
# The Provision and Quality of Drinking Water in Ireland

## A Report for the Years 2007 - 2008

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# A Report for the Years 2007 - 2008

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**ISBN: 1-84095-188-2** **04/09/500**

**Price: €25**

## Acknowledgements

The Environmental Protection Agency would like to acknowledge the help and contribution of all the local authorities and the National Federation of Group Water Schemes in the preparation of this report. Thanks are also due to Michael O'Donnell (EPA), Aisling McElwain (EPA) and Sarah Walsh for assistance in the preparation of the report.

# EXECUTIVE SUMMARY

This report, ***The Provision and Quality of Drinking Water in Ireland: A Report for the Years 2007-2008*** assesses the safety and security of drinking water supplies covered by the European Communities (Drinking Water) (No. 2) Regulations, 2007. These Regulations assign the role of supervisory authority over public drinking water supplies to the EPA and give powers of enforcement to ensure action is taken where the quality of public drinking water is deficient. This report provides an assessment of the quality of drinking water based on the results of monitoring carried out in 2007 and highlights EPA enforcement in the period September 2007 to September 2008. Chapter 1 of this report gives an overview of the provision of safe and secure drinking water. Chapter 2 outlines the EPA's enforcement activities during 2008. Chapter 3 deals with the security of drinking water and sets out the key issues and actions necessary while Chapter 4 provides an assessment of the safety of drinking water in Ireland with respect to the quality standards that are in force.

**The Safety of Drinking Water in Ireland**

The **safety** of drinking water supplies in Ireland is determined by comparing the results of almost 240,000 monitoring tests carried out on 952 public water supplies, 830 public group water schemes, 588 private group water schemes and 888 small private supplies, against the standards set in the 2007 Drinking Water Regulations. In relation to the safety of drinking water in Ireland the EPA has found that:

- *Escherichia coli (E. coli* - an indicator of whether human or animal waste has entered a water supply) was detected on at least one occasion in 52 public water supplies during 2007. This figure is down from 77 in 2006. Nonetheless, this indicates that intermittent contamination of 5% of public water supplies occurred in 2007. The presence of *E coli* can be due to a number of possible causes from inadequate disinfection to a burst pipe.
- In general the microbiological quality of private group water schemes remains poor as compared to the public supplies. The number of private group water schemes where *E. coli* was detected dropped from 246 in 2006 to 184 in 2007. However, despite this improvement, over 31% of private group water schemes were contaminated at least once during 2007.
- Overall compliance with the chemical standards is satisfactory at 99.1% but challenges exist regarding the replacement of old lead service pipes connecting water distribution mains to individual properties.
- Compliance with several indicator parameters in particular compliance with aluminium and turbidity parametric values remains poor.
- An outbreak of cryptosporidiosis associated with the Galway City supply took place in 2007. This was discussed in detail in last year's report.

**The Security of Drinking Water in Ireland**

The **security** of water supplies is assessed under three activity areas as recommended by the World Health Organisation. These are as follows:

- Assessment of risk to the quality of the supply from catchment to consumer.
- Monitoring of the risks identified to the quality of the water supply from catchment to consumer.
- Management of the supply during normal and incident conditions by personnel adequately trained and resourced to deliver clean and wholesome drinking water.

In relation to the security of water supplies the EPA has found that:

- Of the 339 public water supplies identified by the EPA and placed on a Remedial Action List (RAL) in early 2008, 51 supplies completed the necessary remedial actions and were removed from the RAL. However, the EPA identified a further 53 public

water supplies which need to be upgraded, improved in respect of operational practices or discontinued to ensure that the water supplied is wholesome and clean. Thus, at the end of September 2008, 341 public water supplies were on the RAL.

- Local authorities have reported that there are 57 public water supplies that originate from surface water that have no treatment other than disinfection. These supplies have no treatment barrier to prevent *Cryptosporidium* (if present in the raw water) entering the supply. This is an improvement of 7 as compared to last year.
- Chlorine monitors and alarms are a vital part of the infrastructure of a drinking water plant. At the end of August 2008, 40% of public water supply treatment plants had such equipment in place. This is a 10% increase since January 2008. The EPA expects that all local authorities will install chlorine monitors and alarms in 2009.
- Boil water notices or restrictions of use (e.g. do not drink) were put in place in 53 supplies serving approximately 118,000 persons in 2008. Adverse weather conditions in August 2008 alone led to the imposition of boil water notices in 20 supplies. Of these 6 were precautionary and 4 were removed within 3 days. In some cases these water advisory notices are still in place.

Local authorities should take action to ensure that each supply has adequate treatment in place. In particular, supplies with no barrier to treatment should install an adequate barrier as soon as possible. Furthermore, all supplies must install chlorine monitors and alarms without delay. Local authorities must reduce the contamination of supplies and must strive to reduce the number of supplies where contamination has occurred to the extent where the imposition of boil water notice or water advisory has become necessary.

**The Enforcement of Drinking Water Quality in Ireland**

The EPA has adopted a risk based and outcome driven approach to the enforcement of the Drinking Water Regulations focusing on issues that present the greatest risk to health such as contamination with *E. coli* and *Cryptosporidium*. The EPA is notified by local authorities of each failure to meet the microbiological and chemical standards or where there is a risk to health. During the period September 2007 to September 2008 the EPA has:

- Received and assessed 283 notifications of failure to meet drinking water standards. The notifications received by the EPA in the first nine months of 2008 indicate that despite the improvement in *E coli* compliance during 2007 the issue of intermittent detection of *E coli* in some supplies remains a priority.
- Carried out 59 audits of water treatment plants in the first 9 months of 2008 focusing on supplies on the EPA Remedial Action List, supplies that have failed to meet a microbiological or chemical standards and larger public water supplies. Of the plants audited many were found to be operated with a low awareness of the risks to the quality of the drinking water while many other were found to have inadequately considered source protection. A significant proportion of the plants audited were found to have unsatisfactory process control (e.g. no chlorine monitors) and poor chemical dosing arrangements.
- Issued 47 legally binding Directions to 15 local authorities requiring specific actions to be undertaken to improve the security of the supply in question.
- Prosecuted one local authority (Galway County Council) for the failure to comply with a Direction requiring the installation of a chlorine monitor and alarm.

**Key Recommendations of This Report:**

**Assessment of Risk from Catchment to Consumer**

**Assessment of the risk of contamination of water supplies** - All plants operated by local authorities must be profiled on a regular basis from catchment to consumer to determine the risks to a safe and secure water supply.

**Upgrading, replacement or closure of plants** - There are at least 57 supplies that have inadequate treatment barriers. These supplies, serving a combined population of 170,000, need to be upgraded or replaced. While plans are in place to deal with several of these plants in a number of cases Directions had to be issued by the EPA. In total, the EPA has identified 341 supplies that require remedial action to ensure the safety and security of the supply.

**Monitoring of the Water Supply from Catchment to Consumer**

**The Water Source** - The source of each water supply needs to be characterised to ensure that the water supplier is aware of the characteristics of the water to be treated.

**Treatment plants** - Water suppliers must continuously monitor basic parameters such as chlorine (indicator of the effectiveness of disinfection and removal of *E. coli*) and turbidity (indicator of effectiveness of the treatment barrier to *Cryptosporidium*) and use this information to improve the operation of the treatment plant. Chlorine monitors and alarms must be installed at all water treatment plants while turbidity monitors must be installed after all filters at water treatment plants. Where monitors are not in place the EPA will take further enforcement action during 2009.

**Distribution Network –** Water supplies must consider and manage the risk posed by contamination in the distribution network. In particular local authorities should carry out a lead survey to determine the extent of lead piping in the distribution network. Guidance on how to undertake such a survey has been prepared by the EPA and is available from our website at www.epa.ie.

**Management of the Water Supply**

**Competence and training** - All drinking water operators should undergo appropriate training in the provision of drinking water supplies such as that delivered by the Water Service National Training Group www.wsntg.ie. As a minimum each operator must be trained for each treatment process for which they are required to operate at the plant.

**Notification of exceedences** - Local authorities should ensure that each exceedance of the parametric values is investigated and notified to the EPA as outlined in guidance prepared by the EPA and also available from our website. Actions taken to address the cause of the non-compliance must include actions to prevent the exceedance occurring in the future.

**Communication** - Consumers expect their drinking water to comply with standards and should be informed by their water supplier when this expectation is not met. Consumers should be informed of the quality of their water supply on an ongoing basis. Local authorities should post notifications to the EPA and up-to-date monitoring results of their water supplies on their websites.

# 1 THE PROVISION OF SAFE AND SECURE DRINKING WATER

## 1.1 Introduction

This report, "*The Provision and Quality of Drinking Water in Ireland 2007 – 2008"* is the eighteenth in a series of drinking water reports published by the Environmental Protection Agency (EPA) as required under Section 58 of the Environmental Protection Agency Act 1992. Under this legislation, the EPA is required to collect and verify monitoring results for all water supplies in Ireland covered by the European Communities (Drinking Water) No. 2, Regulations, 2007. This involves the collection of results on an annual basis from local authorities and the carrying out of audits on selected local authorities to verify the information that has been submitted.

In March 2007, new Drinking Water Regulations were published by the Department of Environment, Heritage and Local Government. While these Regulations made no changes to the monitoring required and only one minor change to the quality standards to be achieved they significantly changed the role of the EPA in relation to drinking water. Since March 2007 the powers assigned to the EPA include a responsibility to:

- Ensure local authorities are taking the appropriate action to ensure that public water supplies comply with the relevant quality standards.
- Review the actions taken by local authorities in public water supplies where there has been a breach of a standard or any other risk to human health.
- Review and approve monitoring programmes to ensure that adequate monitoring is carried out by local authorities.
- Audit local authority water treatment plants.
- Publish guidance on how local authorities are to implement the Regulations.

The local authority, in turn, has been designated as the supervisory authority over private water supplies (including group water schemes) and has similar responsibilities to the EPA in relation to these supplies.

The Regulations do not provide the EPA with powers to prosecute a water supplier for supplying water that is not clean and wholesome. In general, the powers available to the EPA under the 2007 Regulations relate to the performance of the local authority in respect of any (EPA) Direction. The Regulations require local authorities to notify the EPA of failures to meet the quality standards following which the EPA can direct the local authority to take corrective action. Only where the corrective action, as directed, is not taken can a prosecution be considered for failing to comply with the terms of a Direction. In other words the EPA may prosecute a local authority only if it fails to comply with an EPA Direction.

In 2008, the EPA adopted a water safety plan approach to ensuring drinking water is both "safe" and "secure". A drinking water supply is deemed to be safe if it meets quality standards each time the supply is tested. A drinking water supply is deemed to be secure if there is in place a management system that has identified all potential risks and reduction measures to manage these risks (Figure 1-1).

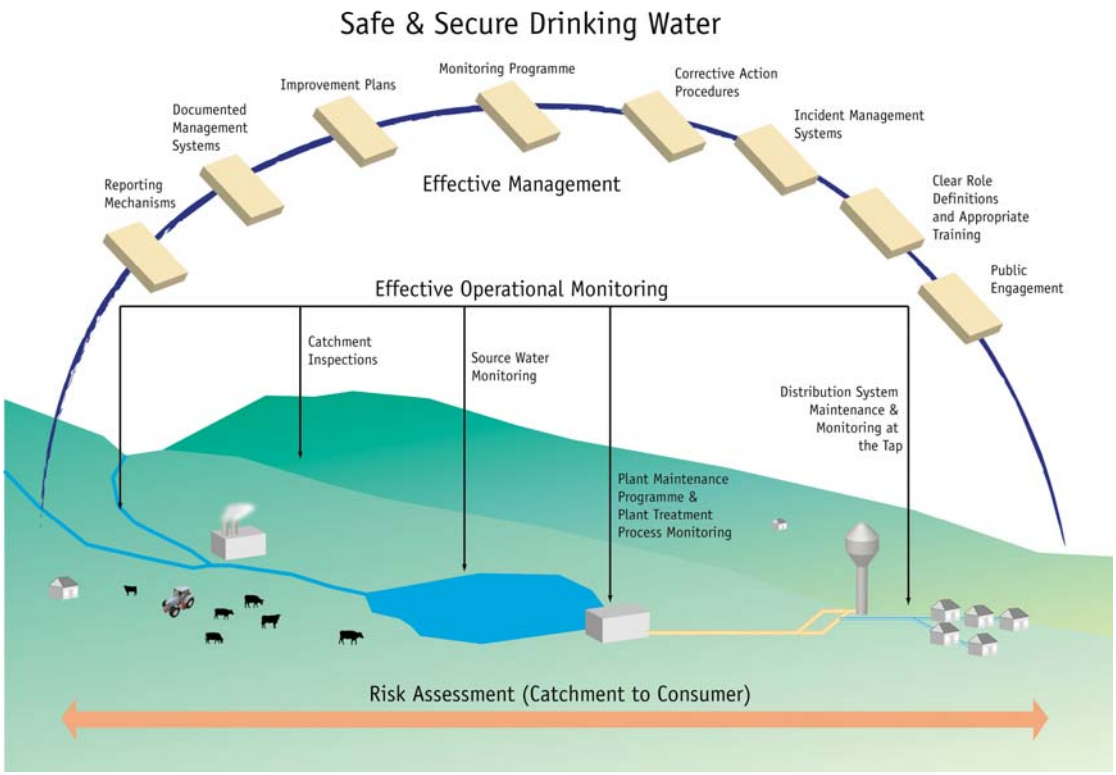


**Figure 1-1. Essential Components of a Drinking Water Safety Plan.**

This approach is based on the World Health Organisation (WHO) criteria for a safe and secure drinking water supply. The WHO has set out three essential components for a safe and secure drinking water supply. These are:

1. **Risk assessment of water supplies from catchment to consumer** – Identification and assessment of all risks in the catchment, treatment plant and distribution network up to the tap that may result in a risk to health and/or a breach of the required standard.
2. **Effective operational monitoring** – Inspection of the catchment, reservoirs, treatment plant and distribution network to detect pollution, equipment failure or chemical dosing faults; followed by prompt and effective corrective actions where problems have been identified.
3. **Effective management** – Competent management of the supply during normal and abnormal conditions, regular and accurate reporting of treatment plant operations and personnel trained and resourced to deliver clean and wholesome drinking water.

The implementation of the WHO recommendations by water suppliers as part of a robust Drinking Water Safety Plan is a key measure to ensuring the delivery of a safe and secure water supply.

The current report covers the quality of drinking water in Ireland in 2007 (and the enforcement actions taken in the period September 07 to September 08 using the powers under the European Communities (Drinking Water) Regulations (No. 2), 2007). Issues identified by the EPA during compliance checking on the safety and security of water supplies are also presented in this report.

## 1.2 Overall Quality of Drinking Water in Ireland

The safety of drinking water is determined by assessing compliance with the requirements of the drinking water quality standards. The results of analyses submitted by water suppliers are compared to the standard for 48 parameters specified in the European Communities (Drinking Water) Regulations (No.2), 2007 (see Appendix 2). Local authorities submitted the results of 239,319 individual analysis carried out in 2007. This represents an increase of 8.1% in the number of tests carried out on drinking water in Ireland from 2006. In particular, there was an increase of 26% and 75% in the number of tests carried out in public group water schemes and small private supplies respectively.

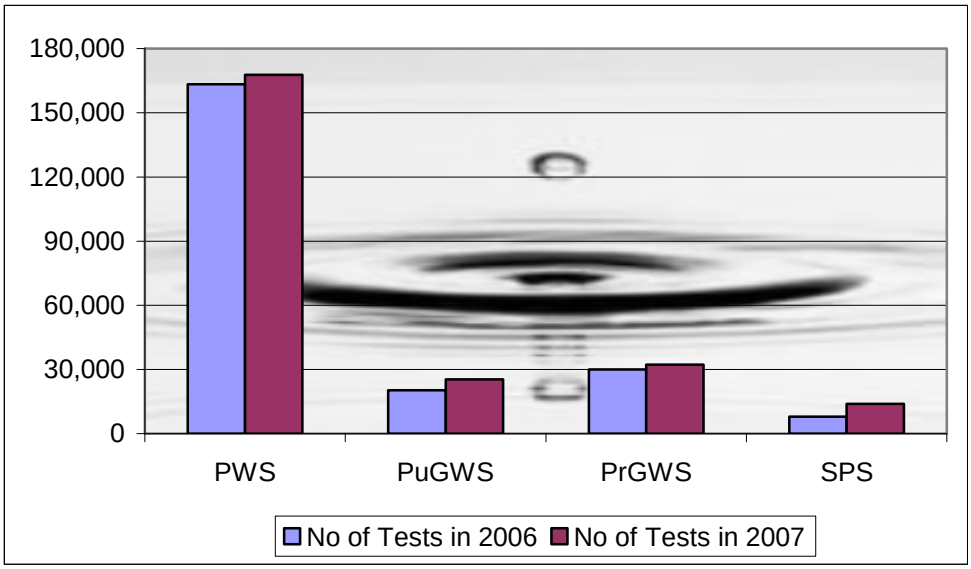


**Figure 1-2. Number of Tests Carried out on Drinking Water Supplies in 2006 and 2007.**

This increase in monitoring has significantly reduced the monitoring shortfall that was highlighted in last year's report. While a small monitoring shortfall remains (just over 1% of the number of tests required were not carried out) there remain some technical issues to be addressed regarding the methods of analysis used by some laboratories. In this regard, 736 test results submitted by 16 local authorities were deemed unacceptable by the EPA. This is because the method of analysis used was not accurate enough to determine compliance with the parametric values (the limit of detection of the method of analysis was at or above the parametric value).

The level of non-compliance with the 48 parameters to be monitored under the Regulations is listed on Table 1-1. Full details of compliance with all parameters in each of the supply categories is given in Appendix 3. The parameters that are of most concern nationally are *E. coli,* lead, nitrate, trihalomethanes, aluminium and turbidity (highlighted in red in Table 1-1). These parameters require the greatest attention by water suppliers.

**Table 1-1. Compliance with Drinking Water Standards by Supply Category[1].**

| Parameter | Public Water Supplies | | Public Group Water Schemes | | Private Group Water Schemes | |
|---|---|---|---|---|---|---|
| | No. of Samples Exceeding | % of Non Compliant Samples | No. of Samples Exceeding | % of Non Compliant Samples | No. of Samples Exceeding | % of Non Compliant Samples |
| **Microbiological Parameters** | | | | | | |
| *E. coli* | 58 | 0.5 | 14 | 0.8 | 319 | 14.8 |
| *Enterococci* | 9 | 0.4 | 27 | 2.3 | 53 | 13.4 |
| **Chemical Parameters** | | | | | | |
| 1,2-dichloroethane | 0 | 0 | 0 | 0 | 0 | 0 |
| Antimony | 1 | 0.1 | 0 | 0 | 0 | 0 |
| Arsenic | 3 | 0.2 | 0 | 0 | 2 | 0.7 |
| Benzene | 2 | 0.1 | 0 | 0 | 0 | 0 |
| Benzo(a)pyrene | 0 | 0 | 0 | 0 | 0 | 0 |
| Boron | 0 | 0 | 0 | 0 | 0 | 0 |
| Bromate | 1 | 0.1 | 0 | 0 | 3 | 1.1 |
| Cadmium | 0 | 0 | 0 | 0 | 0 | 0 |
| Chromium | 0 | 0 | 0 | 0 | 0 | 0 |
| Copper | 1 | 0.1 | 0 | 0 | 0 | 0 |
| Cyanide | 0 | 0 | 0 | 0 | 0 | 0 |
| Fluoride | 289 | 8.9 | 52 | 12.4 | 5 | 1.7 |
| Lead | 17 | 0.9 | 1 | 0.3 | 0 | 0 |
| Mercury | 2 | 0.2 | 0 | 0 | 0 | 0 |
| Nickel | 5 | 0.4 | 0 | 0 | 0 | 0 |
| Nitrate | 22 | 0.5 | 1 | 0.1 | 10 | 0.8 |
| Nitrite (at tap) | 3 | 0.1 | 1 | 0.1 | 1 | 0.1 |
| Nitrites (at WTW) | 1 | <0.1 | 0 | 0 | 0 | 0 |
| PAH | 0 | 0 | 0 | 0 | 0 | 0 |
| Pesticides - Total | 3 | 0.3 | 0 | 0 | 1 | 0.3 |
| Selenium | 0 | 0 | 0 | 0 | 0 | 0 |
| Tetrachloroethene & Trichloroethene | 0 | 0 | 0 | 0 | 0 | 0 |
| Trihalomethanes (Total) | 51 | 2.7 | 8 | 1.3 | 5 | 1 |
| **Indicator Parameters** | | | | | | |
| Aluminium | 339 | 5.1 | 61 | 6.5 | 56 | 7.9 |
| Ammonium | 23 | 0.2 | 11 | 0.7 | 12 | 0.6 |
| Chloride | 4 | 0.3 | 0 | 0 | 0 | 0 |
| Clostridium Perfringens | 98 | 1.2 | 33 | 2.2 | 182 | 11.9 |
| Coliform Bacteria | 615 | 5.8 | 59 | 3.5 | 614 | 28.2 |
| Colony Count @ 22°C | 79 | 5.0 | 6 | 5.3 | 54 | 18.9 |
| Colour | 303 | 2.9 | 49 | 2.9 | 199 | 9.5 |
| Conductivity | 0 | 0 | 0 | 0 | 0 | 0 |
| Iron | 267 | 4.0 | 57 | 4.8 | 83 | 6.5 |
| Manganese | 113 | 4.0 | 13 | 1.4 | 56 | 6.0 |
| Odour | 143 | 1.5 | 33 | 2.2 | 29 | 1.5 |
| Oxidisability | 0 | 0 | 0 | 0 | 0 | 0 |
| pH | 519 | 4.9 | 41 | 2.4 | 137 | 6.5 |
| Sodium | 4 | 0.3 | 0 | 0 | 2 | 0.7 |
| Sulphate | 1 | 0.1 | 0 | 0 | 1 | 0.3 |
| Taste | 17 | 0.3 | 0 | 0 | 0 | 0 |
| Total Organic Carbon | 17 | 1.4 | 1 | 0.4 | 7 | 2.2 |
| Turbidity (at tap) | 75 | 0.8 | 13 | 0.8 | 51 | 2.6 |
| Turbidity (at WTW) | 219 | 5.1 | 4 | 14.3 | 12 | 18.7 |
| **Radioactivity** | | | | | | |
| Tritium | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Indicative Dose | 0 | 0 | 0 | 0 | 0 | 0 |

Section 4 provides a discussion of compliance with microbiological, chemical and indicator parametric values. Appendix 1 provides a summary report on a county-by-county basis for all local authorities.

European Union (EU) Member States are required to report to the European Commission on the quality of drinking water in supplies serving more than 5,000 persons every three years to historically

[1] This assessment of compliance is based on results submitted.

compare the quality of drinking water across Europe. A number of Member States including the UK and the Netherlands publish this information on an annual basis; however, the majority of EU Member States do not make drinking water quality information available in this manner. A comparison of non-compliance with the *E. coli* parametric value in public water supplies in Ireland with the UK and Netherlands shows that further improvement is necessary in Ireland. The majority of public water supplies in Ireland are small (serving less than 5,000 persons) while in the UK and Netherlands few public water supplies of this size exist. Hence, the graph illustrates the comparison of larger Irish public water supplies with those in the UK and Netherlands. This graph illustrates that the smaller supplies have a higher rate of contamination as compared to the larger supplies.

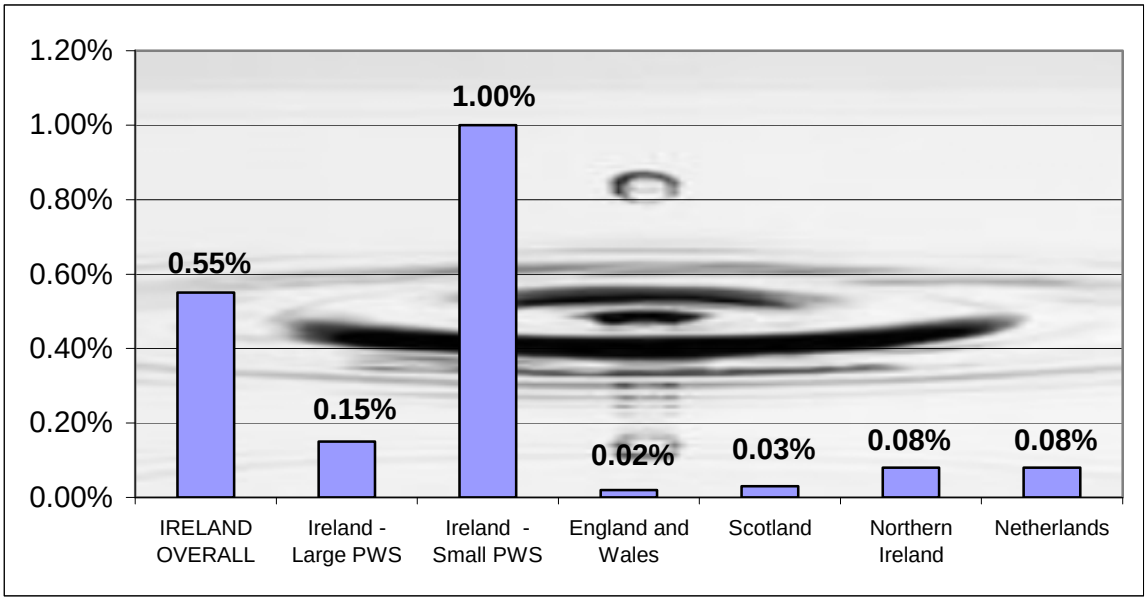


**Figure 1-3. Comparison of Non-Compliance with the *E. coli* Parametric Value in Public Water Supplies in Ireland and Other EU Countries.**

# 2 ENFORCEMENT OF THE DRINKING WATER REGULATIONS

Drinking water must be clean and wholesome. That means it must meet the relevant water quality standards and must not contain any other substance or micro-organism in concentrations or numbers that constitute a potential danger to human health. The principal risks to drinking waters are those that have a health impact, particularly contamination of supplies associated with *E. coli* and *Cryptosporidium*. Compliance is assessed by determining the safety (compliance with the standards) and security (identification, monitoring and management of risk) of public water supplies.

To ensure that these standards are met, each water supply must be monitored on a regular basis. Minimum monitoring frequencies for drinking water depend on the size of the supply in question, and the monitoring frequency is legally set out in the Regulations concerning drinking water. Though the Regulations specify two types of supplies ("public" and "private"), in practice there are five distinct categories of water supply in Ireland, of which the latter four would be classified as "private" in the context of the Regulations. These categories are listed below:

- **Public Water Supplies (PWS).** These are local authority operated schemes (though these may be run by a private contractor on behalf of the local authority). They supply water to the majority of households in Ireland.
- **"Public" Group Water Schemes (PuGWS).** These are schemes where the water is provided by the local authority but responsibility for distribution of the water rests with the group scheme. These schemes tend to be supplied off larger public water supplies.
- **"Private" Group Water Schemes (PrGWS).** These are schemes where the owners of the scheme (usually representatives of the local community) source and distribute their own water. Combined, the "public" and "private" group water schemes supply water to around 10% of the population of Ireland.
- **Small Private Supplies (SPS).** This is a large group of different types of supply comprising industrial water supplies (such as those used in the brewing industry) to boreholes serving commercial premises (e.g. pubs, hotels etc.) and public buildings (e.g. schools, nursing homes).
- **Exempted Supplies.** These are supplies serving less than 50 persons and not supplying water as part of a public or commercial activity. The majority of these supplies are private wells serving individual houses. These supplies serve approximately 10% of the population.

This report and the assessment of monitoring carried out covers the year 2007. The number of water supply zones monitored during 2007 for each of these categories and the percentage of the total population served is given in Table 2-1. There has been an apparent increase in the number of public group water schemes in 2007 (830 in 2007 up from 777 in 2006) however, this is most likely due to improved identification and reporting of such schemes rather than an actual increase in the number of schemes. There has also been a drop in the number of private group water schemes which can be attributed to schemes being taken in charge by local authorities and also by amalgamation of schemes which is taking place as the treatment plants and distribution networks are being upgraded.

There has been an increase in the number of private supplies that supply water as part of a public or commercial activity identified by local authorities in 2007. A total of 888 such supplies have been identified by 25 local authorities as being required to meet the requirements of the Drinking Water Regulations, of which 794 were monitored during 2007 (up from 523 in 2006). Notwithstanding the improvements in the identification and monitoring of these private water supplies, a large proportion of local authorities have not identified all such supplies. The identification of private water supplies that come within the remit of the Drinking Water Regulations in Ireland is a requirement of Regulation 7 of the Drinking Water Regulations.

**Table 2-1. Water Supply Zones in 2007 and the Proportion of the Population Served.**

| Type of Supply | No. of Water Supply Zones[2] | % of Total Population Served |
|---|---|---|
| Public Water Supply | 952 | 87.5 |
| Public Group Water Scheme | 830 | 3.2 |
| Private Group Water Scheme | 588 | 5.0 |
| Small Private Supply | 888 | 0.4 |
| Exempted Supplies[3] | N/A | 3.9 |

In Ireland, the majority of drinking water (83.7%) originates from surface water (i.e. rivers and lakes) with the remainder originating from groundwater (8.8%) and springs (7.5%). This is particularly so for public water supplies whereas group water schemes and small private supplies tend to be slightly more reliant on groundwater or spring water.

## 2.1 Remedial Action List

In January 2008, the EPA identified 339 public water supplies representing 36% of public drinking water supplies that require detailed profiling to ensure that the supply is providing clean and wholesome drinking water. The focus of the EPA is to ensure that the supplies on the Remedial Action List (RAL) achieve full compliance with the requirement to provide clean and wholesome drinking water. This list of supplies that require remedial action is not exhaustive and additional supplies are added as further information is gathered from audits carried out by EPA Inspectors and information gathered from local authorities, the Health Service Executive and the Department of Environment, Heritage and Local Government. Supplies are removed from the list when sufficient corrective action is taken by the local authority. In general, a supply will not be removed from the list on the basis of monitoring results alone, the local authority must demonstrate that appropriate actions have been taken (e.g. new infrastructure, procedures or training) to ensure that compliance is secured and the risks of failure have been minimised. The EPA has published guidance (Guidance Booklet No.3) to outline the purpose of the Remedial Action List and the actions that must be taken.

Supplies were included on the list for one or more reasons, including:

- They failed to meet the *E. coli* standard at some point in the last two years.
- They had inadequate treatment (e.g. no treatment other than chlorination or poor turbidity removal or excessive levels of aluminium in the treated water).
- They had elevated levels of nitrate or are unable to meet the new bromate or trihalomethanes standards came into force at the end of 2008.
- Monitoring results or compliance checks by the EPA indicate a lack of operational control at the treatment plant.
- Supplies identified by the Health Service Executive where improvements are required.

The Remedial Action List includes supplies where the primary issue to be addressed is the water treatment plant. This list does not include supplies where there are issues of quality caused by the distribution network. For example, supplies that have failed to meet the lead parametric value due to the presence of lead pipework in the distribution network have not been included on this list. The supplies that have been notified to the EPA as having failed to meet the lead parametric value are listed separately in the CD ROM disk that is published with this report.

Local authorities with supplies on the RAL were requested by the EPA to put in place a plan of action to profile the water supply from catchment to consumer to determine the risks to a safe and secure

[2] A water supply zone is a geographically defined area within which drinking water comes from one or more sources and water quality is uniform.

[3] Exempted supplies are supplies that are provided from either an individual supply providing less than $10m^3$ a day on average or serving fewer than 50 persons and do not supply water as part of a public or commercial activity. Exempted supplies may also be a supply used exclusively for the purposes in respect of which the sanitary authority is satisfied that the quality of the water has no influence, either directly or indirectly, on the health of consumers concerned (e.g. industrial cooling water).

water supply. This involved identifying the risk to the security of the water supply, managing the risks identified by either abandoning or replacing the source, upgrading the treatment facilities or improving operational and maintenance arrangements.

As of the end of September 2008, 51 supplies had been removed from the list while 53 supplies were added. Thus, at the end of September 2008, there were 341 supplies on the Remedial Action List. The reasons for the removal/addition of supplies from the list are indicated on the table below. Local authorities reported to the EPA whether they intended to replace or abandon the source, upgrade the treatment facilities or improve the operational and maintenance arrangements at the plant. Local authorities have indicated to the EPA that of the 341 supplies remaining on the Remedial Action List 60 (18%) are to be replaced, 216 (63%) are to be upgraded with 65 (19%) to have improvements in the operation of the plant. The supplies that are listed on the Remedial Action List as of the end of September 2008 are listed in the CD ROM disk that accompanies this report.

**Table 2-2. Summary of Supplies Added or Removed from the Remedial Action List.**

| | No. of Water Supplies |
|---|---|
| **Supplies Added to RAL** | |
| Microbiological Failure e.g. E. coli, Cryptosporidium | 26 |
| Chemical Failure e.g. Nitrate, THM | 7 |
| Indicator Failure e.g. aluminium, coliforms | 6 |
| Other[4] | 14 |
| **Total No. of Supplies Added** | **53** |
| | |
| **Supplies Removed from the RAL** | |
| Abandoned or Replaced | 24 |
| Upgraded | 15 |
| Improved Operations | 9 |
| Other[4] | 3 |
| **Total No. of Supplies Removed** | **51** |

The EPA is not satisfied by the progress being made by local authorities in upgrading, replacing or improving the operation of some treatment plants that are listed on the RAL. Further work is required to improve the security of supplies to ensure that consumers receive safe and secure drinking water. Seven of the 64 supplies identified by the EPA in 2007 as having no treatment barrier to remove *Cryptosporidium* have installed an adequate barrier since the March 2007 outbreak of *Cryptosporidium* in Galway City.

## 2.2 Public Water Supplies – Enforcement by the EPA

Under the Drinking Water Regulations local authorities must notify the EPA where there has been a failure to meet a quality standard in accordance with guidelines issued by the EPA. Guidance was produced in November 2007 by the EPA and circulated to water suppliers to make them aware of their obligations. This guidance (Guidance Booklet No. 1) is available on the EPA website (www.epa.ie). A summary of the notifications received and actions taken during the period September 07 to September 08 by the EPA is outlined in Tables 2-3 and 2-4 below.

The EPA received 283 notifications during the period September 2007 to September 2008. The EPA assesses each notification and the corrective actions proposed by the local authority. If the corrective actions taken by the local authority are appropriate then no further action is warranted by the EPA. If the corrective action is not deemed to be satisfactory the EPA can issue legally binding Directions or may carry out an audit of the treatment plant to assess the actions taken. The main causes of the notifications are summarised in Table 2-3 and the enforcement action taken is summarised in Table 2-4. Where the EPA issues a legally binding Direction to the local authority and a local authority fails

[4] Other includes supplies identified as having inadequate treatment or corrections to the original Remedial Action List due to incorrect supply names.

to comply with that Direction the local authority has committed an offence and is liable for prosecution.

In the period September 2007 to September 2008, the EPA issued 47 binding Directions to 15 local authorities and compliance with the Directions issued is being monitored to determine if further enforcement action, up to and including prosecution, is warranted. A full list of all Directions issued by the EPA is included in Appendix 5.

**Table 2-3. Reason for Notifications to the EPA.**

| Reason | No. of Notifications |
|---|---|
| *E. coli* | 74 |
| Coliform Bacteria | 38 |
| Aluminium | 33 |
| Lead | 26 |
| Trihalomethanes | 23 |
| pH | 14 |
| Nitrate | 10 |
| *Cryptosporidium* | 9 |
| Iron | 8 |
| *Clostridium perfringens* | 8 |
| Turbidity | 7 |
| Nickel | 6 |
| Copper, Pesticides, *Enterococci* and Fluoride | 4 each |
| Mercury, Colour, Arsenic and Precautionary[5] | 2 each |
| Acrylamide, Antimony and Manganese | 1 each |

**Table 2-4. Summary of Notifications Received and Enforcement Action During the Period September 2007 to September 2008.**

| Action | No. |
|---|---|
| No. of notifications under Reg. 9 or 10 received | 283 |
| No. of Directions issued by the EPA<br>• Regulation 9 Direction<br>• Regulation 10 Direction<br>• Regulation 16 Direction | <br>15<br>7<br>25 |
| No. of prosecutions by the EPA | 1 |

The notifications to the EPA in the period September 07 to September 08 indicate that 53 supplies serving approximately 118,000 persons either had a boil water notice or restriction of use placed on them (e.g. do not drink). There was a rise in the number of boil water notices/restrictions of use placed on supplies during August 2008. The increase is attributed to the extreme weather conditions experienced during the month of August and the inability of the affected treatment plants to cope with the challenges posed. This situation highlights the need for treatment plants to be designed and operated to cope with the variations in weather and the resultant changes in raw water quality. While some of the problems experienced were unavoidable (e.g. the mudslide in Kerry affecting the Dromin treatment plant and the flooding of the Newcastlewest treatment plant); others, with improved management and operational practice, are preventable.

[5] Two notifications were received for supplies that did not have any failures to meet a standard but a boil water notice was imposed as a precautionary measure due to flooding.

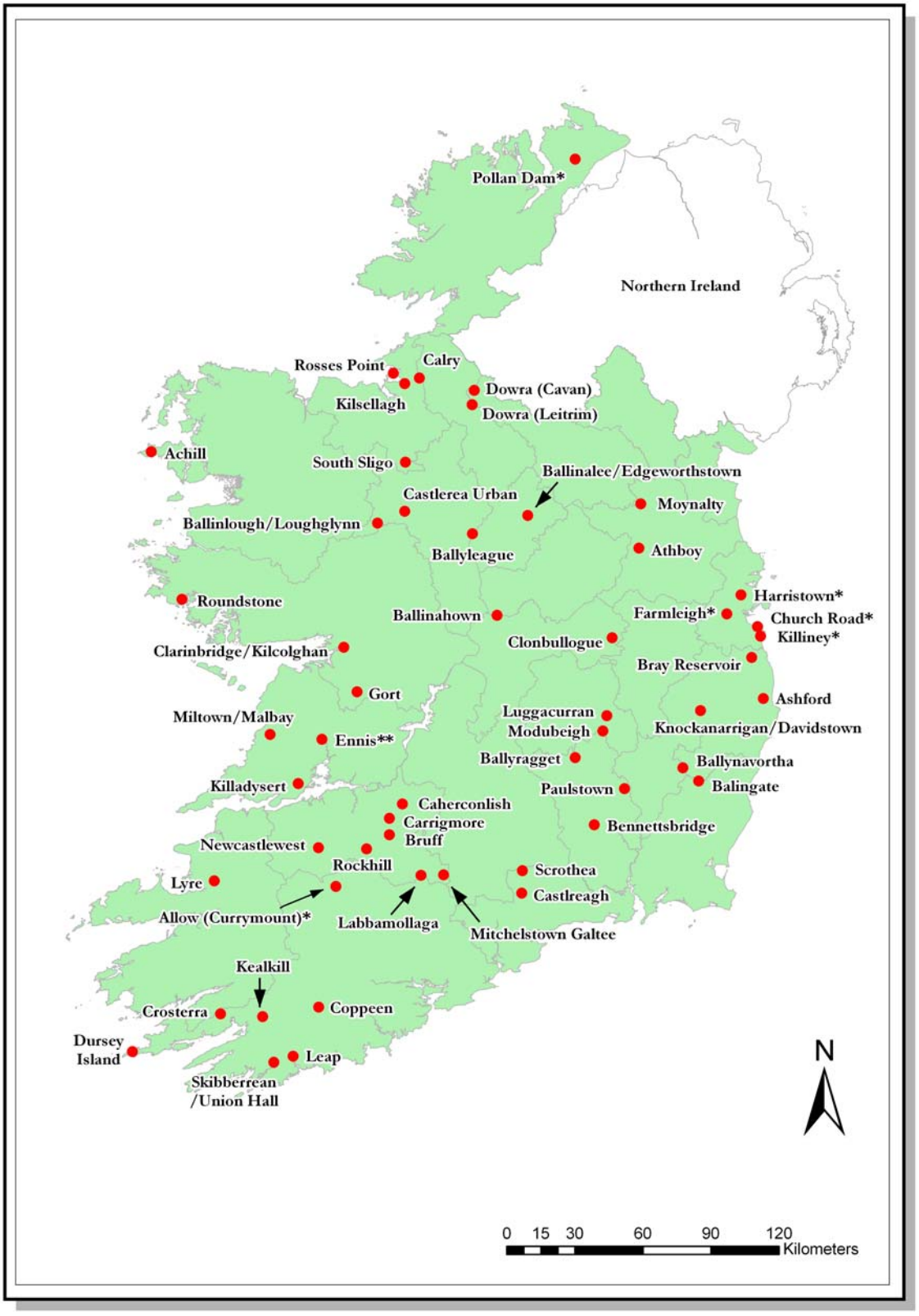


**Figure 2-1. Map of Boil Water Notices/Restrictions of Use in Public Water Supplies During the Period September 2007 to September 2008[6].**

[6] * Boil water notice was for a localised part of the distribution network and not the entire supply.

** Boil water notice was a restricted boil notice to certain parts of the population and not the entire population.

The EPA carried out 56 audits of water treatment plants during the period January to September 2008. Although the enforcement section of this report deals with the period September 2007 to September 2008, EPA audits carried out in 2008 were discussed in the previous report and hence not included in this assessment. The majority of audits were carried out on supplies where notifications were received or supplies on the Remedial Action List.

The key issues identified by the EPA from audits carried out in 2008 are:

- Awareness of the potential risks to the provision of safe and secure drinking water is low.
- Source protection in a large number of water supplies is not adequately considered.
- Process control at treatment plants including proper use of monitoring equipment is not satisfactory at many plants (e.g. chlorine/UV monitors/alarms, turbidity monitors).
- Improvement in the management of filters and automated control of chemical dosing is required at many plants.
- The lack of ongoing maintenance and investment in many treatment plants has resulted in some plants not operating as originally designed.

Additional issues identified during audits are summarised in Table 2-5. Disinfection, the key treatment stage at all water treatment plants, needs to be verified at all times and this could not be guaranteed at a large number of treatment plants, where key equipment such as chlorine monitors and alarms were not installed.

In 2008, the EPA prosecuted one local authority for failure to comply with a Direction. Galway County Council was directed to install a chlorine monitor and alarm at the Craughwell water treatment plant no later than 31 October 2007. Following an audit in November 2007, at which it was discovered that the chlorine monitor and alarm had not been installed, the EPA initiated legal proceedings. On 23 April 2008 Galway County Council pleaded guilty of failing to comply with the Direction and was fined €4,000 and costs of €5,500 were awarded to the EPA. Following the prosecution the Council installed the chlorine monitor and alarm and has since shut down the Craughwell treatment plant.

**Table 2-5. Issues Identified by EPA Audits of Drinking Water Treatment Plants.**

| | Issue | No. of Water Supplies | % of Supplies Audited |
|---|---|---|---|
| 1 | Problems in the operation of the filters<br>***Reason: Poor filtration indicates inadequate treatment of the water which may result in contaminants not being removed.*** | 18 | 67 |
| 2 | No turbidity monitors on each filter<br>***Reason: Turbidity monitors are critical to control the quality of treated water post filtration.*** | 22 | 65 |
| 3 | Inadequate chemical dosing arrangements<br>***Reason: Failure to dose correctly will result in excessive chemicals in treated water or inadequately treated water.*** | 29 | 52 |
| 4 | No chlorine monitor and alarm<br>***Reason: Chlorine monitors and alarms alert the operator of the plant to inadequate treatment of the supply even when the plant is unattended.*** | 28 | 50 |
| 5 | Floc carryover from the clarifier<br>***Reason: Floc carryover indicates poor control over chemical dosing and may result in excessive chemicals in treated water or inadequate treatment of water.*** | 10 | 48 |
| 6 | No source-protection measures in place<br>***Reason: Potential sources of pollution could be present to contaminate the supply.*** | 25 | 45 |
| 7 | Final water turbidity >1.0 NTU[7]<br>***Reason: Excessive levels of turbidity indicate that if Cryptosporidium is present in the source water it is likely to be in the treated water and may pose a risk to human health.*** | 13 | 45 |
| 8 | No duty and standby chlorine pumps<br>***Reason: If a pump fails undisinfected water may enter the water supply and pose a risk to human health.*** | 19 | 34 |
| 9 | Plant operating >10% above design capacity<br>***Reason: Excessive loading on plant places stresses on treatment processes making them vulnerable to failure.*** | 8 | 14 |
| 10 | Inadequate disinfection contact time<br>***Reason: Inadequate contact time may result in micro-organisms posing a risk to human health.*** | 7 | 13 |
| 11 | Treatment process partially or fully bypassed<br>***Reason: Bypassing treatment processes reduces the protection to the supply that these treatment processes provide and increase the likelihood of contamination.*** | 4 | 7 |
| 12 | Unapproved/inappropriate chemicals used<br>***Reason: Unapproved/inappropriate chemicals may pose a risk to health.*** | 2 | 4 |
| 13 | Uncovered reservoir/contact tank<br>***Reason: Direct contamination of treated water by animals or malicious intent may occur and may pose a risk to human health.*** | 2 | 4 |

[7] Nephelometric Units

**The Actions Necessary**

- Treatment plants must be capable of ensuring that all treatment processes operate adequately at all times. For treatment plants that are not staffed 24 hours a day, automation of the treatment processes e.g. chemical dosing, should be implemented, using alarms etc.
- Local authorities should ensure that each exceedance of the parametric values is investigated and notified to the EPA as outlined in the Guidance Booklet No. 1 published by the EPA. Actions taken to address the cause of the non-compliance must include actions to prevent the exceedance occurring in the future.
- Local authorities must actively manage the risks identified in their catchments and continually assess the quality of the source water to ensure that treatment at the plant is optimised.
- Consumers must be informed of the quality of their water supply on an ongoing basis and must particularly be informed of quality issues that affect their water supply. In this regard, the public should be engaged when developing source protection measures to ensure that consumers understand and appreciate the impact they can have on the quality of their water supply.
- Local authorities need to put in place adequate controls at treatment plants including a means of checking that any procedures and training provided do result in an effective system for the supply of safe and secure drinking water.
- All drinking water operators should undergo appropriate training in the provision of drinking water supplies such as that delivered by the Water Services National Training Group (www.wsntg.ie). As a minimum, each operator should be trained for each treatment process for which they are required to operate at the plant.

# 3 THE SECURITY OF DRINKING WATER

## 3.1 Supplies with Inadequate Treatment

**The Issues**

Untreated water is rarely suitable for drinking without some form of treatment, except where there is an adequately protected borehole with a small distribution network (e.g. a house with a private well). All public water supplies should be subject to some form of treatment. The type of treatment that is necessary to ensure that the water supplied is clean and wholesome will depend on:

- The source of the water supply (e.g. surface water supplies require more treatment than groundwaters).
- The quality of the untreated water.
- The risks to the quality of the water.

As a minimum all water should be disinfected. The disinfection system should be reliable (e.g. flow proportional dosing, adequate contact time with duty and standby pumps) and verifiable (e.g. should have a chlorine monitor/alarm). The EPA has identified 5 (down from 13 at the start of 2008) public water supplies (from groundwater) where there is no disinfection.

Water supplies that originate from surface waters or those that are influenced by surface waters require further treatment in addition to disinfection to ensure that the water is wholesome and clean. Local authorities have reported that there are 57 (down from 64) supplies from surface water that have no treatment other than disinfection. Of the 64 supplies identified in last year's report as having an inadequate barrier to prevent *Cryptosporidium* entering the water supply, 6 were found to contain *Cryptosporidium* during all of 2008, 12 were contaminated with *E. coli* and 2 were contaminated with Enterococci. Thus, where a supply has no treatment other than disinfection it was four times more likely to have been contaminated with *E.* coli than if such a barrier was in place. In total, boil water notices were put in place on 8 of the supplies on this list. This highlights the necessity to ensure that adequate treatment is in place in all treatment plants and that as a minimum surface water supplies must have at least one barrier to prevent entry of *Cryptosporidium* into the water supply.

**The Actions Necessary**

Disinfection as a minimum must be installed on the 5 public water supplies that have no treatment while an appropriate treatment barrier must be put in place in the 57 public water supplies (from surface water sources) that have no treatment other than disinfection. All of these supplies are on the EPA Remedial Action List of Public Water Supplies and the local authorities have been directed to put in place a plan of action to ensure that these supplies have adequate treatment.

The EPA has issued a Direction to the three local authorities that operate the 5 public water supplies that have no disinfection. The Direction requires the local authorities to install disinfection at these supplies as soon as possible and no later than September 2009.

In relation to the 57 supplies with inadequate treatment the EPA has (at the end of September) issued 2 Directions to 2 local authorities requiring them to install an appropriate treatment barrier. Further enforcement action is scheduled by the EPA in relation to the remaining supplies.

**Figure 3-1. Vulnerable Spring with Inadequate Source Protection.**

## 3.2 E. coli

**The Issues**

*E. coli* is an indicator bacteria organism that provides evidence that recent faecal contamination of a water supply has occurred. The presence of even a single *E. coli* in drinking water is unacceptable as it indicates that the source of the supply has become contaminated or that the treatment plant is not operating sufficiently to remove the organism.

The main cause of failures to meet the *E. coli* parametric value of 0/100 ml in public water supplies has tended to be either inadequate disinfection or a failure in the disinfection system. The number of public water supplies and private group water schemes that detected *E. coli* at least once during 2007 dropped from 77 (8.3%) and 246 (35.8%) in 2006 to 52 (5.5%) and 184 (31.4%) respectively in 2007. A summary of compliance with the *E. coli* parametric value is provide on Figure 3-2. While this drop is to be welcomed, it is nonetheless unacceptable that 52 public water supplies were contaminated with *E.* coli at least once during 2007. Furthermore, it is unlikely that this drop will be sustained without further improvements in the disinfection process in 2009. Notifications received by the EPA indicate that *E* .coli was detected at least once in 74 supplies in the first 9 months of 2008.

Outbreaks of Verotoxigenic *E. coli* (VTEC[8]) have been found by the Health Protection Surveillance Centre to be linked to consumption of untreated private well water during heavy rainfall such as that experienced in August 2008 (http://www.hpsc.ie/hpsc/EPI-Insight/Volume92008/File,3130,en.pdf). The HPSC advise that in times of heavy rainfall users of vulnerable supplies should consider boiling their water or should take appropriate action to prevent the risk of illness.

[8] VTEC is a pathogenic strain of *E. coli.*

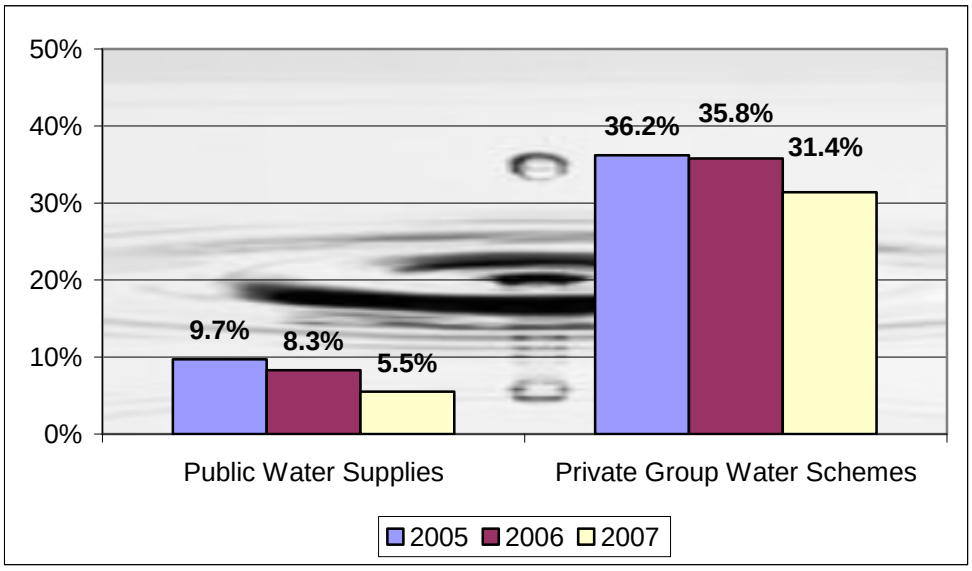


**Figure 3-2. Percentage of Supplies Contaminated with E. coli during the period 2005 - 2007.**

The EPA has recommended in previous Quality of Drinking Water in Ireland reports that local authorities should install chlorine monitors with alarms linked to recording devices in each water treatment plant. As of January 2008 chlorine monitors and alarms were present in just 30.8% of public water supply treatment plants nationally. A further survey of the presence of chlorine monitors and alarms by the EPA in August 2008 indicated that chlorine monitors were installed in a further 9.2% (81) of water treatment plants. However, 60% (541) of water treatment plants remain without chlorine monitors and alarms as of August 2008. A summary of the number and proportion of chlorine monitors and alarms installed in water treatment plants in each local authority as of August 2008 is shown on Table 3-1. A number of local authorities have issued tenders to install chlorine monitors and alarms at all water treatment plants; however, this needs to be replicated nationally. The EPA has issued a circular instructing all local authorities to install chlorine monitors and alarms at all public water supplies no later than 28 February 2009. The EPA plans to resurvey local authorities during 2009 and take appropriate enforcement action against suppliers that have not installed these monitors.

The other issues relating to disinfection identified during EPA assessment of notifications of failures to meet the *E. coli* parametric value and audits include:

- The World Health Organisation guidelines for the adequate disinfection of drinking water requiring a chlorine concentration of 0.5 mg/l for at least 30 mins with the pH <8 and turbidity <1.0 NTU are not being adhered to at a number of plants.
- The absence of standby pumps at a number of water treatment plants, leaving the consumers vulnerable to receiving water that has not been disinfected in the event of failure of the chlorine pump.
- The absence of flow proportional dosing leading to low levels of chlorine in supplies at times where the level of flow through the plant varies.
- Inappropriate use of ultraviolet (UV) treatment systems as an alternative method of disinfection. Many UV treatment units were operating outside their validated range, did not have standby lamps nor had UV intensity or UV transmissivity monitors in place.

**Table 3-1. Number and Proportion of Chlorine Monitors and Alarms installed in Water Treatment Plants in Each Local Authority as of August 2008.**

| Local Authority | No. of Supplies Without Chlorine Monitors/ Alarms | Chlorine Monitors Installed Between Jan. and Aug. 08 |
|---|---|---|
| Waterford County Council | 96 | 1 |
| Cork North County Council | 62 | 8 |
| Cork South County Council | 50 | 6 |
| Limerick County Council | 42 | 1 |
| Kerry County Council | 27 | 0 |
| Laois County Council | 27 | 0 |
| Cork West County Council | 25 | 4 |
| North Tipperary County Council | 24 | 1 |
| Wexford County Council | 22 | 0 |
| Clare County Council | 18 | 1 |
| Mayo County Council | 17 | 1 |
| Donegal County Council | 16 | 6 |
| Cavan County Council | 14 | 1 |
| Kildare County Council | 10 | 0 |
| Louth County Council | 10 | 0 |
| Galway County Council | 8 | 4 |
| Meath County Council | 8 | 4 |
| Offaly County Council | 8 | 7 |
| Wicklow County Council | 7 | 7 |
| Kilkenny County Council | 7 | 4 |
| Monaghan County Council | 4 | 1 |
| South Tipperary County Council | 4 | 9 |
| Carlow County Council | 3 | 1 |
| Westmeath County Council | 2 | 12 |
| Dun Laoghaire Rathdown County Council | 1 | 0 |
| Leitrim County Council | 1 | 4 |
| Sligo County Council | 1 | 2 |
| South Dublin County Council | 1 | 0 |

**The Actions Necessary**

Disinfection systems must be secure and verifiable. This means there must be in place a fail-safe system such that if one aspect of the disinfection system fails the entire system does not cease to provide safe disinfection of the supply. This is done by assessing the risk at each vulnerable part of the disinfection process and taking the appropriate measures. Verification of the disinfection process is important and will provide proof of how the system was operating and will give assurances to the operator that the treatment system is working satisfactorily.

In relation to chlorine disinfection systems, local authorities should take the following actions to prevent *E. coli* from contaminating water supplies:

1. The source of the water supply must be protected to reduce the levels of contamination in the source water prior to treatment.
2. All treatment plants should have a continuous chlorine residual monitor on the final water and such monitors should be alarmed and linked to a recording device to ensure that either a sudden increase or decrease in chlorine demand or a failure of the chlorine dosing system is detected immediately. The aim of such alarms is to ensure that corrective action is initiated as quickly as possible to prevent undisinfected water entering the distribution mains.

3. Duty and standby chlorine dosing pumps with automatic changeover should be installed to ensure that in the event of the failure of the duty pump the standby pump is automatically activated and there is no interruption to the disinfection process.
4. Dosing of chlorine should be flow proportional to ensure that the levels of chlorine in the treated water are not compromised by any changes in flow out of the treatment plant.

The operation of UV treatment units can be a useful additional barrier to improve disinfection. However, in order for UV to operate successfully the local authority must ensure the following:

1. Any UV treatment system has been validated to a recognised international standard such as the German DVGW W294 UV standard or other equivalent validation standard;
2. The UV treatment system must operate within its validated range at all times;
3. There must be a UV intensity or UV transmissivity monitor with alarm and recording device on each UV treatment system that alerts the operator when the UV treatment system is operating close to or outside its validated range;
4. There should be duty and standby UV lamps to ensure that disinfection is not compromised in the event of malfunction, repair or maintenance of the UV treatment system; and
5. An assessment of the need for additional disinfection (such as chlorination) to provide residual disinfection in the distribution network should be carried out.

## 3.3 Cryptosporidium

**The Issues**

Cryptosporidium is a protozoal parasite that causes a diarrhoeal illness in humans known as cryptosporidiosis. Both humans and animals serve as potential reservoirs and there are multiple routes of transmission. The consumption of contaminated water is regarded as being an important transmission route, but infection has also been associated with swimming pools, farm animal contact, food and person-to-person contact. A primary public health concern regarding *Cryptosporidium* is its relative resistance to chlorination. *C. parvum* and *C. hominis* are the main species associated with human infection, although a minority of human infections have been linked with other species. The primary reservoir for *C. hominis* is humans while both livestock (calves and lambs in particular) and humans serve as reservoirs for *C. parvum*. Thus, speciation can be used to indicate a likely source of infection for individual cases.

There was a rise in the number of cases of cryptosporidiosis reported to the Health Protection Surveillance Centre in 2007 (605 cases during 2007 up from 361 cases during 2006 [www.ndsc.ie]). This was primarily due to the outbreak of cryptosporidiosis in Galway during 2007 where 242 cases of the disease were reported to the Health Protection Surveillance Centre.

The EPA issued guidance (Guidance Booklet No.4 "Risk screening methodology for *Cryptosporidium*") to all local authorities in January 2008. All local authorities were advised to complete the risk screening methodology on all public water supplies by June 2008. The purpose of this risk screening methodology was to assist local authorities in prioritising supplies that are at high risk of contamination with *Cryptosporidium* and to identify high risk factors, which can be mitigated to reduce the risk associated with the supply. This risk screening methodology should be considered as a first step in the Water Safety Plan approach in so far as it deals with risk of contamination with *Cryptosporidium*. Local authorities should use the tool to develop an action programme to reduce the risk of contamination from *Cryptosporidium* in supplies that are identified as high risk. It should also be seen as a model to assist in the identification of other risks to the supply from the catchment to consumer.

Many water treatment plants are not equipped to measure turbidity at levels below 1.0 NTU (the standard which must be met on water leaving a treatment plant) and indeed a large

number of treatment plants that were monitored did not comply with this parametric value (87 of 239 monitored reported turbidity levels in excess of the parametric value of 1.0 NTU). Therefore, it would appear, that a great many water supplies in Ireland are operating under conditions of high risk, with a significant risk of *Cryptosporidium* oocysts failing to be removed by the treatment processes at treatment plants (if present in the raw water).

There is no standard for *Cryptosporidium* in the Drinking Water Regulations. Where *Cryptosporidium* is detected in a water supply the local authority should consult with the Health Service Executive in each specific case to determine whether there is a potential danger to human health.

**The Actions Necessary**
Specific actions which must be taken to reduce the risk of future outbreaks of cryptosporidiosis include:

1. **Assessment of the risk of contamination of all water supplies -** The EPA has circulated a revised risk-screening tool to all local authorities and requested all local authorities to complete the risk-screening methodology. All supplies identified as "high" or "very high" risk must develop a programme of works to reduce the risk either in the source of the water or the level of treatment must be upgraded to ensure that there is an adequate barrier to prevent the parasite entering the water supply.

2. **Review of the operation of water treatment plants -** Many plants in Ireland either do not have the ability to determine whether the treatment standard of 1.0 NTU can be met or are simply not capable of treating the water to reduce levels of turbidity to below this level. Levels of turbidity ex works should be less than 1.0 NTU and ideally should be as low as possible. Local authorities will need to review the operation of current treatment plants to ensure that treatment is optimised and that they strive for a target level of turbidity in the treated water of no more than 1.0 NTU and ideally below 0.2 NTU.

3. **Upgrading, replacement or closure of all plants identified by the EPA in its survey of all local authority treatment plants –** There are presently 57 supplies that have inadequate treatment (i.e. supplies which originate from surface water and have no treatment other than chlorination). Plans must be put in place by the local authorities to ensure these supplies do not pose a risk to public health. This may involve upgrading, replacement or closure of these plants.

4. **Protection of the sources of water supplies –** The local authority (in conjunction with the River Basin Districts) must work to identify and reduce polluting activities within the catchment so as to reduce the likelihood of contamination of supplies at source.

The reduction of the risk of contamination of public water supplies by *Cryptosporidium* should be considered as part of the overall Water Safety Plan approach to the management of drinking water as outlined in Section 1.

## 3.4 Chemicals in Drinking Water

**The Issues**
There are five potential sources of the presence of chemicals in drinking water. These are:

1. **Contamination from chemicals used at the water treatment plant** – The use of chemicals as coagulants, coagulant aids and disinfectants is an essential part of the treatment of water without which the quality of drinking water would be compromised. Issues can arise where inappropriate or unapproved chemicals are used in treatment plants, where dosing is poorly controlled or where accidents occur

leading to over or under-dosing of chemicals. While the majority of chemicals used in Ireland are fit for purpose, during audits in 2008 the EPA identified isolated incidents where unapproved or inappropriate chemicals were used. A more common source of chemicals in drinking water is inadequate control over the chemical dosing (usually aluminium sulphate) leading to excessive levels of aluminium in the treated water. The contamination of a batch of polyaluminium chloride in a number of group water schemes in East Cavan and Monaghan in early 2007 is an example of what can go wrong when proper control of chemicals is not in place. A full investigation was carried out by Cavan County Council and the Health Service Executive and a copy of the report into this investigation can be downloaded from the website of Cavan County Council.

2. **Contamination from disinfection by-products –** Disinfection is the most critical part of the treatment process at a water treatment plant. However, where there is inadequate pre-treatment of the water or poor control over the disinfection process, the formation of disinfection by-products can occur. The most common disinfection by-product in the Irish context are trihalomethanes which are formed when chlorine is used to disinfect water where there has been inadequate removal of organic material. A more stringent parametric value of 100 µg/l for trihalomethanes took effect in December 2008. The results of monitoring in 2007 indicate that trihalomethane levels in almost 10% of public water supplies were in excess of this new parametric value.

3. **Contamination from materials used in contact with drinking water** – The distribution networks of some supplies are old and consequently parts of the distribution network do not meet current standards. For example, lead was commonly used as a plumbing material prior to the 1970's. It is likely that the lead standard will be exceeded in drinking water where lead is present in the distribution network, service connection or in the internal plumbing of a house. This situation is exacerbated where there is a long length of lead piping and/or where the water is corrosive. Where this is the case, leaching of plumbing materials such as lead, copper and nickel can occur and result in levels that may exceed the drinking water standards. An analysis of information reported to the EPA by local authorities indicates a relatively small number of lead distributions mains are present in the network; however, there are a large number of lead service connections (i.e. the pipe that takes water from the main to the house). The EPA met with the local authorities responsible for the largest supplies of drinking water (Dublin, Waterford, Cork, Limerick and Galway). There are a significant number of lead service pipes remaining in the drinking water networks in these large cities. These lead service pipes connect the mains to individual properties. An important point to note is that property owners are generally responsible for any lead piping within their own properties.

4. **Water pollution** – Chemical contamination of water supplies from pollution is a less common occurrence though elevated levels of nitrate in groundwater supplies can be a problem in intensive agricultural catchments.

5. **Natural contamination** – Levels of metals and other substances in excess of the drinking water standards can occur due to natural conditions. The geology in the zone of contribution of groundwater supplies can have natural levels of substances which are at unacceptable levels for drinking water. In this regard, occasional exceedances of the arsenic and antimony have been reported to the EPA due to natural contamination during 2008.

**The Actions Necessary**

Local authorities need to review their monitoring data to ensure that all supplies are complying with the chemical standards. The actions necessary will depend on the source of the contamination.

1. **Contamination from chemicals used at the water treatment plant** – Local authorities need to examine chemicals used in water treatment to ensure that they are not contributing to non-compliances. Only treatment chemicals that are approved for use in drinking water treatment should be used. Only chemicals with appropriate Irish standards for use in drinking water treatment (e.g. NSAI) or chemicals on the Drinking Water Inspectorate of England and Wales' list of approved products and processes or other appropriate approval list should be used for drinking water treatment in Ireland. In some cases chemicals will have to be replaced, e.g. where there are bromate exceedances it may be necessary to switch to a low bromide form of sodium hypochlorite. In other cases additional pretreatment may be necessary to ensure chemicals are working properly e.g. additional removal of organic material will be necessary to reduce trihalomethane formation where chlorination is practised.

2. **Contamination from disinfection by-products** – Local authorities will need to install adequate treatment to remove organic material in treatment plants where there is no barrier to treatment (e.g. supplies that originate from surface water and have disinfection only). Treatment will need to be optimised in other supplies to ensure adequate removal of organic material. Furthermore, the disinfection system will need to be more actively managed to optimise the levels of chlorine used while at all times ensuring that adequate disinfection is taking place.

3. **Contamination from materials used in contact with drinking water –** Local authorities will need to replace all lead distribution mains in public water supplies. The EPA has recently published guidance ("Lead compliance monitoring and surveys") to be followed by each local authority to determine the extent of lead in the distribution network of each water supply. Further guidance ("Action programme to restore the quality of drinking water impacted by lead pipes") also recently published by the EPA, outlines a risk-based strategy for dealing with lead pipes. The main solution recommended is the removal (or the phased removal) of pipes in order to meet the current lead standard and the new standard in 2013. Other short-term options for dealing with lead exceedances are also set out, such as pH optimisation.

   Local authorities will need to carry out lead surveys to determine the extent of lead in the network and put in place a phased programme for the replacement of lead service connections while at the same time advising consumers of the actions they can take if exceedances are caused by internal lead plumbing within buildings. Local authorities will need to ensure that their water supplies are not aggressive and increasing the amount of leaching that may occur. The replacement of lead pipes is the best solution for ensuring compliance with the drinking water standards for lead and also is the most sustainable solution in the long term.

4. **Water pollution** – In cases where supplies are being polluted by agricultural or industrial activities, the local authority will need to review source protection of the supply to ensure that all relevant legislation is being complied with and that any sources of pollution are eliminated (e.g. landspreading within the zone of contribution of a well). The local authority should enforce the European Communities (Good Agricultural Practice for the Protection of Water) Regulations, 2007 to detect and deal with any sources of pollution.

5. **Natural contamination** – In relation to supplies with naturally high levels of chemicals (such as arsenic), it may not be possible to eradicate the source of the non-compliance and in such cases the local authority may need to consider either additional treatment to remove the chemical in question or replace the source of the water.

## 3.5 Group Water Schemes and Private Water Supplies

The quality of group water schemes continues to be inferior to the public water supplies. This trend has been reported on since the first drinking water annual report was published in 1991 and particularly since the 2003 report, when the EPA distinguished between the private group water schemes and the public group water schemes and reported on them separately. The quality of drinking water in public group water schemes is broadly similar to that of the public water supplies themselves; however, the quality of water supplied by private group water schemes is inferior. The results for 2007 shows that 184 schemes or 31.4 % (down from 35.8% in 2006) of all schemes monitored were contaminated with *E. coli*. The number of contaminated schemes in each county is shown in Figure 3-3.

The upgrading of quality-deficient privately sourced group water schemes continued to be a priority in 2007. This involved one of three routes (i) Design, Build, Operate (DBO) bundling (ii) connection to a public main or (iii) minor upgrade (predominantly for good-quality groundwater supplies).

DBO projects were finalised in Clare (4 schemes) and Limerick (18 schemes), while the first of 2 planned DBO projects in Galway (16 schemes) was also brought into full operation. While most of the first Mayo DBO bundle project (21 schemes) was completed, the extent of unaccounted-for-water (e.g. leakage) delayed the opening of 2 of these, while legal issues delayed the construction of a third. The planned completion of a further DBO bundle, involving 20 group schemes across six counties in South Leinster, was also subject to delays and only 4 plants were fully operational as of 31 December 2007. Two plants that had not previously been operational in Co. Cavan began supplying treated water, effectively completing construction on the three DBO bundles in that county. Phenol contamination on five schemes in the East Cavan DBO bundle in April 2007 represented a setback, but this has resulted in closer controls over the use of chemicals in all water treatment plants. Construction on the remaining three DBO bundles (in Roscommon, Galway and Mayo) did not begin in 2007, as anticipated. While the tendering process was completed in Mayo, issues over the potential impact of water abstraction on the ecology of sensitive waterways had not been resolved. The Galway and Roscommon contracts went for tender again and as such construction on these was unlikely to begin until 2009.

The connection of schemes to public mains accelerated in 2007, as most local authorities moved from the design stage to construction. Although only four such upgrades were completed in Galway during the year, a further 21 schemes were ready to move to construction by the end of the year. Apart from the difficulty in persuading some groups to go this route (an issue largely dealt with under the Water Services Act), a problem has arisen where current public water supplies are insufficient to cope with the addition of group schemes, many of which have high levels of unaccounted-for-water[9]. The National Federation of Group Water Schemes (NFGWS) Annual Report for 2007 points out that 19 Mayo schemes awaiting connection to the Lough Mask Regional Supply were unable to proceed for this reason. Individual group water scheme upgrades, principally on schemes in the south and east, were also progressed in 2007.

In total, 105 DBO treatment plants had completed construction at the end of 2007 (up from 79 at the end of 2006), of which 96 were new-build structures, while a further 9 involved the upgrading of existing plants by DBO contractors. This strategy resolved water quality issues on 115 schemes (several of which amalgamated as part of the upgrade process).

[9] Unaccounted-for water is the difference between the amount of water produced, or purchased, and the amount of water supplied to all customers. Unaccounted-for water includes underground leakage; unauthorized use; unavoidable leakage, inaccurate master, industrial, commercial and domestic meters; and unusual causes.

As of March 2007, the local authority has been designated as the supervisory authority in respect of private water supplies, which includes group water schemes. As the supervisory authority, the local authority can now issue Directions to water suppliers to prepare and implement action programmes. The local authority may also issue Directions to the water supplier to secure compliance with the relevant water quality standards. Furthermore, it is an offence to fail to comply with a Direction issued by a supervisory authority. Enforcement of the Drinking Water Regulations by local authorities must be risk based and outcome driven. The principal risks to drinking waters are those that have a health impact, particularly contamination of supplies associated with *E. coli* and *Cryptosporidium*. Compliance should be assessed by determining the safety (compliance with the standards) and security (identification, monitoring and management of risk) of group water schemes. Ultimately the enforcement options available to local authorities under the March 2007 Regulations must be used to eliminate the supply of water to members of the public from private group water schemes that is unfit for human consumption.

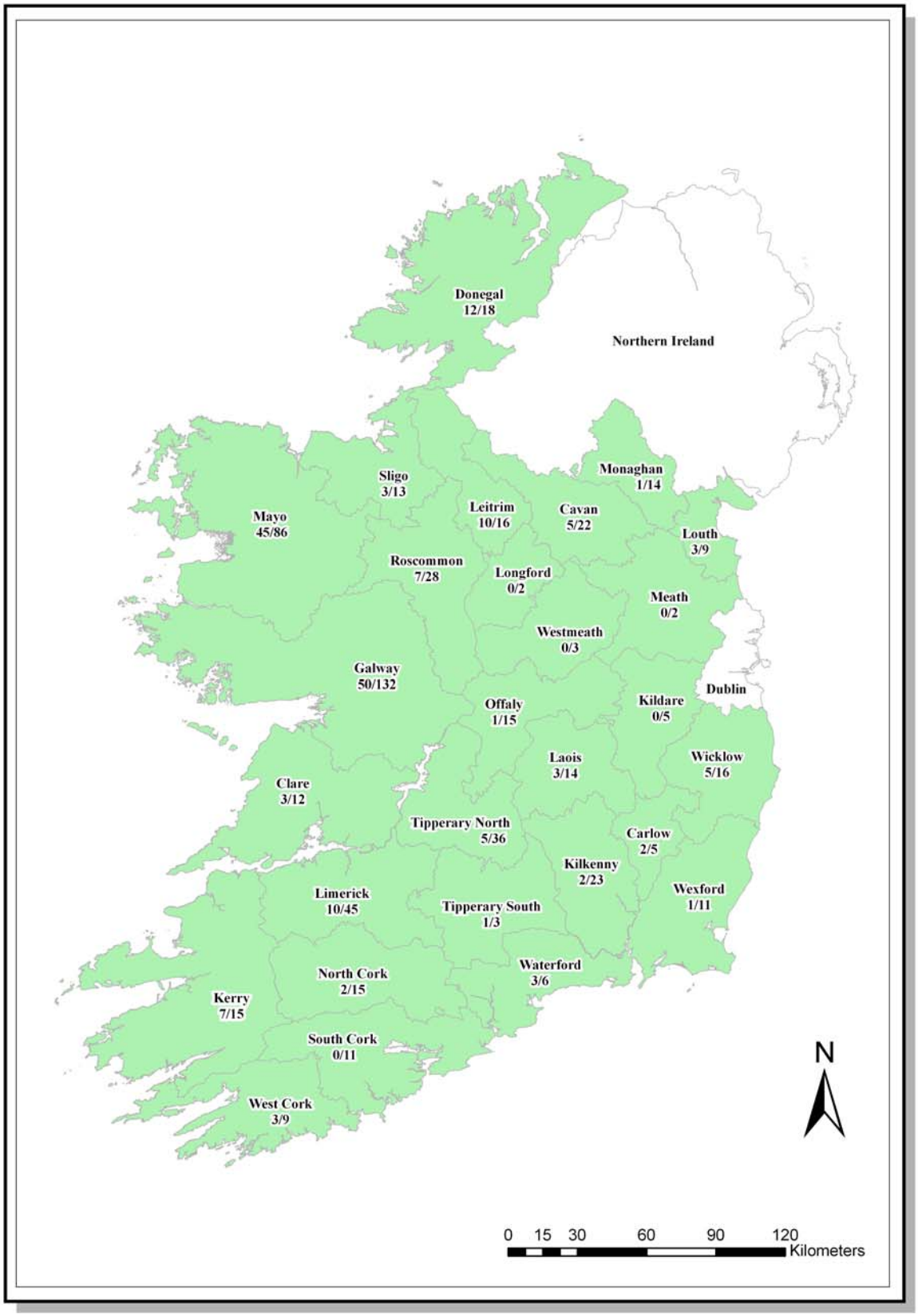


**Figure 3-3. Number of Private Group Water Schemes Contaminated with *E. coli* during 2007[10] as a Proportion of the Total Number of Schemes.**

[10] There are no group water schemes serving >50 persons in any of the four Dublin local authority areas.

# 4 THE SAFETY OF DRINKING WATER

This report assesses the monitoring carried out on treated drinking water. For the purposes of analysing trends, the results of drinking water analyses presented in this report are of value only if the drinking water supply in question has been monitored adequately, that is to say at the frequencies set out in the Regulations. Where supplies have not been monitored to meet the minimum requirements, the water suppliers in question cannot give assurances to their consumers on water quality.

Consumers drinking water from water supplies that are not monitored should be considered to be at risk of poor water quality. In 2007, no monitoring was carried out at 9 (<1%) public water supplies, 60 (7%) public group water schemes and 2 (<1%) private group water schemes. This compares to 1%, 16% and 2% respectively in 2006 and is a substantial improvement in comparison to 2006. Of the 9 public water supplies not monitored, in 2 instances, the lack of monitoring was due to the re-organisation of the supply zones resulting in these zones not being monitored while the remaining 7 supplies were all serving less than 50 persons. In the case of the public group water schemes, the parent public water supply is monitored but often the water is not monitored once it leaves the parent public water supply. These supplies collectively serve a population of over 9,000 persons.

Local authorities are required to ensure that the methods of analysis comply with the performance characteristics specified in Section 2 of Part 3 of the Schedule of the Regulations. Section 2 sets out the trueness, precision and limits of detection that are applicable to the analysis of each parameter. An assessment of the drinking water monitoring results for 2007 indicates that these performance criteria are not being met by a significant number of local authorities. In particular, 16 local authorities reported 736 monitoring results with the limit of detection at the parametric value for a number of parameters (the limit of detection should be 10% or 25% of the parametric value depending on the parameter) and consequently the data could not be used for compliance assessment.

**Table 4-1. Summary of the Water Supply Zones (WSZ's) Not Monitored in 2007.**

| Parameter | No. of WSZ's | No. of WSZs Not Monitored | Estimated Population Served |
|---|---|---|---|
| Public Water Supplies | 952 | 9 | 1,813 |
| Public Group Water Schemes | 830 | 60 | 7,173 |
| Private Group Water Schemes | 588 | 2 | 171 |

Table 4-1 indicates that over 3% of water supplies in Ireland supplying approximately 0.2% of the population were not monitored at all during 2007, the majority of which were public group water schemes. While this is an improvement compared to 2006 where over 6% of supplies were not monitored, there is still a shortfall and several local authorities are failing in their statutory duty to monitor the quality of drinking water supplied to the public. It should be noted that many of the compliant local authorities are carrying out monitoring far in excess of that required by the Regulations.

In relation to the sampling frequencies, a number of supplies were not monitored at the required frequency, primarily due to insufficient parameters being analysed within each sample.

## 4.1 Compliance with the Microbiological Standards

The most important indicators of drinking water quality in Ireland are the microbiological parameters and, in particular, *E. coli*. The *E. coli* bacteria is present in very high numbers in human or animal faeces and is rarely found in the absence of faecal pollution in surface waters or groundwaters. As such, its presence in drinking water is a good indication that the treatment process at the water treatment plant is not operating adequately or that contamination has entered the water distribution system after treatment. The World Health Organisation (WHO, 2005) states that "the presence of *E. coli* provides evidence of recent faecal contamination, and detection should lead to consideration of further action, which could include further sampling and investigation of potential sources such as inadequate treatment or breaches in the distribution system integrity". Similar to *E. coli*,, Enterococci bacteria are present in large numbers in sewage and water environments polluted by sewage or wastes from humans and animals. They are generally present in numbers lower than *E. coli* but they survive longer than *E. coli* and thus can indicate pollution that has occurred in the past.

### 4.1.1 Compliance with the E. coli Standard

In 2007, a total of 353 supplies (out of 3,084 supplies) failed to meet the standard for *E. coli* at one time or more during the year. This represents a compliance rate of 96.6% of samples and 88.6% of water supplies. The main reason for the drop in the number of supplies contaminated was due to a drop in the number of private group water schemes contaminated from 242 in 2006 to 184 in 2007. Overall, 11.4% of water supplies were contaminated with *E. coli* at least once during 2007, an improvement from 14.4% in 2006. The majority of the contaminated supplies were private group water schemes (Table 4-2). The majority of exceedances in public water supplies (those that serve 87.5% of the population) were found in the smaller public water supplies. Indeed the rate of compliance in the large public water supplies (serving greater than 5,000 people) increased in 2007 to 99.9% of samples analysed in 2007 (up from 99.7% in 2006).

**Table 4-2. Summary of Water Supply Zones (WSZ's) Contaminated with *E. coli* in 2007.**

| | No. of WSZ's Monitored | No. of WSZ's with Exceedances | No. with Serious Exceedances[11] |
|---|---|---|---|
| Public Water Supplies | 941 | 52 (5.5%) | 11 (1.2%) |
| Public Group Water Schemes | 763 | 14 (1.8%) | 4 (0.5%) |
| Private Group Water Schemes | 586 | 184 (31.4%) | 65 (11.1%) |
| Small Private Supplies | 794 | 103 (13.0%) | 40 (5.0%) |
| **Total** | **3,084** | **353 (11.4%)** | **120 (3.9%)** |

The majority of the population (87.5%) receive their water from public water supplies, but a sizeable proportion (5%) get their water from private group water schemes. The contamination of water supplies with *E. coli* is worse in group water schemes as compared to public water supplies. *E. coli* was present in 31.4% of private group water schemes (184 supplies). There has been a reduction in the percentage of public water supplies contaminated during 2007 (5.5%, down from 8.3% in 2006) and the proportion of private group water schemes contaminated during 2007 also dropped but remains high (31.4%, down from 35.8% in 2006) (Figure 3-2).

It is evident that compliance (based on the number of samples) with the *E. coli* parametric value in public water supplies and public group water schemes is improving (99.5% and 99.2% respectively). However, the percentage of samples complying with the *E. coli*

[11] A serious exceedance is where the numbers of *E. coli* are in excess of 20 cfu/100ml. The standard for *E. coli* is 0 cfu/100ml.

parametric value in private group water schemes remains unacceptably low at 85.2%, while that in the small private supplies was unsatisfactory at 89.3% (Figure 4-1).

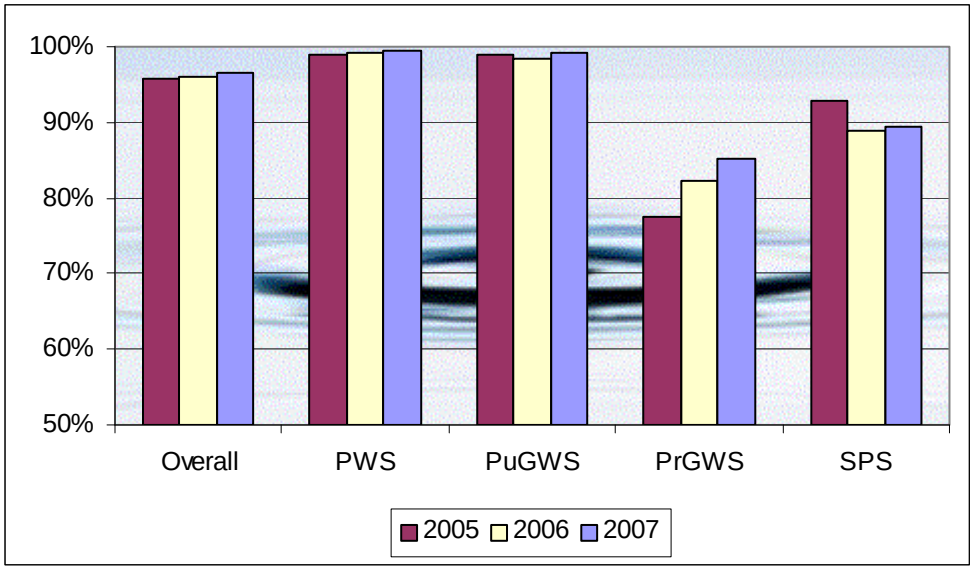


**Figure 4-1. Compliance with the *E. coli* Parametric Value During the Period 2005-2007 Based on the Number of Samples.**

An analysis of the severity of *E. coli* contamination of public water indicates that the majority of incidents of contamination were moderate (<20 cfu/100ml) (Figure 4-2).

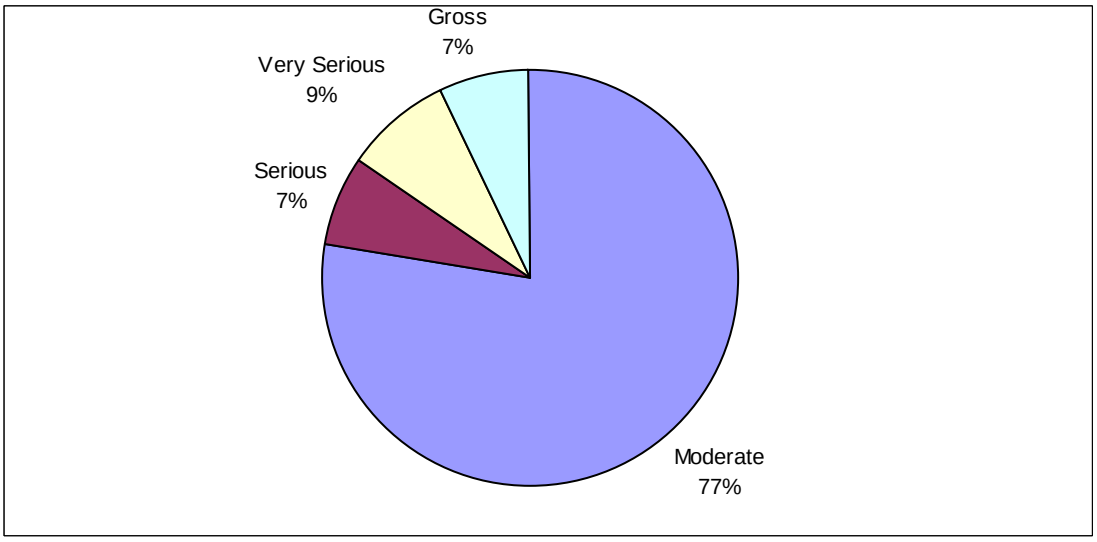


**Figure 4-2. Classification of E. coli Non-Compliances in Public Water Supplies in 2007.**

In 2007, 11 local authorities reported that all public water supplies within their functional area were fully compliant with the *E. coli* parametric value, which is unchanged from 2006. These local authorities were Clare, Cork City, Fingal, Kildare, Leitrim, Limerick City, Longford, Meath, Offaly, South Dublin and Waterford City.

In 2007, 5 local authorities (up from 2 in 2006) reported that all samples analysed for *E. coli* in private group water schemes were compliant. The percentage of group water scheme samples contaminated with *E. coli* in the majority of local authority areas is unacceptable. In particular, more than a quarter of group water scheme samples analysed in Carlow (40%), Cork West (33%), Donegal (67%), Galway (38%), Kerry (46%), Leitrim (62%), Louth (33%),

Mayo (52%), South Tipperary (33%), Waterford (50%) and Wicklow (31%) were contaminated during 2007.

The local authorities with the largest number of contaminated group water schemes in 2007 were Galway (50), Mayo (45), Donegal (12), Cork West (10), Leitrim (10) and Limerick (10).

### 4.1.2 Compliance with the Enterococci Standard

The results of monitoring for Enterococci (Table 4-3) mirror those of *E. coli* with a high level of compliance in the public water supplies and the public group water schemes but with a much higher level of non-compliance evident in the private group water schemes and the private water supplies.

**Table 4-3. Summary of Compliance with the Enterococci Parametric Value in 2007.**

| | No. of WSZs Monitored | No. of Non-Compliant WSZs | No. of Samples Analysed | No. of Non-Compliant Samples |
|---|---|---|---|---|
| Public Water Supplies | 728 | 9 (1.2%) | 2,385 | 9 (0.4%) |
| Public Group Water Schemes | 199 | 7 (3.5%) | 300 | 7 (2.3%) |
| Private Group Water Schemes | 290 | 46 (15.9%) | 395 | 53 (13.4%) |
| Small Private Supplies | 360 | 46 (12.8%) | 643 | 65 (10.1%) |
| **Total** | **1,577** | **108 (7.8%)** | **3,723** | **134 (3.6%)** |

There has been a drop in the number of public water supplies failing to meet the Enterococci parametric value (9 in 2007, down from 26 in 2006) but there has been an increase in the number of public group water schemes contaminated with Enterococci (7 in 2007 up from 2 in 2006).

## 4.2 Compliance with the Chemical Standards

The level of monitoring of the chemical parameters increased by 11% in 2007 compared to 2006. However, there is still a 1.4% shortfall in the number of analyses carried out for the chemical parameters nationally.

Of the 26 chemical parameters included in this group of parameters, full compliance was reported in 2007 for 9 of the 26 parameters, while compliance in excess of 99% was reported for a further 12 parameters, while a further 3 do not require monitoring (acrylamide, epichlorhydrin and vinyl chloride) (Table 4-4). Compliance for 2 parameters was less than 99%. The compliance issues are discussed below and a brief overview of the possible health effects of these chemicals (as outlined in the WHO's "Guidelines for Drinking Water Quality") is given in Appendix 2.

While compliance with the chemical standards in Ireland was good overall in 2007 at 99.1%, standards for 2 chemicals, bromate and total trihalomethanes are going to become more stringent and challenging from 25 December 2008.

**Table 4-4. Total Number of Water Supply Zones (WSZs) Monitored and Samples Analysed for the Chemical Parameters.**

| Parameter | No. of WSZs Monitored | No. of WSZs with Exceedances | % of WSZs Complying | No. of Samples Analysed | No. of Samples Exceeding | % of Samples Complying |
|---|---|---|---|---|---|---|
| **Chemical[12] Parameters** | | | | | | |
| Antimony | 1,099 | 1 | **99.9** | 1,766 | 1 | **99.9** |
| Arsenic | 1,139 | 6 | **99.5** | 1,960 | 7 | **99.6** |
| Benzene | 1,031 | 1 | **99.9** | 1,614 | 2 | **99.9** |
| Benzo(a)pyrene | 960 | 0 | **100** | 1,429 | 0 | **100** |
| Boron | 1,008 | 0 | **100** | 1,682 | 0 | **100** |
| Bromate | 1,118 | 4 | **99.6** | 1,666 | 4 | **99.8** |
| Cadmium | 1,131 | 0 | **100** | 1,914 | 0 | **100** |
| Chromium | 1,138 | 0 | **100** | 1,962 | 0 | **100** |
| Copper | 1,411 | 2 | **99.9** | 2,564 | 2 | **99.9** |
| Cyanide | 972 | 0 | **100** | 1,427 | 0 | **100** |
| 1,2-dichloroethane | 1,106 | 0 | **100** | 1,747 | 0 | **100** |
| Fluoride | 1,229 | 185 | **84.9** | 4,009 | 346 | **91.4** |
| Lead | 1,515 | 18 | **98.8** | 2,962 | 18 | **99.4** |
| Mercury | 1,043 | 1 | **99.9** | 1,695 | 2 | **99.9** |
| Nickel | 1,087 | 6 | **99.4** | 1,778 | 6 | **99.7** |
| Nitrate | 2,200 | 49 | **97.8** | 7,053 | 59 | **99.2** |
| Nitrite (at tap) | 2,257 | 7 | **99.7** | 7,851 | 7 | **99.9** |
| Nitrites (at WTW) | 151 | 2 | **98.7** | 2,344 | 2 | **99.9** |
| PAH | 1,033 | 0 | **100** | 1,533 | 0 | **100** |
| Pesticides - Total | 1,003 | 4 | **99.6** | 1,481 | 4 | **99.7** |
| Selenium | 1,031 | 0 | **100** | 1,657 | 0 | **100** |
| Tetrachloroethene & Trichloroethene | 1,226 | 0 | **100** | 2,753 | 0 | **100** |
| Trihalomethanes | 1,313 | 32 | **97.6** | 3,020 | 64 | **97.9** |

### Antimony

Antimony concentrations in excess of the parametric value were detected in one water supply (a public water supply) though this may be due to contamination from sample containers rather than from the supply itself.

### Arsenic

There were 7 samples analysed for arsenic during 2007 (out of 1,960 samples) that exceeded the parametric value for arsenic. These exceedances were reported in 3 public water supplies (Clontibert, Co. Monaghan, Ahenny Co. Tipperary (South) and Ballyogarty, Co.

[12] Compliance with the acrylamide, epichlorohydrin and vinyl chloride parametric values is to be determined by product specification and not by laboratory analysis. Hence, compliance with these 3 parametric values is diskussed separately later in this section.

Waterford), 2 private group water schemes (Drybridge/Waterunder, Co. Louth and Monamolin, Co. Wexford) and in one small commercial supply in Mayo.

### Bromate

Analysis for bromate was carried out in 1,666 samples analysed in 1,118 water supplies. Overall, 99.8% of samples analysed complied with the standard and elevated levels of bromate were found in 4 supplies (one of which was a public water supply and 3 were private group water schemes). While this a welcome drop in the number of supplies contaminated with bromate (5 supplies were contaminated during 2006), it is important to note that the bromate parametric value (25 μg/l) is an interim standard and the more stringent standard of 10μg/l took effect on 25 December 2008. A comparison of compliance with this new standard as well as a breakdown of compliance in the different supply types is shown on Table 4-5.

**Table 4-5. Compliance with the Bromate Parametric Value.**

| | Current Standard (25 μg/l) | | New Standard (10 μg/l ) | |
|---|---|---|---|---|
| | % of Samples Complying | No. of Non-Compliant WSZs | % of Samples Complying | No. of WSZs with >10 μg/l |
| **Overall** | **99.8** | **4** | **99.3** | **12** |
| Public Water Supplies | 99.9 | 1 | 99.5 | 6 |
| Public Group Water Schemes | 100 | 0 | 100 | 0 |
| Private Group Water Schemes | 98.9 | 3 | 97.9 | 6 |

There is a marked improvement in the number of compliant samples as compared to 2006 (up from 95.9%), the improvement occurring, for the most part, in the public water supplies and the public group water schemes. However, there are challenges facing some local authorities and water suppliers in the coming year, with 12 supplies failing to meet the incoming parametric value.

### Copper

Elevated levels of copper were found in 2 of the 1,411 water supplies monitored (one in a public water supply and one in a small private supply) and were due to the internal domestic plumbing at the sample points.

### Fluoride

Naturally elevated levels of fluoride are quite rare in Ireland and thus any exceedances reported are due almost entirely to public water supplies being dosed with fluoride at levels in excess of the legally permitted dose. Overall, compliance with the fluoride standard in 2007 was 91.4%, which was a decrease from 96.7% in 2006. The majority of fluoride non-compliances were marginally above the parametric value.

The primary reason for the drop in compliance with the fluoride standard was the confusion caused by the discrepancy between the fluoride parametric value in the Drinking Water Regulations and the required level of fluoride to be dosed under the Fluoride Regulations. Between 8 March 2007 and 12 June 2007 the Drinking Water Regulations set a standard that must not be exceeded of 0.8 mg/l while the Fluoride Regulations required the minimum dose of fluoride to be at least 0.8 mg/l and no more than 1.0 mg/l. Effectively the Drinking Water Regulations standard was lowered prematurely as the Fluoride Regulations maximum dose of 0.8 mg/l came into effect on 1 July 2007. It is worth noting the Irish standards are more stringent than the EU Drinking Water Directive Standard of 1.5 mg/l. A more detailed assessment of the results clearly shows that this is the cause of the increase in the number of fluoride exceedances. Compliance for the first six months of 2007 was 85.3% while for the second six months of 2007 (after both Regulations were harmonised) compliance with the fluoride standard was 96.9%.

In this regard, the "*Code of Practice on the Fluoridation of Water Supplies 2007"* published by the Irish Expert Body on Fluorides and Health should be followed by local authorities to ensure that compliance with the fluoride parametric value improves.

### Lead

The Regulations impose a parametric value of 25 μg/l Pb until 25 December 2013, after which the parametric value of 10μg/l Pb becomes effective. The results for 2007 are examined in the context of compliance with the current standard of 25μg/l Pb, as well as the future standard of 10μg/l Pb.

**Table 4-6. Compliance with the Lead Parametric Value.**

| | Current Standard (25 μg/l) | | New Standard (10 μg/l) | |
|---|---|---|---|---|
| | % of Samples Complying | No. of Non-Compliant WSZs | % of Samples Complying | No. of WSZs with >10 μg/l |
| **Overall** | **99.4** | **18** | **97.8** | **55** |
| Public Water Supplies | 99.1 | 17 | 97.5 | 48 |
| Public Group Water Schemes | 99.7 | 1 | 98.9 | 4 |
| Private Group Water Schemes | 100 | 0 | 99.5 | 2 |
| Small Private Supplies | 100 | 0 | 99.9 | 1 |

A total of 18 supplies reported lead exceedances during 2007 (down from 22 in 2006); however, 55 supplies have reported levels of lead in excess of the 2013 parametric value of 10μg/l for lead (up from 46 in 2006). Local authorities should examine how compliance with the standard of 10 μg/l in 2013 is to be achieved. Reduction of the plumbosolvency can be implemented by correcting pH. Implementation of this measure can assist the local authorities in achieving a higher level of compliance, but the best means of assuring full compliance is to initiate a programme of the removal of all lead pipes from the distribution network. Owners of dwellings in which lead pipes may be located should be informed of the risks and given advice by the water supplier on their safe replacement.

To date, many samples tested for lead tend to have been fully flushed prior to sampling. However, this does not meet the requirements of the current Regulations and it is recommended that the Random Daytime Sampling[13] method be used. All local authorities should move to implement this method, if they have not already done so. The EPA has recently published guidance ("Lead compliance monitoring and surveys") to be followed by each local authority to determine the extent of lead in the distribution network of each water supply. Further guidance ("Action programme to restore the quality of drinking water impacted by lead pipes"), also recently published by the EPA, outlines a risk-based strategy for dealing with lead pipes.

### Mercury

Of the 1,043 supplies monitored for the mercury standard there was only one supply that was non-compliant, (Callan public water supply in Kilkenny), which had 2 non-compliant samples in 2007. These were due to the presence of a flow meter which contained mercury. The meter has since been removed.

### Nickel

There were 6 samples (of 1,778 samples analysed) that reported levels of nickel in excess of the parametric value (in 5 public water supplies and one small private supply). These non-compliances were likely due to the tap fittings at the sample point rather than nickel being present in the water supply.

[13] Random Daytime Sampling is defined as taking water directly from the tap normally used for consumption without any prior water abstraction, flushing or cleaning of the tap prior to sampling. The sample should be chosen randomly within the day but during normal office hours.

### Nitrate

Exceedances of the nitrate parametric value were reported in 49 supplies in 2007 (up from 47 in 2006). There were an increasing number of public water supplies with elevated levels of nitrates (Table 4-7). Six of the non-compliant public water supplies Castletownkinnagh (Cork West), Moynalty (Meath), Two Mile Borris (North Tipperary) and Adramone, Lismore Ballyduff, Lismore Ballyhane (all in Waterford) also failed to meet the standard during 2006. While 8 public water supplies that had elevated levels of nitrate in 2006 were returned to compliance in 2007, 12 supplies compliant in 2006 failed to comply in 2007. These supplies were Nurney (Carlow), Kilmagnier (Cork North), Roberts Cove (Cork South), Troyswood (Kilkenny), Rockhill, Ballingarry (both in Limerick), Daingean (Offaly), Kealfoun, Kilnafrehan, Rathgormuck (all in Waterford) and Marshalstown, Monamolin (both Wexford).

**Table 4-7. Summary of Water Supply Zones Non-Compliant with the Nitrate Parametric Value in 2007 and 2006.**

| | No. of WSZs with Exceedances in 2007 | Population Affected in 2007 | No. of WSZs with Exceedances in 2006 | Population Affected in 2006 |
|---|---|---|---|---|
| Public Water Supplies | 18 | 13,886 | 16 | 10,209 |
| Public Group Water Schemes | 1 | 42 | 2 | 1,904 |
| Private Group Water Schemes | 8 | 2,409 | 17 | 3,204 |
| Small Private Supplies | 22 | N/A | 12 | N/A |
| **Total** | **49** | **16,337** | **47** | **15,317** |

### Nitrite

There are 2 parametric values for nitrite, as the water leaves the treatment works and at the tap. Compliance with the nitrite parametric values was very high at both the water treatment works (99.9%) and at the tap (99.9%).

### Pesticides

There are 2 general parametric values for pesticides: one for total pesticides and the other for individual pesticides, while there are also some specific pesticides parametric values in the Regulations. Local authorities were requested to report compliance against the total pesticide parametric value (i.e. by adding the results of analyses of any pesticides together) and also to report to the EPA all individual pesticides detected above the limit of detection. In total, 1,481 samples were analysed for pesticides in 1,003 water supplies, 1,257 of which did not detect any traces of pesticides. Of the remaining 224 samples where pesticides were detected, 4 reported total concentrations in excess of the parametric value of 0.5 µg/l. The affected supplies were the East Meath, Jarretstown and Navan-Mid Meath supplies (all Meath County Council) as well as one private group water scheme. Furthermore, in 11 supplies the individual pesticides detected were greater than the individual pesticides parametric value of 0.1 µg/l. A complete list of the supplies where the individual pesticide limit was exceeded is shown in Table 4-8. The total and individual pesticides parametric values are precautionary and not health based. Therefore, upon detection of a pesticides concentration above 0.1 µg/l it is necessary to consult with the relevant health based guidelines and the HSE to determine whether there is a risk to public health.

**Table 4-8. List of Water Supplies where the Individual Pesticide Parametric Value was Exceeded in 2007.**

| Local Authority | Name of Water Supply | Pesticide Detected | Result (µg/l) |
|---|---|---|---|
| Limerick County Council | Newcastlewest | Triazine | 0.11 |
| Longford County Council | Longford Central | MCPA | 0.126 |
| Longford County Council | Longford Central | MCPA | 0.108 |
| Longford County Council | Ballymahon | MCPA | 0.346 |
| Meath County Council | Navan-Mid Meath | Atrazine | 0.179 |
| Meath County Council | Navan-Mid Meath | MCPA | 0.105 |
| Meath County Council | East Meath | Dichlorobenil | 0.706 |
| Meath County Council | Irishtown/Mabestown | Isoproturon | 0.253 |
| Meath County Council | Jarretstown | Isoproturon | 0.47 |
| Offaly County Council | Shinrone/Brosna | Dichlorobenil | 0.131 |
| Monaghan County Council | Churchill/Oram GWS | Parathion-ethyl | 0.141 |
| Monaghan County Council | Corduff GWS | Diazinon | 0.613 |
| Monaghan County Council | Inishkeen | Malathion | 0.152 |

### Trihalomethanes – Total

There were 3,020 samples analysed for trihalomethanes in 1,313 water supply zones. The Regulations impose a parametric value of 150 µg/l until 25 December 2008; thereafter the parametric value of 100µg/l is effective. The results for 2007 are examined in the context of compliance with the current standard of 150µg/l, as well as the future standard of 100µg/l (Table 4-9).

**Table 4-9. Compliance with the Trihalomethanes (Total) Parametric Value.**

| | Current Standard (150 µg/l) | | New Standard (100 µg/l) | |
|---|---|---|---|---|
| | % of Samples Complying | No. of Non-Compliant WSZs | % of Samples Complying | No. of WSZs with > 100 µg/l |
| **Overall** | **97.9** | **32** | **91.4** | **123** |
| Public Water Supplies | 97.3 | 20 | 90.6 | 60 |
| Public Group Water Schemes | 97.9 | 7 | 88.4 | 53 |
| Private Group Water Schemes | 98.3 | 5 | 97.1 | 10 |

The results, as shown on Table 4-9 show that compliance with the trihalomethanes parametric value in 2008 will be challenging for a number of supplies. Based on the monitoring carried out in 2007, over 9.4% of public water supplies nationally (123 of 1,313 supplies monitored) will be unable to comply with the parametric value of 100µg/l.

## 4.3 Compliance with the Indicator Parametric Values

The indicator group of parameters is a diverse group of parameters designed to provide information on the management of the treatment process and the organoleptic and aesthetic quality of drinking water. As such, several parameters do not have quantitative standards but are dependent on acceptability to consumers, while others are based on practical consideration, e.g. the iron parametric value is set at a level that will ensure that water is acceptable to consumers rather than that which is a risk to public health. In this regard, comparing the indicator parameter monitoring results to the parametric values should be given less importance than comparing the microbiological or chemical monitoring with their respective parametric values. In other words, a value reported above the indicator parametric value should not, *de facto*, be considered a cause for concern but more appropriately a guide for the local authority to initiate an investigation into the cause of the elevated level of the parameter concerned. In many cases, it is not the indicator parameter that is of concern, rather, it is what the presence that parameter may imply. For example, elevated aluminium levels indicate that the treatment plant is not operating adequately and may indicate that the plant is operating above its design capacity, or elevated turbidity levels may indicate that the plant is not capable of providing a treatment barrier to the presence of *Cryptosporidium*. A summary of compliance with the indicator parameters is provided in Table 4-10.

**Table 4-10. Total Number of Water Supply Zones (WSZ's) Monitored and Samples Analysed for the Indicator Parameters.**

| Parameter | No. of WSZ's Monitored | No. of WSZ's with Exceedances | % of WSZ's Complying | No. of Samples Analysed | No. of Samples Exceeding | % of Samples Complying |
|---|---|---|---|---|---|---|
| **Indicator Parameters** | | | | | | |
| Aluminium | 1,660 | 187 | **88.7** | 8,439 | 458 | **94.6** |
| Ammonium | 2,900 | 54 | **98.1** | 14,807 | 65 | **99.6** |
| Chloride | 1,234 | 1 | **99.9** | 2,059 | 4 | **99.8** |
| Clostridium Perfringens | 2,196 | 254 | **88.4** | 11,877 | 358 | **97.0** |
| Coliform Bacteria | 3,081 | 932 | **69.8** | 15,771 | 1,695 | **89.3** |
| Colony Count @ 22°C | 1,065 | 137 | **87.1** | 2,020 | 152 | **92.5** |
| Colour | 2,928 | 284 | **90.3** | 15,066 | 590 | **96.1** |
| Conductivity | 2,899 | 0 | **100** | 15,743 | 0 | **100** |
| Iron | 2,185 | 255 | **88.3** | 9,662 | 463 | **95.2** |
| Manganese | 1,848 | 146 | **92.1** | 5,019 | 219 | **95.6** |
| Odour | 2,663 | 118 | **95.6** | 13,864 | 206 | **98.5** |
| Oxidisability | 7 | 0 | **100** | 7 | 0 | **100** |
| pH | 2,931 | 444 | **84.9** | 15,268 | 819 | **94.6** |
| Sodium | 1,162 | 10 | **99.1** | 1,888 | 10 | **99.5** |
| Sulphate | 1,053 | 2 | **99.8** | 1,671 | 2 | **99.9** |
| Taste | 1,384 | 8 | **99.4** | 8,460 | 17 | **99.8** |
| Total Organic Carbon | 1,081 | 23 | **97.9** | 1,771 | 25 | **98.6** |
| Turbidity (at tap) | 2,789 | 167 | **94.0** | 13,991 | 195 | **98.6** |
| Turbidity (at WTW) | 293 | 99 | **66.2** | 4,428 | 235 | **94.7** |
| **Radioactivity** | | | | | | |
| Tritium | 53 | 0 | **100** | 90 | 0 | **100** |
| Total indicative dose | 20 | 0 | **100** | 44 | 0 | **100** |

*For several of the indicator parameters there are no specific standards in the Regulations. Therefore, for comparison purposes arbitrary levels have been assigned above which the local authority may be concerned about the quality of the water and should investigate further.

Compliance with the indicator parametric values was lower than that of the microbiological or chemical parametric values. Although failure to meet the indicator parametric values is perhaps less serious than failure to meet the microbiological or chemical standards, it nonetheless illustrates the issues associated with the operation of water treatment plants. The majority of failures to meet the indicator parametric values are caused by the following:

1. Poor performance of a water treatment plant, e.g. elevated levels of turbidity indicate poor treatment of water in the filters.

2. Poor disinfection efficiency, e.g. regrowth of coliform bacteria can occur in an inadequately disinfected water supply.
3. Naturally present substances, e.g. iron and manganese can be naturally present in groundwater.

### Aluminium

Compliance with the aluminium parametric value has been problematic in a number of supplies in Ireland due to the poor control over addition of treatment chemicals. Failure to meet the aluminium parametric value can be due to several reasons, including naturally elevated levels of aluminium in the raw water, operation of the treatment plant above design capacity, poor management of the treatment plant or inadequate management of the distribution network. While a small number of water supply zones have naturally elevated levels of aluminium, the majority of aluminium non-compliances in Ireland in 2007 are due to management and design. The level of compliance with the aluminium parametric value rose to 94.6% in 2007 from 92.8% in 2006. The compliance rates in the different types of water supplies are presented in Table 4-11 below.

**Table 4-11. Summary of Aluminium Monitoring in 2007.**

| | No. of WSZ's Monitored | % of Samples Complying | No. of Non-Compliant WSZ's |
|---|---|---|---|
| **Overall** | **1660** | **94.6** | **187** |
| Public Water Supplies | 732 | 94.9 | 113 |
| Public Group Water Schemes | 494 | 93.5 | 50 |
| Private Group Water Schemes | 351 | 92.1 | 23 |
| Small Private Supplies | 83 | 98.3 | 1 |

The higher proportion of non-compliances in public group water schemes compared to the public water supplies (which supply water to the former) is likely to be due to the different management regimes of the distribution networks. If a programme of regular flushing and scouring is not carried out, this may lead to aluminium building up in the distribution network resulting in aluminium non-compliances at the tap.

The rates of compliance vary significantly from county to county, with 4 local authorities (Dun Laoghaire Rathdown, Galway City, North Tipperary and Waterford City) achieving full compliance with the standard (up from 2 in 2006), while 9 local authorities reported compliance rates of less than 90% (down from 10 in 2006). Particularly poor rates of compliance were reported in public water supplies in Longford (78.9%) and Mayo (68.2%).

### Ammonium

Overall, in 2007, 99.6% of the 14,807 samples analysed complied with the ammonium parametric value (down slightly from 99.7% in 2006). The parametric value of 0.3 mg/l in the Regulations is more stringent than that in the European Drinking Water Directive, which sets out a parametric value of 0.5 mg/l. Analysis of the results in comparison with the EU parametric value indicates that just 34 of the 14,807 samples analysed were above 0.5 mg/l (99.8% compliance).

**Table 4-12. Summary of Ammonium Monitoring in 2007.**

| | No. of WSZ's Monitored | % of Samples Complying | No. of Non-Compliant WSZ's |
|---|---|---|---|
| **Overall** | **2,900** | **99.6** | **54** |
| Public Water Supplies | 941 | 94.9 | 19 |
| Public Group Water Schemes | 756 | 99.3 | 11 |
| Private Group Water Schemes | 585 | 99.4 | 9 |
| Small Private Supplies | 618 | 98.0 | 15 |

### Chloride

All but 4 of the 2,059 samples analysed in 1,234 water supply zones during 2007 complied with the parametric value for chloride.

### *Clostridium perfringens*

*Clostridium perfringens* was originally included in the Drinking Water Directive (and hence the Regulations) as an organism to indicate the possibility of the presence of *Cryptosporidium*. The Regulations require that "*in the event of non-compliance with this parametric value, the supply shall be investigated to ensure that there is no potential danger to human health arising from the presence of pathogenic micro-organisms, e.g. Cryptosporidium*". Although *Clostridium perfringens* is a useful indicator of faecal pollution (particularly in groundwater) it should not be relied upon exclusively as an indicator for *Cryptosporidium.* The European Microbiological Advisory Group (EMAG), which was set up as an advisory group to the European Commission to advise on microbiological matters related to the Drinking Water Directive, has advised that the evidence for a relationship between the occurrence of *Clostridium perfringens* and *Cryptosporidium* is inconclusive and recommended consideration of its removal from the Directive. Therefore, local authorities should not presume the absence of *Clostridium perfringens* indicates that *Cryptosporidium* is also absent.

**Table 4-13. Summary of *Clostridium perfringens* Monitoring in 2007.**

| | No .of WSZs Monitored | % of Samples Complying | No. of Non-Compliant WSZs |
|---|---|---|---|
| **Overall** | **2,196** | **97.0** | **254** |
| Public Water Supplies | 734 | 98.8 | 72 |
| Public Group Water Schemes | 689 | 97.8 | 25 |
| Private Group Water Schemes | 455 | 88.1 | 120 |
| Small Private Supplies | 318 | 90.2 | 37 |

### Hydrogen Ion Concentration (pH)

The pH of drinking water at the tap should lie between 6.5 and 9.5. Overall, compliance with the pH parametric value dropped slightly from 95.0% in 2006 to 94.6% in 2007. Of the 15,268 samples analysed in 2,931 water supply zones, 819 samples fell outside the acceptable range of 6.5 to 9.5, with 99% of the values reported outside this range being below 6.5. While pH in itself is not harmful at low levels, it may have implications for the plumbing materials (copper, lead and nickel) and for this reason local authorities need to adjust pH levels so that they comply with the parametric value.

### Iron

Iron is commonly found naturally in many groundwaters in Ireland and hence many supplies may have levels of iron above the parametric value, though elevated levels of iron may also be caused by leaching of iron from old cast iron mains. Overall, 95.2% of samples were below the parametric value of 200 μg/l in 2007, representing an increase of 3% in

compliance compared to 2006 (92.2% compliance). Compliance rates for iron in the different types of supplies are shown in Table 4-14.

**Table 4-14. Summary of Iron Monitoring in 2007.**

| | No .of WSZ's Monitored | % of Samples Complying | No. of Non-Compliant WSZ's |
|---|---|---|---|
| **Overall** | **2,185** | **95.2** | **255** |
| Public Water Supplies | 808 | 96.0 | 118 |
| Public Group Water Schemes | 560 | 97.6 | 47 |
| Private Group Water Schemes | 431 | 93.5 | 48 |
| Small Private Supplies | 386 | 88.9 | 42 |

### Manganese

As with iron, a significant number of groundwater supplies in Ireland have levels of manganese in excess of the parametric value, though the compliance with the manganese parametric value (95.6% in 2007, up from 95.0% in 2006) is greater than for iron. Compliance rates for manganese in the different types of supplies are shown in Table 4-15.

**Table 4-15. Summary of Manganese Monitoring in 2007.**

| | No .of WSZ's Monitored | % of Samples Complying | No. of Non-Compliant WSZ's |
|---|---|---|---|
| **Overall** | **1,848** | **95.6** | **146** |
| Public Water Supplies | 726 | **96.0** | 60 |
| Public Group Water Schemes | 463 | **98.6** | 13 |
| Private Group Water Schemes | 383 | **94.0** | 38 |
| Small Private Supplies | 276 | **89.1** | 35 |

### Sodium

The parametric value of 200 mg/l has been set due to the unacceptable taste of drinking water with concentrations of sodium above this level. There were 1,871 samples analysed in 1,162 water supply zones, with just 10 non-compliances reported in 2007.

### Coliform Bacteria

Compliance with the coliform bacteria parametric value has been problematic in the past in Ireland, with a large number of supplies testing positive for the presence of coliform bacteria historically, particularly private group water schemes.

**Table 4-16. Summary of Coliform Bacteria Monitoring in 2007.**

| | No .of WSZ's Monitored | % of Samples Complying | No. of Non-Compliant WSZ's |
|---|---|---|---|
| **Overall** | **3,081** | **89.3** | **932** |
| Public Water Supplies | 941 | **94.2** | 265 |
| Public Group Water Schemes | 763 | **96.5** | 51 |
| Private Group Water Schemes | 585 | **71.5** | 318 |
| Small Private Supplies | 792 | **69.0** | 298 |

The low level of compliance with the parametric value for coliform bacteria needs to be addressed, particularly so in the private group water schemes of which 54.4% (318 of 585 schemes) contained coliform bacteria at least once during 2007. In the private group water schemes, these non-compliances are caused by a combination of poor quality water being

supplied into the distribution network and by poor management of the distribution mains. There should be a regular programme of flushing and cleaning to ensure that there is no contamination in the network.

### Turbidity

A parametric value of 4.0 NTU's at the tap is used for comparative purposes as this was the parametric value in the 1988 Drinking Water Regulations. However, a value of 1.0 NTU must be strived for at the water treatment plant. Turbidity at the tap indicates a very different problem to turbidity at the treatment plant. Elevated levels of turbidity at the tap may indicate sediment in the mains or ingress into the distribution network while turbidity at the treatment plant may indicate breakthrough of *Cryptosporidium* through the filters and hence a potential risk to health.

**Table 4-17. Percentage of Samples in Compliance with the Turbidity Parametric Values in 2007.**

| Parameter | Overall | PWS | PuGWS | PrGWS | SPS |
|---|---|---|---|---|---|
| Turbidity (at the tap) | **98.6** | 99.2 | 99.2 | 97.4 | 94.2 |
| Turbidity (at WTW) | **94.7** | 94.9 | 85.7 | 81.3 | 100 |

Measuring turbidity at the plant is a useful tool to determine whether *Cryptosporidium* is being removed adequately. Such monitoring as set out in Table 4-17 indicates a low rate of compliance with the turbidity parametric value at the water treatment works. Although limited monitoring was reported, the results indicate that 33.8% (99 of 293) of supplies monitored at the water treatment works reported results in excess of the turbidity parametric value. Elevated levels of turbidity have been shown to be associated with outbreaks of *Cryptosporidium* (Carlow, 2006 and Galway City in 2007). The results indicate that a large proportion of supplies in Ireland are not operating to a level sufficient to ensure removal of *Cryptosporidium* oocysts and thus if the oocysts are present in the raw water they are likely to be present in the treated water.

### Colour, Odour, Taste, Colony Count at 22°C and Total Organic Carbon

The above mentioned parameters are included in the Regulations but do not have specific parametric values assigned to them. The Regulations state that in respect of colour, odour and taste the drinking water at the tap must be "*acceptable to consumers and no abnormal change*", while in respect of colony count at 22°C and total organic carbon there must be "*no abnormal change*". Thus, the determination of whether a supply is complying in respect of these parameters is not easy to determine and will depend on what is acceptable to consumers. For the purposes of this report, the parametric value was considered to be exceeded in respect of odour and taste, only where there was a definite odour or taste, and values reported as having a slight odour or taste were considered acceptable to most consumers. In respect of colour, an arbitrary value of 20 mg/l Hazen was taken as a value above which consumers may begin to question the acceptability of the water supplied (these were the Maximum Admissible Concentrations from the 1988 Drinking Water Regulations). Consequently, the compliance figures reported in respect of these parameters should be considered a rough indication rather than an accurate figure. The percentages of samples reported with values above these arbitrary "acceptability" thresholds is shown in the table below.

**Table 4-18. Percentage of Samples below the Parametric Value for Colour, Odour, Taste, Colony Count at 22°C, Total Organic Carbon and Turbidity in 2007.**

| Parameter | Overall | PWS | PuGWS | PrGWS | SPS |
|---|---|---|---|---|---|
| Colour | **96.1** | 97.1 | 97.1 | 90.5 | 96.1 |
| Odour | **98.5** | 98.5 | 97.8 | 98.5 | 99.9 |
| Taste | **99.8** | 99.7 | 100 | 100 | 100 |
| Colony count at 22°C | **92.5** | 95.0 | 94.7 | 81.1 | 67.5 |
| Total Organic Carbon | **98.6** | 98.5 | 99.6 | 97.8 | 100 |

# 5 FINDINGS AND RECOMMENDATIONS

The main findings and recommendations presented in this chapter are based on an assessment of monitoring results for 2007 and EPA enforcement of the Drinking Water Regulations in 2007 and 2008.

## *5.1 The Quality of Drinking Water*

### 5.1.1 Public Water Supplies

**Findings**

1. There was a major outbreak of cryptosporidiosis in Galway City in March 2007 with 242 cases of the disease notified to the Health Protection Surveillance Centre. This outbreak highlighted the importance of having adequate measures in place to prevent *Cryptosporidium* from entering the source of water supplies in the first instance and also having an adequate treatment barrier in place in the event of the parasite being present in the source water. The EPA was notified of the detection of *Cryptosporidium* in 18 public water supplies since March 2007.
2. Boil water notices or restrictions of use were placed on the consumers of 53 public water supplies serving approximately 118,000 persons in the period September 2007 to September 2008. The main reason for the imposition of these notices was microbiological contamination (e.g. *Cryptosporidium* or *E. coli)*. In particular, the inability of several water treatment plants to deal with the heavy rainfall experienced in August 2008 led to the imposition of 20 boil water notices during this month alone.
3. *E. coli* was detected in 52 (5.5%) public water supplies at least once during 2007. This is down from 77 (8.3%) public water supplies in 2006. The majority of supplies with *E. coli* were small supplies and compliance with the *E. coli* standard in supplies serving over 5,000 people was 99.7%. However, notifications to the EPA for 2008 indicate that 74 public water supplies were contaminated with *E. coli* in the period January to September 2008. The presence of *E. coli* in drinking water is an indication that the water supply has become contaminated with human or animal waste.
4. Compliance with the 26 chemical parameters across all water supplies was 99.1%. However, compliance with the nitrate, trihalomethanes and lead parametric values was poor. Many public water supplies will be unable, without remedial action, to comply with the new, more stringent, quality standards for trihalomethanes effective from December 2008. Action is also needed at a small number of supplies to meet the new bromate parametric value, again, effective from 25 December 2008.
5. Lead surveys carried out by local authorities in 2008 indicated that lead exceedances were reported in parts of water supplies where there were lead distribution mains, lead service connections or lead in the internal plumbing of the premises. Lead is not present in the source of any water supply in Ireland.
6. Levels of nitrate above the standard were detected in 49 small supplies in 2007. Collectively, these supplies serve over 16,000 people (0.4% of the population).
7. Compliance with the indicator parametric values (96.6%) was the same as the microbiological parametric values but less than that of the chemical parameters (99.1%). Compliance with the aluminium and turbidity (at the water treatment plant) parametric values was poor (89% and 66% respectively).
8. A total of 64 treatment plants serving 135,000 persons which take their water from rivers or lakes were identified in April 2007 by the EPA as having inadequate treatment (consisting of chlorination only). These supplies have no treatment barrier to prevent *Cryptosporidium* (if present in the river or lake) from entering the supply. As of September 2008, just 7 of the treatment plants were replaced or upgraded.

9. In January 2008, the EPA developed an initial list of 339 public water supplies representing 36% of all public drinking water supplies that required detailed profiling (the "Remedial Action List"). The profiling will determine whether the supply needs to be upgraded, improved in respect of operational practices or discontinued to ensure that the water supplied is clean and wholesome. As of September 2008, 51 supplies were upgraded, replaced or had operations improved and thus removed from the list. A further 53 supplies were added to the Remedial Action List during this period as a result of quality problems experienced. The total number of supplies now on the RAL is 341.

**Recommendations**

- Local authorities should review all *E. coli* exceedances reported in public water supplies to ensure that the root cause of the non-compliance is rectified. As a minimum this should include a review of the disinfection contact time to ensure that World Health Organisation guidelines are being met, the operation of monitors and alarms to control the disinfection process, and a review of dosing arrangements and integrity of the distribution system.
- Local authorities with supplies on the Remedial Action List, need to develop an appropriate solution with specified timeframes that will involve abandoning or replacing the source, upgrading the treatment facilities or improving management and operational practices.
- Local authorities should ensure that each exceedance of the parametric values is investigated and notified to the EPA as outlined in the Guidance Booklet No.1 published by the EPA. Actions taken to address the cause of the non-compliance must include actions to prevent the exceedance occurring in the future.
- Local authorities must prepare action programmes to deal with the exceedances of the trihalomethane parametric values having regard to the more stringent standard which came into force on 25 December 2008. Disinfection should not be compromised in attempting to control disinfection by-products.
- Local authorities should annually carry out the *Cryptosporidium* risk assessment and, if a supply has been identified as high risk, then the local authority should take action to reduce the risk. Furthermore, local authorities must review operations of all other plants to ensure that the turbidity levels are below the target level of 0.2 NTU.
- Local authorities should carry out a lead survey to determine the extent of lead piping in the distribution network. Local authorities should replace all lead distribution mains in public water supplies and the EPA recommends that local authorities put in place a phased programme for the replacement of lead service connections. Consumers should be advised of the actions they can take if exceedances are caused by internal lead plumbing.
- Local authorities should install continuous turbidity monitors on each filter and the final treated water at water treatment plants. These monitors should be linked to a recording device and alarm in the event of a deviation from the acceptable operating range of the filters.
- Local authorities should ensure that fluoridation is carried out in accordance with the Code of Practice for Fluoridation of Water Supplies and that levels in the final waters do not exceed 0.8 mg/l.
- Local authorities should respond positively to all complaints received by members of the public in relation to the organoleptic quality of drinking water and should strive to reduce these exceedances as much as possible. Records should be kept of all responses to complaints about poor quality drinking water.

## 5.1.2 Group Water Schemes

**Findings**

1. The microbiological quality of the private group water schemes was unsatisfactory and the proportion of schemes contaminated with *E. coli* remains high at 31.4%. In total, 184 schemes were found to be contaminated with *E. coli* at least once during 2007. However, this is a drop from 2006 when 246 private group water schemes were contaminated with *E. coli.*
2. The chemical quality of the public and private group water schemes was generally good. However, there were a number of private group water schemes in which elevated levels of nitrate were reported.
3. Compliance with the indicator parametric values in the public group water schemes was similar to that of their parent public water supplies with the exception of aluminium which had a lower compliance rate.
4. Compliance with the indicator parametric values in the private group water schemes was unsatisfactory. In particular, 54% of private group water schemes failed to meet the coliform bacteria parametric value at least once during 2007.

**Recommendations**

- Local authorities should ensure that each group water scheme (public or private), has an action programme prepared to address microbiological exceedances where they exist. Local authorities should particularly focus on the private group water schemes that are not being upgraded as part of a planned Design Build Operate (DBO) bundle. Where a group water scheme has not prepared a corrective action programme in accordance with the requirements of Regulation 10 of the Regulations and where there is little evidence of action being taken to improve the quality of the water supply, the local authority should use enforcement powers under the 2007 Regulations to bring the supply into compliance.
- Operators of private group water schemes in breach of the nitrate parametric value should investigate the cause of the exceedance and take the necessary steps to reduce the levels of nitrate in the water supply.
- Operators of public group water schemes should ensure that the distribution networks are regularly cleaned and maintained to ensure that the quality of the water supplied by the local authority does not deteriorate in the group water schemes distribution network.

## 5.1.3 Small Private Supplies

**Findings**

1. There was a 75% increase in the monitoring of small private water supplies that supply water as part of a public or commercial activity in 2007 compared to 2006.
2. The quality of drinking water supplied by a sizeable proportion of the small private supplies monitored was unsatisfactory. The Health Protection Surveillance Centre identified an increase in cases of Verotoxigenic *E. coli* (VTEC) associated with consumption of water in private wells during the extreme weather conditions in August.

**Recommendations**

- Owners of small private supplies that supply water (serving <50 persons or <10m$^3$/day) as part of a public or commercial activity must be identified by the local authority and the owners made aware of the obligation to meet the quality requirements of the Regulations.

## 5.2 Monitoring

### Findings

1. The shortfall in monitoring highlighted in previous reports has been largely eliminated and there was an overall monitoring shortfall of just 1.5% in 2007.
2. There was a 2% increase in the number of tests carried out in public water supplies and in particular there was an increase in the level of sampling of the chemical parameters in public water supplies; however, no monitoring was carried out at 9 small public water supplies (<1%).
3. There was a 23% increase in the number of tests carried out in public group water schemes and an 8% increase in the number of samples analysed in private group water schemes in 2007; however, no monitoring was carried out in 60 (7%) public group water schemes.
4. There was an increase in the number of private water supplies identified from 624 in 2006 to 888.

**Recommendations**

Local authorities should develop/review their documented monitoring programme to ensure that:

- All public water supplies and group water schemes covered by the Regulations have individual monitoring programmes established for each supply, that, as a minimum, meets the frequencies specified in the Drinking Water Regulations.
- Where audit sampling is to be carried out the local authority should ensure that all parameters in the audit group of parameters are analysed unless the local authority can satisfy the requirements of Section 2 of Table A of Part 2 of the Schedule of the Regulations with regard to the removal of certain parameters from the monitoring programme.
- A survey should be carried out (in consultation with the local Health Service Executive) to identify all private supplies that supply water as part of a public or commercial activity. Such supplies should be included in the monitoring programme and the monitoring frequencies for such supplies specified.

## 5.3 Safe and Secure Drinking Water

### Findings

1. Alarmed residual chlorine monitors were present in 40% of water treatment plants at the end of August 2008. A total of 81 residual chlorine monitors were installed in water treatment plants between January and August 2008. The EPA prosecuted Galway County Council for the failure to comply with a Direction to install a chlorine monitor and alarm in the Craughwell water treatment plant.
2. Audits carried out by the EPA in 2008 found the absence of source-protection measures (45% of plants audited), inadequate chemical dosing arrangements (52% of plants audited), problems in the operation of filters (67% of plants audited) as well as the absence of basic process-control monitoring equipment such as chlorine monitors (50% of plants audited) and turbidity monitors (65% of plants audited).

14% of water treatment plants audited were being run at >10% above design capacity

3. From 56 audits, the EPA concluded that a holistic catchment to consumer approach to the management of drinking water is not common practice.

4. The response by the local authorities to the EPA recommendations following an audit has generally been positive. The majority of local authorities have prepared action plans to implement the recommendations contained in the audit reports.

**Recommendations**

- All local authorities should install a continuous chlorine residual monitor at all treatment plants and monitors should be alarmed and linked to a recording device. This will ensure that either a sudden increase in chlorine demand or a failure of the chlorine dosing system is immediately detected. The aim of such alarms is to ensure that corrective action is initiated as quickly as possible to prevent undisinfected water entering the distribution mains.
- Local authorities should adopt the World Health Organisation recommended water safety plan approach to the management of drinking water supplies. The three components of a water safety plan which should be adopted are (i) risk assessment; (ii) effective operational monitoring and (iii) effective management. The adoption of this approach will ensure the safety and security of water supplies from catchment to consumer.
- All local authorities should develop a documented protocol for dealing with exceedances of the microbiological, chemical and indicator parametric values. Local authorities should develop this protocol in conjunction with the Health Service Executive and should ensure that it is regularly reviewed to ensure it meets the requirements of the 2007 Regulations and that it accurately reflects the up to date situation. In this regard, the EPA should be notified of any failures to meet the standards in accordance with the EPA Guidance Booklet No.1.
- The source of each water supply needs to be characterised on an ongoing basis to ensure that the water supplier is aware of the characteristics of the water to be treated.
- Process control at water treatment plants needs to improve. In this regard, online monitoring of the raw, filtered and treated water should be carried out as appropriate. This will ensure that risks to the quality of the treated water are identified as soon as possible and corrective action taken before the water is supplied to consumers.
- A documented management system should be used to manage drinking water supplies, and the performance management system developed by the Department of Environment, Heritage and Local Government should be used by all local authorities.
- Local authorities and all other water suppliers should regularly examine chemicals used in water treatment to ensure that they are not contributing to non-compliances and are fit for purpose. Only treatment chemicals that are approved for use in drinking water treatment should be used. The EPA recommends that only chemicals with appropriate Irish standards for use in drinking water treatment (e.g. NSAI) or chemicals on the Drinking Water Inspectorate of England and Wales' list of approved products and processes (or other appropriate list) are used for drinking water treatment in Ireland.
- All drinking water operators should undergo appropriate training in the provision of drinking water supplies such as that delivered by the Water Service National Training Group (www.wsntg.ie). As a minimum, each operator should be trained for each

treatment process for which they are required to operate at the plant.

- Group water schemes should obtain certification under the Hazard Analysis Critical Control Points (HACCP) system adopted by the National Federation of Group Water Schemes. Where the quality model adopted by the NFGWS is not in place, those responsible for the group water scheme should prepare a protocol in order to reduce the risk of an unsafe drinking water supply.
- All local authorities should review chemical storage arrangements at treatment plants. Chemicals must be stored in bunded areas capable of containing at least 110% of the volume of chemicals stored therein. Fill points for storage tanks inside the bunds should be located within the bunded area.

## 5.4 Reporting and Communication

### Findings

1. The EPA receives requests for drinking water monitoring results from members of the public concerned about the quality of their supply.

**Recommendations**

- Drinking water results should be made more accessible to the public by the local authority. In this regard the EPA recommends that local authorities post up-to-date results of their monitoring on their websites on a regular basis. Progress in upgrading supplies on the Remedial Action List should also be published on local authority websites to keep consumers informed of actions being taken to improve the quality of drinking water.

# SUGGESTED FURTHER READING


Carlow County Council (2006). *Report on Cryptosporidiosis Outbreak in Carlow Town and Environs 2005,* Carlow County Council, Carlow.

Council Directive 98/83/EC of 3 November 1998 on the Quality of Water Intended for Human Consumption.

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# APPENDIX 1
# SUMMARY REPORTS FOR ALL LOCAL AUTHORITIES

## Carlow County Council

### Summary of Water Supplies[14]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 15 | 51,037 |
| PuGWS | 5 | 273 |
| PrGWS | 5 | 959 |
| SPS | 21 | N/A |

### Assessment of 2007 Monitoring

Carlow County Council carried out 3,798 individual tests on drinking water during 2007.

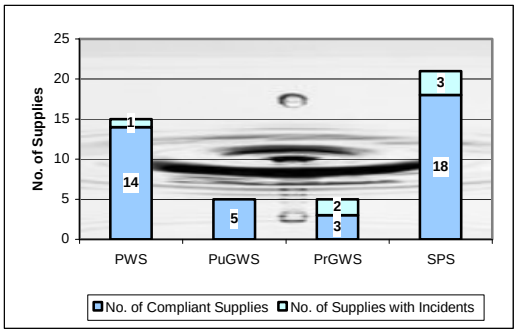
### Overall Compliance in 2007

The overall rate of compliance in Co. Carlow was 96.1%, a drop from 98.9% in 2006 and below the national average. Compliance in the public water supplies was down from 99.6% in 2006 to 98.0% in 2007. Compliance with the different types of water supplies is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 91.4% | 99.2% | 95.4% |
| **PWS** | 99.6% | 99.3% | 97.3% |
| **PuGWS** | 100% | 100% | 100% |
| **PrGWS** | 73.7% | 100% | 84.4% |
| **SPS** | 67.5% | 96.2% | 88.8% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There was one incident of *E. coli* contamination in the Hacketstown public water supplies in Carlow during 2007. *E. coli* contamination was also detected at serious levels in 2 private group water schemes. Both of these schemes were also contaminated with *E. coli* during 2005 and 2006.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards in public water supplies and group water schemes was generally good (99%) with the exception of a small number of fluoride exceedances (due to a tighter fluoride standard introduced in 2007), one lead exceedance (due to localised plumbing) and one nitrate exceedance in a public water supply. The latter was in the Nurney public water supply which has since been replaced and connected to the Carlow Town water supply. While there were no chemical exceedances in any of the group water schemes monitored, 2 of the private water supplies were found to have elevated levels of nitrate.

Compliance with the majority of indicator parameters was above the national average. There was a drop in the level of compliance with the aluminium parametric value from 97% in 2006 to 88% in 2007. In particular, there was a large number of aluminium exceedances in the Borris supply (6 of 10 samples analysed).

Although there was a slight improvement, 44% of the samples analysed for coliform bacteria in private group water schemes were non-compliant (up slightly from 43% in 2006). However, Carlow County Council are in the process of completing upgrading works on many of the group water schemes in Carlow as part of the South Leinster Design Build Operate Bundle which is due for completion in 2008.

### EPA Enforcement in 2007/2008

There are currently 6 public water supplies operated by Carlow County Council on the Remedial Action List (RAL[15]) of public water supplies. A total of 2 supplies in Carlow County were added to the RAL in 2008 while none were removed. Of the supplies currently on the RAL, Carlow County Council indicates that 3 supplies will be upgraded and 3 will have operations at the plant improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Carlow County Council had installed chlorine monitors and alarms on 11 of 14 supplies.

The EPA received 5 notifications of the failure to meet the parametric value from Carlow County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (3), nitrate (1) and lead (1) parametric values.

[14] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[15] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Cavan County Council

### Summary of Water Supplies[16]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 15 | 22,301 |
| PrGWS | 22 | 21,817 |
| SPS | 14 | N/A |

### Assessment of 2007 Monitoring

Cavan County Council carried out 4,439 individual tests on drinking water during 2007.

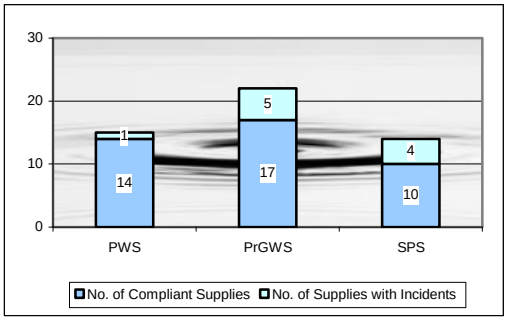
### Overall Compliance in 2007

The overall rate of compliance in Co. Cavan during 2007 was slightly below the national average at 96.5%, though it has improved from 94.3% in 2006. Compliance with the microbiological, chemical and indicator parametric values for the different types of water supplies is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 95.6% | 97.7% | 96.2% |
| **PWS** | 99.2% | 95.8% | 96.9% |
| **PrGWS** | 95.0% | 99.0% | 95.7% |
| **SPS** | 71.4% | | 95.2% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There was one incident of *E. coli* contamination in public water supplies in Cavan during 2007 in the Ballinagh public water supply. A single *E. coli* was detected in one sample during 2007. *E. coli* was detected in 5 of the 22 private group water schemes monitored (down from 7 in 2006) and were thus of a poor quality in 2007.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was below average (97.7%). The majority of chemical exceedances were due to the tightening of the fluoride standard during 2007. The majority of these exceedances occurred during the first six months of 2007 (during the transition period) with just 3 of the 16 exceedances reported in the second half of 2007. There was also 2 lead exceedances in the Bailieboro and Kingscourt public water supplies due to the presence of lead in service connection or internal plumbing.

There were 5 exceedances due to disinfection byproducts reported in private group water schemes in Cavan during 2007. Bromate exceedances were reported in 3 private group water schemes while 2 trihalomethanes exceedances were also reported. Furthermore, 4 private group water schemes in East Cavan became contaminated with phenols due to the use of a tainted batch of polyaluminium chloride while a further 4 had a suspect batch of the chemical. The Health Service Executive and Cavan County Council carried out a full investigation into the matter and the chemicals were replaced with an approved batch. The report on this incident is available to download at the Cavan County Council website (www.cavancoco.ie).

Compliance with the indicator parametric values in public water supplies rose from 92.5% in 2006 to 96.9% in 2007, which is above the national average. Further improvement is necessary for the parametric values for aluminium (94% compliance) and turbidity at the water treatment plant (72% compliance).

Compliance with the indicator parametric values in the private group water schemes also rose from 92.5% in 2006 to 95.7% in 2007. While the level of compliance with the coliform bacteria parametric value improved from 76% in 2006 to 86% in 2007, compliance remains low. Furthermore, compliance with the aluminium and turbidity at the water treatment plant parametric values remains unacceptably low (73% and 70% compliance respectively).

### EPA Enforcement in 2007/2008

There are currently 9 public water supplies operated by Cavan County Council on the Remedial Action List (RAL[17]) of public water supplies. One supply was removed from the list in 2008 and none were added. Of the supplies currently on the RAL, Cavan County Council indicates that 2 supplies will be upgraded, 3 will be abandoned/replaced and 4 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Cavan County Council had installed chlorine monitors and alarms on 1 of 15 supplies.

The EPA received 4 notifications of the failure to meet the parametric value from Cavan County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (1), aluminium (2) and manganese (1) parametric values.

During this period one restriction of use was put in place in the Dowra supply in May 2008 due to the presence of high levels of aluminium. Arising from this notification a Direction was issued by the EPA to Cavan County Council, which required the preparation of an action programme. This programme was later submitted to the EPA.

[16] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[17] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Clare County Council

### Summary of Water Supplies[18]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 24 | 84,313 |
| PuGWS | 102 | 22,509 |
| PrGWS | 12 | 14,258 |
| SPS | 15 | N/A |

### Assessment of 2007 Monitoring

Clare County Council carried out 8,416 individual tests on drinking water during 2007.

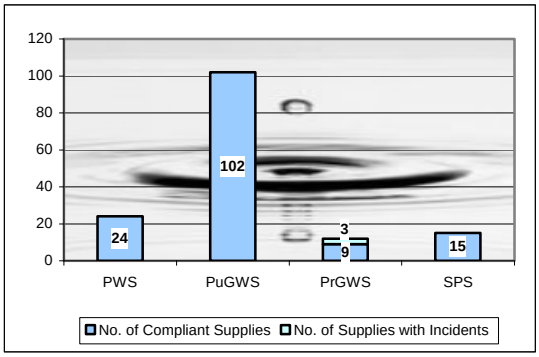
### Overall Compliance in 2007

The Ennis supply has been on a partial boil water notice for an extended period while the Miltown Malbay water supply was on a restriction of use notice for persons with poor renal/kidney function on two separate occasions. Notwithstanding these two issues the overall rate of compliance in Co. Clare was 98.5%, and improved from 97.2% in 2006. Compliance with the microbiological, chemical and indicator parametric values for the different types of water supplies is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 99.1% | 98.8% | 98.3% |
| **PWS** | 100% | 98.7% | 99.0% |
| **PuGWS** | 100% | 98.4% | 98.5% |
| **PrGWS** | 91.9% | 100% | 95.4% |
| **SPS** | 100% | 100% | 96.9% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There were no incidents of *E. coli* contamination of public water supplies in Clare during 2007. However, as noted above, the Ennis town supply was not satisfactory with a partial boil water notice in place during the year. The notice was in place due to inadequate treatment for Cryptosporidium and the detection of this parasite in the supply. Although a temporary treatment plant was installed in June 2006, a portion of the water supply has bypassed the treatment plant for extended period. A new permanent treatment plant is anticipated for March 2009.

Although private group water schemes in Clare were generally of a higher quality than those in the majority of other local authorities, there remains a number of quality deficient schemes during 2007 with 3 of the 12 schemes monitored contaminated during the year.

### Compliance with the Chemical and Indicator Parametric Values

Water supplies in Clare were generally compliant with chemical standards with the exception of a small number of fluoride exceedances and a number of trihalomethanes exceedances. Although the number of supplies with trihalomethanes exceedances has dropped from 4 to 1, the number of trihalomethanes exceedances reported in the Ennis supply was high (8 of 46 samples analysed). Furthermore, 26 of the 46 samples analysed were above the new trihalomethane parametric value of 100 µg/l effective from 25 December 2008. There were no exceedances of any of the chemical standards in any private group water schemes or private water supplies in 2007.

Compliance with the indicator parametric values in public water supplies in Clare was 99.0% which was above the national average. Compliance with the coliform bacteria parametric value in private group water schemes remains unacceptably low, though it did rise from 58% compliance in 2006 to 78% compliance in 2007. Nonetheless, coliform bacteria were detected in 9 of the 12 private group water schemes in Clare in 2007.

### EPA Enforcement in 2007/2008

There are 8 public water supplies operated by Clare County Council on the Remedial Action List (RAL[19]) of public water supplies. There were no supplies added to the RAL in 2008 while one supply was removed from the RAL. Of the supplies currently on the RAL, Clare County Council indicates that one supply will be upgraded, 2 will be replaced and 5 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Clare County Council had installed chlorine monitors and alarms on 1 of 19 supplies.

The EPA received 4 notifications of the failure to meet the parametric value from Clare County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (1), aluminium (2 notifications) and *Cryptosporidium*/trihalomethanes (1) parametric values.

During this period 2 restrictions of use were put in place in the following supplies; Killadysert (February 2008) and Miltown-Malbay (May and December 2007) while a partial boil water notice was in place in Ennis. Arising from these notifications 2 Directions were issued by the EPA to Clare County Council which required specific measures to improve the operation of the treatment plants.

[18] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[19] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Cork City Council

### Summary of Water Supplies[20]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 1 | 123,000 |
| SPS | 2 | N/A |

### Assessment of 2007 Monitoring

Cork City Council carried out 2,982 individual tests on drinking water during 2007.

### Overall Compliance in 2007

The overall rate of compliance in Cork City, 98.2%, was above the national average during 2007 and the microbiological and chemical quality of the water supply in Cork was excellent with no exceedances of these standards recorded.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **PWS** | 100.0% | 100.0% | 97.7% |
| **SPS** | 100.0% | 100.0% | 91.2% |

### Compliance with the *E. coli* Standard

Compliance with the *E. coli* and Enterococci parametric value was excellent in Cork City during 2007 with none of the samples analysed for either parameters detecting any *E. coli or* Enterococci.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was similarly excellent with no non-compliances of any of the 26 chemical parameters.

Compliance with the indicator parametric values was above the national average at 97.6%. There were coliform bacteria non-compliances detected in a number of samples (15 of 216 samples analysed).

### EPA Enforcement in 2007/2008

There is one public water supply operated by Cork City Council on the Remedial Action List (RAL[21]) of public water supplies. The Council indicate that they will upgrade the treatment works and improve plant operations to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Cork City Council had installed a chlorine monitor and alarm on their single water treatment plant.

The EPA received no notifications of the failure to meet the parametric value from Cork City Council in the period March 2007 to September 2008.

[20] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[21] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Cork (North) County Council

### Summary of Water Supplies[22]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 72 | 72,708 |
| PuGWS | 18 | 2,355 |
| PrGWS | 15 | 1,372 |
| SPS | 31 | N/A |

### Assessment of 2007 Monitoring

Cork (North) County Council carried out 4,617 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Cork (North) during 2007 with approximately 5% of tests not carried out.

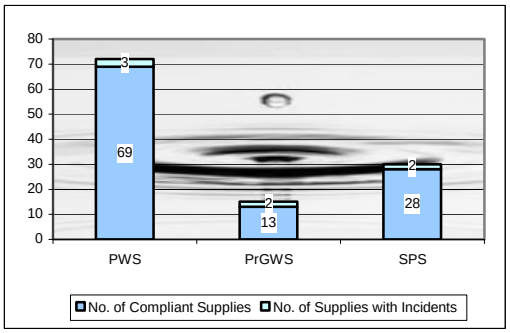
### Overall Compliance in 2007

The overall rate of compliance in Cork (North), 96.8% was below the national average during 2007. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.3% | 99.4% | 95.9% |
| **PWS** | 99.1% | 99.6% | 97.3% |
| **PrGWS** | 92.9% | 90.9% | 91.1% |
| **SPS** | 92.5% | 99.2% | 88.6% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 3 incidents of *E. coli* contamination of public water supplies in Cork (North) during 2007 in the Killavullen, Stagmount and Knoppogue public water supplies. The Knoppogue incident in October 2007 was serious (>20 cfu/100ml) and required the imposition of a boil water notice to consumers supplied. *E. coli* was detected in 2 of the 15 private group water schemes monitored in Cork (North) during 2007.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was generally satisfactory though exceedances of the fluoride and nitrates standards were recorded in a small number of public water supplies. Two moderate fluoride exceedances were reported in 2007 while one public water supply (Kilmagnier) and one private group water scheme (Kilcoran) failed to meet the nitrate standard.

The level of compliance with the indicator parametric values was less satisfactory. Poor compliance was reported against the pH (87% down from 89% in 2006) and coliform bacteria (94% up from 92% in 2006) parametric values in public water supplies.

Similarly, compliance with the indicator parametric values in group water schemes was poor due to a very low level of compliance with the pH (71% compliance) and coliform bacteria (64% compliance) standards. In total, 9 of the 15 private group water schemes contained coliform bacteria during 2007. pH correction may be necessary in some of these group water schemes (as well as some public water supplies) to achieve compliance with the parametric values in the Regulations.

### EPA Enforcement in 2007/2008

There are currently 12 public water supplies operated by Cork (North) County Council on the Remedial Action List (RAL[23]) of public water supplies. Six supplies were added to the RAL in North Cork in 2008 while 2 were removed. Of the supplies on the RAL, Cork (North) Council indicate that 2 supplies will be replaced while 10 will be upgraded to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Cork (North) County Council had installed chlorine monitors and alarms on 11 of 73 supplies.

The EPA received 6 notifications of the failure to meet the parametric value from Cork (North) County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (5) and lead (1) parametric values.

During this period 4 boil water notices were put in place due to contamination with *E. coli* in the following supplies; Allow (August 2008), Knoppogue (October 2007), Labbamolloga (September 2008) and Mitchelstown Galtee (September 2008). Arising from these notifications 1 Direction was issued by the EPA to Cork North County Council which required the installation of a chlorine monitor. This was installed as required.

[22] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[23] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Cork (South) County Council

### Summary of Water Supplies[24]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 65 | 209,225 |
| PuGWS | 6 | 500 |
| PrGWS | 12 | 1,075 |
| SPS | 47 | N/A |

### Assessment of 2007 Monitoring

Cork (South) County Council carried out 6,364 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Cork (South) during 2007 with approximately 4% of tests not carried out.

### Overall Compliance in 2007

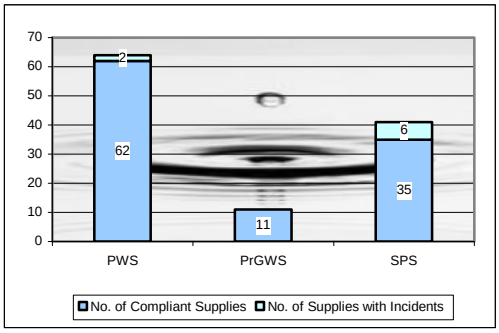
The overall rate of compliance in Cork (South), 97.7%, was above the national average during 2007 but was down from 98.4% in 2006.

Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.3% | 99.4% | 97.3% |
| **PWS** | 99.6% | 99.8% | 98.0% |
| **PrGWS** | 100% | 100% | 92.2% |
| **SPS** | 86.0% | 93.3% | 89.5% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 2 incidents of *E. coli* contamination of public water supplies in Cork (South) during 2007, in the Glanmire and Kilbrittain supplies. The Kilbrittain supply also failed to meet the *E. coli* standard in 2006. *E. coli* was not detected in any of the 11 private group water schemes monitored.

### Compliance with the Chemical and Indicator Parametric Values

The chemical quality of public water supplies in Cork South was good at 99.4% and there were just 2 chemical exceedances reported in Cork South during 2007. A single lead exceedance was reported in the Ballymakerra public water supply while elevated levels of nitrate were reported in the Roberts Cove public water supply.

Monitoring of the chemical parameters in private group water schemes in South Cork was limited to nitrate and nitrite (additional monitoring was not required in these supplies). Nitrate exceedances were reported in none of the private group water schemes but were reported in 2 of the private water supplies.

Compliance with the indicator parametric values in public water supplies was above the national average (98.0%). Compliance with the aluminium parametric value was problematic (93% compliance) in the Macroom (5 of 11 samples analysed exceeded) and Midleton (5 of 12 samples analysed exceeded). Low pH was a problem in Cork South with 30% (19 of 64) supplies monitored reporting low levels of pH at least once during 2007; pH correction may be necessary for some supplies in Cork South.

Compliance with the coliform bacteria standard in private group water schemes in Cork South in 2007 was poor with half of the supplies monitored for coliform bacteria failing to meet the standards (6 of the 11 schemes monitored did not comply).

### EPA Enforcement in 2007/2008

There are currently 10 public water supplies operated by Cork (South) County Council on the Remedial Action List (RAL[25]) of public water supplies. One supply was added to the RAL in South Cork in 2008 while none were removed. Of the supplies on the RAL, Cork (South) County Council indicates that 10 supplies will be upgraded to ensure these supplies can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Cork (South) County Council had installed chlorine monitors and alarms on 16 of 66 supplies.

The EPA received 3 notifications of the failure to meet the parametric value from Cork (South) County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (2) and nitrate (1) parametric values.

[24] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[25] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Cork (West) County Council

### Summary of Water Supplies[26]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 34 | 34,303 |
| PuGWS | 14 | 2,207 |
| PrGWS | 9 | 777 |
| SPS | 45 | N/A |

### Assessment of 2007 Monitoring

Cork (West) County Council carried out 2,718 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Cork (West) during 2007 with approximately 7% of tests not carried out.

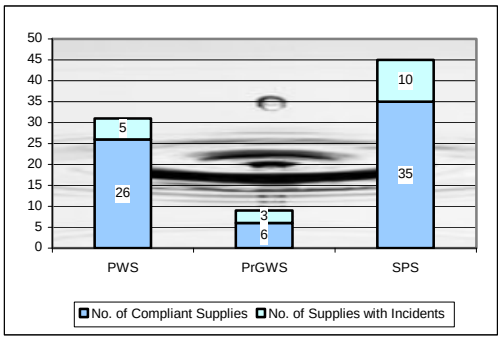
### Overall Compliance in 2007

The overall rate of compliance in Cork (West), 94.4%, was below the national average and was due to a lower rate of compliance across all three categories of parameters in both public water supplies and private group water schemes. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 89.7% | 99.4% | 93.7% |
| **PWS** | 96.1% | 99.4% | 96.8% |
| **PrGWS** | 83.3% | 100% | 89.8% |
| **SPS** | 79.4% | 100% | 76.9% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 6 incidents of *E. coli* contamination in 5 public water supplies in Cork (West) during 2007. These supplies were Coppeen, Clonakilty (2 incidents), Drimoleague, Dromore Public (Bantry), and Whiddy Island. Boil water notices were imposed on the Copeen supply (November 2007), Dromore (July 2007) and the Adrigole (August 2007). The latter was detected as a result of operational monitoring. Three of the 9 private group water schemes monitored were contaminated with *E. coli* during 2007, a drop from 4 in 2006.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was high at 99.4%. However, the Castletownkinnagh supply contained elevated levels of nitrate again. An exceedance of the trihalomethanes parametric value was recorded in the Castletownbere New supply.

Monitoring of the chemical parameters in private group water schemes in South Cork was limited to nitrate, nitrite and lead (additional monitoring was not required in these supplies) all of which complied with the standards.

Compliance with the indicator parametric values in public water supplies during 2007 was marginally above the national average at 96.8%. Compliance with the aluminium parametric value at 88% was low and due to exceedances in different supplies.

Half of the eight private group water schemes monitored contained coliforms at least once during 2007 while compliance with the pH parametric value (72%) was poor.

### EPA Enforcement in 2007/2008

There are currently 20 public water supplies operated by Cork (West) Council on the Remedial Action List (RAL[27]) of public water supplies. A total of 2 supplies in West Cork were added to the RAL in 2008 while one was removed. Of the supplies on the RAL, Cork (West) County Council indicates that 17 supplies will be upgraded and 3 will be replaced to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Cork (West) County Council had installed chlorine monitors and alarms on 9 of 34 supplies.

The EPA received 14 notifications of the failure to meet the parametric value from Cork (West) County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (13) and trihalomethanes (1) parametric values.

During this period 8 boil water were put in place due to contamination with *E. coli* in the following supplies; Adrigole (August 2007), Coppeen (November 2007), Dromore (July 2007), Crosterra (July 2008), Dursey Island (June 2008), Kealkill (September 2008), Leap (September 2008) and Skibberrean/Union Hall (September 2008). Arising from these notifications 3 Directions were issued by the EPA to Cork West County Council which required the implementation of corrective action.

[26] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[27] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Donegal County Council

### Summary of Water Supplies[28]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 43 | 134,877 |
| PuGWS | 13 | 5,176 |
| PrGWS | 18 | 3,600 |
| SPS | 15 | 466 |

### Assessment of 2007 Monitoring

Donegal County Council carried out 13,026 individual tests on drinking water during 2007.

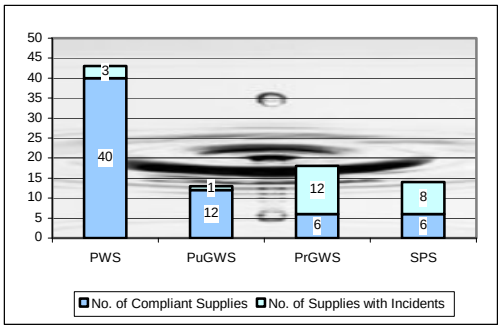
### Overall Compliance in 2007

The overall rate of compliance in County Donegal, 95.3% was below the national average during 2007 but improved slightly from 95.1% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 93.2% | 99.6% | 93.6% |
| **PWS** | 99.5% | 99.6% | 94.9% |
| **PuGWS** | 96.8% | 99.7% | 94.9% |
| **PrGWS** | 59.7% | 100% | 86.7% |
| **SPS** | 56.5% | 99.2% | 80.3% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 3 incidents of *E. coli* contamination of public water supplies in Donegal during 2007. They were in the Ballintra, Cullionboy and Lettermacaward supplies, with the former being serious (>20 cfu/100ml). Of the 18 private group water schemes monitored for *E. coli,* 12 were contaminated during 2007. The Council reported that many of these are in the process of being upgraded or replaced in 2008.

### Compliance with the Chemical and Indicator Parametric Values

Though the overall rate of compliance with the chemical parametric values was above the national average, the Kilcar and Rosbeg public water supplies reported exceedances of the trihalomethanes parametric value during 2007. All private group water schemes monitored were compliant with the chemical standards; however, one small private supply contained elevated levels of nitrate in excess of the standard.

There was a large number of exceedances of the indicator parametric values in Donegal during 2007. Compliance was unsatisfactory with the aluminium (86%), colour (86%), iron (81%) and turbidity (87%) parametric values. Sixteen of the 41 treatment plants monitored reported turbidity levels in excess of 1.0 NTU's (down from 22 in 2006). If *Cryptosporidium* is present in the source water of the supply then the treatment processes at such plants are operating under conditions of risk such that they may not be adequate to remove the parasite. Aluminium continues to be a problem in water supplies in Donegal with exceedances reported in several supplies. The Frosses-Inver supply failed to comply with the aluminium standard in any of the 7 samples analysed during the year. A similar picture was reported in 2006. Aluminium exceedances were also problematic at the Inishowen East supply with 7 of the 10 samples analysed failing to meet the parametric value. Donegal County Council reported that capital works at the Frosses-Inver have resolved the exceedances while operational improvements have been made at the Inishowen East supply to address the issue at this plant.

In the private group water schemes, compliance with the colour parametric value was also problematic (69% compliance) though compliance with the coliform bacteria parametric value was very poor with just 3 of 18 supplies complying.

### EPA Enforcement in 2007/2008

There are currently 30 public water supplies operated by Donegal County Council on the Remedial Action List (RAL[29]) of public water supplies. One supply in Donegal County was added to the RAL in 2008 while 4 were removed. Of the supplies on the RAL, Donegal County Council indicates that 13 supplies will be upgraded, 12 will be replaced, 5 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Donegal County Council had installed chlorine monitors and alarms on 26 of 42 supplies.

The EPA received 11 notifications of the failure to meet the parametric value from Donegal County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (5), lead (3), copper (1), trihalomethanes (1) and antimony (1) parametric values.

During this period 1 boil water notice was put in place in part of the Pollan Dam supply due to contamination with *E. coli.* One Direction was issued by the EPA to Donegal County Council which required the installation of disinfection at one treatment plant. An action plan for completion of this has been submitted.

[28] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[29] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Dublin City Council

### Summary of Water Supplies[30]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 7 | 606,500 |
| PuGWS | 0 | |
| PrGWS | 0 | |
| SPS | 0 | |

### Assessment of 2007 Monitoring

Dublin City Council carried out 13,548 individual tests on drinking water during 2007. Thus, Dublin City Council met (and indeed exceeded) the monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2007

The overall rate of compliance in Dublin City, 98.9% (up from 98.8% in 2006), was above the national average and the quality of water in Dublin was good. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **PWS** | 99.8% | 99.8% | 98.6% |

### Compliance with the *E. coli* Standard

Compliance with the *E. coli* and Enterococci parametric values was good during 2007. *E. coli* was not detected in the public water supply. In 2 of the 827 samples analysed it was detected at low levels (a single organism in both samples) and was not indicative of an exceedance with the supply but rather of a localised sample point contamination.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was good and full compliance was achieved with 24 of the 26 chemical standards. Three minor fluoride exceedance was reported marginally above the parametric value (though well below the EU standard) with a further one exceedance of the lead parametric value.

Though compliance with the indicator parametric values was lower than that of the microbiological and chemical parametric values it was nonetheless above the national average at 98.6% in 2007. However, compliance with the coliform bacteria parametric value was relatively low at 85% (down from 89% in 2006). The majority of the coliform bacteria exceedances appear to be in the Vartry-Ballymore Eustace supply zone (69 of 271 samples analysed exceeded).

### EPA Enforcement in 2007/2008

There is one public water supply operated by Dublin City Council on the Remedial Action List (RAL[31]) of public water supplies. The Council has indicated that they will improve plant operations to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants.

As of August 2008, Dublin City Council had installed chlorine monitors and alarms on all 3 of their water treatment plants.

The EPA received 1 notification of the failure to meet the parametric value from Dublin City Council in the period March 2007 to September 2008. The notification was due to the failure to meet the *E. coli* parametric value.

[30] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[31] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Dun Laoghaire Rathdown County Council

### Summary of Water Supplies[32]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 8 | 189,782 |
| PuGWS | 0 | |
| PrGWS | 0 | |
| SPS | 0 | |

### Assessment of 2007 Monitoring

Dun Laoghaire Rathdown County Council carried out 5,470 individual tests on drinking water during 2007. Thus Dun Laoghaire Rathdown County Council met (and indeed exceeded) the monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2007

The overall rate of compliance in Dun Laoghaire Rathdown, 98.9% (up from 98.4% in 2006), was above the national average and the quality of water in Dun Laoghaire Rathdown was in general good. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **PWS** | 99.8% | 99.5% | 98.8% |

### Compliance with the *E. coli* Standard

Compliance with the *E. coli* and Enterococci parametric values was good during 2007. In one of the 383 samples analysed it was detected at low levels (a single organism) and was not indicative of an exceedance with the supply but rather of a localised sample point contamination. Enterococci were not detected in any of the 30 samples analysed.

### Compliance with the Chemical and Indicator Parametric Values

Full compliance was achieved with 24 of the 26 chemical parameters. There were 2 moderate fluoride exceedances and one nickel exceedance reported in 2007. Nickel can be present in drinking water from the tap fittings and thus is not representative of the supply as a whole but rather due to contamination at the sample point.

Though compliance with the indicator parametric values was lower than that of the microbiological and chemical parametric values it was nonetheless satisfactory and above the national average. In common with the other supplies in the greater Dublin area, compliance with the coliform bacteria parametric value was less than it should be (91% compliance) though did improve from 89% in 2006.

### EPA Enforcement in 2007/2008

There are no public water supplies operated by Dun Laoghaire Rathdown County Council on the Remedial Action List (RAL[33]) of public water supplies.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants.

As of August 2008, Dun Laoghaire Rathdown County Council had installed chlorine monitors and alarms on 2 of 3 water treatment plants.

The EPA received 3 notifications of the failure to meet the parametric value from Dun Laoghaire Rathdown County Council in the period March 2007 to September 2008. The 3 notifications were due to the failure to meet the *E. coli* parametric value.

During this period 2 boil water notices were put in place in localised areas of the distribution network arising from mains works.

[32] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[33] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Fingal County Council

### Summary of Water Supplies[34]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 4 | 293,546 |
| PuGWS | 0 | |
| PrGWS | 0 | |
| SPS | 0 | |

### Assessment of 2007 Monitoring

Fingal County Council carried out 5,937 individual tests on drinking water during 2007. Thus, Fingal County Council met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2007

The overall rate of compliance in Fingal, 99.0% (up from 98.5% in 2006), was above the national average and the quality of water in Fingal was in general good. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **PWS** | 100.0% | 99.7% | 98.8% |

### Compliance with the *E. coli* Standard

Compliance with the *E. coli* and Enterococci parametric values was excellent during 2007 and neither micro-organism was detected in any of the samples analysed in Fingal during 2007.

### Compliance with the Chemical and Indicator Parametric Values

Full compliance was achieved with 25 of the 26 chemical parameters. The sole parameter for which failures were reported was with the fluoride standard which was made more stringent in 2007.

Though compliance with the indicator parametric values was lower than that of the microbiological and chemical parametric values it was nonetheless satisfactory and above the national average. Coliform bacteria compliance dropped from 91% to 86% and this was lower than the national average.

### EPA Enforcement in 2007/2008

There are no public water supplies operated by Fingal County Council on the Remedial Action List (RAL[35]) of public water supplies.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Fingal County Council had installed chlorine monitors and alarms on both of their water treatment plants.

The EPA received 3 notifications of the failure to meet the parametric value from Fingal County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (3) and copper (1) parametric values.

During this period 2 boil water notices and one restriction of use was put in place. The boil water notices were due to contamination of localised areas of part of the distribution network which is in private ownership while a restriction of use was placed on the occupants of an apartment block due to leaching of copper from the internal pipework.

[34] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[35] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Galway City Council

### Summary of Water Supplies[36]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 1 | 76,983 |
| PuGWS | 0 | |
| PrGWS | 0 | |
| SPS | 0 | |

### Assessment of 2007 Monitoring

Galway City Council carried out 3,874 individual tests on drinking water during 2007.

### Overall Compliance in 2007

The overall rate of compliance in Galway City, 98.6%, was above the national average. However, the quality of drinking water in Galway City during 2007 was poor and the supply was on 2 separate boil water notices during the year. The initial boil water notice was due to the *Cryptosporidium* outbreak while the second was due to the presence of *E. coli*. While compliance with the standards was high water must also be free of other harmful micro-organisms and substances to be considered clean and wholesome. Thus, although there is no standard for *Cryptosporidium* in drinking water, its presence in the Galway City supply rendered it unwholesome during the outbreak and therefore not compliant with the Regulations. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **PWS** | 99.6% | 97.5% | 99.0% |

### Compliance with the *E. coli* Standard

There was one incident of *E. coli* contamination of the Galway City supply during 2007. In September 2007, 15,000 residents of the Knocknacarra area of Galway had to boil their water due to localised contamination.

### Compliance with the Chemical and Indicator Parametric Values

Full compliance was achieved with 25 of the 26 chemical parameters. A number of fluoride exceedances were reported in 2007. However, this was due to a tightening of the fluoride standard. All of these non-compliances occurred in the first six months of 2007 when the transition to the new standard occurred. All samples analysed for fluoride in the latter half of 2007 were fully compliant.

Though compliance with the indicator parametric values was lower than that of the microbiological and chemical parametric values it was nonetheless above the national average. However, the lower rate of compliance with the indicator parametric values was primarily due to the elevated levels of turbidity in the water that was coming from the Terryland Old water treatment plant. This plant was shut down in July 2007 and only one exceedance of the turbidity parametric value occurred after this date. Elevated levels of turbidity in a supply that has been previously classified as "very high" risk indicate that the supply is at very high risk of contamination with *Cryptosporidium.* In March of 2007 the largest outbreak of *Cryptosporidium* in Ireland was detected in Galway City and parts of Galway County. Elevated levels of *Cryptosporidium* were detected in the water supply and there was also a huge increase in the number of cases of cryptosporidiosis in the Galway City and environs region. While it is likely that there were multiple sources of the parasite in Lough Corrib the reason the outbreak occurred was due to the insufficient treatment at the Terryland Old water treatment plant. The plant consisted of 50+ year old pressure filters and chlorination. The Terryland Old plant provided no effective treatment against *Cryptosporidium* and hence oocysts of the parasite in Lough Corrib directly entered the water supply in Galway. The Council were directed by the EPA to cease operation of the Terryland Old plant and to install UV treatment at the Terryland New plant. The Council completed the actions required by the EPA Direction by replacing the water from the Terryland Old plant with water from the Luimnagh water treatment plant (operated by Galway County Council). A new UV treatment plant was also installed. Completion of these works enabled the lifting of the boil water notice in the supply on 20 August 2007. In total the residents of Galway City were subjected to a boil water notice for over 5 months, while 242 people were officially affected by the parasite (though the actual number is likely to be over 1,000).

### EPA Enforcement in 2007/2008

There are no public water supplies operated by Galway City Council on the Remedial Action List (RAL[37]) of public water supplies. One supply, serving Galway City was removed from the RAL in 2008 due to the shutting down of the Terryland Old water treatment plant in July 2007.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Galway City Council had installed a chlorine monitor and alarm on their single water treatment plant.

The EPA received 7 notifications of the failure to meet the parametric value from Galway City Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (1), lead (2), iron (1), nickel (1) and acrylamide (1) parametric values while a further notification was received in respect of the detection of *Cryptosporidium.*

During this period 2 boil water notices were put in place. Arising from these notifications 2 Directions were issued by the EPA to Galway City Council which required specific actions to be taken following the *Cryptosporidium* outbreak and also to submit an action programme to deal with lead pipes in the distribution network. A lead distribution main in the Old Mervue part of the city is being replaced and work is to be complete by September 2009.

[36] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[37] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Galway County Council

### Summary of Water Supplies[38]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 43 | 112,092 |
| PuGWS | 164 | 24,687 |
| PrGWS | 132 | 36,454 |

### Assessment of 2007 Monitoring

Galway County Council carried out 24,426 individual tests on drinking water during 2007. This was the largest drinking water monitoring programme in the country and reflects the large number of supplies in Galway.

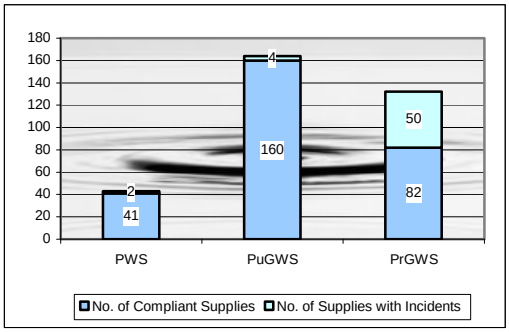
### Overall Compliance in 2007

The overall rate of compliance in Co. Galway, 96.4%, was below the national average though it rose from 95.0% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 91.5% | 99.3% | 95.0% |
| **PWS** | 99.3% | 98.8% | 94.9% |
| **PuGWS** | 98.7% | 99.3% | 97.4% |
| **PrGWS** | 78.6% | 99.8% | 93.2% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




*E. coli* was detected in 2 public water supplies during routine compliance monitoring in Galway during 2007 in the Craughwell and Roundstone supplies.

There was a drop in the number of private group water schemes contaminated with *E. coli* in Galway during 2007. Fifty (40%) private group water schemes (down from 68 in 2006) were contaminated during 2007.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parameters was below the national average in public water supplies. The main reason for this was the high number of schemes with elevated levels of trihalomethanes. Ten public water supplies, 7 public group water schemes and 3 private group water schemes had elevated trihalomethanes during 2007. The standard for trihalomethanes is tightened in December 2008 and it is clear, based on the 2007 results, that 19 (44%) public water supplies, 40 (25%) public group water schemes and 6 (5% of private group water schemes) monitored will not be able to meet this standard if the current situation persists.

There was a slight improvement in compliance with the indicator parametric values in public water supplies. However, compliance was poor due to low rates of compliance with the turbidity (27 of 42 treatment plants monitored had exceedances), colour (89% compliance) and aluminium (84% compliance) parametric values. If *Cryptosporidium* is present in the source water of the supplies which are not complying with the turbidity standard then the treatment processes at such plants are operating under conditions of risk such that they may not be adequate to remove the parasite. Compliance with the indicator parametric values in private group water schemes was poor with a large proportion of private group water schemes exceeding the coliform bacteria parametric value (67 of 132 schemes monitored).

### EPA Enforcement in 2007/2008

There are currently 38 public water supplies operated by Galway County Council on the Remedial Action List (RAL[39]) of public water supplies, 10 of which have an inadequate barrier to prevent *Cryptosporidium* contamination. Four supplies in Galway County were added to the RAL in 2008 while one was removed. Galway County Council indicates that 22 supplies will be upgraded, 12 will be replaced and 4 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Galway County Council had installed chlorine monitors and alarms on 35 of 43 supplies.

The EPA received 15 notifications of the failure to meet the parametric value from Galway County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (4), coliform bacteria (1), *Cryptosporidium* (2), *Clostridium perfringens* (1), trihalomethanes (4) and lead (3) parametric values.

During this period 6 boil water notices or restrictions of use were put in place due to *Cryptosporidium* in the Clarinbridge/Kilcolghan (November 2007), Roundstone (November 2007) Headford and Luimnagh supplies (March 2007) and *E.* coli in the Mid Galway supply (July 2007) and coliform bacteria in the Gort supply (August 2008. Arising from these notifications 5 Directions were issued by the EPA to Galway County Council which required the preparation of action programmes, installation of chlorine monitors as well as other specific measures to improve treatment. Galway County Council was prosecuted by the EPA in April 2008 for failure to comply with a Direction in respect of the Craughwell supply.

[38] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[39] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Kerry County Council

### Summary of Water Supplies[40]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 83 | 111,591 |
| PuGWS | 41 | 11,074 |
| PrGWS | 15 | 1,568 |
| SPS | 46 | N/A |

### Assessment of 2007 Monitoring

Kerry County Council carried 15,661 individual tests on drinking water during 2007. Thus, Kerry County Council met the monitoring requirements of the Regulations.

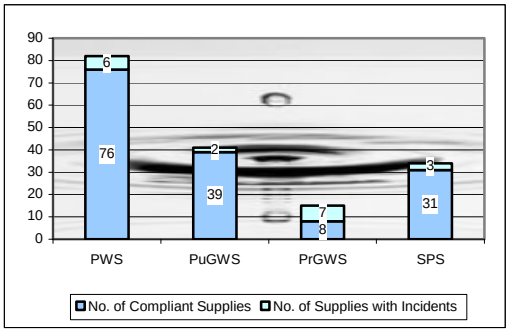
### Overall Compliance in 2007

The overall rate of compliance in Co. Kerry, 96.6%, was below the national average during 2007 though marginally up from 96.0% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.5% | 98.6% | 95.8% |
| **PWS** | 99.0% | 98.6% | 96.2% |
| **PuGWS** | 98.5% | 97.4% | 97.4% |
| **PrGWS** | 68.4% | 100% | 83.9% |
| **SPS** | 90.0% | 100% | 92.2% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 7 incidents of *E. coli* contamination in 6 public water supplies in Kerry during 2007. These were the An Ceapaigh Iarthair, Gearrha/Mid Kerry, Glenbeigh (2 incidents), Killorglin, Liscarney and Shrone supplies. The detection of *E. coli* in the Glenbeigh supply resulted in the imposition of a boil water notice in August 2007. The large number of water supplies in Kerry contaminated with *E. coli* is unacceptable. The situation is worse in the private group water schemes with 7 of the 14 schemes monitored.

### Compliance with the Chemical and Indicator Parametric Values

Public water supplies in Kerry were fully compliant with 24 of the 26 chemical standards. The only exceedances reported were with the fluoride and lead standards. The former were due to a tightening standard for fluoride which came into force during 2007. Lead exceedances were reported in 5 samples analysed and were due to a lead service main (1), lead service connections (3) and internal lead plumbing (1). All lead pipes in the ownership of Kerry County Council, involved in these exceedances have been replaced. There were no exceedances of the chemical parametric values in either the private group water schemes or the small private supplies during 2007.

Compliance with the indicator parametric values in Kerry was below average and poor in the case of the private group water schemes. Compliance with the coliform bacteria (92%), colour (94%) and pH (83%) parametric values were unacceptably low in public water supplies. Turbidity levels at the water treatment plant were also poor with over 20% of treatment plants reporting turbidity levels in excess of 1.0 NTU, indicating potential vulnerability to contamination with *Cryptosporidium*.

Twelve of the 15 private group water schemes in Kerry contained coliform bacteria at least once during 2007 although there has been a slight improvement in the quality of private group water schemes in Kerry.

### EPA Enforcement in 2007/2008

There are currently 42 public water supplies operated by Kerry County Council on the Remedial Action List (RAL[41]) of public water supplies. This is the largest number for any single county in the country. Two supplies were added to the RAL in 2008 for Co. Kerry, while 2 supplies were removed. Of the supplies on the RAL, Kerry County Council indicates that 37 supplies will be upgraded, 2 will be replaced and 3 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Kerry County Council had installed chlorine monitors and alarms on 54 of 81 supplies.

The EPA received 22 notifications of the failure to meet the parametric value from Kerry County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (13), lead (2), aluminium (5) and fluoride (2) parametric values.

During this period 2 boil water notices or restrictions of use were put in place in the following supplies; Glenbeigh (August 2007) and Lyre (August 2008). Enforcement action in the form of Directions are being progressed by the EPA in relation to a number of supplies.

[40] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[41] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Kildare County Council

### Summary of Water Supplies[42]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 14 | 168,719 |
| PuGWS | 0 | 0 |
| PrGWS | 5 | 2,110 |
| SPS | 32 | 2,190 |

### Assessment of 2007 Monitoring

Kildare County Council carried out 6,597 individual tests on drinking water during 2007.

### Overall Compliance in 2007

The overall rate of compliance in Co. Kildare, 98.9%, was above the national average, though dropped from 99.1% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 99.8% | 99.3% | 98.6% |
| **PWS** | 99.9% | 99.4% | 98.7% |
| **PrGWS** | 98.9% | 100% | 98.5% |
| **SPS** | 100% | 97.6% | 97.5% |

### Compliance with the *E. coli* Standard

There were no incidents of *E. coli* contamination reported in any of the 430 samples analysed in 14 public water supplies, 5 private group water schemes or 14 small private supplies. However, Enterococci were detected in one public water supply and one private group water scheme.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was generally good. There were a small number of fluoride exceedances in the first six months of 2007 due to the tightening of the fluoride standard; however, no exceedances were reported after April. There were also 2 nickel exceedances in the Athy and Poulaphouca supplies. However, nickel is not present in the untreated or treated water from these supplies and it is likely that these exceedances were due to contamination from tap fittings. There were no chemical exceedances of any other parameter nor were there any chemical exceedances in any of the private group water scheme. However, 3 of the private water supplies did contain elevated levels of nitrate.

Compliance with the indicator parametric values was also good (98.7%) and well above the national average. Apart from a small number of manganese exceedances in Clonuff and Johnstownbridge supplies, compliance with the indicator parametric values in public water supplies was good. Compliance with the indicator parametric values in the private group water schemes was similar to that in the public water supplies (98.5%).

### EPA Enforcement in 2007/2008

There are no public water supplies operated by Kildare County Council on the Remedial Action List (RAL[43]) of public water supplies.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Kildare County Council had installed chlorine monitors and alarms on 4 of 14 supplies.

The EPA received no notifications of the failure to meet the parametric value from Kildare County Council in the period March 2007 to September 2008.

[42] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply,

[43] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie,

## Kilkenny County Council

### Summary of Water Supplies[44]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 15 | 51.409 |
| PuGWS | 25 | 2,467 |
| PrGWS | 23 | 3,397 |
| SPS | 83 | N/A |

### Assessment of 2007 Monitoring

Kilkenny County Council carried out 7,197 individual tests on drinking water during 2007. There was a minor shortfall in the number of tests carried out in Kilkenny during 2007 with just over 1% of tests not carried out.

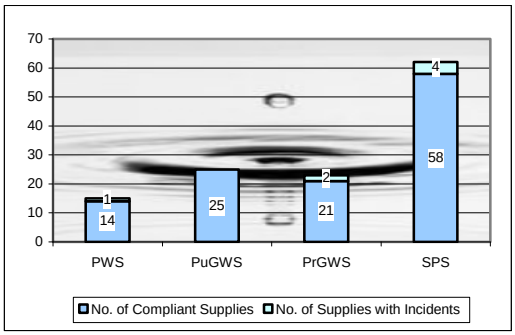
### Overall Compliance in 2007

The overall rate of compliance in Co. Kilkenny, 97.6%, was above the national average, though improved marginally compared to 2006 (up from 97.3% compliance). Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 98.6% | 98.7% | 96.9% |
| **PWS** | 99.7% | 98.6% | 97.5% |
| **PuGWS** | 100% | 100% | 97.6% |
| **PrGWS** | 96.9% | 100% | 97.0% |
| **SPS** | 93.8% | 98.0% | 94.0% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There was one incident of *E. coli* contamination in public water supplies in the Gowran-Goresbridge-Paulstown supply in Kilkenny during 2007. The microbiological quality of the majority of private group water schemes was good; however, 2 of the 23 schemes monitored were contaminated with *E. coli* during the year. This is a drop in the number of contaminated schemes compared to 2006 (when 4 schemes were contaminated).

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standard was below average and was mainly due to a relatively large number of marginal exceedances of the fluoride standard (15 of 69 samples analysed exceeded). However, the majority of these exceedances (11) were in the first six months of 2007 and were due to the reduction in the fluoride standard. There were 2 marginal mercury exceedances in the Callan water supply which were subsequently found to be due to an old flowmeter at the treatment plant which contained mercury. This meter has been removed from the treatment plant and the supply is now compliant with the mercury standard. A single lead exceedance in the Clogh-Castlecomer supply was due to the presence of a lead service connection and a single nitrate exceedance was also reported in the Kilkenny City (Troyswood) supply. The latter is significantly higher than the 33 other samples analysed and may be an anomalous result. Compliance with the trihalomethanes parametric value in the Kilkenny City (Radestown) supply was also problematic as 2 of the 8 samples analysed failed to meet the standard.

There were no exceedances of the chemical parametric values in private group water schemes in Kilkenny during 2007 (down from 6 in 2006). However, 5 of the 62 private water supplies monitored failed to comply with the nitrate standard. Though compliance with the indicator parametric values in public water supplies was the same as the national average, a large number of samples analysed for pH failed to comply with the parametric at the Glenmore (all 6 samples analysed failed) and the Piltown Fiddown (9 of 10 samples analysed failed). Furthermore, 10 of the 23 private group water schemes and 17 of the 62 private water supplies monitored contained coliform bacteria.

### EPA Enforcement in 2007/2008

There are currently 9 public water supplies operated by Kilkenny County Council on the Remedial Action List (RAL[45]) of public water supplies. Two supplies in Kilkenny County were added to the RAL in 2008 while none were removed. Of the supplies on the RAL, Kilkenny County Council indicates that 4 supplies will be upgraded, 3 will be replaced and 2 supplies will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Kilkenny County Council had installed chlorine monitors and alarms on 8 of 15 supplies.

The EPA received 7 notifications of the failure to meet the parametric value from Kilkenny County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (2), coliform bacteria (2), *Cryptosporidium* (1) and mercury (1) parametric values while one supply was notified to the EPA as a precaution due to flooding at the treatment plant. During this period 3 boil water notices were put in place in the following supplies; Ballyragget, Paulstown and Bennetsbridge. All 3 were in August 2008 and were due to the poor weather in this period. Arising from the notifications 2 Directions were issued by the EPA to Kilkenny County Council, which required the preparation of action programmes in both cases.

[44] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[45] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Laois County Council

### Summary of Water Supplies[46]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 31 | 63,259 |
| PuGWS | 17 | 2,029 |
| PrGWS | 14 | 5,109 |
| SPS | 83 | N/A |

### Assessment of 2007 Monitoring

Laois County Council carried out 5,670 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Laois during 2007 with just under 4% of tests not carried out. The Council has indicated that this shortfall has been resolved in 2008.

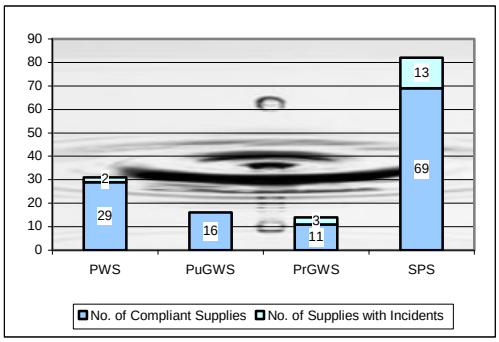
### Overall Compliance in 2007

The overall rate of compliance in Co. Laois, 96.7%, was just below to the national average in 2007 and fell from 97.2% in 2006.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 96.7% | 99.0% | 95.9% |
| **PWS** | 99.3% | 98.9% | 97.9% |
| **PuGWS** | 100% | 100% | 99.6% |
| **PrGWS** | 96.2% | 98.5% | 95.6% |
| **SPS** | 91.1% | 99.1% | 90.9% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There were 3 incidents in 2 supplies during 2007. The Luggacurran and Durrow public water supplies were contaminated with *E. coli* in 2007. The Luggacurran supply has since been replaced and the original contaminated source is no longer in use. Of the 14 private group water schemes monitored for *E. coli* 3 were contaminated with *E. coli* in 2007 and were thus of an unsatisfactory quality.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards in public water supplies was close to the national average at 99%. Non-compliances with the trihalomethane standard were reported in the Mountmellick water supply (2 of 3 samples analysed) while there was one lead exceedance in the Arles supply.

Nitrate continued to be a problem in the 2 group water schemes highlighted in 2005 and 2006, Ballacolla and Killeaney. There were no other exceedances of the chemical parametric values in private group water schemes in Laois in 2007.

Compliance with the indicator parametric values in public water supplies in Laois was above the national average at 97.9% in 2007. The results of monitoring of the indicator parametric values in private group water schemes indicate that the most significant issue related to the failure of a large number of schemes (11 of 14 schemes analysed) to comply with the coliform bacteria standard. Similarly, in the small private supplies half of the supplies monitored contained coliform bacteria at least once during 2007 (41 of 82 supplies monitored).

### EPA Enforcement in 2007/2008

There are currently 4 public water supplies operated by Laois County Council on the Remedial Action List (RAL[47]) of public water supplies. Two supplies were added to the RAL in 2008 while 2 supplies in Co. Laois were removed. Of the supplies on the RAL, Laois County Council indicates that 2 supplies will be upgraded and 2 will be replaced so as to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Laois County Council had installed chlorine monitors and alarms on 4 of 31 supplies.

The EPA received 10 notifications of the failure to meet the parametric value from Laois County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the nitrate (3), coliform bacteria (4), trihalomethanes (1) and aluminium (2) parametric values.

During this period 2 boil water notices or restrictions of use were put in place in the following supplies; Modubeigh and Luggacurran both in May 2007. Arising from these notifications 2 Directions were issued by the EPA to Laois County Council which required the preparation of action programmes in respect of both supplies. The works have been complete and both supplies have since been replaced.

[46] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[47] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Leitrim County Council

### Summary of Water Supplies[48]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 7 | 17,420 |
| PuGWS | 89 | 5,925 |
| PrGWS | 16 | 4,280 |
| SPS | 0 | |

### Assessment of 2007 Monitoring

Leitrim County Council carried out 6,866 individual tests on drinking water during 2007.

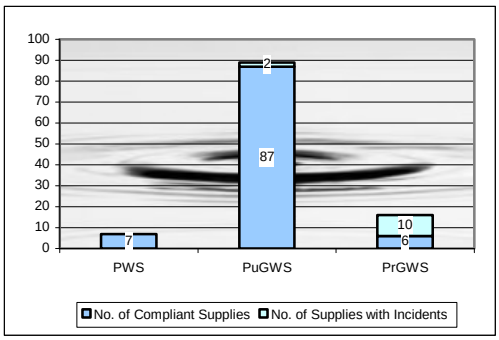
### Overall Compliance in 2007

The overall rate of compliance in Co. Leitrim, 97.4%, was close to the national average during 2007 and improved from 96.4% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 95.2% | 99.9% | 96.4% |
| **PWS** | 100. | 99.7% | 98.7% |
| **PuGWS** | 99.0% | 100% | 98.6% |
| **PrGWS** | 66.7% | 100% | 78.0% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2006 is provided in the figure below.




The microbiological quality of drinking water in public water supplies in Leitrim was good in 2007 and there were no exceedances of the *E. coli* or *Enterococci* parametric values during the year.

In contrast, the quality of private group water schemes was poor with 10 of the 16 schemes monitored contaminated with *E. coli*. However, it must be noted that the number of private group water schemes dropped from 22 in 2006 to 16 in 2007. This drop in the number of schemes was due to their connection to public water supplies and thus the improvement of the quality of these schemes. To this end there was an overall drop in the number of contaminated private group water schemes in Leitrim from 14 in 2006 to 10 in 2007.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parametric values in all water supplies in Leitrim in 2007 was good with just 2 exceedances of the lead standard in the Kiltyclogher and South Leitrim Regional supply. Both were due to lead plumbing in private ownership. There were no exceedances of the chemical parametric values in any of the public group water schemes or private group water schemes.

Compliance with the indicator parametric values was above the national average in public water supplies in Leitrim (98.7% compliance) though compliance with the aluminium parametric value remains low (91%). There was a number of aluminium exceedances in the South Leitrim Regional supply (8 of 60 samples analysed). The aluminium problems in the South Leitrim Regional supply had the knock on effect of elevated levels in a number of public group water schemes that received their water from the South Leitrim Regional supply.

Compliance with the indicator parametric values in private group water schemes was poor (78% compliance) and below the national average (92.9%). A large proportion of private group water schemes contained coliform bacteria during 2007 (13 of the 16 schemes monitored). However, these schemes are in the process of being taken in charge or replaced with new treatment plants.

### EPA Enforcement in 2007/2008

There are currently 2 public water supplies operated by Leitrim County Council on the Remedial Action List (RAL[49]) of public water supplies. One supply in Co. Leitrim was added to the RAL in 2008 while one was removed. Of the supplies on the RAL, Leitrim County Council has indicated that one supply will be replaced and one will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Leitrim County Council had installed chlorine monitors and alarms on 5 of 6 supplies.

The EPA received 13 notifications of the failure to meet the parametric value from Leitrim County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (1), coliform bacteria (3), aluminium (3), lead (2), iron (2), turbidity (1) and colour (1) parametric values.

During the period 1 restriction of use was put in place in Dowra supply arising from excessive levels of aluminium in the drinking water. The treatment plant for this supply originates in Cavan.

[48] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[49] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Limerick City Council

### Summary of Water Supplies[50]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 1 | 52,000 |
| PuGWS | 0 | |
| PrGWS | 0 | |
| SPS | 0 | |

### Assessment of 2007 Monitoring

Limerick City Council carried out 2,389 individual tests on drinking water during 2007.

### Overall Compliance in 2007

The overall rate of compliance in Limerick City rose from 97.2% in 2006 to 99.2% in 2007. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **PWS** | 100% | 98.5% | 99.4% |

### Compliance with the *E. coli* Standard

Compliance with the microbiological parametric values for *E. coli* and Enterococci was good in Limerick City during 2007 and neither *E.coli* or Enterococci were detected in any of the samples analysed during 2007.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was similarly good and the supply complied with 25 of the 26 chemical standards at all times that monitoring took place. The sole exception was fluoride which was exceeded in March and April 2007. This was due to the adjustment to the tighter fluoride standard which took effect in March 2007. All samples analysed after this adjustment period were compliant.

Full compliance was achieved with all of the indicator parametric values during 2007 with the exception of aluminium. There were a number of aluminium exceedances (10 of 147 samples analysed).

### EPA Enforcement in 2007/2008

There is one public water supply operated by Limerick City Council on the Remedial Action List (RAL[51]) of public water supplies. This is the only water supply operated by Limerick City Council, which serves Limerick City. Limerick City Council has indicated that the supply is being upgraded at present and will improve operations at the treatment plant to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Limerick City Council had installed a chlorine monitor and alarm on their single water treatment plant.

The EPA received no notifications of failure to meet any parametric value from Limerick City Council in the period March 2007 to September 2008.

[50] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[51] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Limerick County Council

### Summary of Water Supplies[52]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 56 | 77,723 |
| PuGWS | 74 | 9,571 |
| PrGWS | 45 | 8,954 |
| SPS | 4 | N/A |

### Assessment of 2007 Monitoring

Limerick County Council carried out 8,917 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Limerick during 2007 with approximately 9% of tests not carried out.

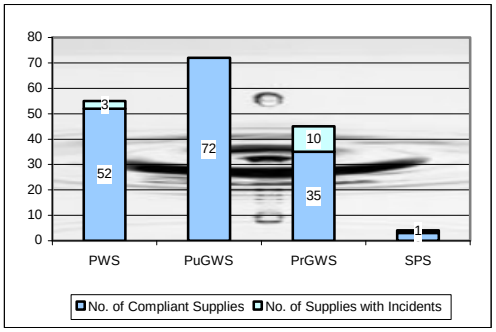
### Overall Compliance in 2007

The overall rate of compliance in Co. Limerick, 98.1%, was above the national average in 2007 and improved from 96.6% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 94.1% | 97.7% | 98.8% |
| **PWS** | 98.9% | 98.1% | 98.9% |
| **PuGWS** | 97.6% | 93.6% | 99.4% |
| **PrGWS** | 86.0% | 99.2% | 97.4% |
| **SPS** | 76.9% | 88.9% | 99.0% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 3 incidents of *E. coli* contamination of public water supplies in the Ballyhahill, Banogue and the Pallaskenry/Kildimo supplies. The Banogue incident was due to a serious exceedance of the *E. coli* parametric value (>20 cfu/100ml).

There was a rise in the number of private group water schemes contaminated with *E. coli* during 2007 with 10 (up from 9 in 2006) of 45 schemes failing to meet the *E. coli* parametric value in 2007.

### Compliance with the Chemical and Indicator Parametric Values

There was a drop in the level of compliance with the chemical parametric values in 2007. The nitrate standard was breached in the Rockhill and Ballingarry public water supplies during 2007 while the lead parametric value was breached in the Bruff public water supply during the year. Restrictions of use (i.e. do not drink) were placed on all 3 of these supplies in 2007 (Rockhill and Ballingarry) and January 2008 (Bruff). Although there were a number of fluoride exceedances (83% compliance) the majority of these exceedances (28 of 32) were in the first six months of 2007 and were due to the transition to a more stringent standard for fluoride. The only chemical parametric value exceeded in the private group water schemes and small private supplies was nitrate. The standard was exceeded in 2 private group water schemes and 1 small private supply.

Compliance with the indicator parametric values was improved in 2007 and was above the national average. Compliance with the aluminium parametric value rose from 77% in 2006 to 94% in 2007. The majority of these exceedances were marginal and were from the Limerick City supply (which serves parts of Limerick County).

Though compliance with the indicator parametric values in private group water schemes in Co. Limerick was above the national average, compliance with the coliform bacteria (90% compliance) has improved compared to 2006, however, it remains poor.

### EPA Enforcement in 2007/2008

There are currently 16 public water supplies operated by Limerick County Council on the Remedial Action List (RAL[53]) of public water supplies. A total of 6 supplies in Co. Limerick were added to the RAL in 2008 while none were removed. Of the supplies on the RAL, Limerick County Council indicates that 11 supplies will be upgraded, one will be replaced and 4 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Limerick County Council had installed chlorine monitors and alarms on 14 of 56 supplies.

The EPA received 38 notifications of the failure to meet the parametric value from Limerick County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (7), coliform bacteria (6), *Enterococci* (1), *Clostridium perfringens* (1), nitrate (5), lead (6), nickel (5), copper (2), fluoride (3) and turbidity (2 notifications) parametric values.

During this period 4 boil water notices and 2 restrictions of use were put in place in the following supplies; Ballingarry (March 2007), Bruff (January 2008), Caherconlish (August 2008), Carrigmore (December 2007), Newcastlewest (August 2008) and Rockhill (November 2007 and August 2008). Arising from these notifications one Direction was issued by the EPA to Limerick County Council which required the preparation of an action programme.

[52] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

[53] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Longford County Council

### Summary of Water Supplies[54]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 8 | 16,587 |
| PuGWS | 57 | 6,681 |
| PrGWS | 2 | 340 |
| SPS | 11 | N/A |

### Assessment of 2007 Monitoring

Longford County Council carried out 2,846 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Longford during 2007 with approximately 3% of tests not carried out.

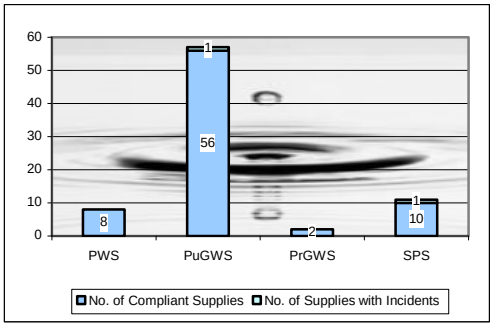
### Overall Compliance in 2007

The overall rate of compliance in Co. Longford, 97.3%, though improved from 95.8% in 2006, was below the national average in 2007. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 98.6% | 97.8% | 96.8% |
| **PWS** | 100% | 97.8% | 96.1% |
| **PuGWS** | 98.8% | 97.6% | 97.2% |
| **PrGWS** | 100% | 100% | 97.4% |
| **SPS** | 92.3% | 100% | 95.8% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2006 is provided in the figure below.




There were no incidents of *E. coli* contamination in public water supplies in Longford in 2007. With the exception of one public group water scheme all other public and private group water schemes were free of *E. coli*.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parametric values in public water supplies in Longford was below average. There was a number of fluoride exceedances while the single sample analysed for trihalomethanes in the Ballinalee/Edgeworthstown public water supply failed to meet the standard. Limited monitoring for the chemical parameters in both public and private group water schemes indicated that, with the exception of fluoride in public group water schemes, all chemical parameters tested were below the parametric value.

Compliance with the indicator parametric values in public water supplies in Longford was unsatisfactory and was below the national average. There was an improvement in compliance with the aluminium parametric value from 73% in 2006 to 79% in 2007. A number of aluminium exceedances were reported in the Granard (3 of 6 samples analysed) and Longford Central (3 of 6 samples analysed) public water supplies. The elevated levels of aluminium in these public water supplies also led to a large proportion of exceedances in the public group water schemes that receive their water from these public supplies (13 of 57 schemes monitored reported aluminium exceedances).

There was an improvement in the quality of the private group water schemes in Longford with all schemes compliant with the coliform bacteria parametric value in 2007 (down from 2 in 2006).

### EPA Enforcement in 2007/2008

There are currently 3 public water supplies operated by Longford County Council on the Remedial Action List (RAL[55]) of public water supplies. One of the supplies in Co. Longford was removed from the RAL in 2008 while none were added. Of the supplies on the RAL, Longford County Council indicates that one supply will be replaced, one will have operations improved and one will have a combination of upgrade and operation improvement in order to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Longford County Council had installed chlorine monitors and alarms on all 8 of their supplies.

The EPA received 6 notifications of the failure to meet the parametric value from Longford County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *Cryptosporidium* (1), aluminium (3), lead (1) and iron (1) parametric values.

During this period 1 boil water notice was put in place in the Ballinalee/Edgeworthstown supply (August 2008). Arising from these notifications 2 Directions were issued by the EPA to Longford County Council which required the preparation of action programmes for 2 supplies. Both action programmes have been submitted and are being implemented by Longford County Council.

[54] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[55] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Louth County Council

### Summary of Water Supplies[56]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 16 | 83,805 |
| PuGWS | 0 | 0 |
| PrGWS | 9 | 3,565 |
| SPS | 0 | N/A |

### Assessment of 2007 Monitoring

Louth County Council carried out 4,330 individual tests on drinking water during 2007.

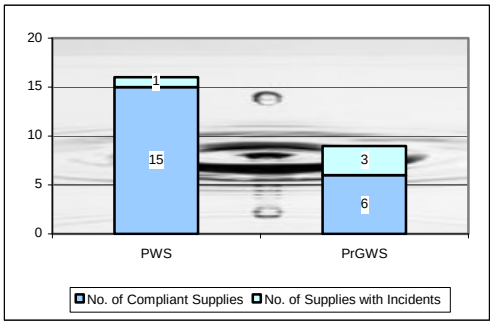
### Overall Compliance in 2007

The overall rate of compliance in Co. Louth, 97.1%, was close to the national average. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.9% | 96.4% | 97.2% |
| **PWS** | 99.3% | 96.0% | 97.5% |
| **PrGWS** | 86.5% | 99.0% | 94.7% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There was one incident of *E. coli* contamination in the Staleen public water supply in Louth during 2007 although Enterococci exceedances were reported in one public water supplies (Drybridge). Exceedances of the *E. coli* parametric value were recorded in 3 of the 9 private group water schemes monitored in 2007, unchanged from 2006.

### Compliance with the Chemical and Indicator Parametric Values

All samples analysed in public water supplies and group water schemes were fully compliant for 25 of the 26 chemical parameters. The only parameteric value with which full compliance was not achieved was fluoride. However, the majority of these exceedances were in the first 6 months of 2007 and were due to the transition to a more stringent fluoride parametric value during the year.

There was one marginal exceedance of the arsenic parametric value in a private group water scheme.

Although compliance with the aluminium parametric value was slightly above the national average, compliance with some indicator parameters was problematic. There were a number of aluminium exceedances in the Staleen supply (21 of 55 samples analysed). The local authority reported that this supply is in the process of being upgraded.

There was a drop in compliance with the coliform bacteria parametric value from 68% in 2006 to 59% in the private group water schemes. As in 2006, coliform bacteria exceedances were recorded in 6 of the 9 private group water schemes monitored in 2007.

### EPA Enforcement in 2007/2008

There are currently 3 public water supplies operated by Louth County Council on the Remedial Action List (RAL[57]) of public water supplies. No supplies in Co. Louth were added or removed from the RAL in 2008. Of the supplies on the RAL, Louth County Council indicates that all 3 supplies will be upgraded to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Louth County Council had installed chlorine monitors and alarms on 5 of 15 supplies.

The EPA received 4 notifications of the failure to meet the parametric value from Louth County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (2), *Clostridium perfringens* (1) and lead (1) parametric values. Louth County Council has prepared and is implementing an action programme to deal with lead in the distribution network in the supplies in question.

[56] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[57] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Mayo County Council

### Summary of Water Supplies[58]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 24 | 73,574 |
| PuGWS | 94 | 20,429 |
| PrGWS | 86 | 3,258 |
| SPS | 33 | N/A |

### Assessment of 2007 Monitoring

Mayo County Council carried out 9,601 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Mayo during 2007 with approximately 3% of tests not carried out due to a lack of monitoring in public group water schemes which the Council indicates has been rectified.

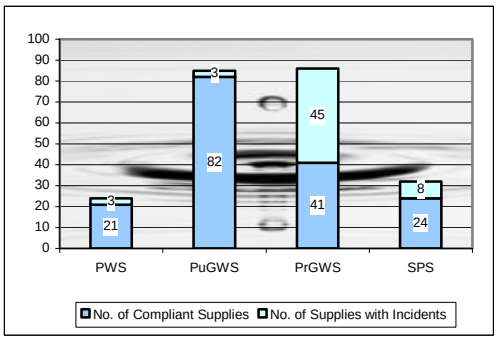
### Overall Compliance in 2007

The overall rate of compliance in Co. Mayo, 94.0%, was well below the national average though it did improve from 91.7% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 84.8% | 99.8% | 92.8% |
| **PWS** | 98.2% | 99.7% | 96.8% |
| **PuGWS** | 98.3% | 100% | 97.6% |
| **PrGWS** | 69.3% | 100% | 87.9% |
| **SPS** | 78.0% | 98.3% | 87.4% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There were 3 incidents of *E. coli* contamination of 3 public water supplies in Mayo during 2007, namely in Kiltimagh, Knock Airport and Swinford. As in 2006, over half of the private group water schemes (45 of 96 monitored) were found to be contaminated with *E. coli* during 2007. The EPA notes that the Council are co-operating with a national task force to deal with non-compliant private group water schemes.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was generally good though there was one moderate exceedance of the fluoride standard and one lead exceedance (due to the presence of lead in a service connection). While the chemical quality of the group water schemes was good with full compliance with the standards achieved, elevated levels of arsenic were detected in one commercial supply that supplies water to the public.

Compliance with the indicator parametric values was unsatisfactory in public water supplies. Compliance with the aluminium parametric value was problematic in Mayo (68% down from 73% in 2006). This is due to the large number of public water supplies in Mayo that are being run above their design capacity, thus causing difficulty in achieving adequate chemical dosing. Over half the samples analysed for aluminium in the Achill, Kiltimagh, Louisburgh, Mulranny, Newport and Westport supplies were above the aluminium parametric value. While the upgrade of the Lough Mask Regional supply (due for completion in 2010) will reduce the demand on these supplies, the continued failure of these supplies to meet the aluminium parametric value is an issue that needs to be addressed as a matter of priority.

There were a number of indicator parameters with low rates of compliance in the private group water schemes. In total, 61 of the 86 private group water schemes, monitored were found to contain coliform bacteria at least once during 2007 and were thus of an unacceptably poor quality.

### EPA Enforcement in 2007/2008

There are currently 15 public water supplies operated by Mayo County Council on the Remedial Action List (RAL[59]) of public water supplies. No supplies in Co. Mayo were added or removed from the RAL in 2008. Of the supplies on the RAL, the Council indicates that 5 will be upgraded, 2 will be replaced and 8 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Mayo County Council had installed chlorine monitors and alarms on 7 of 24 supplies.

The EPA received 18 notifications of the failure to meet the parametric value from Mayo County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (2), coliform bacteria (2), *Clostridium perfringens* (3), aluminium (6) and trihalomethanes (4) parametric values while 1 notification was made as a precaution due to inadequate treatment at the plant.

During this period 4 boil water notices were put in place in the following supplies: Achill (August 2008), Cong (March 2007), Lough Mask – part of supply (September 2007) and Swinford (September 2007). Arising from these notifications 3 Directions were issued by the EPA to the Council which required the preparation of action programmes.

[58] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[59] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Meath County Council

### Summary of Water Supplies[60]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 33 | 101,068 |
| PuGWS | 0 | 0 |
| PrGWS | 2 | 1,600 |
| SPS | 153 | N/A |

### Assessment of 2007 Monitoring

Meath County Council carried out 9,605 individual tests on drinking water during 2007.

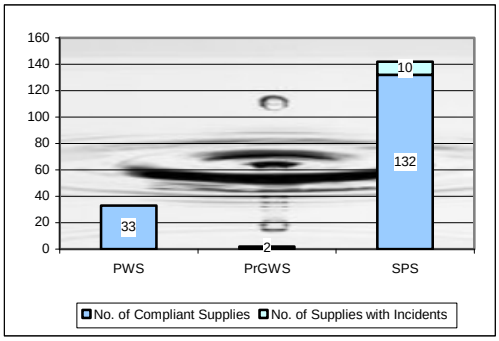
### Overall Compliance in 2007

Compliance with the standards in Co. Meath was up to 97.5% in 2007 from 95.8% in 2006 and was close to the national average. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 98.2% | 99.2% | 96.8% |
| **PWS** | 100% | 99.3% | 97.8% |
| **PrGWS** | 100% | 100% | 100% |
| **SPS** | 95.5% | 98.5% | 94.7% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




All public water supplies and private group water schemes in Meath were microbiological compliant with the standards.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards in the majority of supplies was good. Notwithstanding this, elevated levels of pesticides were detected in the Jarretsown, East Meath and Navan-Mid-Meath supplies. The latter 2 of these supplies are abstracted from the River Boyne. Action must be taken to identify the cause of the pesticides and the Council should investigate whether treatment to remove pesticides is necessary on all these supplies. There was a single exeedance of the nitrate standard in the Moynalty public water supply and 2 exceedances of the trihalomethanes parametric value in the East Meath supply. Both of these supplies had similar exceedances in 2006. However, Meath County Council reported that treatment to remove nitrate has been installed in the Moynalty public water supply.

Both private group water schemes were fully compliant with the chemical standards; however, there were 6 private water supplies which failed to comply with the nitrate standard and were thus of an unsatisfactory quality.

Compliance with the indicator parametric values was close to the national average in Meath in 2007, though compliance with the aluminium standard was relatively low (84% in public water supplies down from 88% in 2006). There were a number of aluminium exceedances in the East Meath (18 of 71 samples analysed exceeded) and Trim (14 of 28 samples analysed exceeded) supplies. Compliance with the indicator parametric values for the 2 private group water schemes was excellent and both supplies were fully compliant for all parameters tested during 2007.

The private water supplies were of an inferior quality to the public water supplies and group water schemes. Compliance with the standards for coliform bacteria (76% compliance) was poor in the private water supplies.

### EPA Enforcement in 2007/2008

There are currently 10 public water supplies operated by Meath County Council on the Remedial Action List (RAL[61]) of public water supplies. A total of 3 supplies in Co. Meath were added to the RAL in 2008 while one was removed. Of the supplies on the RAL, Meath County Council indicates that 9 supplies will be upgraded and 1 will be replaced to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Meath County Council had installed chlorine monitors and alarms on 11 of 19 supplies.

The EPA received 12 notifications of the failure to meet the parametric value from Meath County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (3), *Enterococci* (3), trihalomethanes (1), arsenic (1), mercury (1) and pesticides (3) parametric values.

During this period 4 boil water notices were put in place in the following supplies; Athboy (August 2008), Ballivor (August 2007), Cloneycavan (August 2007) and Moynalty (August 2008).

[60] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[61] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Monaghan County Council

### Summary of Water Supplies[62]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 12 | 32,373 |
| PuGWS | 0 | 0 |
| PrGWS | 14 | 26,500 |
| SPS | 0 | 0 |

### Assessment of 2007 Monitoring

Monaghan County Council carried out 3,884 individual tests on drinking water during 2007. There was a shortfall of approximately 2% in the number of samples analysed.

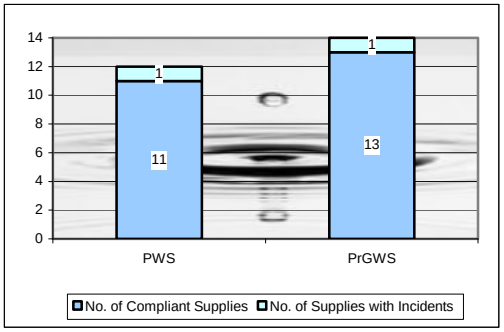
### Overall Compliance in 2007

The overall rate of compliance in Co. Monaghan, 96.7%, was close to the national average and unchanged from 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.6% | 99.1% | 95.9% |
| **PWS** | 99.4% | 98.6% | 97.4% |
| **PrGWS** | 95.2% | 99.7% | 93.9% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There was one incident of *E. coli* contamination of public water supplies in Monaghan during 2007, in the Emyvale public water supply. There was just one of the 14 private group water schemes monitored contaminated with *E. coli* during 2007, the Donaghmoyne GWS, which was the only group water scheme in Monaghan which chose not to be upgraded as part of the Monaghan DBO. This supply was found to be contaminated on numerous occasions during 2007.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parametric values was good. For the third successive year in succession antimony and arsenic were detected in the Clontibret supply while the bromate parametic value was exceeded in the Monaghan public water supply. There was one exceedance of the chemical standards in the private group water schemes monitored in Monaghan during 2007. The Corduff public water supply failed to meet the pesticides standard on one occasion during the year.

Compliance with the indicator parametric values in public water supplies was close to the national average in Monaghan during 2007. However, compliance with the coliform bacteria parametric value was low (89%).

Compliance with the indicator parametric values in private group water schemes in Monaghan was low for a number of parameters including aluminium (87% compliance), coliform bacteria (82% compliance) and iron (89% compliance) and dropped for all 3 of these parameters.

### EPA Enforcement in 2007/2008

There are currently 8 public water supplies operated by Monaghan Council on the Remedial Action List (RAL[63]) of public water supplies. No supplies in Co. Monaghan were added to the RAL in 2008 while 4 were removed. Of the supplies on the RAL, Monaghan County Council indicates that 4 supplies will be upgraded and 4 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Monaghan County Council had installed chlorine monitors and alarms on 8 of 12 supplies.

The EPA received 7 notifications of the failure to meet the parametric value from Monaghan County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *Clostridium perfringens* (3) and aluminium (4) parametric values.

[62] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[63] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## North Tipperary County Council

### Summary of Water Supplies[64]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 32 | 47,170 |
| PuGWS | 0 | 0 |
| PrGWS | 36 | 6,451 |
| SPS | 31 | N/A |

### Assessment of 2007 Monitoring

North Tipperary County Council carried out 8,888 individual tests on drinking water during 2007 and complied with the monitoring requirements in the Regulations for all supplies.

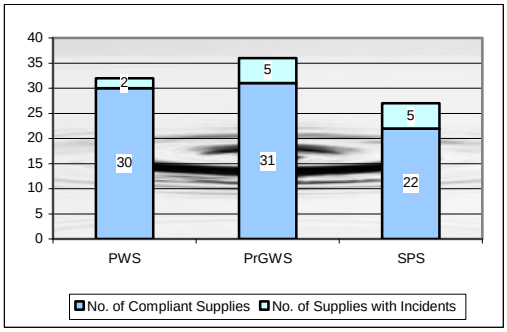
### Overall Compliance in 2007

The overall rate of compliance in North Tipperary, 98.9% in 2007, was above average and improved from 98.6% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 98.2% | 99.7% | 98.6% |
| **PWS** | 99.6% | 99.8% | 98.8% |
| **PrGWS** | 97.1% | 100% | 98.7% |
| **SPS** | 85.7% | 98.9% | 95.1% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 2 incidents of *E. coli* contamination of public water supplies in North Tipperary during 2007 in the Ballingarry/Aglish and Lorrha/Rathcabbin supplies. The former was due to insufficient chlorine in the treated water while the latter was due to the commissioning of a new source. There was a reduction in the number of contaminated private group water schemes from 12 in 2006 to 5 in 2007.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was above average in North Tipperary during 2007. Notwithstanding this, the nitrate standard was exceeded in Two Mile Borris once during 2007 (of the 7 times it was monitored). Full compliance with all the chemical parametric values was achieved in the private group water schemes at all times when these schemes were monitored during 2007.

Compliance with the indicator parametric value was above the national average in North Tipperary in 2007 though compliance with the coliform bacteria parametric value was relatively low (94%). Similarly, in the private group water schemes compliance was, above the national average though compliance with the coliform bacteria parametric value (93%) was low. This has improved compared to 2006 (83% compliance).

### EPA Enforcement in 2007/2008

There are currently 7 public water supplies operated by North Tipperary County Council on the Remedial Action List (RAL[65]) of public water supplies. Two supplies in North Tipperary were added to the RAL in 2008 while one was removed. Of the supplies on the RAL, North Tipperary County Council indicates that 4 supplies will be upgraded, 2 will be replaced and 1 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, North Tipperary County Council had installed chlorine monitors and alarms on 8 of 32 supplies.

The EPA received 7 notifications of the failure to meet the parametric value from North Tipperary County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (2), coliform bacteria (1), lead (3) and fluoride (1) parametric values. The Council is carrying out a detailed investigation into the extent of lead in the distribution network in the affected areas.

[64] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[65] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Offaly County Council

### Summary of Water Supplies[66]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 24 | 44,600 |
| PuGWS | 15 | 1,849 |
| PrGWS | 15 | 14,322 |
| SPS | 43 | N/A |

### Assessment of 2007 Monitoring

Offaly County Council carried out 5,218 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Offaly during 2007 with approximately 3% of tests not carried out.

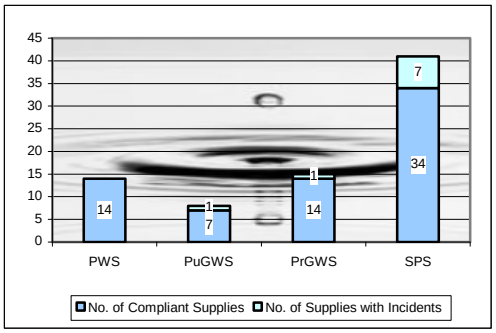
### Overall Compliance in 2007

The overall rate of compliance in Co. Offaly, 98.6% was above the national average in 2007 though this did drop from 99% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.3% | 99.6% | 98.3% |
| **PWS** | 100% | 99.6% | 99.1% |
| **PuGWS** | 95.5% | 100% | 98.6% |
| **PrGWS** | 98.8% | 99.7% | 99.0% |
| **SPS** | 83.3% | | 51.9% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There were no incidents of *E. coli* contamination of public water supplies during 2007 although *E. coli* was detected in one public group water scheme which originated from a public water supply. The microbiological quality of the private group water schemes was also good in the majority of schemes with just one of the 15 schemes monitored failing to comply with the *E. coli* standard during 2007.

### Compliance with the Chemical and Indicator Parametric Values

Full compliance was achieved with 24 of the 26 chemical standards in public water supplies in Offaly, There were a small number of exceedances of the fluoride standard due to the tightening of the fluoride standard in 2007 and also one nitrate exceedance. Elevated levels of nitrates were detected in the Daingean public water supply. There was just one exceedance of the chemical standard in the private group water schemes. Elevated levels of nitrite were detected in the Mountlucas group water scheme.

Though compliance with the indicator parametric value was less than that of the microbiological or chemical parametric values in 2007 it was above the national average at 99.1% in public water supplies. However, compliance with the aluminium parametric value in public water supplies remained low at 97% compliance, although was up from 94% in 2006.

Compliance with the indicator parametric values in private group water schemes was similarly high (90%) but compliance with the coliform bacteria parametric value was less than satisfactory (90%) and dropped slightly compared to 2006 (92%).

### EPA Enforcement in 2007/2008

There are currently 4 public water supplies operated by Offaly County Council on the Remedial Action List (RAL[67]) of public water supplies. No supplies in Co. Offaly were added to the RAL in 2008 while 4 were removed. Of the supplies on the RAL, Offaly County Council indicates that all 4 supplies will be upgraded to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Offaly County Council had installed chlorine monitors and alarms on 13 of 21 supplies.

The EPA received 26 notifications of the failure to meet the parametric value from Offaly County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the coliform bacteria (16), trihalomethanes (2), nitrates (2), aluminium (2), pesticides (2) and fluoride (1) parametric values while one supply was notified to the EPA as a precaution due to discolouration. Offaly County Council has been proactively investigating these failures and have taken action to close out the cause of these failures.

During this period 1 boil water was put in place in the Clonbullogue supply as a precaution due to flooding (August 2008). Arising from these notifications 3 Directions were issued by the EPA to Offaly County Council which required the preparation of action programmes in respect of all 3 supplies. Offaly County Council has complied with all 3 Directions and has implemented the action programmes as agreed with the EPA.

[66] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[67] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Roscommon County Council

### Summary of Water Supplies[68]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 22 | 44,288 |
| PuGWS | 29 | 5,223 |
| PrGWS | 28 | 5,413 |
| SPS | 9 | N/A |

### Assessment of 2007 Monitoring

Roscommon County Council carried out 4,958 individual tests on drinking water during 2007.

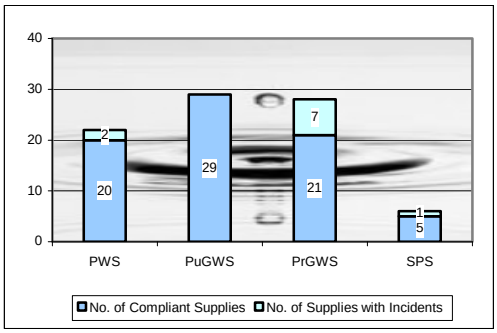
### Overall Compliance in 2007

The overall rate of compliance in Co. Roscommon, 97.4% in 2007 was close to the national average and rose from 94.3% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.1% | 99.5% | 96.8% |
| **PWS** | 99.1% | 99.5% | 98.5% |
| **PuGWS** | 100% | 100% | 96.2% |
| **PrGWS** | 82.5% | | 87.7% |
| **SPS** | 83.3% | | 83.3% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 2 incidents of *E. coli* contamination in the Bellanagare and Knockcroghery/Leacarrow public water supplies. Both supplies have inadequate treatment as both supplies originate from springs influenced by surface water and have no treatment other than chlorination. Of the 28 private group water schemes monitored for *E. coli* 7 (down from 13) were found to be contaminated with *E. coli* at least once during the year. Although there has been a welcome reduction in the number of group water schemes contaminated there are still a significant number of contaminated schemes.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was above average in public water supplies in Roscommon. There were a small number of fluoride exceedances due to the tightening of the fluoride standard in 2007 and a single nickel and nitrite exceedance also reported in 2007. No chemical monitoring was carried out in any of the private group water schemes in 2007.

Though compliance with the indicator parametric values in public water supplies was above the national average in Roscommon in 2007, the high number of exceedances of the turbidity parametric value is of concern (6 of the 21 public water supplies monitored failed to meet the turbidity parametric value). This is undoubtedly due to the fact that several treatment plants in Roscommon do not have adequate treatment and cannot remove turbidity. If *Cryptosporidium* is present in the sources of these supplies it will not be removed and will enter the public water supply.

Compliance with the indicator parametric values in private group water schemes was also below the national average and poor. This was due to poor compliance with the colour (68%) and coliform bacteria (72%) parametric values. The poor rates of compliance with these parametric values means that the quality of the private group water schemes in Roscommon is in general unsatisfactory.

### EPA Enforcement in 2007/2008

There are currently 13 public water supplies operated by Roscommon County Council on the Remedial Action List (RAL[69]) of public water supplies. Four supplies in Co. Roscommon were added the RAL in 2008. Of the supplies on the RAL, Roscommon County Council indicates that all 13 supplies will be upgraded to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of mid-November 2008, Roscommon County Council has indicated that it has installed chlorine monitors and alarms on all 21 water treatment plants.

The EPA received 15 notifications of the failure to meet the parametric value from Roscommon County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (3), *Cryptosporidium* (5), iron (2), turbidity (4) and pH (1) parametric values.

During this period 3 boil water notices were put in place in the following supplies: Ballinlough/Loughglynn (August 2008), Ballyleague (August 2008) and Castlerea Urban (January 2008). Arising from these notifications 3 Directions were issued by the EPA to Roscommon County Council which required the preparation of action programmes (2 supplies) and the installation of chlorine monitors (1 supply).

[68] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[69] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Sligo County Council

### Summary of Water Supplies[70]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 13 | 38,059 |
| PuGWS | 21 | 4,257 |
| PrGWS | 13 | 4,935 |
| SPS | 3 | N/A |

### Assessment of 2007 Monitoring

Sligo County Council carried out 6,523 individual tests on drinking water during 2007. Although an adequate number of samples were taken by Sligo County Council there was a shortfall in the number of tests carried out in some of these samples during 2007 with approximately 2% of tests not carried out.

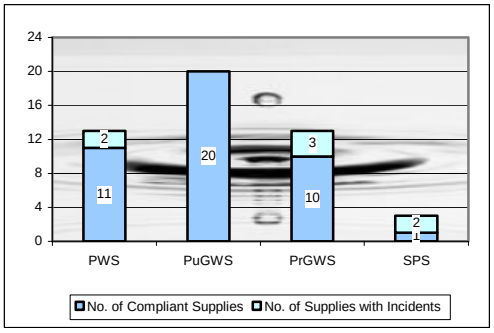
### Overall Compliance in 2007

The overall rate of compliance in Co. Sligo, 96.9%, was slightly below the national average but did rise from 96.5% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.5% | 99.6% | 96.1% |
| **PWS** | 99.4% | 99.5% | 96.5% |
| **PuGWS** | 100% | 100% | 97.4% |
| **PrGWS** | 94.5% | 100% | 95.3% |
| **SPS** | 73.3% | | 86.5% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There were 2 incidents of *E. coli* contamination in the Kilsellagh (Direct) and Kilsellagh (Farancardy) supply zones due to the detection of a single *E. coli* organism. In spite of the completion of the upgrading of private group water schemes in Sligo in 2006 (11 new treatment plants were constructed) 3 of the 13 private group water schemes monitored were contaminated with *E. coli* at least once during 2007 with one of these schemes contaminated on several occasions.

### Compliance with the Chemical and Indicator Parametric Values

Full compliance with 24 of the 26 chemical parametric values was achieved in Sligo during 2007. There was one marginal fluoride exceedance in public water supplies during 2007 as well as a number of exceedances of the trihalomethanes standard. All 3 trihalomethane exceedances were in the Kilsellagh supply. This supply originates from a raw water source with high colour and has no treatment other than disinfection. There were no chemical exceedances in the 9 private group water schemes monitored in Sligo during 2007.

Compliance with the indicator parametric values was less than that of the microbiological and chemical parametric values. The level of compliance in public water supplies with the iron (84%) and turbidity (85%) parametric values was low. Elevated levels of turbidity were recorded in 4 of the 7 supplies monitored indicating that these supplies are operating under risk of *Cryptosporidium* being present in the drinking water if present in the raw water.

The upgrade of private group water schemes in Sligo has resulted in an improvement in compliance with the coliform bacteria standard from 77% in 2006 to 82% in 2007 though it is still in need of further improvement. There was a low rate of compliance with the aluminium parametric value in these upgraded treatment plants (66%). The majority of these exceedances were in one private group water scheme. This scheme also recorded a number of coliform bacteria exceedances in 2007.

### EPA Enforcement in 2007/2008

There are currently 8 public water supplies in Sligo on the Remedial Action List (RAL[71]) of public water supplies, however, 2 of these are originate from Roscommon. No supplies in Sligo County were added to or removed from the RAL in 2008. Of the supplies on the RAL, Sligo County Council indicates that 5 supplies will be upgraded, one will be replaced and 2 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Sligo County Council had installed chlorine monitors and alarms on 10 of 11 supplies.

The EPA received 11 notifications of the failure to meet the parametric value from Sligo County Council in the period March 2007 to September 2008. The notifications were due to failures to meet the *E. coli* (1), coliform bacteria (4), *Cryptosporidium* (1), aluminium (3), colour (1) and iron (2) parametric values.

During this period 5 boil water notices were put in place in the following supplies; Calry (December 2007), Kilsellagh (August 2008), North Sligo (July 2007), Rosses Point (August 2008) and South Sligo (July 2008). Arising from these notifications one Direction was issued by the EPA to Sligo County Council which required the preparation of action programme.

[70] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[71] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## South Dublin County Council

### Summary of Water Supplies[72]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 4 | 250,680 |
| PuGWS | 0 | |
| PrGWS | 0 | |
| SPS | 0 | |

### Assessment of 2007 Monitoring

South Dublin County Council carried out 4,294 individual tests on drinking water during 2007. Thus, South Dublin County Council met (and indeed exceeded) the monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2007

The overall rate of compliance in South Dublin, 99.2%, was above the national average. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **PWS** | 100% | 99.2% | 99.1% |

### Compliance with the *E. coli* Standard

Compliance with the *E. coli* and Enterococci parametric values was good during 2007. *E. coli* was not detected in any of the 316 samples analysed in 2007 while Enterococci were not detected in any of the 17 samples analysed.

### Compliance with the Chemical and Indicator Parametric Values

The chemical quality of drinking water in South Dublin was good. The only exceedances reported were a small number of fluoride exceedances due to the tightening of the fluoride standard in early 2007. No fluoride exceedances were reported in the last six months of 2007.

Though compliance with the indicator parametric values was slightly lower than that of the microbiological and chemical parametric values it was nonetheless good and above the national average. A relatively low rate of compliance with the coliform bacteria parametric value (91%) was reported. This is a drop from 93% compliance in 2006.

### EPA Enforcement in 2007/2008

There are no public water supplies operated by South Dublin County Council on the Remedial Action List (RAL[73]) of public water supplies.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, South Dublin County Council had not installed a chlorine monitor and alarm at their single treatment plant.

The EPA received no notifications of the failure to meet the parametric value from South Dublin County Council in the period March 2007 to September 2008.

[72] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[73] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## South Tipperary County Council

### Summary of Water Supplies[74]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 27 | 73,788 |
| PuGWS | 0 | 0 |
| PrGWS | 3 | 360 |
| SPS | 12 | N/A |

### Assessment of 2007 Monitoring

South Tipperary County Council carried out 6,261 individual tests on drinking water during 2007.

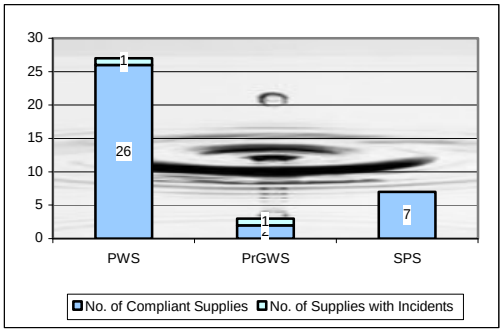
### Overall Compliance in 2007

The overall rate of compliance in South Tipperary, 98.0%, was above the national average and improved from 97.6% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 99.4% | 99.4% | 97.4% |
| **PWS** | 99.6% | 99.3% | 97.5% |
| **PrGWS** | 83.3% | 100% | 93.9% |
| **SPS** | 100% | | 92.9% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There was one incident of *E. coli* contamination in the Killurney public water supply in South Tipperary during 2007. This was due to the detection of a single organism in one sample in the supply. However, the Clonmel Glenary supply was found to contain *Cryptosporidium* in 2007, necessitating a boil water notice being placed on the supply. The type of *Cryptosporidium* found was not normally infectious to humans and no illnesses were reported in the population served by the supply. The Council has undertaken remedial actions to improve the operation of the treatment plant at Glenary.

One of the 3 private group water schemes and none of the 7 small private supplies monitored were found to contain *E. coli* during 2007.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values was good (99.3%). There was a single marginal arsenic and benzene exceedance, though the latter sample was taken in a Council depot which may explain this exceedance (benzene is used in fuel oils) while a subsequent sample for the former was compliant.

A single sample in each of the 3 private group water schemes was analysed for the chemical parameters in 2007. All of these samples were compliant with the standards.

Compliance with the indicator parametric values in public water supplies in South Tipperary improved from 96.7% in 2006 to 97.4% in 2007. Compliance with the aluminium parametric value remains low (83%). The supplies with a poor level of compliance with the aluminium standard were the Dundrum Regional (11 of 18 samples analysed exceeded) and the Galtee Regional (11 of 36 samples analysed exceeded). These supplies have been consistently reporting high numbers of aluminium exceedances over the past number of years.

Compliance with the indicator parametric values in private group water schemes in South Tipperary dropped slightly in 2007. This is attributed to the detection of coliform bacteria in half of the samples analysed in private group water schemes during the year.

### EPA Enforcement in 2007/2008

There are currently 15 public water supplies operated by South Tipperary County Council on the Remedial Action List (RAL[75]) of public water supplies. One supply in South Tipperary was added to the RAL in 2008 while none were removed. Of the supplies on the RAL, South Tipperary County Council indicates that 8 supplies will be upgraded and 7 will be replaced to ensure the supply can produce safe and secure water. Of the supplies on the RAL, South Tipperary County Council indicates that 8 plants will be upgraded and a further 6 will have interim works carried out to ensure that the supply can produce safe and secure water, with the ultimate replacement of 7 supplies planned.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, South Tipperary County Council had installed chlorine monitors and alarms on 23 of 27 supplies.

The EPA received 8 notifications of the failure to meet the parametric value from South Tipperary County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (4), *Enterococci* (2), *Clostridium perfringens* (1) and aluminium (1) parametric values. During this period 1 boil water notice was put in place in the Clonmel Glenary supply (July 2007). Arising from these notifications 3 Directions were issued by the EPA to South Tipperary County Council which required the preparation of action programmes (2 supplies) and installation of a chlorine monitors (1 supply).

[74] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[75] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Waterford City Council

### Summary of Water Supplies[76]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 1 | 45,748 |
| PuGWS | 0 | |
| PrGWS | 0 | |
| SPS | 0 | |

### Assessment of 2007 Monitoring

Waterford City Council carried out 1,233 individual tests during 2007.

### Overall Compliance in 2007

The overall rate of compliance in Waterford City Council, 99.0% in 2007, was relatively unchanged compared to 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **PWS** | 100.0% | 99.6% | 98.5% |

### Compliance with the *E. coli* Standard

Compliance with the *E. coli* and Enterococci parametric values in 2007 in Waterford City was good with all samples analysed complying with the relevant standards.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the indicator parametric values was good with a single fluoride and benzene exceedance in 2007. The former was due to the tightening of the fluoride standard in 2007. The benzene exceedance was from a sample point in a Council depot and may explain the exceedance (benzene is used as a fuel oil) as 4 other samples in the distribution network on the same day were compliant with the benzene parametric value.

Compliance with the indicator parametric values was similarly high and at 98.5% was above the national average.

### EPA Enforcement in 2007/2008

The supply serving Waterford City, the East Waterford Regional public water supply, is on the Remedial Action List (RAL[77]). Waterford County Council operates the water treatment plant serving this supply. This supply is on the RAL due to a single *E. coli* exceedance in 2006. There have been no exceedances for this parameter since then and improvements are being carried out including the installation of booster chlorine disinfection systems, linked with chlorine residual monitors and alarms at reservoirs in the city.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. The East Waterford Regional Treatment Plant, which is operated by Waterford County Council, has a chlorine monitor and alarm system in place. The EPA received no notifications of the failure to meet the parametric value from Waterford City Council in the period March 2007 to September 2008.

[76] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[77] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Waterford County Council

### Summary of Water Supplies[78]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 104 | 45,216 |
| PuGWS | 1 | N/A |
| PrGWS | 6 | 310 |
| SPS | 7 | N/A |

### Assessment of 2007 Monitoring

Waterford County Council carried out analysis 4,893 individual tests during 2007. There was a shortfall of approximately 6% primarily due to the failure to carry out adequate numbers of audit samples.

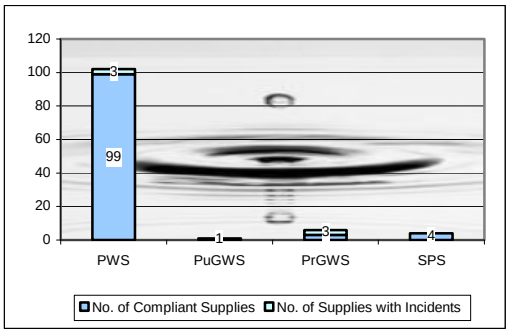
### Overall Compliance in 2007

The overall rate of compliance in Co. Waterford, 95.2%, was below the national average though it did improve marginally from 94.2% in 2006.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 98.3% | 98.4% | 93.2% |
| **PWS** | 99.1% | 98.6% | 93.4% |
| **PuGWS** | 100% | 100% | 100% |
| **PrGWS** | 62.5% | 91.2% | 82.1% |
| **SPS** | 100% | 100% | 91.4% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below.




There were 3 incidents of *E. coli* contamination in public water supplies in Waterford in 2007. These were in the Colligan, Currabaha West and Tallow Hill supplies. Although the number of supplies with incidents reduced compared to 2006 (down from 6 in 2006) the number of incidents remains high. Three of the 6 private group water schemes monitored were found to be contaminated with *E. coli* in 2007.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards in Waterford was below average. High levels of arsenic were detected in the Ballyogarty public water supply. This supply has naturally occurring arsenic in the source of the supply and has a treatment plant designed to remove arsenic. However, this treatment plant was not operating adequately at the time of the failure though has since been rectified. There was also a rise in the number of public water supplies failing to meet the nitrate standard in 2007. Six public water supplies (up from 5) did not comply with the nitrate standard in 2007. These supplies were the Adramone, Kealfoun, Kilnafrehan, LCB Ballyhane, LCB Lismore Ballyduff and Rathgormuck public water supplies. There was limited monitoring of the chemical parameters in private group water schemes and private water supplies. While the majority of samples analysed were compliant, elevated levels of nitrate were detected in 2 private group water schemes and one private water supply.

Compliance with the indicator parametric values in public water supplies in Waterford County was poor and the lowest nationally at 93.4% (down from 93.8% in 2006). This was primarily due to the failure of two-thirds of the public water supplies (69 of 102 monitored) to comply with the pH standard. While pH is not a risk to health it can have a significant effect on the treatment process and on leaching of metals out of plumbing materials (e.g. lead, copper and nickel).

As with the chemical parameters, there was limited monitoring of the indicator parameters in private group water schemes during 2007. Similar to 2006 all samples analysed for coliform bacteria in all group water schemes monitored failed to meet the standards and were thus of a poor quality during 2007.

### EPA Enforcement in 2007/2008

There are currently 26 public water supplies operated by Waterford County Council on the Remedial Action List (RAL[79]) of public water supplies. A total of 8 supplies in Co. Waterford were added to the RAL in 2008 while none were removed. Of the supplies on the RAL, Waterford County Council indicates that 21 supplies will be upgraded, one will be replaced while 4 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Waterford County Council had installed chlorine monitors and alarms on 5 of 101 supplies.

The EPA received 11 notifications of the failure to meet the parametric value from Waterford County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (6), coliform bacteria (1), trihalomethanes (2), arsenic (1) and turbidity (1) parametric values.

During this period 3 boil water notices were put in place in the following supplies; Ballinacourty/Deelish (June 2007), Castlreagh (December 2007) and Scrothea (December 2007). 17 Directions were issued by the EPA to Waterford County Council which required the preparation of action programmes (one supply), installation of chlorine monitors (15 supplies) and other actions to improve treatment (2 supplies).

[78] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[79] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Westmeath County Council

### Summary of Water Supplies[80]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 14 | 62,225 |
| PuGWS | 40 | 6,265 |
| PrGWS | 3 | 1,050 |
| SPS | 34 | N/A |

### Assessment of 2007 Monitoring

Westmeath County Council carried out 3,284 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Westmeath during 2007 with just approximately 5% of tests not carried out.

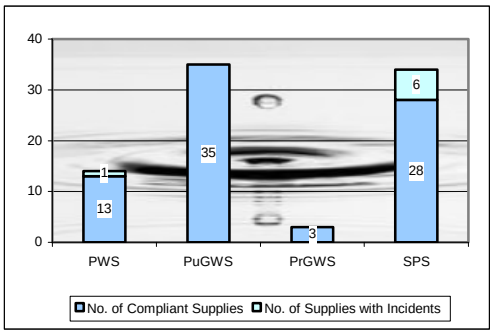
### Overall Compliance in 2007

The overall rate of compliance in Co. Westmeath, 96.9% was below the national average during 2007 and dropped from 99.1% in 2006 due to an increase in monitoring in the predominantly poorer quality small private supplies. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 96.9% | 96.9% | 96.8% |
| **PWS** | 99.5% | 97.1% | 97.7% |
| **PuGWS** | 100% | 95.0% | 98.2% |
| **PrGWS** | 100% | 100% | 100% |
| **SPS** | 82.0% | 99.0% | 90.6% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There was one incident of *E. coli* contamination of a public water supply in Westmeath in the Mullaghmeenan rechlorination station supply zone. All 35 public group water schemes and 3 private group water schemes were free of contamination and no sample tested contained *E. coli* or Enterococci. Thus the group water schemes were of good microbiological quality.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values was below average in public water supplies in Westmeath during 2007. However, this was mainly due to exceedances with the fluoride standard which tightened in 2007. Westmeath County Council failed to adjust fluoride doses in some supplies in order to comply with this new standard and hence a number of exceedances were reported. There was also a single nickel exceedance in the Gaybrook water tower supply zone though it is likely that this was due to sample point (e.g. the tap) as nickel is not present in the untreated water. There were no exceedances of the chemical standard in any of the private group water schemes monitored during 2007.

Compliance with the indicator parametric value in public water supplies dropped slightly in 2007 (97.7% down from 98.5%). This was mainly due to the low rate of compliance with the aluminium parametric value (93%). These were all in the Athlone public water supply in which 7 of the 21 samples analysed failed to meet the parametric value.

Compliance with the indicator parametric values in group water schemes in Westmeath was excellent and full compliance was achieved in 2007. The 3 private group water schemes in Westmeath were 100% compliant with all of the standards during 2007.

### EPA Enforcement in 2007/2008

There is currently 1 public water supplies operated by Westmeath County Council on the Remedial Action List (RAL[81]) of public water supplies. One supply in Co. Westmeath was removed from the RAL in 2008 while none were added. Westmeath County Council indicates that this supply will be upgraded to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Westmeath County Council had installed chlorine monitors and alarms on 12 of 14 supplies.

The EPA received 2 notifications of the failure to meet the parametric value from Westmeath County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (1) and coliform bacteria (1) parametric values.

During this period 1 boil water notice was put in place in the Ballinahown supply (August 2008). This supply has since been replaced.

[80] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[81] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Wexford County Council

### Summary of Water Supplies[82]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 30 | 105,010 |
| PuGWS | 0 | 0 |
| PrGWS | 11 | 4,315 |
| SPS | 53 | N/A |

### Assessment of 2007 Monitoring

Wexford County Council carried out 4,531 individual tests on drinking water during 2007.

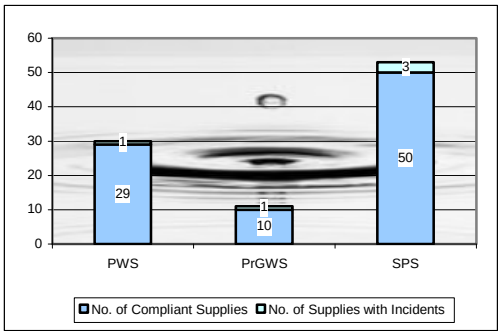
### Overall Compliance in 2007

The overall rate of compliance in Co. Wexford, 95.3% was below the national average during 2007 though this did improve from 94.2% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 97.9% | 99.5% | 93.7% |
| **PWS** | 99.6% | 99.5% | 96.0% |
| **PrGWS** | 90.9% | 99.1% | 85.4% |
| **SPS** | 92.3% | | 91.8% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There was one incident of *E. coli* contamination of a public water supply in Wexford during 2007 in the Davidstown supply. This was due to the detection of a single *E. coli* in one sample. One of the 11 private group water schemes monitored during 2007 was contaminated with *E. coli* during 2007; however, Enterococci were detected in 2 private group water schemes. With the exception of one private group water scheme compliance with the microbiological parametric values was generally satisfactory in private group water schemes in Wexford during 2007. Compliance with the microbiological standards was less satisfactory in the private water supplies as 3 of the 53 schemes were contaminated with *E. coli*.

### Compliance with the Chemical and Indicator Parametric Values

There was one lead exceedance reported in the Wexford Town supply. The Council has advised that this was due to lead in a service connection. The nitrate standard was exceeded in 2 public water supplies, the Marshalstown and Monamolin supplies.

While compliance with the chemical standards was generally good there was one exceedance of the arsenic standard. This was in the Monamolin group water scheme (note this is different from the Monamolin public water supply referred to above).

Compliance with the indicator parametric values in public water supplies was below average and was mainly due to the low level of compliance with the pH parametric value. 18 of the 30 public water supplies in Wexford reported pH exceedances during 2007. While pH itself is not a risk to health it can have a significant effect on the treatment process and on leaching of metals out of plumbing materials (such as lead, copper and nickel).

There was a slight drop in compliance (from 76% in 2006 to 74% in 2007) with the coliform bacteria parametric value in private group water schemes. Furthermore, compliance with the pH standard deteriorated with just 27% of samples analysed complying with the standards. Ten of the 11 private group water schemes reported exceedances of the pH standard.

### EPA Enforcement in 2007/2008

There are currently 3 public water supplies operated by Wexford County Council on the Remedial Action List (RAL[83]) of public water supplies. One supply in Co. Wexford was removed from the RAL in 2008. Of the supplies on the RAL, Wexford County Council indicates that one supply will be upgraded, one will be replaced and one will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Wexford County Council had installed chlorine monitors and alarms on 8 of 30 supplies.

The EPA received 20 notifications of the failure to meet the parametric value from Wexford County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (1), coliform bacteria (2), nitrate (1), aluminium (2), pH (13) and iron (1) parametric values.

Arising from these notifications 1 Direction was issued by the EPA to Wexford County Council which required the installation of a chlorine monitor which has since been installed.

[82] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[83] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

## Wicklow County Council

### Summary of Water Supplies[84]

| Type of Supply | No. of Supply Zones | Population Served |
|---|---|---|
| PWS | 49 | 92,053 |
| PuGWS | 5 | 277 |
| PrGWS | 17 | 2,542 |
| SPS | 61 | N/A |

### Assessment of 2007 Monitoring

Wicklow County Council carried out 6,010 individual tests on drinking water during 2007. There was a shortfall in the number of tests carried out in Wicklow during 2007 with approximately 5% of tests not carried out.

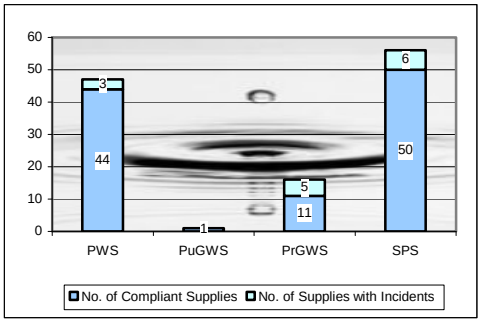
### Overall Compliance in 2007

The overall rate of compliance in Co. Wicklowl, 96.1%, was below the national average during 2007 though it did improve from 95.0% in 2006. Compliance with the microbiological, chemical and indicator parametric values is shown below.

| | Micro | Chemical | Indicator |
|---|---|---|---|
| **Overall** | 96.6% | 98.8% | 94.8% |
| **PWS** | 99.2% | 98.5% | 97.1% |
| **PuGWS** | 100% | 100% | 100% |
| **PrGWS** | 79.7% | 100% | 82.9% |
| **SPS** | 94.2% | 99.7% | 90.2% |

### Compliance with the *E. coli* Standard

A summary of the number of incidents of *E. coli* contamination reported during 2007 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.




There were 4 incidents of *E. coli* contamination of 3 public water supplies in Wicklow in 2007, in the Avoca/Ballinaclash (2 incidents), Enniskerry and Thomastown supplies. The Council has upgraded a number of the smaller public water supplies in Wicklow in 2008. The microbiological quality of the private group water schemes in Wicklow was poor with 5 of the 16 schemes monitored contaminated with *E. coli* at least once during the year.

Many of the quality deficient public water supplies and group water schemes in Wicklow were upgraded as part of the South Leinster Design Build Operate (DBO) bundle and it is anticipated that this will resolve the quality deficiency in these schemes.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parametric values in Wicklow was below the national average during 2007. However, this was primarily due to a number of fluoride exceedances which were due to the tightening of the fluoride standard in early 2007. Fifteen of the 16 exceedances reported were in the first six months of 2007 with just a single marginal exceedance after this period. The only other exceedance reported was a failure to meet the trihalomethanes standard in the Avoca/Ballinaclash public water supply.

Monitoring of the chemical parameters in the group water schemes and private water supplies was restricted to monitoring for nitrate and nitrite. There were no exceedances of either nitrate or nitrite in any of the group water schemes or private water supplies monitored in 2007.

Compliance with the indicator parametric values in public water supplies was below average at 97.1%. This was mainly due to the relatively poor compliance reported against the coliform bacteria (93% compliance) and pH standard (90% compliance). Overall compliance with the indicator parametric values in private group water schemes in Wicklow was poor. Thiteen of the 16 private group water schemes monitored in 2007 did not comply with the coliform bacteria parametric value.

### EPA Enforcement in 2007/2008

There are currently 16 public water supplies operated by Wicklow County Council on the Remedial Action List (RAL[85]) of public water supplies. A total of 4 supplies in Co. Wicklow were added to the RAL in 2008 while 10 were removed. Of the supplies on the RAL, Wicklow County Council indicates that 8 supplies will be upgraded, 1 will be replaced and 7 will have operations improved to ensure the supply can produce safe and secure water.

The EPA has advised all local authorities to install chlorine monitors and alarms at all treatment plants. As of August 2008, Wicklow County Council had installed chlorine monitors and alarms on 34 of 41 supplies.

The EPA received 24 notifications of the failure to meet the parametric value from Wicklow County Council in the period March 2007 to September 2008. The notifications were due to the failure to meet the *E. coli* (2), coliform bacteria (12), trihalomethanes (7), lead (1), aluminium (1) and iron (1) parametric values.

During this period 7 boil water notices were put in place in the following supplies: Ashford (September 2007), Ballingate (November 2007), Ballinaclash/Avoca (March and November 2007), Bray (August 2008), Knockanarrigan/Davidstown (October 2007 and February 2008) and Windgates (June 2007). Arising from these notifications 6 Directions were issued by the EPA to Wicklow County Council which required the preparation of action programmes.

[84] PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply.

[85] Details on the supplies that are on the RAL are listed in the disk published with this report and this list is also available at www.epa.ie.

# APPENDIX 2

# LIST OF MICROBIOLOGICAL, CHEMICAL AND INDICATOR PARAMETERS MONITORED AND ASSOCIATED PARAMETRIC VALUES IN THE EUROPEAN COMMUNITIES (DRINKING WATER) NO. 2 REGULATIONS, 2007

## MICROBIOLOGICAL, CHEMICAL AND INDICATOR PARAMETRIC VALUES

| | Parameter | Parametric value | Unit | Comments | Notes |
|---|---|---|---|---|---|
| **Microbiological Parameters** | | | | | |
| 1 | *Escherichia coli* (*E. coli*) | 0 | No./100ml | The *E. coli* bacteria is present in very high numbers in human or animal faeces and is rarely found in the absence of faecal pollution. As such, its presence in drinking water is a good indication that either the source of the water has become contaminated or that the treatment process at the water treatment plant is not operating adequately. | |
| 2 | *Enterococci* | 0 | No./100ml | *Enterococci* originate in human or animal waste and thus their presence provides an indication that the water supply has been contaminated with faeces | |
| **Chemical Parameters** | | | | | |
| 3 | Acrylamide | 0.10 | µg/l | Acrylamide can be present in water supplies from the use of polyacrylamides as coagulant aids in water treatment. It is classified by the International Agency for Research on Cancer (IARC) in Group 2A (i.e., probably carcinogenic to humans). | Note 1 |
| 4 | Antimony | 5.0 | µg/l | Antimony is a naturally occurring trace element used in the metal industry and in flame retardant materials. It can also occur naturally from weathering of rocks. The toxicity of antimony depends on the form it occurs in (naturally occurring antimony is likely to be in the less toxic form) and while there is some evidence for the carcinogenicity of certain antimony compounds by inhalation, there is no data to indicate carcinogenicity by the oral route. | |
| 5 | Arsenic | 10 | µg/l | Arsenic is widely distributed through-out the Earth's crust and is used in certain industrial applications (primarily as alloying agents in the manufacture of transistors, lasers and semi-conductors) and has been used in the past as a component of the wood preservative CCA (Copper-Chromium-Arsenic) though it is no longer in use. However, the primary source of arsenic in drinking water is from its dissolution into groundwater from naturally occurring ores and minerals.<br><br>Arsenic has been shown to have significant health effects in some parts of the world (e.g. Bangladesh). Arsenic is one of the few substances shown to cause cancer in humans through consumption of drinking water and there is overwhelming evidence that consumption of arsenic through drinking water is causally related to the development of cancer in several different locations in the body. | |
| 6 | Benzene | 1.0 | µg/l | The principle source of benzene is from vehicle emissions which may find their way into water. Benzene is carcinogenic to humans. | |
| 7 | Benzo(a)pyrene | 0.010 | µg/l | Benzo(a)pyrene was formerly included in the group of chemicals called PAHs (Polycyclic Aromatic Hydrocarbons) which are generally undesirable in water. The absolute undesirability of benzo(a)pyrene in drinking water has been emphasised by its inclusion as a separate parameter. It is carcinogenic. | |
| 8 | Boron | 1.0 | mg/l | Boron is a naturally occurring element and can occur naturally in groundwater. It is also used in the manufacture of glass, soap, and detergents and as flame retardants. Development toxicity has been demonstrated in laboratory animals at levels in excess of the parametric value. | |

| | Parameter | Parametric value | Unit | Comments | Notes |
|---|---|---|---|---|---|
| 9 | Bromate | 10 | µg/l | Bromate is classified by the International Agency for Research on Cancer (IARC) in Group 2B (i.e., possibly carcinogenic to humans). Bromate is not normally found in water but may be formed during ozonation when the bromide ion is present in water. Under certain conditions, bromate may also be formed in concentrated hypochlorite solutions used to disinfect water (WHO, 2004). | Note 2 |
| 10 | Cadmium | 5.0 | µg/l | Cadmium is used in the steel and plastics industry and is a common component of batteries. It may also enter water from trace impurities in the zinc of galvanised pipes and solders and some metal fittings. Cadmium can accumulate in the kidneys. | |
| 11 | Chromium | 50 | µg/l | Chromium is commonly found in the Earth's crust, though can be present in water from contamination from timber treatment chemicals (Copper-Chromium-Arsenic). The toxicity of chromium depends on the form in which it is found, with hexavalent chromium classified as a human carcinogen. | |
| 12 | Copper | 2.0 | mg/l | Copper is a nutrient essential for health, though at elevated levels can become a contaminant (elevated levels can cause acute gastrointestinal effects). The primary source of copper in drinking water is from corrosion of internal copper plumbing. The levels of copper in drinking water depend on the length of time the water has been stagnant in the copper piping and thus fully flushed water generally has low levels of copper. | Note 3 |
| 13 | Cyanide | 50 | µg/l | Cyanide is a reactive, highly toxic entity, which, in excessive amounts, will cause mortality to humans. It is a common constituent of industrial wastes, especially from metal plating processes and electronic components manufacture. | |
| 14 | 1,2-dichloroethane | 3.0 | µg/l | 1,2-dichloroethane is a synthetic intermediate and organic solvent used in the manufacture of chemicals. It can enter water from discharges from facilities using the chemical. It is a toxic substance which can cause a variety of ill-effects including eye damage, dermatitis and narcotic effects. It has also been classified by the IARC in Group 2 (possible human carcinogen). | |
| 15 | Epichlorohydrin | 0.10 | µg/l | Epichlorohydrin can be present in water supplies from the use of polyamines as coagulant aids in water treatment and from epoxy resin linings of water mains and water retaining structures. It is classified by the International Agency for Research on Cancer (IARC) in Group 2A (i.e., probably carcinogenic to humans). | Note 1 |
| 16 | Fluoride | 0.8 | mg/l | Fluoride arises almost exclusively from fluoridation of public water supplies and from industrial discharges, although it occurs naturally in quite rare instances. Past health studies have shown that the addition of fluoride to water supplies at levels above 0.6mg/l $F^-$ leads to a reduction in tooth decay in growing children and that the optimum beneficial effects were thought to occur around 1.0 mg/l. However, in light of recent international and Irish research which shows an increasing occurrence of dental fluorosis, the Forum on Fluoridation (2002) recommended the lowering of the fluoride levels in drinking water to a range of 0.6 to 0.8 mg/l, with a target of 0.7 mg/l. | Note 11 |
| 17 | Lead | 10 | µg/l | Lead is present in drinking water primarily from its dissolution from lead pipes or lead-containing solder and thus the concentration of lead in drinking water depends on a number of factors including pH, temperature, water hardness and standing time of the water. Consequently, the method of sampling for lead is critical and depending on the | Notes 3 and 4 |

| | Parameter | Parametric value | Unit | Comments | Notes |
|---|---|---|---|---|---|
| | | | | method used results can vary significantly. According to the World Health Organisation (WHO, 2004) lead is a general toxicant that accumulates in bone. Infants, children up to 6 years of age and pregnant women are the most susceptible to its health effects. It is toxic to both the central and peripheral nervous systems. | |
| 18 | Mercury | 1.0 | µg/l | Mercury is a very toxic metal that primarily effects the kidney. It has been used in electrical appliances, batteries, plastics and in dental amalgams, though many of these uses are no longer applicable. | |
| 19 | Nickel | 20 | µg/l | Nickel is a metal used in the production of stainless steels and alloys and thus may be present in drinking water from water that comes into contact with nickel or chromium plated taps particularly where the water has been stagnant prior to consumption. Nickel compounds are carcinogenic and metallic nickel is possibly carcinogenic. | Note 3 |
| 20 | Nitrate | 50 | mg/l | Nitrate in the environment originates mostly from organic and inorganic sources such as waste discharges, animal slurries and artificial fertiliser. High levels of nitrate in drinking water may induce "blue baby" syndrome (methaemaglobinemia). The nitrate converts to nitrite which reacts with blood haemoglobin thus reducing the availability of the blood to hold oxygen. | Note 5 |
| 21 | Nitrite | 0.50 | mg/l | Nitrites exist in very low levels principally because the nitrogen will tend to exist in other forms (such as ammonia). Nitrite is an intermediate in the oxidation of ammonia to nitrate. Nitrite is associated with methaemaglobinemia as previously discussed. | Note 5 |
| 22 | Pesticides | 0.10 | µg/l | Pesticides refers to a wide range of chemicals used for the control of pests. The parametric value is set on a precautionary basis. Where pesticides are detected the individual pesticide detected must be considered and its toxicology. | Notes 6 and 7 |
| 23 | Pesticides – Total | 0.50 | µg/l | Pesticides refers to a wide range of chemicals used for the control of pests. The parametric value is set on a precautionary basis. Where pesticides are detected the individual pesticide detected must be considered and its toxicology. | Note 6 and 8 |
| 24 | Polycyclic aromatic hydrocarbons | 0.10* | µg/l | Polycyclic Aromatic Hydrocarbons (PAHs) are a group of organic compounds containing 2 or more fused aromatic rings of carbon and hydrogen atoms. Although there are many compounds in this group, for the purposes of determining compliance with the Drinking Water Regulations only four are considered – benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene. They originate from many sources including coal-tar coating of drinking water pipes, soot, vehicle emissions and as combustion products of hydrocarbon fuels. This group of compounds are widely regarded as carcinogens, though the potency of the different PAHs varies. | Note 9 |
| 25 | Selenium | 10 | µg/l | Selenium originates from the weathering of rocks and soils but is also used in industry as a chemical catalyst. It is an essential biological requirement though only very small concentrations of selenium are required, above which it is toxic and can cause a variety of illnesses. | |
| 26 | Tetrachloroethene/Trichloroethene | 10* | µg/l | Tetrachloroethene and trichloroethene are synthetic solvents used in the dry-cleaning industry and other various industrial and manufacturing processes as well as being used as a degreaser. It may be carcinogenic but otherwise can have a variety of ill effects. | |
| 27 | Trihalomethanes – Total | 100* | µg/l | Trihalomethanes (THMs) are derivatives of the simplest organic compound - methane, $CH_4$ | Note 10 |

| | Parameter | Parametric value | Unit | Comments | Notes |
|---|---|---|---|---|---|
| | | | | - in which 3 of the hydrogen atoms are substituted by halogen atoms. The principal halogens are fluorine ($F_2$), chlorine ($Cl_2$), bromine ($Br_2$) and iodine ($I_2$), but while many combinations are theoretically possible, the term trihalomethanes is applied to four specific compounds containing only chlorine and/or bromine as the halogen elements. The four compounds are *chloroform* ($CHCl_3$), *bromodichloromethane* ($CHBrCl_2$), *dibromochloromethane* ($CHBr_2Cl$) and *bromoform* ($CHBr_3$).<br>Chlorine (or appropriate compounds of it) is undoubtedly the most important chemical used in water treatment in Ireland today, as it has been in the past. Although it is a highly poisonous gas in its pure form and a powerful oxidising agent, chlorine in very dilute solution is a most effective agent for the disinfection of water. It is very efficient at destroying those bacteria which originate in human or animal waste and which cause undesirable and dangerous contamination of drinking water.<br>As a powerful oxidising agent, chlorine also breaks down the complex and inert organic molecules which are the colouring agents of the water, forming smaller, reactive entities. These entities react with chlorine (and with bromine derived from the oxidation by chlorine of bromide naturally present) to form the THM compounds, the most abundant of which is chloroform($CHCl_3$). There is thus a fairly straightforward relationship between the degree of colour in the water prior to chlorination and the quantities of THMs present following chlorination. If colour is present at the point of chlorination, THMs are likely to be formed.<br>THM compounds are undesirable in drinking water for two reasons. Firstly, the actual compounds themselves may pose a hazard to the health of the consumer if present in excessive amounts, as chloroform is a suspected carcinogen. Secondly, the presence of the THM group may be an indicator of the possible presence of other organic by-products of chlorination in trace amounts. The WHO advises that "*In controlling trihalomethanes, a multistep treatment system should be used to reduce organic trihalomethane precursors, and primary consideration should be given to ensuring that disinfection is never compromised*". | |
| 28 | Vinyl chloride | 0.50 | µg/l | Vinyl chloride can be present in water supplies from the use of unplasticised polyvinyl chloride (uPVC) pipes in water distribution systems. It is carcinogenic. | Note 1 |
| **Indicator Parameters** | | | | | |
| 29 | Aluminium | 200 | µg/l | Aluminium is present in drinking water as a result of its use as aluminium sulphate (a coagulant) in the water treatment process, though can be naturally present in some waters. Historically, there has been some concern about possible links between aluminium in drinking water and Alzheimer's disease. However, the WHO states that:<br>*"On the whole, the positive relationship between aluminium in drinking water and Alzheimer's disease which was demonstrated in several epidemiological studies, cannot be totally discounted. However, strong reservations about inferring a causal relationship are warranted in view of the failure of these studies to account for demonstrated confounding factors and for the total aluminium intake from all sources".* | |

| | Parameter | Parametric value | Unit | Comments | Notes |
|---|---|---|---|---|---|
| 30 | Ammonium | 0.30 | mg/l | Ammonium in water supplies originates from agricultural and industrial processes, as well as from disinfection with chloramines (a method of disinfection not in use in Ireland). Elevated levels of ammonium may arise from intensive agriculture in the catchment of the water source. Ammonium is therefore an indicator of possible bacterial, sewage and animal waste pollution. Ammonium in itself is not a health risk but the parametric value serves as a valuable indicator of source pollution. | |
| 31 | Chloride | 250 | mg/l | Chloride can originate from natural sources such as saltwater intrusion in coastal sources but can be present in sewage and industrial effluents and thus can be an indicator of pollution from these sources. | Note 12 |
| 32 | *Clostridium perfringens* (incl spores) | 0 | No/100 ml | *Clostridium perfringens* is a member of the bacterial intestinal flora of humans and therefore serves as an indicator of faecal pollution. The spores of *Clostridium perfringens* are particularly resistant to unfavourable conditions in the environment and thus they survive for long periods. As such they can be useful indicators of water that is intermittently polluted. | Note 13 |
| 33 | Colour | Acceptable to consumers and no abnormal change | | Colour in water is usually due to the presence of complex organic molecules derived from vegetable (humic) matter such as peat, leaves, branches etc. While colour, in itself is primarily as aesthetic parameter it may indicate other problems with the water supply particularly where the water is chlorinated. In such cases the formation of trihalomethanes may occur. | |
| 34 | Conductivity | 2500 | $\mu S\ cm^{-1}$ at 20 $^0C$ | Conductivity is a measure of the ability of water to conduct an electrical current, therefore conductivity is related to the ionic content of the water. | Note 12 |
| 35 | Hydrogen ion concentration | $\geq$ 6.5 and $\leq$9.5 | pH units | pH is a measure of whether a liquid is acid or alkaline. The pH scale ranges from 0 (very acid) to 14 (very alkaline). The range of natural pH in freshwaters extends from around 4.5 for acid peaty upland waters to over 10 in waters where there is intense photosynthetic activity by algae. However, the most frequently encountered range is 6.5 to 8.0. The control of pH is a critical component of water treatment and distribution, influencing the effectiveness of coagulation, disinfection and the concentration of plumbing materials (such as lead, copper and nickel) in the final product. | Note 12 |
| 36 | Iron | 200 | µg/l | Iron is an abundant metal found in the Earth's crust. It is naturally present in water but can also be present in drinking water from the use of iron coagulants or the corrosion of steel and cast iron pipes during water distribution. Iron is an essential element in human nutrition. The WHO (WHO, 2004) states that values of up to 2 mg/l (10 times the parametric value) do not present a hazard to health. However, at levels less than 2 mg/l but above the parametric value, the colour of water may turn brown, become turbid or may deposit solids on clothes washed in the water or food cooked using water. | |
| 37 | Manganese | 50 | µg/l | Manganese is an element abundant in the Earth's crust and is commonly found in groundwater. In common with iron, the problems associated with levels of manganese above the parametric value are primarily aesthetic, as manganese can cause staining problems. High levels of manganese also cause objectionable tastes in the water but there are no particular toxicological connotations. The WHO recommend a guideline value of 0.4 mg/l, which is twice the parametric value in the Regulations. | |

| | Parameter | Parametric value | Unit | Comments | Notes |
|---|---|---|---|---|---|
| 38 | Odour | Acceptable to consumers and no abnormal change | | | |
| 39 | Oxidisability | 5.0 | mg/l $0_2$ | Oxidisability is a measure of the organic (and other oxidisable) matter present in a water. | Note 14 |
| 40 | Sulphate | 250 | mg/l | Sulphate is naturally occurring and is present in numerous minerals. The WHO review (WHO, 2004) did not identify a level of sulphate in water that is likely to cause adverse health effects but studies did indicate a laxative effect at concentrations of 1,000 to 1,200 mg/l (i.e., several times higher than the parametric value). | Note 12 |
| 41 | Sodium | 200 | mg/l | Sodium is an abundant natural constituent of rocks and soils and is always present in natural waters. Excessive intake can cause hypertension but the primary mode of intake is via food. | |
| 42 | Taste | Acceptable to consumers and no abnormal change | | | |
| 43 | Colony count $22^0$C | No abnormal change | | This is the number of organisms per millilitre when the water is stored at $22^0$C. The usefulness of this parameter is that sudden or significant changes in the levels of organisms can indicate problems with the water supply. | |
| 44 | Coliform bacteria | 0 | No./100 ml | The coliform bacteria (previously know as Total Coliforms) are a group of organisms that can survive and grow in water. They are a useful indicator of treatment efficiency and the cleanliness of the distribution mains. Coliform bacteria can occur in sewage and in natural waters. Coliform bacteria should not be present in a water that is disinfected and their presence indicates that either disinfection has not been complete, that there is ingress into the water mains in the distribution network or that the sample point is contaminated. | |
| 45 | Total Organic Carbon (TOC) | No abnormal change | | This is a measure of the organic carbon in water. Sudden or significant changes in the level of TOC in the treated water can indicate problems with the water supply. | Note 15 |
| 46 | Turbidity | Acceptable to consumers and no abnormal change | | The control of turbidity is one of the indicators of the efficiency of treatment at the plant. Elevated levels of turbidity in the treated water indicate that the treatment process is not operating adequately. It also provides a good indication of whether the treatment plant is capable of removing *Cryptosporidium* oocysts. While the parametric value for turbidity (at the tap) is that the water must be "*acceptable to consumers and* [there must be] *no abnormal change*" there is a parametric value for turbidity (for water leaving the treatment plant) of 1.0 NTU. However, it must be stressed that this value is for visual acceptability of the water. In practice turbidity levels need to be much lower and should not exceed 0.2 NTU and preferably be below 0.1 NTU to be protective against *Cryptosporidium* breakthrough in the treatment plant. | Note 16 |
| 47 | Tritium | 100 | Bq/l | | Notes 17 and 19 |
| 48 | Total indicative dose | 0.10 | mSv/year | | Notes 18 and 19 |

* sum of concentrations of specified compounds

**Notes**

**Note 1:** The parametric value refers to the residual monomer concentration in the water as calculated according to specifications of the maximum release from the corresponding polymer in contact with the water.

**Note 2:** For the water referred to in sub-articles 6 (a), (b) and (c) the parametric value to be met by 1 January, 2004 is 25 μg/l. A value of 10 μg/l must be met by 25 December, 2008.

**Note 3:** The value applies to a sample of water intended for human consumption obtained by an adequate sampling method* at the tap and taken so as to be representative of a weekly average value ingested by consumers and that takes account of the occurrence of peak levels that may cause adverse effects on human health.

*The Copper, Lead and Nickel parameters shall be monitored in such a manner as the Minister shall determine from time to time.

**Note 4:** For water referred to in sub-articles 6 (a), (b) and (c), the parametric value to be met by 1, January 2004 is 25 μg/l. A value of 10 μg/l must be met by 25 December, 2013.

All appropriate measures shall be taken to reduce the concentration of lead in water intended for human consumption as much as possible during the period needed to achieve compliance with the parametric value.

When implementing the measures priority shall be progressively given to achieve compliance with that value where lead concentrations in water intended for human consumption are highest.

**Note 5:** Compliance must be ensured with the conditions that [nitrate]/50 + [nitrite]/3 < 1, the square brackets signifying the concentrations in mg/l for nitrate (NO3) and nitrite (NO2) and the value of 0.10mg/l for nitrites ex water treatment works.

**Note 6:** Only those pesticides which are likely to be present in a given supply require to be monitored.

"Pesticides" means:

- organic insecticides,
- organic herbicides,
- organic fungicides,
- organic nematocides,
- organic acaricides,
- organic algicides,
- organic rodenticides,
- organic slimicides,
- related products (inter alia, growth regulators)

and their relevant metabolites, degradation and reaction products.

**Note 7:** The parametric value applies to each individual pesticide. In the case of aldrin, dieldrin, heptachlor and heptachlor epoxide the parametric value is 0.030 μg/l.

**Note 8:** "Pesticides – Total" means the sum of all individual pesticides detected and quantified in the course of the monitoring procedure.

**Note 9:** The specified compounds are:

- benzo(b)fluoranthene

- benzo(k)fluoranthene

- benzo(ghi)perylene

- indeno(1,2,3-cd)pyrene.

**Note 10:** The specified compounds are: chloroform, bromoform, dibromochloromethane and bromodichloromethane.

For the water referred to in sub-articles 6 (a), (b) and (c), the parametric value to be met by 1 January, 2004 is 150 μg/l. A value of 100 μg/l must be met by 25 December, 2008.

All appropriate measures must be taken to reduce the concentration of THMs in water intended for human consumption as much as possible during the period needed to achieve compliance with the parametric value.

When implementing the measures to achieve this value, priority must progressively be given to those areas where THM concentrations in water intended for human consumption are highest.

**Note 11**: The parametric value is 1.0mg/l for fluoridated supplies. In the case of supplies with naturally occurring fluoride the parametric value is 1.5mg/l.

**Note 12:** The water should not be aggressive

**Note 13:** This parameter need not be measured unless the water originates from or is influenced by surface water. In the event of non-compliance with this parametric value, the supply shall be investigated to ensure that there is no potential danger to human health arising from the presence of pathogenic micro-organisms, e.g. *cryptosporidium*.

**Note 14:** This parameter need not be measured if the parameter TOC is analysed.

**Note 15:** This parameter need not be measured for supplies of less than 10,000$m^3$ a day.

**Note 16:** In the case of surface water treatment, a parametric value not exceeding 1.0 NTU (nephelometric turbidity units) in the water ex treatment works must be strived for.

**Note 17:** Monitoring frequencies to be set at a later date in Part 2 of the Schedule.

**Note 18:** Excluding tritium, potassium –40, radon and radon decay products; monitoring frequencies, monitoring methods and the most relevant locations for monitoring points to be set at a later date in Part 2 of the Schedule.

**Note 19:** **A**. The proposals required by Note 6 on monitoring frequencies, and Note 7 on monitoring frequencies, monitoring methods and the most relevant locations for monitoring points in Part 2 of the Schedule shall be adopted in accordance with the Committee procedure laid down in Article 12 of Council Directive 98/83/EEC.

**B.** Drinking water need not be monitored for tritium or radioactivity to establish total indicative dose where, on the basis of other monitoring carried out, the levels of tritium of the calculated total indicative dose are well below the parametric value.

# APPENDIX 3
# SUMMARY OF MONITORING CARRIED OUT IN 2007

## Table A-1. Total Number of Water Supply Zones (WSZs) Monitored and Samples Analysed for All Parameters in Public Water Supplies.

| Parameter | No. of WSZs Monitored | No. of WSZs with Exceedances | % of WSZs Complying | No. of Samples Analysed | No. of Samples Exceeding | % of Samples Complying |
|---|---|---|---|---|---|---|
| **Microbiological Parameters** | | | | | | |
| E. coli | 941 | 52 | **94.5** | 10,619 | 58 | **99.5** |
| Enterococci | 728 | 9 | **98.8** | 2,385 | 9 | **99.6** |
| **Chemical Parameters** | | | | | | |
| 1,2-dichloroethane | 666 | 0 | **100** | 1,262 | 0 | **100** |
| Antimony | 678 | 1 | **99.9** | 1,297 | 1 | **99.9** |
| Arsenic | 687 | 3 | **99.6** | 1,451 | 3 | **99.8** |
| Benzene | 616 | 1 | **99.8** | 1,158 | 2 | **99.8** |
| Benzo(a)pyrene | 601 | 0 | **100** | 1,030 | 0 | **100** |
| Boron | 593 | 0 | **100** | 1,221 | 0 | **100** |
| Bromate | 676 | 1 | **99.9** | 1,164 | 1 | **99.9** |
| Cadmium | 680 | 0 | **100** | 1,406 | 0 | **100** |
| Chromium | 687 | 0 | **100** | 1,454 | 0 | **100** |
| Copper | 708 | 1 | **99.9** | 1,652 | 1 | **99.9** |
| Cyanide | 624 | 0 | **100** | 1,053 | 0 | **100** |
| Fluoride | 693 | 130 | **81.2** | 3,255 | 289 | **91.1** |
| Lead | 715 | 17 | **97.6** | 1,933 | 17 | **99.1** |
| Mercury | 635 | 1 | **99.8** | 1,239 | 2 | **99.8** |
| Nickel | 671 | 5 | **99.3** | 1,315 | 5 | **99.6** |
| Nitrate | 829 | 18 | **97.8** | 4,280 | 22 | **99.5** |
| Nitrite (at tap) | 810 | 3 | **99.6** | 4,905 | 3 | **99.9** |
| Nitrites (at WTW) | 141 | 1 | **99.3** | 2,299 | 1 | **100** |
| PAH | 646 | 0 | **100** | 1,105 | 0 | **100** |
| Pesticides - Total | 633 | 3 | **99.5** | 1,070 | 3 | **99.7** |
| Selenium | 635 | 0 | **100** | 1,220 | 0 | **100** |
| Tetrachloroethene & Trichloroethene | 650 | 0 | **100** | 1,741 | 0 | **100** |
| Trihalomethanes(Total) | 677 | 20 | **97.0** | 1,872 | 51 | **97.3** |
| **Indicator Parameters** | | | | | | |
| Aluminium | 732 | 113 | **84.6** | 6,674 | 339 | **94.9** |
| Ammonium | 941 | 19 | **98.0** | 10,183 | 23 | **99.8** |
| Chloride | 693 | 1 | **99.9** | 1,435 | 4 | **99.7** |
| Clostridium Perfringens | 734 | 72 | **90.2** | 8,422 | 98 | **98.8** |
| Coliform Bacteria | 941 | 265 | **71.8** | 10,607 | 615 | **94.2** |
| Colony Count @ 22°C | 673 | 71 | **89.5** | 1,580 | 79 | **95.0** |
| Colour | 938 | 129 | **86.2** | 10,298 | 303 | **97.1** |
| Conductivity | 936 | 0 | **100** | 11,015 | 0 | **100** |
| Iron | 808 | 118 | **85.4** | 6,706 | 267 | **96.0** |
| Manganese | 726 | 60 | **91.7** | 2,828 | 113 | **96.0** |
| Odour | 906 | 65 | **92.8** | 9,675 | 143 | **98.5** |
| Oxidisability | 6 | 0 | **100** | 6 | 0 | **100** |
| pH | 941 | 245 | **74.0** | 10,497 | 519 | **95.1** |
| Sodium | 695 | 4 | **99.4** | 1,365 | 4 | **99.7** |
| Sulphate | 658 | 1 | **99.8** | 1,232 | 1 | **99.9** |
| Taste | 605 | 8 | **98.7** | 6,709 | 17 | **99.7** |
| Total Organic Carbon | 615 | 16 | **97.4** | 1,173 | 17 | **98.6** |
| Turbidity (at tap) | 862 | 64 | **92.6** | 9,470 | 75 | **99.2** |
| Turbidity (at WTW) | 239 | 87 | **63.6** | 4,322 | 219 | **94.9** |
| **Radioactivity** | | | | | | |
| Tritium | 36 | 0 | **100** | 72 | 0 | **100** |
| Total Indicative Dose | 20 | 0 | **100** | 44 | 0 | **100** |

## Table A-2. Total Number of Water Supply Zones (WSZs) Monitored and Samples Analysed for All Parameters in Public Group Water Schemes.

| Parameter | No. of WSZs Monitored | No. of WSZs with Exceedances | % of WSZs Complying | No. of Samples Analysed | No. of Samples Exceeding | % of Samples Complying |
|---|---|---|---|---|---|---|
| **Microbiological Parameters** | | | | | | |
| E. coli | 763 | 14 | **98.2** | 1,692 | 14 | **99.2** |
| Enterococci | 199 | 7 | **96.5** | 300 | 7 | **97.7** |
| **Chemical Parameters** | | | | | | |
| 1,2-dichloroethane | 155 | 0 | **100** | 160 | 0 | **100** |
| Antimony | 116 | 0 | **100** | 121 | 0 | **100** |
| Arsenic | 113 | 0 | **100** | 118 | 0 | **100** |
| Benzene | 152 | 0 | **100** | 157 | 0 | **100** |
| Benzo(a)pyrene | 106 | 0 | **100** | 109 | 0 | **100** |
| Boron | 110 | 0 | **100** | 114 | 0 | **100** |
| Bromate | 164 | 0 | **100** | 197 | 0 | **100** |
| Cadmium | 113 | 0 | **100** | 118 | 0 | **100** |
| Chromium | 113 | 0 | **100** | 118 | 0 | **100** |
| Copper | 218 | 0 | **100** | 320 | 0 | **100** |
| Cyanide | 103 | 0 | **100** | 105 | 0 | **100** |
| Fluoride | 250 | 50 | **80.0** | 419 | 52 | **87.6** |
| Lead | 246 | 1 | **99.6** | 359 | 1 | **99.7** |
| Mercury | 109 | 0 | **100** | 114 | 0 | **100** |
| Nickel | 121 | 0 | **100** | 126 | 0 | **100** |
| Nitrate | 485 | 1 | **99.8** | 947 | 1 | **99.9** |
| Nitrite (at tap) | 526 | 1 | **99.8** | 1,070 | 1 | **99.9** |
| Nitrites (at WTW) | 5 | 0 | | 20 | 0 | |
| PAH | 117 | 0 | **100** | 120 | 0 | **100** |
| Pesticides - Total | 91 | 0 | **100** | 93 | 0 | **100** |
| Selenium | 106 | 0 | **100** | 110 | 0 | **100** |
| Tetrachloroethene & Trichloroethene | 279 | 0 | **100** | 472 | 0 | **100** |
| Trihalomethanes(Total) | 326 | 7 | **97.9** | 593 | 8 | **98.7** |
| **Indicator Parameters** | | | | | | |
| Aluminium | 494 | 50 | **89.9** | 936 | 61 | **93.5** |
| Ammonium | 756 | 11 | **98.5** | 1,632 | 11 | **99.3** |
| Chloride | 112 | 0 | **100** | 115 | 0 | **100** |
| Clostridium Perfringens | 689 | 25 | **96.4** | 1,467 | 33 | **97.8** |
| Coliform Bacteria | 763 | 51 | **93.3** | 1,694 | 59 | **96.5** |
| Colony Count @ 22°C | 110 | 6 | **94.5** | 114 | 6 | **94.7** |
| Colour | 759 | 34 | **95.5** | 1,679 | 49 | **97.1** |
| Conductivity | 727 | 0 | **100** | 1,637 | 0 | **100** |
| Iron | 560 | 47 | **91.6** | 1,184 | 57 | **95.2** |
| Manganese | 463 | 13 | **97.2** | 915 | 13 | **98.6** |
| Odour | 690 | 25 | **96.4** | 1,516 | 33 | **97.8** |
| Oxidisability | 0 | 0 | | 0 | 0 | |
| pH | 759 | 35 | **95.4** | 1,679 | 41 | **97.6** |
| Sodium | 131 | 0 | **100** | 136 | 0 | **100** |
| Sulphate | 106 | 0 | **100** | 109 | 0 | **100** |
| Taste | 256 | 0 | **100** | 593 | 0 | **100** |
| Total Organic Carbon | 179 | 1 | **99.4** | 258 | 1 | **99.6** |
| Turbidity (at tap) | 738 | 13 | **98.2** | 1,600 | 13 | **99.2** |
| Turbidity (at WTW) | 9 | 3 | **66.7** | 28 | 4 | **85.7** |
| **Radioactivity** | | | | | | |
| Tritium | 1 | 0 | **100** | 1 | 0 | **100** |
| Total Indicative Dose | 0 | 0 | | 0 | 0 | |

**Table A-3. Total Number of Water Supply Zones (WSZs) Monitored and Samples Analysed for All Parameters in Private Group Water Schemes.**

| Parameter | No. of WSZs Monitored | No. of WSZs with Exceedances | % of WSZs Complying | No. of Samples Analysed | No. of Samples Exceeding | % of Samples Complying |
|---|---|---|---|---|---|---|
| **Microbiological Parameters** | | | | | | |
| E. coli | 586 | 184 | **68.6** | 2,159 | 319 | **85.2** |
| Enterococci | 290 | 46 | **84.1** | 395 | 53 | **86.6** |
| **Chemical Parameters** | | | | | | |
| 1,2-dichloroethane | 266 | 0 | **100** | 293 | 0 | **100** |
| Antimony | 262 | 0 | **100** | 287 | 0 | **100** |
| Arsenic | 267 | 2 | **99.3** | 297 | 2 | **99.3** |
| Benzene | 245 | 0 | **100** | 268 | 0 | **100** |
| Benzo(a)pyrene | 244 | 0 | **100** | 269 | 0 | **100** |
| Boron | 265 | 0 | **100** | 292 | 0 | **100** |
| Bromate | 259 | 3 | **98.8** | 285 | 3 | **98.9** |
| Cadmium | 266 | 0 | **100** | 296 | 0 | **100** |
| Chromium | 266 | 0 | **100** | 296 | 0 | **100** |
| Copper | 289 | 0 | **100** | 348 | 0 | **100** |
| Cyanide | 224 | 0 | **100** | 234 | 0 | **100** |
| Fluoride | 267 | 5 | **98.1** | 301 | 5 | **98.3** |
| Lead | 304 | 0 | **100** | 371 | 0 | **100** |
| Mercury | 259 | 0 | **100** | 284 | 0 | **100** |
| Nickel | 254 | 0 | **100** | 278 | 0 | **100** |
| Nitrate | 487 | 8 | **98.4** | 1,301 | 10 | **99.2** |
| Nitrite (at tap) | 434 | 1 | **99.8** | 1,176 | 1 | **99.9** |
| Nitrites (at WTW) | 3 | 0 | **100** | 10 | 0 | **100** |
| PAH | 262 | 0 | **100** | 288 | 0 | **100** |
| Pesticides - Total | 261 | 1 | **99.2** | 287 | 1 | **99.3** |
| Selenium | 257 | 0 | **100** | 280 | 0 | **100** |
| Tetrachloroethene & Trichloroethene | 275 | 0 | **100** | 505 | 0 | **100** |
| Trihalomethanes(Total) | 289 | 5 | **98.3** | 521 | 5 | **99.0** |
| **Indicator Parameters** | | | | | | |
| Aluminium | 351 | 23 | **93.4** | 710 | 56 | **92.1** |
| Ammonium | 585 | 9 | **98.5** | 2,027 | 12 | **99.4** |
| Chloride | 279 | 0 | **100** | 320 | 0 | **100** |
| Clostridium Perfringens | 455 | 120 | **73.6** | 1,529 | 182 | **88.1** |
| Coliform Bacteria | 585 | 318 | **46.3** | 2,158 | 614 | **71.8** |
| Colony Count @ 22°C | 256 | 51 | **80.1** | 286 | 54 | **81.1** |
| Colour | 585 | 97 | **83.4** | 2,089 | 199 | **90.5** |
| Conductivity | 584 | 0 | **100** | 2,085 | 0 | **100** |
| Iron | 431 | 48 | **88.9** | 1,269 | 83 | **93.5** |
| Manganese | 383 | 38 | **90.1** | 936 | 56 | **94.0** |
| Odour | 530 | 27 | **94.9** | 1,873 | 29 | **98.5** |
| Oxidisability | 1 | 0 | **100** | 1 | 0 | **100** |
| pH | 586 | 75 | **87.2** | 2,094 | 137 | **93.5** |
| Sodium | 266 | 2 | **99.2** | 293 | 2 | **99.3** |
| Sulphate | 266 | 1 | **99.6** | 293 | 1 | **99.7** |
| Taste | 213 | 0 | **100** | 650 | 0 | **100** |
| Total Organic Carbon | 273 | 6 | **97.8** | 313 | 7 | **97.8** |
| Turbidity (at tap) | 560 | 44 | **92.1** | 1,954 | 51 | **97.4** |
| Turbidity (at WTW) | 44 | 9 | **79.5** | 64 | 12 | **81.3** |
| **Radioactivity** | | | | | | |
| Tritium | 15 | 0 | **100** | 16 | 0 | **100** |
| Total Indicative Dose | 0 | 0 | | 0 | 0 | |

## Table A-4. Total Number of Water Supply Zones (WSZs) Monitored and Samples Analysed for All Parameters in Small Private Supplies.

| Parameter | No. of WSZs Monitored | No. of WSZs with Exceedances | % of WSZs Complying | No. of Samples Analysed | No. of Samples Exceeding | % of Samples Complying |
|---|---|---|---|---|---|---|
| **Microbiological Parameters** | | | | | | |
| E. coli | 794 | 103 | **87.0** | 1,314 | 140 | **89.3** |
| Enterococci | 360 | 46 | **87.2** | 643 | 65 | **89.9** |
| **Chemical Parameters** | | | | | | |
| 1,2-dichloroethane | 19 | 0 | **100** | 32 | 0 | **100** |
| Antimony | 43 | 0 | **100** | 61 | 0 | **100** |
| Arsenic | 72 | 1 | **98.6** | 94 | 2 | **97.9** |
| Benzene | 18 | 0 | **100** | 31 | 0 | **100** |
| Benzo(a)pyrene | 9 | 0 | **100** | 21 | 0 | **100** |
| Boron | 40 | 0 | **100** | 55 | 0 | **100** |
| Bromate | 19 | 0 | **100** | 20 | 0 | **100** |
| Cadmium | 72 | 0 | **100** | 94 | 0 | **100** |
| Chromium | 72 | 0 | **100** | 94 | 0 | **100** |
| Copper | 196 | 1 | **99.5** | 244 | 1 | **99.6** |
| Cyanide | 21 | 0 | **100** | 35 | 0 | **100** |
| Fluoride | 19 | 0 | **100** | 34 | 0 | **100** |
| Lead | 250 | 0 | **100** | 299 | 0 | **100** |
| Mercury | 40 | 0 | **100** | 58 | 0 | **100** |
| Nickel | 41 | 1 | **97.6** | 59 | 1 | **98.3** |
| Nitrate | 399 | 22 | **94.5** | 525 | 26 | **95.0** |
| Nitrite (at tap) | 487 | 2 | **99.6** | 700 | 2 | **99.7** |
| Nitrites (at WTW) | 2 | 1 | **50.0** | 15 | 1 | **93.3** |
| PAH | 8 | 0 | **100** | 20 | 0 | **100** |
| Pesticides - Total | 18 | 0 | **100** | 31 | 0 | **100** |
| Selenium | 33 | 0 | **100** | 47 | 0 | **100** |
| Tetrachloroethene & Trichloroethene | 22 | 0 | **100** | 35 | 0 | **100** |
| Trihalomethanes(Total) | 21 | 0 | **100** | 34 | 0 | **100** |
| **Indicator Parameters** | | | | | | |
| Aluminium | 83 | 1 | **98.8** | 119 | 2 | **98.3** |
| Ammonium | 618 | 15 | **97.6** | 965 | 19 | **98.0** |
| Chloride | 150 | 0 | **100** | 189 | 0 | **100** |
| Clostridium Perfringens | 318 | 37 | **88.4** | 459 | 45 | **90.2** |
| Coliform Bacteria | 792 | 298 | **62.4** | 1,312 | 407 | **69.0** |
| Colony Count @ 22°C | 26 | 9 | **65.4** | 40 | 13 | **67.5** |
| Colour | 646 | 24 | **96.3** | 1,000 | 39 | **96.1** |
| Conductivity | 652 | 0 | **100** | 1,006 | 0 | **100** |
| Iron | 386 | 42 | **89.1** | 503 | 56 | **88.9** |
| Manganese | 276 | 35 | **87.3** | 340 | 37 | **89.1** |
| Odour | 537 | 1 | **99.8** | 800 | 1 | **99.9** |
| Oxidisability | 0 | 0 | | 0 | 0 | |
| pH | 645 | 89 | **86.2** | 998 | 122 | **87.8** |
| Sodium | 70 | 4 | **94.3** | 94 | 4 | **95.7** |
| Sulphate | 23 | 0 | **100** | 37 | 0 | **100** |
| Taste | 310 | 0 | **100** | 508 | 0 | **100** |
| Total Organic Carbon | 14 | 0 | **100** | 27 | 0 | **100** |
| Turbidity (at tap) | 629 | 46 | **92.7** | 967 | 56 | **94.2** |
| Turbidity (at WTW) | 1 | 0 | **100** | 14 | 0 | **100** |
| **Radioactivity** | | | | | | |
| Tritium | 1 | 0 | **100** | 1 | 0 | **100** |
| Total Indicative Dose | 0 | 0 | | 0 | 0 | |

# APPENDIX 4 – LIST OF ALL BOIL WATER OR RESTRICTION OF USE NOTICES PLACED ON PUBLIC WATER SUPPLIES IN THE PERIOD SEPTEMBER 2007 - SEPTEMBER 2008

| Local Authority | Name of Water Supply | Reason | Population Affected | Date |
|---|---|---|---|---|
| Laois | Luggacurran | Coliform Bacteria | 20 | Apr-06 |
| Laois | Modubeigh | Coliform Bacteria | 30 | May-07 |
| Wicklow | Ashford | Coliform Bacteria | 1,090 | Sep-07 |
| Wicklow | Knockanarrigan/Davidstown | Coliform Bacteria | 358 | Oct-07 and Feb-08 |
| Cork (West) | Coppeen | E. coli | 30 | Nov-07 |
| Fingal | Farmleigh | Copper | 140 | Nov-07 |
| Galway | Clarinbridge/Kilcolghan | Clostridium perfringens | 1,270 | Nov-07 |
| Galway | Roundstone | E. coli | 1,815 | Nov-07 |
| Wicklow | Balingate | Coliform Bacteria | 15 | Nov-07 |
| Limerick | Rockhill | Nitrate and E. coli | 1,135 | Nov-07 and Aug-08 |
| Clare | Miltown/Malbay | Aluminium | 1,600 | Dec-07 |
| Dun Laoghaire Rathdown | Killiney | E. coli | 400 | Dec-07 |
| Limerick | Carrigmore | Nitrate | 180 | Dec-07 |
| Sligo | Calry | E. coli | 220 | Dec-07 |
| Waterford | Castlreagh | E. coli | 18 | Dec-07 |
| Waterford | Scrothea | Coliform Bacteria | 10 | Dec-07 |
| Clare | Ennis[86] | *E. coli* and *Cryptosporidium* | 30,000 | Jan-08 |
| Limerick | Bruff | Lead | 360 | Jan-08 |
| Roscommon | Castlerea Urban | E. coli | 2,600 | Jan-08 |
| Clare | Killadysert | Aluminium | 1,500 | Feb-08 |
| Fingal | Harristown | E. coli | 100 | Apr-08 |
| Cavan | Dowra | Aluminium | 180 | May-08 |
| Dun Laoghaire Rathdown | Church Road | Precautionary | 50 | May-08 |
| Leitrim | Dowra | Aluminium | 40 | May-08 |
| Wicklow | Ballynavortha | Coliform Bacteria and Nitrate | 12 | May-08 |
| Cork (West) | Dursey Island | E. coli | 10 | Jun-08 |
| Cork (West) | Crosterra | E. coli | 50 | Jul-08 |
| Sligo | South Sligo | Coliform Bacteria | | Jul-08 |
| Cork (North) | Allow (Currymount) | E. coli | 80 | Aug-08 |
| Cork (North) | Mitchelstown Galtee (Ballyarthur) | E. coli | 100 | Aug-08 |
| Cork (West) | Skibberrean/Union Hall | E. coli | 2,000 | Aug-08 |
| Galway | Gort | Coliform Bacteria | 8,000 | Aug-08 |
| Kerry | Lyre (Listowel) | Precautionary | 1,500 | Aug-08 |
| Kilkenny | Ballyragget | Coliform Bacteria | 1,211 | Aug-08 |
| Kilkenny | Bennettsbridge | Coliform Bacteria | 4,174 | Aug-08 |
| Kilkenny | Paulstown | Precautionary | 1,900 | Aug-08 |
| Limerick | Caherconlish (Pallasgreen) | E. coli | 300 | Aug-08 |
| Limerick | Newcastlewest | Precautionary | 7,649 | Aug-08 |
| Longford | Ballinalee/Edgeworthstown | E. coli | 1,735 | Aug-08 |
| Mayo | Achill | E. coli | 1,000 | Aug-08 |
| Meath | Athboy | Precautionary | 3,000 | Aug-08 |
| Meath | Moynalty | Precautionary | 250 | Aug-08 |
| Offaly | Clonbullogue | Precautionary | 390 | Aug-08 |
| Roscommon | Ballinlough/Loughglynn | E.coli | 2,500 | Aug-08 |
| Roscommon | Ballyleague | E. coli | 700 | Aug-08 |
| Sligo | Kilsellagh | Colour, turbidity | 5,712 | Aug-08 |
| Sligo | Rosses Point | Colour, turbidity | 740 | Aug-08 |
| Westmeath | Ballinahown | E. coli | 100 | Aug-08 |
| Wicklow | Bray Reservoir | Coliform Bacteria | 30,000 | Aug-08 |
| Cork (North) | Labbamollaga | E. coli | 40 | Sep-08 |
| Cork (West) | Kealkill | E. coli | 330 | Sep-08 |
| Cork (West) | Leap | E. coli | 500 | Sep-08 |
| Donegal | Pollan Dam | E. coli | 1,000 | Sep-08 |

[86] The boil water notice in Ennis is a partial boil water notice and only relates to vulnerable groups in the town

# APPENDIX 5 – LIST OF DIRECTIONS ISSUED BY THE EPA TO LOCAL AUTHORITIES IN THE PERIOD SEPTEMBER 2007 TO SEPTEMBER 2008

| Local Authority | Supply | Reason for Direction | Date |
|---|---|---|---|
| South Tipperary | Killurney PWS | E.coli | 21-Sept-07 |
| South Tipperary | Tipperary UDC PWS | E.coli | 21-Sept-07 |
| Sligo | North Sligo PWS | E.coli, Coliform Bacteria, Iron and Turbidity | 24-Sep-07 |
| Cork | Killavullen PWS | E.coli | 24-Sep-07 |
| Mayo | Lough Mask Regional PWS - Taugheen, Claremorris Scheme | Coliform bacteria | 25-Sep-07 |
| Waterford | Deelish/Ballinacourty PWS | | 9-Oct-07 |
| Galway | Craughwell PWS | E.coli and Coliform Bacteria | 9-Nov-07 |
| Wicklow | Enniskerry PWS | Aluminium, E.coli, Coliform Bacteria, Clostridium perfringens and Enterococci | 20-Nov-07 |
| Wicklow | Ashford PWS | Coliform Bacteria | 20-Nov-07 |
| Galway | Clarinbridge PWS | Clostridium perfringens | 19-Dec-07 |
| Kilkenny | Callan PWS | Mercury | 2-Jan-08 |
| Longford | Longford Central PWS | Aluminium and Iron | 24-Jan-08 |
| Galway | Roundstone PWS | E.coli | 29-Jan-08 |
| Waterford | Tallow Hill PWS | E.coli | 29-Jan-08 |
| Waterford | Scrothea PWS | E.coli | 29-Jan-08 |
| Mayo | Kiltimagh PWS | Trihalomethanes | 22-Feb-08 |
| South Tipperary | Galtee Regional PWS | Aluminium | 22-Feb-08 |
| Kilkenny | Paulstown PWS | Cryptosporidium | 3-Mar-08 |
| Clare | Milltown Malbay PWS | Aluminium | 31-Mar-08 |
| Clare | Ennis PWS | Cryptosporidium | 31-Mar-08 |
| Longford | Ballinalee/Edgeworthstown PWS | Cryptosporidium | 31-Mar-08 |
| Roscommon | Castlerea Urban PWS | E.Coli, Coliform, Bacteria & Clostridium perfringens | 22-Apr-08 |
| Galway | Clarinbridge PWS | Clostridium perfringens | 20-Jun-08 |
| Cavan | Dowra PWS | Aluminum | 27-Jul-08 |
| Wexford | Davistown County Council | E.coli | 27-Jul-08 |
| Roscommon | Castlerea Regional PWS | Cryptosporidium | 11-Sep-08 |
| Mayo | Cong PWS | Cryptosporidium | 11-Sep-08 |
| Donegal | Lifford (Old) Water Supply | No Treatment | 11-Sep-08 |
| Cork | Johnstown Water Supply | No Treatment | 11-Sep-08 |
| Wicklow | Killavaney Water Supply | No Treatment | 11-Sep-08 |
| Wicklow | Ballyellis Water Supply | No Treatment | 11-Sep-08 |
| Wicklow | Ballymoneen, Avoca | No Treatment | 11-Sep-08 |
| Waterford | Smoorbeg (Carrigphillip) PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Tallow PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Tramore/Carrigavantry PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Stradbally PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Kill/Bonmahon PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Dunmore East Regional PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Deelish/Ballinacourty PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Ballyduff/Kilmeaden PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Ballyduff/Ballylemon PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Ardmore PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Ring/Helvic/Seaview PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | LCB Lismore, Cappoquinn, Ballyduff PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Waterford | Kilmacthomas PWS | Installation of Chlorine Alarm | 17-Sep-08 |
| Roscommon | Mount Talbot/Four Roads PWS | Cryptosporidium | 18-Sep-08 |
| Galway City | Galway City | Lead | 24-Sep-08 |