrable deterioration in the quality of drinking water.
<i>Cryptosporidium oocyst</i>	a protozoan parasite.	Indicator Parameter	something that is measured to check that the control measures, such as water treatment, are working effectively.
Determination	an analysis for a specific parameter.	Leaching	to lose, or cause to lose, soluble substances by the action of a percolating liquid.
Drinking Water Standards	the prescribed concentrations or values listed in the Regulations.	Linuron	a herbicide mainly used to control grasses and other weeds amongst cereal crops and vegetables.
Enterococci	a sub-group of faecal streptococci commonly found in the faeces of humans and warm-blooded animals.	MCPA	(4-chloro-2-methylphenoxy) acetic acid: an aryloxyalkanoic acid herbicide used for controlling broad-leaved weeds in grass or cereal crops.
<i>Escherichia coli (E. coli)</i>	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.		

Mean Zonal Compliance (%)	a measure of compliance with drinking water standards. It is the average of the zonal percentage compliances of all water supply zones in a region.	Remedial Action	action taken to improve a situation.
Mecoprop (MCP)	2-(4-chloro-2-methylphenoxy) propanoic acid: an aryloxyalkanoic acid herbicide used for controlling broad-leaved weeds in grass or cereal crops.	Sedimentation	the tendency for particles in suspension to settle out of the water under the influence of gravity.
Microbiological	associated with the study of microbes.	Service Pipe	pipe that connects the consumer's property to NI Water's main. It comprises two parts: the communication pipe which is the connection from the water main to the consumer's property boundary (normally at the outside stop tap); and the supply pipe which runs from the boundary of the property to the consumer's inside stop tap.
m³/d	cubic metres per day.	Service Reservoir	a water tower, tank or other reservoir used for the storage of treated water within the distribution system.
mg/l	milligrammes per litre (one thousandth of a gramme per litre).	Supply Point	a point, other than a consumer's tap, authorised for the taking of samples for compliance with the Regulations.
MI/d	megalitres per day (one MI/d is equivalent to 1,000 m ³ /d or 220,000 gallon/d).	Surface Water	untreated water from rivers, impounding reservoirs or other surface water sources.
µg/l	microgrammes per litre (one millionth of a gramme per litre).	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.
Oocyst	the resistant form in which <i>Cryptosporidium</i> occurs in the environment, and which is capable of causing infection.	Water Supply Zone	a pre-defined area of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available.
Parameters	the substances, organisms and properties listed in Schedules 1 and 2, and regulation 2 of the Regulations.	Wholesome/Wholesomeness	a concept of water quality which is defined by reference to standards and other requirements set out in the Regulations.
Pathogen	an organism which causes disease.		
Pesticides	any fungicide, herbicide, insecticide or related product (excluding medicines) used for the control of pests or diseases.		
Plumbosolvency	the tendency for lead to dissolve in water.		
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.		
Raw Water	water prior to receiving treatment abstracted for the purpose of drinking water provision.		

Annex 2

The Regulatory Framework

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

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

Public Water Supplies

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

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

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

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

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

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

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

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

Private Water Supplies

Private water supplies are defined in [The Water and Sewerage Services \(Northern Ireland\) Order 2006](#) as any supplies of water provided otherwise than by the water undertaker, namely NI Water.

[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.

Private supplies to single domestic dwellings are not required to be monitored under the 2009 Regulations. We do, however, continue to offer appropriate advice to all private water supply owners and users. The regulations also exclude bottled water suppliers, who are regulated under [The Natural Mineral Water, Spring Water and Bottled Water Regulations \(Northern Ireland\) 2007](#).

Under Regulation 6 there is a requirement for any newly installed products or substances, used in the provision of a private supply, to be approved for use with drinking water. Details of [approved products](#) are available through the Drinking Water Inspectorate for England and Wales web site.

Annex 3 Drinking Water Quality Tables

The following tables provide more detail of where full compliance with the regulatory standards has not been met in the individual water supply zones. The tables present, by parameter, all the contraventions and the '% compliance' that occurred in water supply zones and at supply points at water treatment works during 2013. The map in Figure 3.1 shows the water supply zones from which samples are collected across Northern Ireland. These will, when used in conjunction with the information in the parameter tables that follow, allow the reader to have a more local focus on water quality issues.

Figure 3.1 Map showing Water Supply Zones across Northern Ireland in 2013

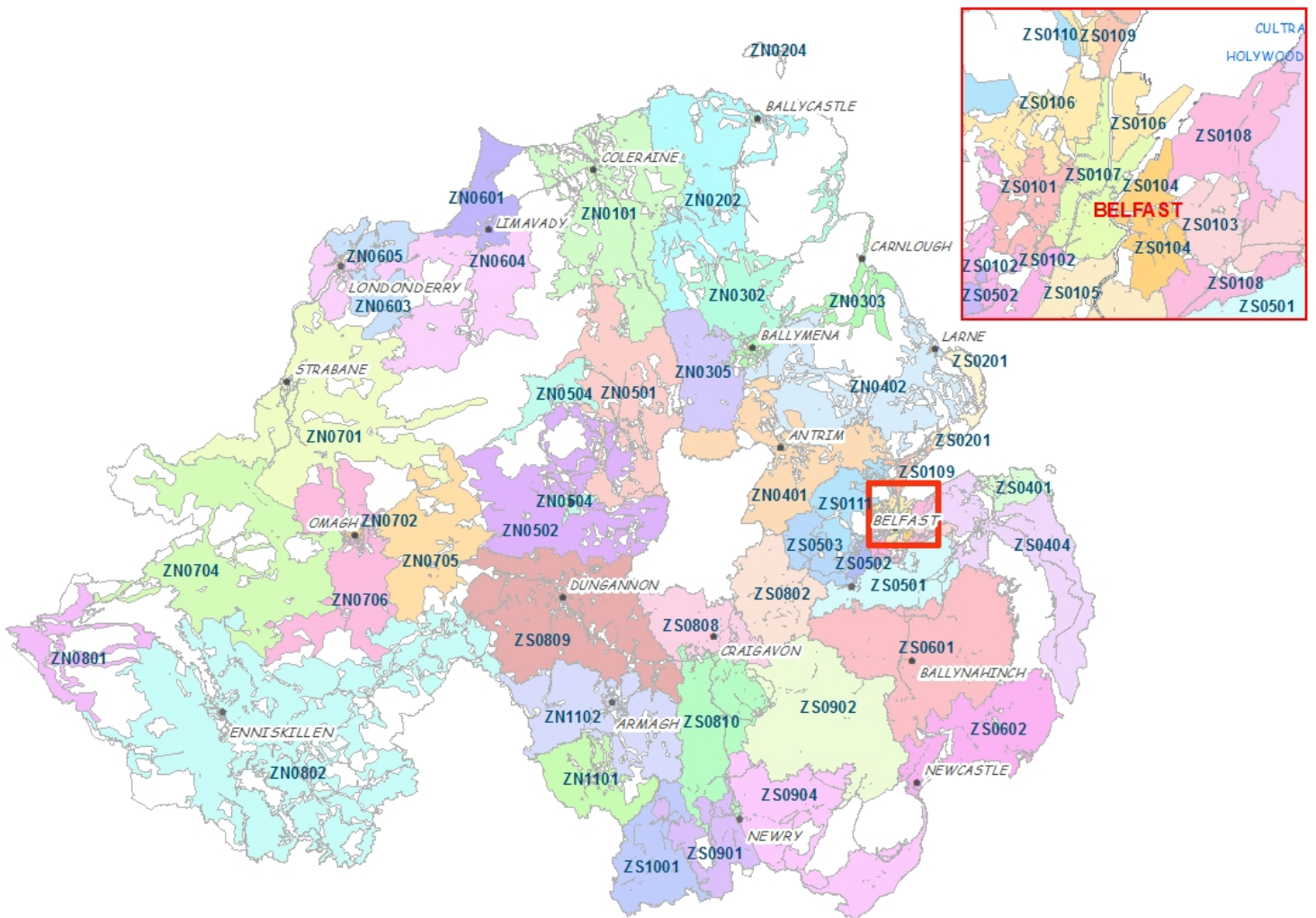


Table 3.1: Water Supply Zones within each Council 2013

Council	Water Supply Zones	
Antrim	ZN0305 – Dungonnell Ahoghill ZN0401 – Dunore Point Antrim ZN0402 – Killylane Ballynure	ZS0111 – Dunore Point Hydepark ZS0503 – Forked Bridge Stoneyford
Ards	ZS0401 - Drumaroad Bangor ZS0404 – Drumaroad Ards	ZS0501 – Drumaroad Lisburn ZS0601 – Drumaroad Ballynahinch
Armagh	ZN1101 – Clay Lake Keady ZN1102 – Seagahan Armagh ZS0808 – Castor Bay Craigavon	ZS0809 – Castor Bay Dungannon ZS0810 – Castor Bay Tandragee
Ballymena	ZN0302 – Dungonnell Glarryford ZN0303 – Dunore Point Ballymena ZN0305 – Dungonnell Ahoghill	ZN0401 – Dunore Point Antrim ZN0402 – Killylane Ballynure
Ballymoney	ZN0101 – Ballinrees Coleraine ZN0202 – Altnahinch Bushmills	ZN0302 – Dungonnell Glarryford
Banbridge	ZS0810 – Castor Bay Tandragee ZS0902 – Fofanny Dromore	ZS0904 – Fofanny Mourne
Belfast	ZS0101 – Dunore Ballygomartin North ZS0102 – Dunore Ballygomartin South ZS0103 – Belfast Ballyhanwood ZS0104 – Dunore Breda North ZS0105 – Dunore Breda South ZS0106 – Dunore Belfast North ZS0107 – Belfast Oldpark	ZS0108 – Belfast Purdysburn ZS0109 – Dorisland Whiteabbey ZS0111 – Dunore Point Hydepark ZS0404 – Drumaroad Ards 47 ZS0501 – Forked Bridge Dunmurry ZS0503 – Forked Bridge Stoneyford
Carrickfergus	ZN0402 – Killylane Ballynure ZS0109 – Dorisland Whiteabbey	ZS0201 – Dorisland Carrick
Castlereagh	ZS0103 – Belfast Ballyhanwood ZS0104 – Dunore Breda North ZS0105 – Dunore Breda South	ZS0108 – Belfast Purdysburn ZS0404 – Drumaroad Ards ZS0501 – Drumaroad Lisburn
Coleraine	ZN0101 – Ballinrees Coleraine ZN0202 – Altnahinch Bushmills	ZN0501 – Moyola Magherafelt
Cookstown	ZN0501 – Moyola Magherafelt ZN0502 – Lough Fea Cookstown	ZN0504 – Moyola Unagh Mormeal
Craigavon	ZS0802 – Castor Bay Lurgan ZS0808 – Castor Bay Craigavon ZS0809 – Castor Bay Dungannon	ZS0810 – Castor Bay Tandragee ZS0902 – Fofanny Dromore
Derry	ZN0903 – Carmoney Eglinton ZN0604 – Caugh Hill Dungiven	ZN0605 – Creggan Derry ZN0607 – Corrody Derry
Down	ZS0601 – Drumaroad Ballynahinch ZS0602 – Drumaroad Downpatrick	ZS0902 – Fofanny Dromore
Dungannon & South Tyrone	ZN0502 – Lough Fea Cookstown ZN0706 – Lough Macrory Killyclogher ZN0802 – Killyhevlin Enniskillen	ZN1102 – Seagahan Armagh ZS0809 – Castor Bay Dungannon
Fermanagh	ZN0704 – Lough Braden Drumquin ZN0801 – Belleek Garrison	ZN0802 – Killyhevlin Enniskillen
Larne	ZN0303 – Dunore Point Ballymena ZN0402 – Killylane Ballynure	ZS0201 – Dorisland Carrick
Limavady	ZN0601 – Balinrees Limavady ZN0603 – Carmoney Eglinton	ZN0604 – Caugh Hill Dungiven ZN0607 – Corrody Derry
Lisburn	ZN0401 – Dunore Point Antrim ZS0111 – Dunore Point Hydepark ZS0501 – Drumaroad Lisburn ZS0502 – Forked Bridge Dunmurry	ZS0503 – Forked Bridge Stoneyford ZS0601 – Drumaroad Ballynahinch ZS0802 – Castor Bay Lurgan
Magherafelt	ZN0101 – Ballinrees Coleraine ZN0501 – Moyola Magherafelt	ZN0502 – Lough Fea Cookstown ZN0504 – Moyola Unagh Mormeal
Moyle	ZN0101 – Ballinrees Coleraine ZN0202 – Altnahinch Bushmills	ZN0204 – Rathlin Island ZN0302 – Dungonnell Glarryford
Newry and Mourne	ZN1101 – Clay Lake Keady ZS0810 – Castorbay Tandragee ZS0901 – Camlough Newry West	ZS0902 – Fofanny Dromore ZS0904 – Fofanny Mourne ZS1001 – Carran Hill Crossmaglen
Newtownabbey	ZN0401 – Dunore Point Antrim ZN0402 – Killylane Ballynure ZS0106 – Dunore Belfast North	ZS0109 – Dorisland Whiteabbey ZS0111 – Dunore Point Hydepark
North Down	ZS0108 – Belfast Purdysburn ZS0401 – Drumaroad Bangor	ZS0404 – Drumaroad Ards
Omagh	ZN0701 – Derg Strabane ZN0702 – Glenhordial Omagh ZN0704 – Lough Bradan Drumquin	ZN0705 – Lough Macrory Beragh ZN0706 – Lough Macrory Killyclogher ZN0802 – Killyhevlin Enniskillen
Strabane	ZN0701 – Derg Strabane	ZN0704 – Lough Bradan Drumquin

Water Quality in Water Supply Zones in 2013

Table 3.1: % Compliance - Iron

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZN0101, Ballinrees Coleraine	76	1	98.68
ZN0202, Altnahinch Bushmills	36	3	91.67
ZN0402, Killylane Ballynure	52	5	90.38
ZN0501, Moyola Magherafelt	36	2	94.44
ZN0704, Lough Bradan Drumquin	24	1	95.83
ZN0802, Killyhevlin Enniskillen	52	1	98.08
ZN1102, Seaghan Armagh	36	2	94.44
ZS0101, Dunore Ballygomartin North	36	1	97.22
ZS0102, Dunore Ballygomartin South	36	2	94.44
ZS0104, Dunore Breda North	36	1	97.22
ZS0105, Dunore Breda South	52	1	98.08
ZS0106, Dunore Breda North	36	1	97.22
ZS0107, Belfast Oldpark	36	1	97.22
ZS0111, Dunore Point HydePark	36	1	97.22
ZS0404, Dumaroad Ards	76	1	98.68
ZS0808, Castor Bay Craigavon	76	4	94.74
ZS0809, Castor Bay Dungannon	52	1	98.08
ZS0902, Fofanny Dromore	36	2	94.44
ZS0904, Fofanny Mourne	52	3	94.23
ZS1001, Carran Hill Crossmaglen	24	2	91.67
All other zones	980	0	100
Overall	1,876	36	98.08

Table 3.2: % Compliance – Total Trihalomethanes

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZN0202, Altnahinch Bushmills	8	1	87.50
ZN0302, Dungonnell Glarryford	8	1	87.50
ZN0305, Dungonnell Ahoghill	8	1	87.50
ZS0103, Belfast Ballyhanwood	8	1	87.50
ZS0401, Drumaroad Bangor	8	1	87.50
ZS0501, Drumaroad Lisburn	8	1	87.50
All other zones	348	0	100
Overall	396	6	98.48

Table 3.3: % Compliance - Lead

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZS0101, Dunore Ballygomartin North	8	1	87.50
ZS0102, Dunore Ballygomartin South	8	1	87.50
ZS0103, Belfast Ballyhanwood	8	1	87.50
ZS0105, Dunore Breda South	8	1	87.50
All other zones	364	0	100.00
Overall	396	4	98.99

Table 3.4: % Compliance - Coliform bacteria

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZN0303, Dunore Point Ballymena	96	4	95.83
ZN0402, Killylane Ballynure	132	1	99.24
ZN0504, Moyola Unagh Mormeal	48	1	97.92
ZN1102, Seagahan Armagh Zone	96	1	98.96
ZS0101, Dunore Ballygomartin North	108	3	97.22
ZS0102, Dunore Ballygomartin South	120	3	97.50
ZS0103, Belfast Ballyhanwood	144	2	98.61
ZS0104, Dunore Breda North	108	2	98.15
ZS0105, Dunore Breda South	144	3	97.92
ZS0106, Dunore Belfast North	120	5	95.83
ZS0107, Belfast Oldpark	108	1	99.07
ZS0108, Belfast Purdysburn	108	2	98.15
ZS0109, Dorisland Whiteabbey	108	2	98.15
ZS0401, Drumaroad Bangor	204	4	98.04
ZS0404, Drumaroad Ards	204	5	97.55
ZS0501, Drumaroad Lisburn	144	3	97.92
ZS0601, Drumaroad Ballynahinch	144	1	99.31
ZS0602, Drumaroad Downpatrick	108	1	99.07
ZS0802, Castor Bay Lurgan	72	1	98.61
ZS0809, Castor Bay Dungannon	156	1	99.36
ZS0902, Fofanny Dromore	96	2	97.92
ZS0904, Fofanny Mourne	156	1	99.36
ZS1001, Carran Hill Crossmaglen	36	1	97.22
All other zones	2760	0	100.00
Overall	5,196	50	99.04

Table 3.5: % Compliance - Aluminium

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZN0501, Moyola Magherafelt	36	1	97.22
ZS0102, Dunore Ballygomartin South	36	1	97.22
ZS0104, Dunore Breda North	36	1	97.22
ZS0105, Dunore Breda South	52	1	98.08
ZS0404, Drumaroad Ards	76	1	98.68
ZS0601, Drumaroad Ballynahinch	52	2	96.15
ZS0602, Drumaroad Downpatrick	36	1	97.22
ZS0809, Castor Bay Dungannon	52	1	98.08
All other zones	1500	0	100.00
Overall	1,876	9	99.52

Table 3.6: % Compliance - Odour

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZN0603, Carmoney Eglinton	36	1	97.22
ZN0604, Caugh Hill Dungiven	52	1	98.08
ZN0802, Killyhevlin Enniskillen	52	1	98.08
ZS0103, Belfast Ballyhanwood	52	1	98.08
ZS0404, Drumaroad Ards	78	1	98.72
ZS0902, Fofanny Dromore	36	1	97.22
All other zones	1,508	0	100.00
Overall	1,800	6	99.67

Table 3.7: % Compliance - Manganese

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZN0202, Altnahinch Bushmills	36	1	97.22
ZS0102, Dunore Ballygomartin South	36	1	97.22
ZS0105, Dunore Breda South	52	1	98.08
ZS0808, Castor Bay Craigavon	76	1	98.68
ZS0809, Castor Bay Dungannon	52	1	98.08
All other zones	1,624	0	100.00
Overall	1,876	5	99.73

Table 3.8: % Compliance – Nickel

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZS1001, Carran Hill Crossmaglen	8	1	87.50
All other zones	388	0	100
Overall	396	1	99.75

Table 3.9: % Compliance - Turbidity

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZS0105, Dunore Breda South	52	1	98.08
ZS0106, Dunore Belfast North	36	1	97.22
ZS0808, Castor Bay Craigavon	76	1	98.68
ZS0904, Fofanny Mourne	52	1	98.08
All other zones	1660	0	100
Overall	1876	4	99.79

Table 3.10: % Compliance - *E. coli*

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZN0303, Dunore Point Ballymena	96	1	98.96
ZN0402, Killylane Ballynure	132	1	99.24
ZN0504, Moyola Unagh Mormeal	48	1	97.92
ZS0101, Dunore Ballygomartin North	108	1	99.07
ZS0104, Dunore Breda North	108	1	99.07
ZS0601, Drumaroad Ballynahinch	144	1	99.31
ZS0809, Castor Bay Dungannon	156	1	99.36
All other zones	4404	0	100.00
Overall	5,196	7	99.87

Table 3.11: % Compliance - *Clostridium perfringens*

Sampling Location - Supply Points	Number of Samples	Number of Tests not Meeting the Standards per Supply Point	% Compliance
W1701P, Ballinrees PPP	104	1	99.04
W2509, Clay Lake	24	1	95.83
All other zones	2133	0	100.00
Overall	2,261	2	99.91

Table 3.12: % Compliance - Taste

Sampling Location - Zones	Number of Samples	Number of Tests not Meeting the Standards per Zone	% Compliance
ZN0604, Caugh Hill Dungiven	52	1	98.08
All other zones	1738	0	100
Overall	1788	1	99.94

Table 3.13: % Compliance - Hydrogen Ion

Sampling Location - Supply Points	Number of Samples	Number of Tests not Meeting the Standards per Supply Point	% Compliance
ZS0802, Castor Bay Lurgan	24	1	95.83
All other zones	1852	0	100
Overall	1876	1	99.95

Table 3.14: % Compliance - Pesticides - Other Substances*

Sampling Location - Supply Points	Number of Samples	Number of Tests not Meeting the Standards per Supply Point	% Compliance
W2509, Clay Lake	296	1	99.66
W4501, Derg	296	1	99.66
W4701, Killyhevin	296	1	99.66
All other zones	7696	0	100
Overall	8584	3	99.97

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

Annex 4

Events

The tables below provide a list of all notified events in 2013. These are presented in the categories: serious (Table 4.1); significant (Table 4.2); minor (Table 4.3); and not significant (Table 4.4).

Table 4.1: **Serious** Drinking Water Quality Events in 2013

Date of Serious Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Serious Event	Associated Council Area(s)
24 April – 21 May 2013	Drumaroad WTWs (513,500 population)	Treatment difficulties led to aluminium contraventions in the works final water and related supply area. There was a significant increase in customer complaints related to water quality.	Ards, Belfast, Castlereagh, Down, Lisburn, North Down
22 July – 26 July 2013	Castor Bay WTWs (334,000 population)	A significant increase in raw water manganese levels led to manganese and turbidity contraventions in the works final water and related supply area. There was a significant increase in customer complaints related to water quality.	Armagh, Banbridge, Belfast, Craigavon, Dungannon, Lisburn and Newry & Mourne

Table 4.2: **Significant** Drinking Water Quality Events in 2013

Date of Significant Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Significant Event	Associated Council Area(s)
2 January – 3 January 2013	Lough Fea WTWs (19,500 population)	Operational maintenance work led to a turbidity contravention in the works final water.	Cookstown, Dungannon & South Tyrone and Magherafelt
4 January 2013	Camrough WTWs (21,000 population)	A turbidity contravention was reported which was unrepresentative due to pumping operations.	Newry & Mourne
13 January – 17 January 2013	Carran Hill WTWs (14,500 population)	Treatment difficulties led to aluminium contraventions in the works final water and related supply area.	Newry & Mourne
21 January 2013	Caugh Hill WTWs (78,500 population)	Iron and manganese contraventions were reported. After investigation by NI Water a cause was not determined.	Derry, Limavady, and Strabane
5 February – 7 February 2013	Lough Macrory WTWs (34,000 population)	Operational maintenance work led to aluminium contraventions in the works final water and related supply area.	Omagh
1 March 2013	Dorisland WTWs (129,000 population)	A turbidity contravention was reported. After investigation by NI Water a cause was not determined.	Belfast, Carrickfergus, Larne & Newtownabbey
22 March – 23 March 2013	Moyola WTWs (61,000 population)	Power related issues adversely affected the treatment process and led to manganese and turbidity contraventions in the works final water.	Cookstown and Magherafelt
4 April – 12 April 2013	Bushmills Road, Coleraine (16 properties)	A significant odour was detected after NI Water's investigation of a customer complaint identified contamination of the mains supply from a commercial borehole.	Coleraine
15 April – September 2013	Derg WTWs (39,000 population)	Lack of adequate pesticide removal treatment led to persistent MCPA contraventions in the works final water.	Strabane
30 April – 1 May 2013	Forked Bridge WTWs (84,500 population)	Third party damage to a trunk main led to a significant turbidity contravention in the final water.	Belfast and Lisburn
22 May 2013	Dorisland WTWs (129,000 population)	An <i>E.coli</i> contravention was most likely due to unrepresentative sampling.	Belfast, Carrickfergus, Larne & Newtownabbey
27 May – 28 May 2013	Dorisland WTWs (129,000 population)	An overdose of coagulant led to an aluminium contravention in the works final water.	Belfast, Carrickfergus, Larne & Newtownabbey
May – June 2013	Dorisland WTWs (129,000 population)	Lack of adequate pesticide removal treatment led to persistent MCPA contraventions in the works final water.	Belfast, Carrickfergus, Larne & Newtownabbey
May – September 2013	Mill Road, Larne (814 properties)	Contraventions of the iron standard and related customer complaints.	Larne

Date of Significant Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Significant Event	Associated Council Area(s)
June – July 2013	Clay Lake WTWs (9,000 population)	Lack of adequate pesticide removal treatment led to persistent MCPA contraventions in the works final water.	Armagh
June 2013	Seagahan WTWs (35,000 population)	An MCPA contravention was reported. There was no recurrence.	Armagh
18 July – 31 July 2013	Camlough WTWs (25,000 population)	Absence of specific manganese removal treatment led to manganese and turbidity contraventions in the works final water and manganese contraventions in the related supply area.	Newry & Mourne
22 July – 29 July 2013	Altnahinch WTWs (31,000 population)	Treatment difficulties led a turbidity contravention in the works final water and THM contraventions in the related supply area.	Ballymoney and Moyle
6 August – 10 August 2013	Derrychara Park & Gardens, Enniskillen (<100 population)	<i>E. coli</i> and coliform bacteria contraventions were detected after contamination occurred during the installation of a new section of main.	Fermanagh
19 September – 23 December 2013	Camlough WTWs (25,000 population)	Absence of specific manganese removal treatment led to manganese contraventions in the works final water and in the related supply area.	Newry & Mourne
June – October 2013	Dungonnell WTWs (37,000 population)	The treatment process was operating below normal performance for organics removal. THM levels were elevated in the related supply area and there was a THM contravention.	Ballymena and Moyle
14 October – 13 November 2013	Killyhevlin WTWs (77,000 population)	Absence of specific pesticide removal treatment led to MCPA contraventions in the works final water.	Dungannon & South Tyrone and Fermanagh
31 October 2013 - 11 February 2014	Baranait Road, Claudy (5 properties)	A 'Do Not Use Tap Water for Drinking or Cooking' notice was issued following significant aluminium, iron and manganese contraventions.	Derry
17 December 2013	Dungonnell WTWs (37,000 population)	An <i>E. coli</i> contravention was most likely due to unrepresentative sampling.	Ballymena and Moyle

Table 4.3: Minor Drinking Water Quality Events in 2013

Date of Minor Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Minor Event	Associated Council Area(s)
7 January 2013	Middlepark Road, Cushendall (1 property)	A pH contravention affecting only one property. Most likely caused by a section of cement-lined main.	Ballymena
25 January 2013	Killylane WTWs (51,500 population)	A turbidity contravention occurred following operational filter washing.	Ballymena, Larne and Newtownabbey & Antrim
12 February 2013	Seagahan WTWs (35,000 population)	A coliform bacteria contravention was reported. After investigation by NI Water a cause was not determined.	Armagh
1 March 2013	Rathlin WTWs (234 population)	A turbidity contravention occurred due to operational work.	Moyle
6 March 2013	Castor Bay WTWs (249,000 population)	An enterococci contravention was reported. After investigation by NI Water a cause was not determined.	Armagh, Banbridge, Belfast, Craigavon, Dungannon, Lisburn and Newry & Mourne
13 March 2013	Dungonnell WTWs (37,000 population)	An <i>E.coli</i> contravention was most likely due to unrepresentative sampling.	Ballymena and Moyle
5 May 2013	Seagahan WTWs (35,000 population)	A coliform bacteria contravention was reported. After investigation by NI Water a cause was not determined.	Armagh
10 May 2013	Forked Bridge WTWs (51,500 population)	An enterococci contravention was reported. After investigation by NI Water a cause was not determined.	Belfast & Lisburn
11 May 2013	Ashley Park, Carryduff (1 property)	A “ Boil Water Before Use ” notice was issued to a single property after two coliform bacteria contraventions.	Castlereagh
10 August – 12 August 2013	Sicily Park, Belfast (3 properties)	Recurring coliform bacteria contraventions following operational work to re-locate a section of mains.	Belfast
30 August 2013	Corlea SR (211 properties)	Two coliform bacteria contraventions occurred due to inadequate disinfection.	Omagh
16 October 2013	Fofanny WTWs (95,500 population)	A coliform bacteria contravention was most likely due to unrepresentative sampling.	Newry & Mourne
28 October 2013	Castor Bay WTWs (334,000 population)	An enterococci contravention was most likely due to unrepresentative sampling.	Armagh, Banbridge, Belfast, Craigavon, Dungannon, Lisburn and Newry & Mourne
1 November – 4 November 2013	Bridgend Road, Ballycarry (5 properties)	Recurring coliform bacteria contraventions occurred following the installation of a new section of mains.	Larne

Date of Minor Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Minor Event	Associated Council Area(s)
6 November 2013	Clay Lake WTWs (9,000 population)	A manganese contravention occurred following clear water tank maintenance.	Armagh
12 November 2013	Ballinrees WTWs (111,500 population)	A <i>Clostridium perfringens</i> contravention was reported. After investigation by NI Water a cause was not determined.	Ballymoney, Coleraine, Limavady, Magherafelt and Moyle
5 December 2013	Drumaroad WTWs (513,500 population)	Treatment difficulties led to elevated aluminium levels in the works final water for a short time.	Ards, Belfast, Castlereagh, Down, Lisburn, North Down

Table 4.4: Not Significant Drinking Water Quality Events in 2013

Date of Not Significant Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Not Significant Event	Associated Council Area(s)
2 January 2013	Derg WTWs (39,000 population)	A turbidity contravention was reported due to unrepresentative sampling.	Strabane
6 March 2013	Caugh Hill WTWs (78,500 population)	A turbidity contravention was reported due to unrepresentative sampling.	Derry, Limavady, and Strabane
12 March 2013	Glenhordial WTWs (33,500 population)	A turbidity contravention was reported due to unrepresentative sampling.	Omagh
22 March – 26 March 2013	Various Locations (2,500 population)	Loss of mains supply during extreme weather requiring alternative drinking water supplies to be provided.	Various
26 March 2013	Lough Fea WTWs (29,000 population)	A turbidity contravention was reported due to unrepresentative sampling.	Cookstown, Dungannon & South Tyrone and Magherafelt
23 May 2013	Lough Bradan WTWs (46,500 population)	A turbidity contravention was reported due to unrepresentative sampling.	Omagh and Fermanagh
4 July 2013	Clay Lake WTWs (9,000 population)	A coliform bacteria contravention was reported. After investigation by NI Water a cause was not determined.	Armagh
30 July 2013	Deehommed SR (1,207 properties)	A coliform bacteria contravention was reported. After investigation by NI Water a cause was not determined.	Banbridge
1 August 2013	Monoclough SR (757 properties)	A coliform bacteria contravention was reported. After investigation by NI Water a cause was not determined.	Ballycastle
5 August 2013	Rathkeel SR (850 properties)	A coliform bacteria contravention was reported. After investigation by NI Water a cause was not determined.	Ballymena
20 November 2013	Clay Lake WTWs (9,000 population)	A <i>Clostridium perfringens</i> contravention was reported. After investigation by NI Water a cause was not determined.	Armagh
1 December 2013	Margaret Ave & Charles Drive, Ballyclare (50 properties)	Loss of mains supply due to a burst watermain requiring alternative drinking water supplies to be provided.	Newtownabbey
5 December 2013	Dungonnell WTWs (37,000 population)	A turbidity contravention was reported due to unrepresentative sampling.	Ballymena and Moyle
14 December 2013	Ballyblack Road, Newtownards (1 property)	A “ Boil Water Before Use ” notice was issued to a single property after two coliform bacteria contraventions.	Ards

Annex 5

Technical Audit Programme

In 2013, the technical audit programme of the public water supplies was satisfactorily undertaken and we acknowledge NI Water's continued co-operation. NI Water has implemented or provided substantive comment on the recommendations and suggestions we provided in our audit reports.

The following table provides a summary of our 2013 Inspection Programme.

Table 5.1: Summary of the 2013 Inspection Programme

Location	Audit Activity	Number of Recommendations ¹	Number of Suggestions ²
Magheraliskmisk SR	To check that good practice is being followed in the storage and distribution of treated water.	3	7
Deehommed SR	To check that good practice is being followed in the storage and distribution of treated water.	3	1
Rathkeel SR	To check that good practice is being followed in the storage and distribution of treated water.	3	2
'Laboratory Information Management System' (LIMS)	To check that data is adequately managed by the 'Laboratory Information Management System'.	4	1
Derg WTWs	To check that good practice in the water treatment process is being operated.	5	2

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

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

Annex 6

Enforcement Orders

Table 6.1 provides a summary of enforcement action taken by us under Section 30, and Section 31(3)(a) of The Water and Sewerage Services (Northern Ireland) Order 2006. On our website you can access full details on Enforcement Notices issued in respect of each Consideration of Provisional Enforcement Order (CPEO) and Provisional Enforcement Order (PEO). It details the remedial actions to be completed by NI Water, in the form of an Undertaking which are accepted as part of the CPEO process, or as a requirement under a PEO.

Table 6.1: A Summary of PEOs and CPEOs in Place during 2012-2013

CPEO or PEO Reference	Water Treatment Works (WTWs) and Associated Water Supply Areas	Parameter	Progress made in 2013
2012			
CPEO/12/01	Dorisland WTWs and Associated Supply Area	MCPA (Pesticide)	Installation of GAC filters for the removal of MCPA (pesticide) is part of NI Water's investment planning outputs for 2014/15 (PC13). Work on-site to commence in 2014 with the filters to be in operation by March 2015. All actions associated with this CPEO were completed during 2013 and a 'Completion of Undertaking' notice was issued to NI Water on 7 March 2013.
CPEO/12/02	Caugh Hill WTWs and Associated Supply Area	Aluminium, iron, hydrogen ion (pH), Trihalomethanes (THMs), and turbidity	Remediation measures associated with this Undertaking included installing an auto-coagulation unit at the WTWs to improve the treatment control process. Due to delays in the delivery schedule for this work a PEO 12/01 was issued requiring NI Water to have appropriate treatment control in place. All actions associated with this CPEO were finally completed during 2013 and a 'Completion of Undertaking' notice was issued to NI Water on 11 July 2013.
CPEO/12/03	Lough Bradan WTWs and Associated Supply Area	Trihalomethanes (THMS)	The CPEO was issued in December 2012 and a series of remedial measures were accepted in the form of an Undertaking. These included a review of the treatment process at the WTWs, and the production of a disinfection statement for the distribution system, as well as other operational measures. All actions associated with this CPEO were completed during 2013 and a 'Completion of Undertaking' notice was issued to NI Water on 3 December 2013.
PEO/12/01	Caugh Hill WTWs and Associated Supply Area	Trihalomethanes (THMS)	Due to delays in the delivery schedule for work identified under CPEO/12/02, a PEO was issued in October 2012. This required NI Water to install the auto-coagulation unit by a revised priority timetable. This work was completed on schedule and a 'Completion of Undertaking' notice for the PEO was issued on the 7 March 2013.

CPEO or PEO Reference	Water Treatment Works (WTWs) and/or Water Supply Areas	Parameter	Progress made in 2013
2013			
CPEO/13/01	Caugh Hill Water Supply Zone (Properties at Gelvin Road, Dungiven)	Iron	Notice of acceptance of Undertakings letter published 13 May 2013 detailing remedial measures in relation to mains rehabilitation for the affected properties. This work was completed on schedule and a 'Completion of Undertaking' notice was issued on the 18 October 2013.
CPEO/13/02	Fofanny Mourne Water Supply Zone (Properties at Glenvale Road, Newry)	Iron	Notice of acceptance of Undertakings letter published 13 May 2013 detailing remedial measures in relation to mains rehabilitation for the affected properties. This work was completed on schedule and a 'Completion of Undertaking' notice was issued on the 18 October 2013.
CPEO/13/03	Clay Lake WTWs and Associated Supply Area	MCPA (Pesticide)	Notice of acceptance of Undertakings letter published 29 August 2013 detailing remedial measures in relation to upgrade Clay Lake WTWs in relation to the refurbishment, installation and operation of two GAC filters and other operational work. The GAC filters were installed and operational by November 2013 and other actions are scheduled for completion in 2014.
CPEO/13/04	Dunore WTWs and Associated Supply Area	Microbiological	Notice of acceptance of Undertakings letter published 19 December 2013. This details remedial measures in relation to Undertaking a review of the current disinfection procedures within the distribution system and to put in place an action plan to reduce the occurrence of microbiological contraventions at services reservoirs and consumers taps. These actions are scheduled for completion during 2014.
PEO/13/01	Dorisland WTWs and Associated Supply Area	MCPA (Pesticide)	Following the completion of Undertakings in relation to CPEO/12/01, a PEO was issued to NI Water on 14 March 2013. This required NI Water to provide, a programme timetable for the compliance improvement work identified with the Dorisland WTWs feasibility report. This work identified the installation of GAC filters for the removal of MCPA (pesticide) as part of NI Water's investment planning outputs for 2014/15 (PC13). A timetabled programme of work was received from NI Water and a 'Completion of Undertaking' notice for the PEO was issued on the 11 June 2013.

Annex 7

Research Programme

Drinking Water Quality and Health Research Programme

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

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

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

Annex 8

Private Water Supplies

Private water supplies are defined as any supplies of water provided otherwise than by the water undertaker, namely 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.

As well as establishing a monitoring programme for all registered private water supplies, the Private Water Supplies Regulations (Northern Ireland) 2009 require that a risk assessment is carried out for each supply to identify areas where there may be potential risks of contamination. This assessment includes the whole private water supply system, from source to tap. These assessments are similar to the drinking water safety plans in place for the public water supply.

In the event of a failure, any contraventions of the wholesomeness standards in the regulations must be investigated and followed up to ensure compliance. If compliance cannot be achieved through informal agreement, we can apply more formal mechanisms to secure the required improvement (e.g. Notices). The regulations also contain provision for the issuing of Notices which could be used to restrict the use of a supply in circumstances where there is a risk to health from consuming or using the water.

There is a further requirement in the regulations for any newly installed products or substances, used in the provision of a private supply, to be approved for use with drinking water. Details of [approved products](#) are available through the Drinking Water Inspectorate for England and Wales web site.

Roles and Responsibilities

The Drinking Water Inspectorate, acting on behalf of the Department of the Environment, has a regulatory responsibility for private 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 human consumption.

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

The regulations require that the sampling and risk assessments of private water supplies are undertaken by a competent person. We have a training programme in place for Environmental Health officers carrying out these duties on our behalf. The '[Private Water Supplies Sampling Manual - A Field Guide](#)', published by us in December 2009, provides details of our standardized sampling methods which have been adopted as guidance throughout the UK.

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 for the safety of the water being provided. They also have a responsibility to take any appropriate remedial actions identified by risk assessment or following an investigation into a failure of the supply to meet the drinking water quality standards.

In addition, we offer advice to owners/users of all private supplies, including those to single domestic dwellings, on action that can be taken to protect human health from the potential adverse effects of a contaminated water supply. An advice leaflet, '[Is your private water supply safe?](#)' (published by us in December 2010) is available on our website or by contacting us.

Register of Supplies

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

Annex 9

Drinking Water Guidance

Drinking Water and Health Guidance

A guidance document, '[Drinking water and health: a guide for public and environmental health professionals and for those in the water industry in Northern Ireland](#)', is available to download from NI Water's website, and was produced through the collaborative working of a cross Departmental Drinking Water Liaison Group. This group has representation from the Chief Environmental Health Officers' Group; the Department of Health, Social Services and Public Safety; the Drinking Water Inspectorate; the Northern Ireland Public Health Laboratory; Northern Ireland Water; and the Public Health Agency.

The purpose of the document is to set out the roles and responsibilities of the different organizations with an involvement in the safety of drinking water, and was revised during 2013.

Guidance on Protection of Drinking Water Sources

This guidance document '[The contribution of Drinking Water Quality Regulations to the implementation of the Water Framework Directive in Northern Ireland](#)' identifies where the requirements of the Drinking Water Quality Regulations complement and support the implementation of the Water Framework Directive. It also provides guidance on practical steps that can be taken to ensure the long-term safety of drinking water supplies. The guidance can be downloaded from our website.

WaterSafe

WaterSafe is a dedicated online search facility, launched on 8th October 2013, to help customers find the nearest qualified plumbing and heating professionals in their area and promote water safety in the home or in businesses. All contractors featured on the [WaterSafe website](#) must be a member of an Approved Contractors' Scheme, ensuring that they provide a quality service.

WaterSafe is supported by government and all UK water quality regulators.

Guidelines for drinking-water quality

The World Health Organization (WHO) publication '[Guidelines for drinking-water quality](#)' (fourth edition) provides detail on the significance, occurrence and removal of microbial and chemical hazards in drinking water, and the preventive risk management approach for ensuring drinking water quality.

Water Safety in Buildings

The World Health Organization (WHO) publication '[Water Safety in Buildings](#)' provides guidance for managing water supplies in buildings.

Private Water Supplies Technical Manual

This [Manual](#) provides comprehensive guidance for owners/users along with other general information relating to private supplies.

Annex 10

Useful Contacts

Northern Ireland Water Ltd (NI Water)

NI Water is responsible for providing all public water supplies and sewerage services in Northern Ireland.

Web address: www.niwater.com

Tel: 08457 440088

E-mail: waterline@niwater.com

Address: Northern Ireland Water Ltd
PO Box 1026

Northern Ireland Utility Regulator

The ‘Utility Regulator’ focuses on ensuring that value for money water and sewerage services are provided.

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

Tel: +44 (028) 9031 1575

E-mail: info@uregni.gov.uk

Address: Queens House
14 Queen Street
Belfast BT1 6ED

Consumer Council for Northern Ireland (CCNI)

CCNI aims to promote and safeguard the interests of all consumers in Northern Ireland.

Web address: www.consumerCouncil.org.uk

Tel: +44 (0) 28 9067 2488 (Enquiries)
or 0800 121 6022 (Complaints)

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 (NIEA)

NIEA has a duty to maintain or improve the quality of surface and underground waters in Northern Ireland.

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

Tel: +44 (028) 9262 3100

E-mail: waterInfo@doeni.gov.uk

Public Health Agency (PHA)

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: 0300 555 0114

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

Food Standards Agency (FSA)

FSA protects 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/northern-ireland/

Tel: +44 (028) 9041 7700

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

Address: Food Standards Agency NI
10A-C Clarendon Road
Belfast BT1 3BG

Local District Councils

District council’s Environmental Health Departments can be contacted if you have a private water supply serving a single domestic dwelling.

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

Drinking Water Inspectorate (DWI)

DWI for England and Wales 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 (DWQR)

DWQR exists to ensure that drinking water in Scotland is safe to drink.

Web address: www.dwqr.org.uk

Tel: +44 (0)131 244 0190

Address: DWQR
Area 1-D South, Victoria Quay
Edinburgh EH6 6QQ

Environmental Protection Agency (EPA)

EPA is a statutory body responsible for protecting the environment in Ireland.

Web address: www.epa.ie

Tel: +353 (0) 53 916 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 (UKWIR)

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)20 7152 4537

E-mail: mail@ukwir.org.uk

Foundation for Water Research (FWR)

FWR 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

Water Regulations Advisory Scheme (WRAS)

WRAS is an advisory scheme which aims to promote knowledge of the water regulations throughout the UK.

Web address: www.wras.co.uk

Tel: +44 (0) 333 207 9030

E-mail: info@wras.co.uk

The Health and Safety Executive for Northern Ireland (HSENI)

HSENI is the lead body responsible for the promotion and enforcement of health and safety at work standards in Northern Ireland.

Web address: www.hseni.gov.uk

Tel: 028 9024 3249

E-mail: mail@hseni.gov.uk

Address: 83 Ladas Drive
Belfast
BT6 9FR

World Health Organization (WHO)

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.

Web address:

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

Information Request:

http://www.who.int/about/contact_form/en/

References

Abstraction Licensing Regulations

www.legislation.gov.uk/nisr/2006/482/contents/made

Code of Practice for using Plant Protection Products (DARD)

www.dardni.gov.uk/cop-plant-protection-final.pdf

Drinking Water Guidance

<https://www.niwater.com/drinking-water-guidance/>

DWTS (Drinking Water Testing Standard)

www.ukas.com/library/Technical-Information/Pubs-Technical-Articles/Pubs-List/LAB37%20Edition%203%20Jun%2013%20final.pdf

Enforcement and Prosecution Policy

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

EU Priority Substances

http://ec.europa.eu/environment/water/water-dangersub/pri_substances.htm

Euratom Directive

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:296:0012:0021:EN:PDF>

Guidelines for drinking-water quality (fourth edition) WHO

http://www.who.int/water_sanitation_health/publications/2011/dwq_guidelines/en/

BS 8558:2011: Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages

List of Approved Products for use in Public Water Supply in the United Kingdom

<http://dwi.defra.gov.uk/drinking-water-products/approved-products/soslistcurrent.pdf>

The Plant Protection Products (Sustainable Use) Regulations 2012

www.legislation.gov.uk/uksi/2012/1657/made

The Plant Protection Products (Sustainable Use) Regulations (Northern Ireland) 2012 -

[http://www.pesticides.gov.uk/Resources/CRD/Migrated-Resources/Documents/P/Plant_Protection_Products_\(Sustainable_Use\)_Regulations_2012.pdf](http://www.pesticides.gov.uk/Resources/CRD/Migrated-Resources/Documents/P/Plant_Protection_Products_(Sustainable_Use)_Regulations_2012.pdf)

Private Water Supplies Sampling Manual: A Field Guide

http://www.privatewatersupplies.gov.uk/private_water/files/PWS_sampling_manual.pdf

Private Water Supplies Technical Manual

http://www.privatewatersupplies.gov.uk/private_water/22.html

River Basin Management Plans

www.doeni.gov.uk/niea/water/wfd.htm

Water Hardness Map

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

The Water Regulations Advisory Scheme

<http://www.wras.co.uk/>

Water Resource Management Plan

www.niwater.com/managing-northern-irelands-water-resources

Water Safety in Buildings (WHO)

http://www.who.int/water_sanitation_health/publications/2011/9789241548106/en/

Request for Feedback on this Report

Did you find what you were looking for?

The Drinking Water Inspectorate is constantly aiming to improve the standard of information provided in this report; our Annual Drinking Water Quality Report is designed to provide clear information and statistics detailing the quality of drinking water supplies in Northern Ireland.

Any views or opinions you may have would be highly valued by us and we would greatly appreciate your feedback.

For your convenience we would encourage you to provide feedback by either

Email: dwi@doeni.gov.uk

or

Post: **Drinking Water Inspectorate
Northern Ireland Environment Agency
Klondyke Building
Cromac Avenue
Gasworks Business Park
Malone Lower
BT7 2JA**



Create prosperity and well being through
environment and heritage excellence.

Drinking Water Inspectorate for Northern Ireland
Environmental Protection
Northern Ireland Environment Agency
Klondyke Building
Cromac Avenue
Gasworks Business Park
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www.doeni.gov.uk/niea



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