



The Provision and Quality of Drinking Water in Ireland

A Report for the Years 2006-2007

Environmental Protection Agency

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The Provision and Quality of Drinking Water in Ireland A Report for the Years 2006-2007

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EXECUTIVE SUMMARY

This is the first report by the Environmental Protection Agency (EPA) on the provision and quality of drinking water in Ireland since new Regulations, the European Communities (Drinking Water) Regulations (No.2), 2007, came into force in March 2007. The EPA is now the supervisory authority over public water supplies and has new powers of enforcement over local authorities in this regard. Prior to these Regulations the role of the EPA was restricted to assessment and reporting of monitoring results and the provision of advice and assistance to the local authorities. The EPA now has enforcement powers to ensure that local authorities take action where there is a quality deficiency in a public water supply and can serve a legally binding direction on the local authority. Failure to comply with a direction is an offence which can lead to prosecution by the EPA.

The format of this report departs from previously published reports on drinking water in that, in addition to presenting the results of monitoring completed by local authorities on drinking water supplies, it presents the enforcement actions taken using new powers granted to the EPA under the March 2007 Regulations. Issues identified by the EPA during compliance checking on the safety and security of water supplies are also presented in this report.

The **safety** of water supplies in Ireland is determined by comparing the results of over 220,000 monitoring tests carried out on 944 public water supplies, 777 public group water schemes, 706 private group water schemes and 624 small private supplies with the drinking water standards. In Ireland, the majority of drinking water (83%) originates from surface water (i.e. rivers and lakes) with the remainder originating from groundwater (11%) and springs (6%).

The **security** of water supplies is determined by assessing the supplies 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; and
- Management of the supply during normal and incident conditions by personnel adequately trained and resourced to deliver clean and wholesome drinking water.

The main findings of this report are.

Safety

- *E. coli*, an indicator of whether human or animal waste has entered the water supply, was detected in less than 1% of all samples taken in public water supplies; however, *E. coli* was detected in 77 out of 944 public water supplies indicating intermittent contamination of over 8% of public water supplies;
- The quality of group water schemes continues to be inferior to public water supplies. *E. coli* was detected in almost 36% of private group water schemes. This means that 246 out of 688 schemes monitored were contaminated at least once during 2006;
- There continues to be inadequate monitoring of 123 public group water schemes. Many Councils are not monitoring these schemes once the water leaves the parent public water supply;
- There was satisfactory compliance (99.3%) with the 26 chemical parameters across all water supplies, however, compliance is in need of improvement for some parameters (e.g. fluoride, nitrate, trihalomethanes and lead);
- Compliance with the 21 indicator parameters, specified in the Regulations, which are generally an indicator of performance at the treatment plant, was not satisfactory. The two most significant indicator parameters in the Irish context are turbidity and aluminium.

- Although limited monitoring was reported, the results indicate that almost 40% of treatment plants monitored did not meet the turbidity standard of 1.0 NTU at the treatment 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, if present in the raw water. Plants with high turbidity are at increased risk of contamination with *Cryptosporidium*;
- 16% of public water supplies reported aluminium exceedences. Exceedences of the aluminium standard usually indicate operation of the treatment plant above design capacity, poor management of the treatment plant or inadequate management of the distribution network.

Security

The EPA has identified 339 public water supplies representing 36% of all public drinking water supplies that require detailed profiling as a result of.

- 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 coming 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; and
- Supplies identified by the Health Service Executive where improvements are required.

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.

Enforcement

- Notifications received by the EPA in the six months since the enactment of the March 2007 Regulations indicate that 21 supplies serving over 113,000 persons either had a boil water notice or restriction of use placed on them (e.g. do not drink). This situation is unacceptable.
- The EPA carried out 28 audits of local authorities or individual water treatment plants in 2007. Issues were identified at all the treatment plants audited.
- The EPA has issued binding directions to 10 local authorities to comply with the Drinking Water Regulations in the first six months of the Regulations.

In evaluating the data that has been submitted to the EPA for 2006, it is evident that point sampling of drinking water, which provides only a snapshot of the quality of the water supply, can no longer be relied upon as the sole indicator of a safe and secure drinking water supply. In order for a supplier to provide a safe and secure drinking water supply, all risks associated with the supply must be identified, monitored and managed to ensure that the relevant drinking water quality standards are met each time the supply is tested. The ability of water suppliers to provide clean and wholesome drinking water will now be determined by a wider range of assessment, controls and management than has previously been the case. Compliance with the 48 parameters specified in the Drinking Water Regulations of March 2007 has to be taken as the minimum requirement and not a requirement to be achieved over a number of years.

Key Recommendations of This Report are:

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 from catchment to consumer to determine the risks to a safe and secure water supply.

Upgrading, replacement or closure of plants - There are presently at least 64 supplies that have inadequate treatment (i.e. supplies which originate from surface water and have no treatment other than chlorination) and need to be upgraded or replaced. In total, the EPA has identified 339 supplies that require profiling to ensure that the supply is providing clean and wholesome drinking water.

Monitoring of the Water Supply from Catchment to Consumer

Monitoring of drinking water supplies - Water suppliers cannot give assurances to their consumers on drinking water quality unless they monitor at the frequency and scope required by law. Water suppliers must ensure that supplies within their functional area are monitored to at least the minimum frequency required under the Drinking Water Regulations.

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.

Operation of treatment plants - Failure by water suppliers to 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*) put populations served by those water supplies at risk. Water suppliers should avail of the contingency fund provided by the Department of Environment, Heritage and Local Government (Circular L7/07) for the installation of such equipment where funding has not already been provided for this purpose.

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 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.

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 up to date monitoring results of their water supplies on their websites on a regular basis.

Enforcement

Enforcement of the Drinking Water Regulations 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 must be assessed by determining the safety (compliance with the standards) and security (identification, monitoring and management of risk) of public water supplies. Local authorities must use the enforcement options available to them under the March 2007 Regulations to eliminate the supply of water to members of the public from private group water schemes that is unfit for human consumption.

1 THE PROVISION OF SAFE AND SECURE DRINKING WATER

1.1 Introduction

This report, "*The Provision and Quality of Drinking Water in Ireland 2006 - 2007*" is the seventeenth in a series of drinking water reports published by the Environmental Protection Agency 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 Drinking Water Regulations. This involves the collection of results on an annual basis from local authorities and carrying out 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. These Regulations assigned new powers and responsibilities to the EPA in the drinking water area. Since March 2007 the new 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; and
- Publish guidance on how local authorities are to implement the Regulations including binding guidelines on auditing.

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.

It is important to note that the 2007 Regulations do not provide the EPA with powers to prosecute a water supplier for supplying water that causes illness or water that is not clean and wholesome. In general, the powers available to the EPA under the new Regulations relate to the performance of the local authority in respect of any (EPA) direction. In other words the EPA may prosecute a local authority only if they fail to comply with an EPA Direction. Thus, the new 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. A more detailed discussion of the Regulations is given in Appendix 2.

The quality of drinking water in Ireland was brought forcefully to the attention of the Irish public with the outbreak of cryptosporidiosis in Galway during 2007, which caused illness in over 240 people, and led to the imposition of a boil water notice in Galway for a period of 5 months during the peak tourist season. While many have taken the quality of drinking water in Ireland for granted in the past, this can no longer be the case. Water suppliers are obliged by law to supply water that is both wholesome and clean.

Since taking on new responsibilities the EPA has adopted a water safety plan approach to ensuring drinking water is 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.

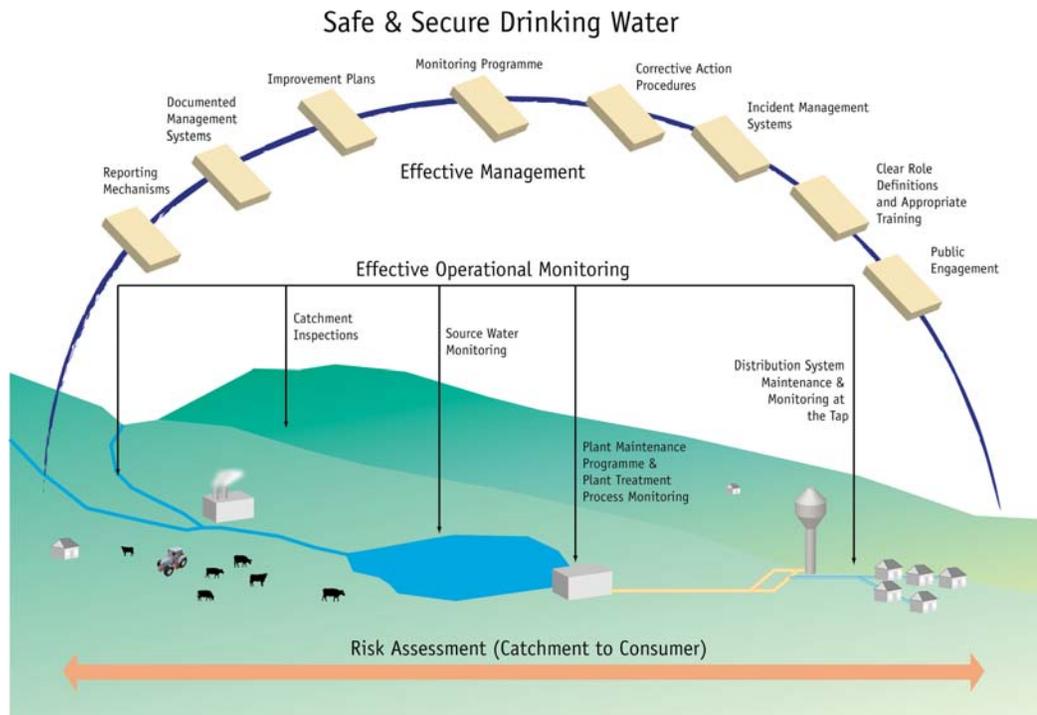


Figure 1-1. Essential Components of a Drinking Water Safety Plan.

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

- **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.
- **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.
- **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.

Implementation of the recommendations of the World Health Organisation 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 (Figure 1-1).

The current report covers the quality of drinking water in Ireland in 2006 (prior to the EPA's new powers) and the enforcement actions taken in 2007 using the new 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 Enforcement of the Drinking Water Regulations

Enforcement of the Drinking Water Regulations by the EPA will be risk based and will be 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 will be assessed by determining the safety (compliance with the standards) and security (identification, monitoring and management of risk) of public water supplies.

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. 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 four distinct categories of water supply in Ireland, of which the latter three 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 single houses. The majority of these supplies are exempt from the requirements of the Regulations, except where the water is supplied as part of a public or commercial activity. These supplies serve approximately 10% of the population.

This report and the assessment of monitoring carried out covers the year 2006 (i.e. before the changed role of the EPA). The number of water supply zones monitored during 2006 and falling into each of these categories and the percentage of the total population served is given in

Table 1-1. There has been an apparent increase in the number of public group water schemes in 2006 (777 in 2006 up from 765 in 2005), 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 been a significant increase in the number of private supplies that supply water as part of a public or commercial activity identified by local authorities in 2006. A total of 624 such supplies have been identified by 18 local authorities as being required to meet the requirements of the Drinking Water Regulations, of which 523 were monitored during 2006 (up from 255 in 2005). Notwithstanding the improvements in the identification and monitoring of these private water supplies, a large proportion of local authorities have still not identified such supplies. There are undoubtedly many more private water supplies that come within the remit of the Drinking Water Regulations in Ireland but some local authorities have

not identified these supplies in their functional area as is required under Regulation 7 of the drinking water regulations.

Table 1-1. Water Supply Zones in 2006 and the Proportion of the Population Served.

Type of Supply	No. of Water Supply Zones ¹	Percentage of Total Population Served
Public Water Supply	944	81.8%
Public Group Water Scheme	777	3.2%
Private Group Water Scheme	706	6.0%
Small Private Supply	624	0.3%
Exempted Supplies²	Unknown	8.7%

In Ireland, the majority of drinking water (83%) originates from surface water (i.e. rivers and lakes) with the remainder originating from groundwater (11%) and springs (6%). 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.

1.2.1 Public Water Supplies – Enforcement by the EPA

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. A guidance booklet was produced in November 2007 by the EPA and circulated to water suppliers to make them aware of their new obligations. This guidance booklet is available on the EPA website (www.epa.ie). A summary of the notifications received and actions taken by the EPA is outlined in this section.

The notifications received in the first six months of the Regulations indicate that 21 supplies serving over 113,000 persons either had a boil water notice or restriction of use placed on them (e.g. do not drink). The most common notification of drinking water contamination received by the EPA related to *E. coli*, an indicator of faecal contamination. A full list of all supplies reported to the EPA which had a boil water or restriction of use notice placed on the supply are listed in Table 1-2.

¹ A water supply zone is a geographically defined area within which drinking water comes from one or more sources and water quality is uniform.

² Exempted supplies are supplies that are provided from either an individual supply providing less than 10m³ 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).

Table 1-2. List of all Boil Water or Restrictions of Use Placed on Supplies During the First Six Months of the New Regulations.

Local Authority	Name of Water Supply	Reason	Population Affected	Date
Clare	Miltown/Malbay	Aluminium	1,600	May-07
Cork	Adrigole	<i>E. coli</i>	200	Aug-07
Cork	Dromore	<i>E. coli</i>	50	Jul-07
Fingal	Leixlip (Knocksedan)	<i>E. coli</i>	500	Aug-07
Galway City	Galway City Supply	<i>Cryptosporidium</i>	90,000	Mar-07
Galway	Headford	<i>Cryptosporidium</i>	see Galway City	Mar-07
Galway	Luimnagh	<i>Cryptosporidium</i>	see Galway City	Mar-07
Galway	Mid Galway	<i>E. coli</i>	2,083	Jul-07
Kerry	Glenbeigh	Coliforms	750	Aug-07
Laois	Luggacurran	Coliforms	20	May-07
Laois	Modubeigh	Coliforms	30	Apr-07
Limerick	Ballingarry	Nitrate	562	Mar-07
Mayo	Cong	<i>Cryptosporidium</i>	500	Mar-07
Mayo	Swinford	<i>E. coli</i>	2,000	Sep-07
Mayo	Lough Mask (part)	<i>E. coli</i>	700	Sep-07
Meath	Ballivor	<i>E. coli</i>	1,280	Aug-07
Sligo	North Sligo Regional	<i>E. coli</i>	N/A	Jul-07
South Tipperary	Clonmel	<i>Cryptosporidium</i>	11,500	Jul-07
Waterford	Ballinacourty/Deelish	Turbidity	1,500	Jun-07
Wicklow	Ballinaclash/Avoca	<i>E. coli</i>	1,349	March + July 2007
Wicklow	Windgates/Templecarrig	<i>E. coli</i>	300	Jun-07

The EPA carried out 28 audits of water treatment plants in 2007. The EPA has issued binding directions to 10 local authorities and compliance with the Directions issued is being monitored to determine if further enforcement action, up to and including prosecution, is warranted. In the eight months since these Regulations were signed into law the EPA has redirected its resources to the drinking water area. A summary of the enforcement work completed is as follows:

Table 1-3. Summary of Notifications Received and Enforcement Action in 2007³.

Action	No.
No. of notifications under Reg. 9 or 10 received	59
No. of directions issued by the EPA	
• Regulation 9 Direction	2
• Regulation 10 Direction	12
• Regulation 16 Direction	1

³ The number of notifications and directions served is correct up to the 8th September 2007 (i.e. the first six months of the Regulations).

Table 1-4. Reason for Notifications to the EPA.

Reason	No. of Notifications
<i>E. coli</i>	20
Coliform bacteria	19
Cryptosporidium	4
Nitrate	3
Aluminium	3
Fluoride	3
Enterococci	2
<i>Clostridium perfringens</i>	2
Iron	1
Pesticides	1
Turbidity	1

Table 1-5. List of Directions Issued by the EPA in 2007³.

Regulation	Local Authority	Supply	Parameter	Date
10	Limerick County	Ballinagarry WS	Nitrate	04/04/2007
10	Laois	Modubeigh PWS	Coliform bacteria	11/05/2007
16	Galway City	Terryland Old WTW	<i>Cryptosporidium</i>	15/05/2007
10	Clare	Miltown-Malbay PWS	Aluminium	24/05/2007
10	Laois	Luggacurran PWS	Coliform bacteria	24/05/2007
10	South Tipperary	Killurney PWS	<i>E. coli</i> /Coliforms	20/06/2007
9	Wicklow	Windgates/Templecarrig PWS	<i>E. coli</i> /Coliforms	20/06/2007
9	Waterford County	Deelish/Ballinacourty PWS	Turbidity	28/06/2007
10	Offaly	Daingean PWS	Nitrate	11/07/2007
10	Offaly	Shinrone/Brosna PWS	Pesticide	11/07/2007
10	Offaly	Dunkerrin PWS	Nitrate	11/07/2007
10	South Tipperary	Tipperary UDC PWS	<i>E. coli</i>	23/07/2007
10	Cork County	Dromore PWS	<i>E. coli</i>	30/07/2007
10	Cork County	Drimoleague PWS	<i>E. coli</i>	30/07/2007
10 and 16	Galway County	Craughwell PWS	<i>E. coli</i> /Coliforms	31/08/2007

1.2.2 Group Water Schemes

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 2006 shows that 246 schemes or 35.8% of all schemes monitored were contaminated with *E. coli*. The number of contaminated schemes in each county is shown in Figure 1-2.

There has been significant progress in upgrading of quality deficient schemes nationally. The procurement of new water treatment facilities under bundled Design Build Operate (DBO) contracts is a key element in the overall strategy towards addressing non-compliance with quality parameters in privately sourced group water schemes. The National Federation of Group Water Schemes (NFGWS 2007) has reported that bundled Design Build Operate (DBO) water treatment projects were completed in counties Cavan, Monaghan and Sligo in 2006. Further bundled DBO treatment plant projects across counties Clare, Galway, Limerick and Mayo got underway during 2006. Many other DBO projects were on schedule to commence construction during 2007. By the end of 2006, 79 new DBO treatment plants were in place supplying water to approximately 27,000 households across 84 previously non-compliant group water schemes. This equates to approximately 50% of the households depending on

privately sourced group water schemes which had been identified for DBO solutions. Figures from the Department of Environment, Heritage and Local Government indicate that 60% of identified non-compliant group water schemes had been upgraded by the end of April 2007, compared to 34% in June 2006 (*Rural Water Conference 2007*).

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. A person guilty of an offence under these Regulations is liable to on summary conviction to a fine up to €5,000 and/or imprisonment for a period up to 3 months or on conviction on indictment, a fine of up to €500,000 and/or imprisonment for a period of up to 3 years. 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.

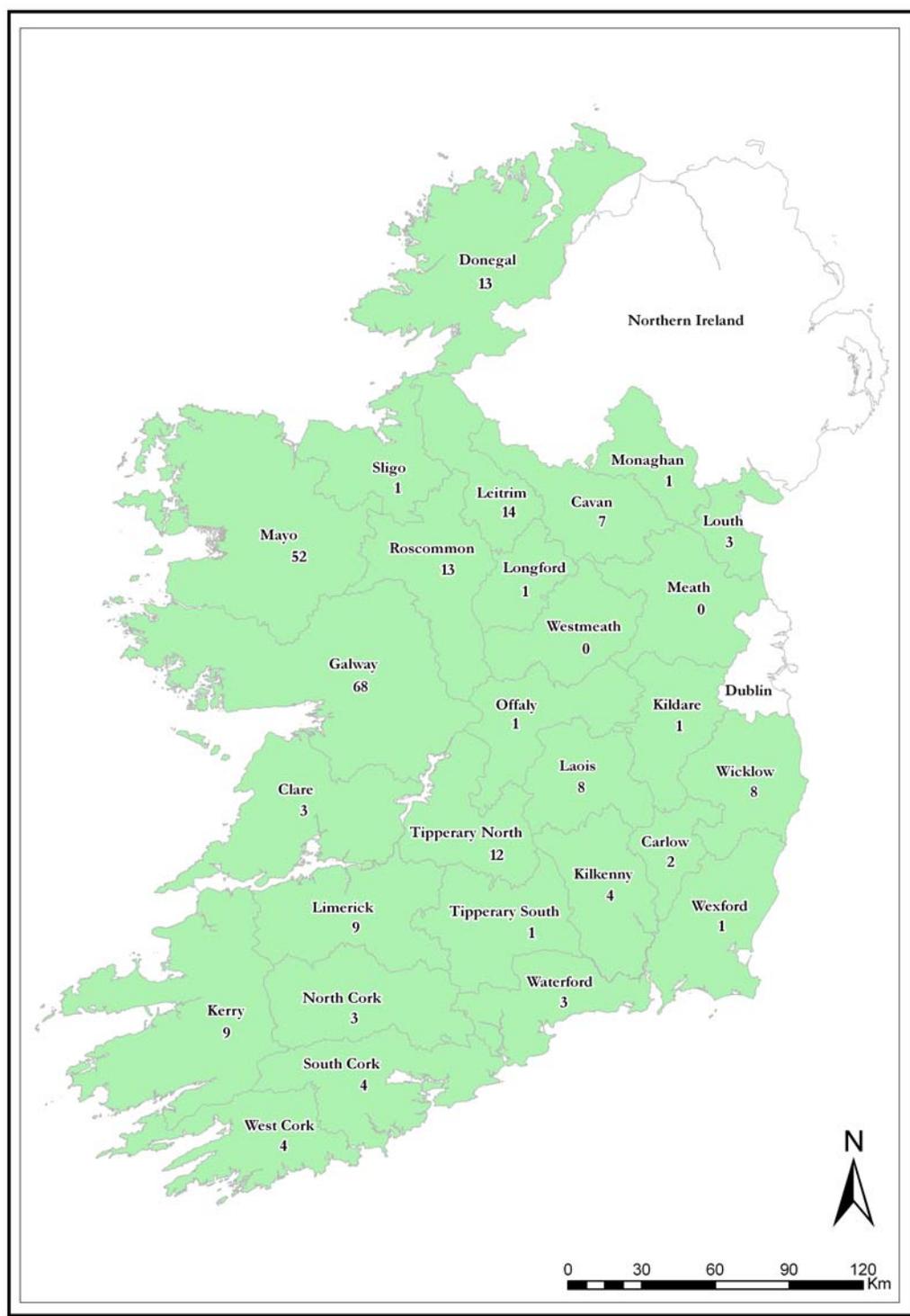


Figure 1-2. Number of Private Group Water Schemes Contaminated with *E. coli* during 2006⁴.

⁴ There are no group water schemes serving >50 persons in any of the four Dublin local authority areas.

1.3 Galway City *Cryptosporidium* Outbreak

A large outbreak of cryptosporidiosis in Galway was detected as a result of the increased number of cases of cryptosporidiosis observed in the Galway area in the first three months of 2007. These cases were predominantly clustered around an area supplied by the Luimnagh, Headford, Terryland Old and Terryland New treatment plants. These plants serve a population of approximately 90,000. As a consequence, in March 2007, the level of monitoring was increased for the parasite *Cryptosporidium*. The results indicated that the parasite was not being removed by the treatment plants in Headford and Terryland Old and as a consequence on 15th March 2007, the local authorities in consultation with the Health Service Executive, placed a boil water notice on the affected supplies. Since this outbreak occurred the Headford and Terryland Old plants have shut down while further treatment barriers in the form of UV treatment were installed at the Terryland New treatment plant. The treatment plant at Luimnagh has been upgraded and the capacity increased to replace the production of drinking water at Headford and Terryland Old. The boil water notice was consequently lifted on 20th August 2007. In total, the Health Service Executive reported that 242 cases of cryptosporidiosis were associated with the outbreak.

Following confirmation that the Galway outbreak was as a result of drinking water contamination the EPA carried out inspections of the Terryland New, Terryland Old and Luimnagh plants. As a result of these inspections, the EPA issued a direction to Galway City Council requiring specific actions to be taken within a specific timeframe. These were as follows:

1. To cease mixing treated water from the Terryland New water treatment plant with the treated water from the Terryland Old water treatment plant;
2. To cease the use of water supplied by the Terryland Old water treatment plant;
3. To install turbidity meters on the filtered water in the Terryland New water treatment plant and link them to their Supervisory Control And Data Acquisition (SCADA) system; and
4. To install UV treatment on the water leaving the Terryland New water treatment plant.

These actions were completed by Galway City Council though the works were not finished with the timeframes directed. The delays experienced by Galway City Council were due to:

- o The tendering and procurement required;
- o The sourcing of the treatment units in Canada; and
- o The extent of the civil and electrical engineering works.

The reasons for the delays experienced were assessed by the EPA and were deemed valid. The EPA considers that the direction achieved its aim of improving the safety and security of the water supply in Galway City into the medium term. In view of this, and in light of the powers granted under the Drinking Water Regulations, the EPA is not considering further enforcement action at this time.



Figure 1-3. Pressure Filters at the now closed Terryland Old water treatment plant in Galway City.

1.4 Safe and Secure Drinking Water Supplies

Point sampling of drinking water, which provides only a snapshot of the quality of the water supply on the day the sample is taken, can no longer be relied upon as the sole indicator of a safe and secure drinking water supply. In order for a water supply to be safe, all risks associated with the supply must be managed in order that the relevant drinking water quality standards are met each time the supply is tested. To be secure, the water supplier must have in place a management system that has identified all potential risks and reduction measures to manage these risks. The need for both a safe and secure water supply is evidenced by the fact that in 2006 the supply for Galway City was sampled over 500 times and determined to have a compliance rate of 99.1%, which was above the national average. However, what was not acted upon were the elevated levels of turbidity, an indicator of whether there is an effective barrier to *Cryptosporidium*, and the fact that the supply was previously classified as very high risk in relation to contamination with *Cryptosporidium*.

1.4.1 Safe Drinking Water

As assessment of the safety of drinking water can be carried out by assessing compliance with the requirements of the drinking water quality standards. Compliance with the drinking water requirements is determined by comparing the results of analyses submitted by water suppliers to the standard for 48 parameters specified in the European Communities (Drinking Water) Regulations (No.2), 2007. Water suppliers submitted the results of over 220,000 individual analysis carried out in 2006. This represents an increase of 10% in the number of tests carried out on drinking water in Ireland from 2005. In particular, there was an increase of almost 50% in the number of tests carried out in public group water schemes. Table 1-6 is colour coded as red, amber and green, with green denoting 100% compliance, amber denoting less than 2% non-compliance and red indicating above 2% non-compliance. Full details of compliance with all parameters in each of the supply categories is given in Appendix 4.

Table 1-6. Compliance with Drinking Water Standards by Supply Category⁵.

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						
<i>E. coli</i>	98	0.9%	16	1.2%	408	17.9%
<i>Enterococci</i>	29	1.2%	2	0.9%	33	10.9%
Chemical Parameters						
Antimony	1	0.1%	0	0%	0	0%
Arsenic	1	0.1%	0	0%	1	0.4%
Benzene	0	0%	0	0%	0	0%
Benzo(a)pyrene	0	0%	0	0%	0	0%
Boron	0	0%	0	0%	1	0.5%
Bromate	4	0.4%	0	0%	1	0.5%
Cadmium	0	0%	0	0%	0	0%
Chromium	0	0%	0	0%	0	0%
Copper	4	0.3%	0	0%	0	0%
Cyanide	0	0%	0	0%	0	0%
1,2-dichloroethane	0	0%	0	0%	0	0%
Fluoride	118	3.2%	24	8.1%	3	1.1%
Lead	25	1.6%	0	0%	0	0%
Mercury	1	0.1%	0	0%	0	0%
Nickel	2	0.1%	0	0%	0	0%
Nitrate	19	0.4%	6	0.8%	26	2.0%
Nitrite (at tap)	8	0.2%	1	0.1%	0	0%
Nitrite (at WTW)	6	<0.9%	1	2.6%	0	0%
Pesticides - Total	2	0.2%	0	0%	0	0%
PAH	0	0%	0	0%	1	0.4%
Selenium	1	0.1%	0	0%	0	0%
Tetrachloroethene/Trichloroethene	1	0.1%	0	0%	0	0%
THMs	80	4.3%	8	1.9%	5	1.2%
Indicator Parameters						
Aluminium	496	7.1%	91	11.7%	20	3.2%
Ammonium	13	0.1%	2	0.1%	15	0.7%
Chloride	4	0.3%	0	0%	0	0%
Clostridium perfringens	115	1.4%	17	1.6%	159	14.5%
Colour	512	4.9%	66	4.8%	263	12.4%
Conductivity	2	<0.1%	0	0%	2	0.1%
pH	469	4.5%	45	3.3%	129	6.0%
Iron	367	7.1%	79	8.1%	124	9.3%
Manganese	102	3.6%	20	3.0%	83	7.8%
Odour	104	1.1%	7	0.7%	24	1.8%
Oxidisability	0	0%	0	0%	0	0%
Sulphate	0	0%	0	0%	0	0%
Sodium	5	0.4%	0	0%	0	0%
Taste	43	0.6%	0	0%	0	0%
Colony count 22C	98	5.8%	3	3.0%	56	26.4%
Coliform bacteria	683	6.3%	100	7.0%	705	30.9%
TOC	28	2.5%	2	0.9%	9	3.7%
Turbidity (at tap)	62	0.6%	12	1.0%	55	2.8%
Turbidity (at WTW)	293	12.7%	4	13.3%	10	25.6%
Radioactivity						
Tritium	0	0%	0	0%	0	0%
Total indicative dose	0	0%	0	0%	0	0%

Chapter 2, 3 and 4 provide 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.

⁵ This assessment of compliance is based on results submitted.

1.4.2 Secure Drinking Water

The EPA has carried out an initial assessment of the security of drinking water supplies in Ireland based on the results of monitoring submitted to the EPA for 2006 and the audits carried out during 2007. This information is discussed in the following sections.

1.4.2.1 Remedial Action List of Public Water Supplies

The EPA has 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 EPA will focus its efforts on the supplies in this Remedial Action List to ensure full compliance with the requirement to provide clean and wholesome drinking water. This list of supplies that require remedial action is not an exhaustive list and additional supplies may be 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.

These supplies are considered to be a priority for improvement or further assessment 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 coming 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; and
- Supplies identified by the Health Service Executive where improvements are required.

What Needs to be Done

- All plants operated by local authorities must be profiled from catchment to consumer to determine the risks to a safe and secure water supply;
- Water suppliers must adopt the recommendations of the World Health Organisation as part of robust Drinking Water Safety Plans; and
- Local authorities with at risk supplies, including those supplies on the Remedial Action List, must manage the risks identified by either abandoning or replacing the source, upgrading the treatment facilities or improving operational and maintenance arrangements.

1.4.2.2 Monitoring of Water Supplies

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 the water quality.

All populations receiving drinking water from water supplies that are not monitored should be considered to be at risk of poor water quality. In 2006, no monitoring was carried out at 1.3% of public water supplies, 15.8% of public group water schemes and 1.8% of private group water schemes. In particular, there was no monitoring of 123 public group water schemes. The relevant local authorities are not monitoring these schemes once the water leaves the parent public water supply. These supplies collectively serve a population of over 18,000 persons.

Table 1-7. Summary of the Water Supply Zones (WSZs) Monitored in 2006.

Parameter	Estimated No. of Supplies	No. of WSZs Not Monitored	Estimated Population Served
Public Water Supplies	944	12 (1.3%)	899
Public Group Water Schemes	777	123 (15.8%)	16,033
Private Group Water Schemes	706	13 (1.8%)	1,525
Overall	2,427	148 (6.1%)	18,487

Table 1-7 indicates that over 6% of water supplies in Ireland were not monitored at all during 2006, the majority of which were public group water schemes. While this is an improvement compared to 2005 where over 14% of supplies were not monitored, there is still a significant deficiency and 14 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 large number of supplies were not monitored at the required frequency, primarily due to insufficient check samples being analysed. EPA audits of local authorities have indicated that the majority of local authorities had developed monitoring programmes that outline their intention to carry out monitoring at the minimum frequency required by the Regulations. Therefore, it is clear that local authorities are aware of their monitoring obligations but are simply failing to implement the planned monitoring programme.

Failure by water suppliers to 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*) put populations served by those water supplies at risk. In 2007, 17 of the 28 plants audited had no residual chlorine monitor on the final water leaving the plant at the time of the audit. Additionally a total of 19 of the 28 plants audited had no turbidity monitoring on their filtered water.

What Needs to be Done

- 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. In this regard the water supplier will need to regularly monitor the raw water to assess trends in quality while the catchment or zone of contribution of the water supply will need to be delineated.
- Monitor water supplies to at least the frequency specified in the Regulations. Local authorities should follow the guidance in the EPA handbook. Revised guidance on development of monitoring programmes will be circulated to all local authorities in 2008.
- Install continuous turbidity monitors on each filter and the final treated water at the water treatment plant. All treatment plants should also have a continuous chlorine residual monitor on the final water. These monitors should be alarmed and linked to a recording device to ensure that either a sudden increase in chlorine demand or turbidity or a failure of the chlorine dosing system or filters is immediately detected.
- During audits of local authorities the EPA will review monitoring programmes and where inadequacies are identified the EPA will direct the local authority to amend the monitoring programme. Future EPA audits will also examine the local authorities approach to risk monitoring in the water supply from catchment to consumer.

1.4.2.3 Management of Water Supplies

The production of safe and secure drinking water requires resources, technical knowledge and competent management. Competent management is not only required during normal conditions, but also during incident conditions. A key aspect is the preparation of

documented management procedures that are communicated to all those involved in the management of the water supply.

Consumers expect their drinking water to comply with standards and should be informed by their water supplier when this expectation is not met.

During audits carried out during 2006 and 2007 the EPA has determined that;

- There is a need to improve awareness of the potential risks to the provision of safe and secure drinking water;
- Some treatment plant operators have not received appropriate ongoing training and/or supervision;
- Actions taken to resolve exceedances have tended to be temporary fixes (e.g. increasing the chlorine dose) rather than finding and resolving the causes of the non-compliance;
- The level of ongoing maintenance and investment in many treatment plants is poor. This has resulted in the deterioration of plants to such a state that they are not capable of operating as originally designed;
- In some cases no assessment or management of the catchment risks and source water quality was being carried out and hence management practices at the plant are not responding to the quality of source water or risks in the catchment;
- The management of drinking water sludges in some treatment plants was inappropriate and in breach of the Waste Management Act; and
- Chemical storage at a number of plants was insufficient and presented a risk to the environment. The majority of plants were storing chemicals in unsuitable conditions and chemicals were being stored in unbunded areas, inadequately banded areas or fill points were located outside banded areas.

What Needs to be Done

- Local authority senior management 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 must be trained for each treatment process for which they are required to operate at the plant;
- 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; and
- 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.

2 COMPLIANCE WITH THE MICROBIOLOGICAL STANDARDS

The most important indicators of drinking water quality in Ireland are the microbiological parameters and, in particular, *Escherichia coli* (*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.

2.1 *Escherichia coli* (*E. coli*) and Enterococci

2.1.1 Compliance with the *E. coli* Standard

In 2006, a total of 602 samples in 405 supplies (out of 2,808 supplies) failed to meet the standard for *E. coli* at one time or more during the year. This represents a compliance rate of 96.0% of samples and 85.6% of water supplies. The main reason that the overall number of supplies failing increased to 405 (up from 348 in 2005) was due to an increase in the number of group water schemes and private water supplies monitored, and thus as more were monitored, more failed. Overall, 14.4% of water supplies were contaminated with *E. coli* at least once during 2006, an improvement from 15.3% in 2005. The majority of the contaminated supplies were private group water schemes (Table 2-1). It is worthy of note that the majority of exceedances in public water supplies (those that serve 82% of the population) were found in the smaller public water supplies and that the rate of compliance in the large public water supplies (serving greater than 5,000 people) was 99.7% in 2006 (down slightly from 99.8% in 2005).

Table 2-1. Summary of Water Supply Zones (WSZs) Contaminated with *E. coli* in 2006.

	No. of WSZs Monitored	No. with Exceedances	No. with Serious Exceedances ⁶
Public Water Supplies	931	77 (8.3%)	20 (2.1%)
Public Group Water Schemes	666	12 (1.8%)	4 (0.6%)
Private Group Water Schemes	688	246 (35.8%)	91 (13.2%)
Small Private Supplies	523	70 (13.4%)	15 (2.9%)
Total	2,808	405 (14.4%)	130 (4.6%)

The majority of the population (82%) receive their water from public water supplies, but a sizeable proportion (6%) get their water from private group water schemes. The contamination of water supplies with *E. coli* is significantly worse in group water schemes than for public water supplies. It is not acceptable for *E. coli* to be present in 35.8% of group water schemes (246 supplies) or 8.3% of public water supplies (77 supplies). Although there has been a reduction in the percentage of public water supplies contaminated during 2006 (8.3%, down from 9.7% in 2005), the proportion of private group water schemes contaminated during 2006 remained essentially unchanged (35.8%, down from 36.2% in 2005) (Figure 2-1).

⁶ 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.

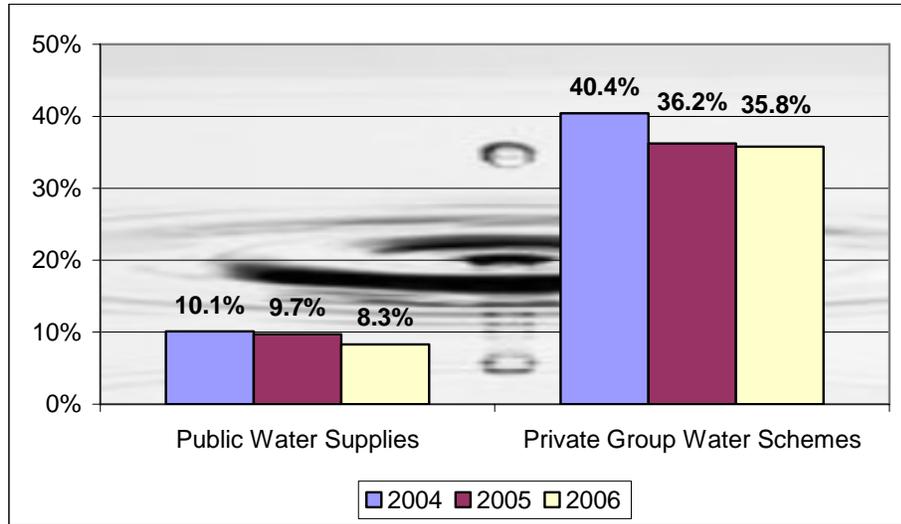


Figure 2-1. Percentage of Supplies Contaminated with *E. coli* during the period 2004 to 2006.

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 slightly (99.1% and 98.8% respectively). However, the percentage of samples complying with the *E. coli* parametric value in private group water schemes is unacceptably low at 82.1%, while that in the small private supplies was also unsatisfactory at 89.3%.

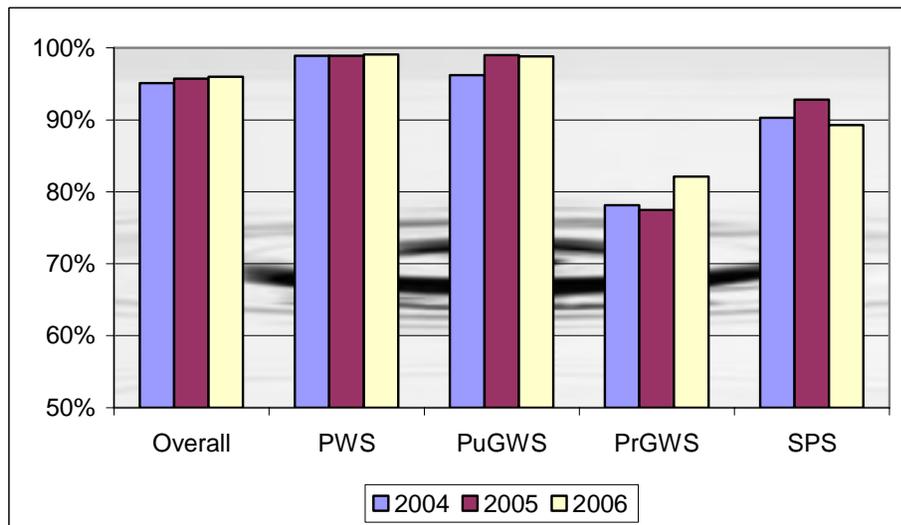


Figure 2-2. Compliance with the *E. coli* Parametric Value During the Period 2004-2006 Based on the Number of Samples.

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), though a significant proportion were serious (>20 cfu/100ml), very serious (>50 cfu/100ml) or gross (>200 cfu/100ml) (Figure 2-3).

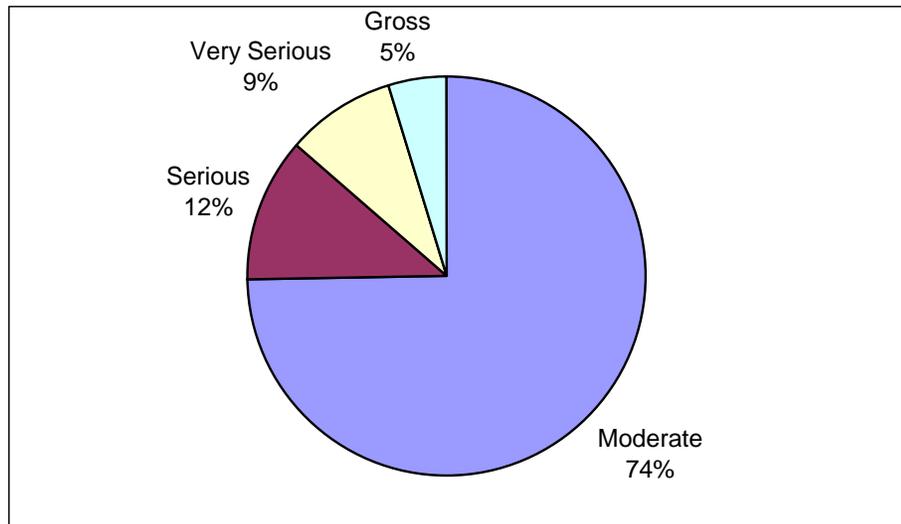


Figure 2-3. Classification of *E. coli* Non-Compliances in Public Water Supplies in 2006.

In 2006, 11 local authorities reported that all public water supplies within their functional area were fully compliant with the *E. coli* parametric value, a decrease from 12 in 2005, while a further 12 local authorities reported compliance in excess of 99% (a decrease from 13 in 2005).

In 2006, just 2 local authorities (down from 3 in 2005) 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. Of concern is the fact that more than a quarter of group water scheme samples analysed in South Cork (29%), West Cork (31%), Donegal (56%), Kerry (44%), Leitrim (41%), Mayo (36%), Roscommon (31%) and Waterford (60%) were contaminated during 2006.

The local authorities with the largest number of contaminated group water schemes in 2006 were Galway (68), Mayo (52), Leitrim (14), Donegal (13), North Tipperary (13), Roscommon (13) and Cork (11).

All public water supplies which reported more than one incident of contamination in the period 2004 to 2006 and where the contamination was not due to contamination of the tap are shown on the map in Figure 2-4.

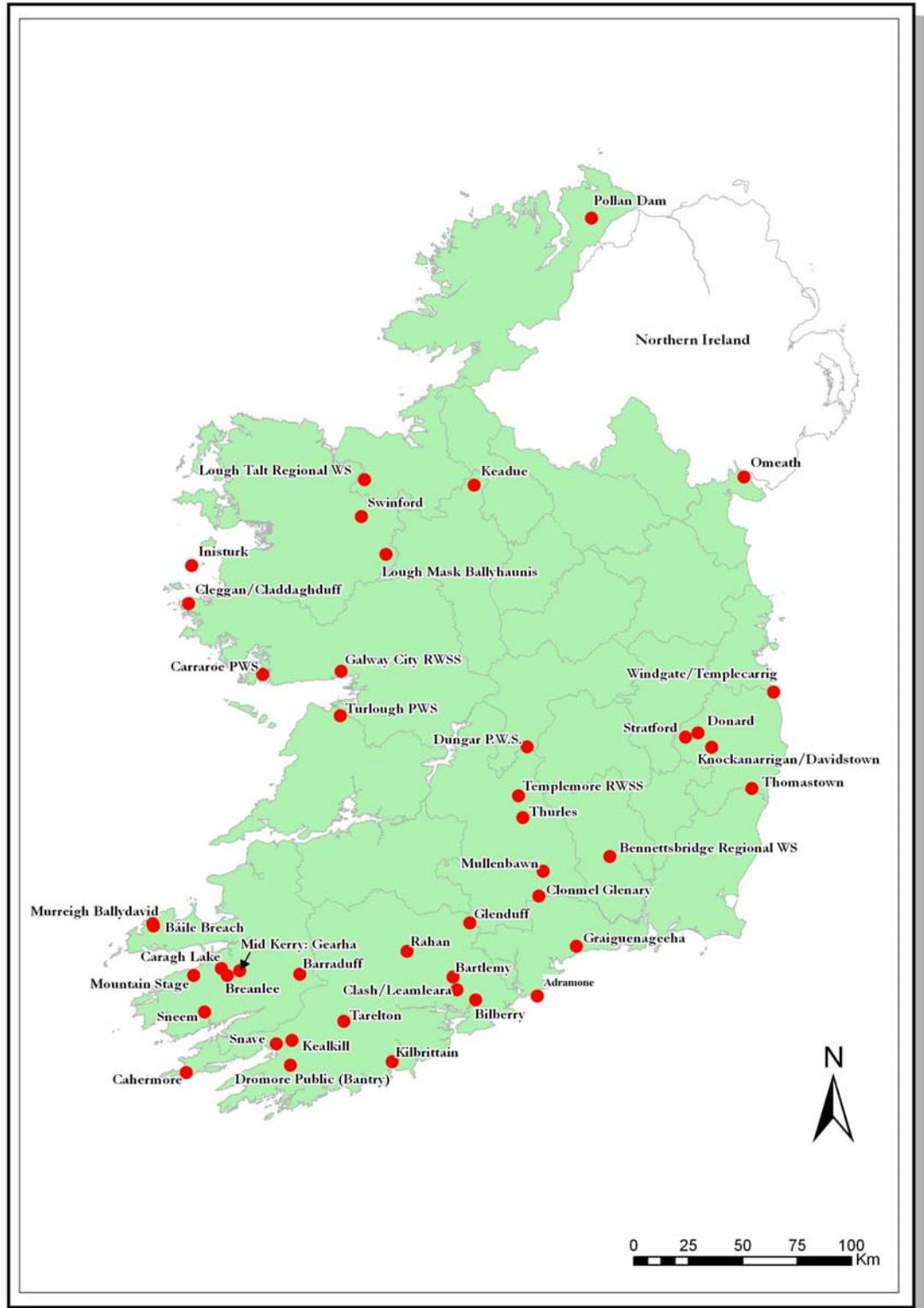


Figure 2-4. Map of Public Water Supplies that were contaminated with E. coli more than once during the period 2004 to 2006.⁷

⁷ Galway City RWSS refers to the supply originating from Galway City but supplying the regional area outside the city. The regional supply became contaminated in the distribution network in 2006 and not in the treatment plant itself.

2.1.2 Compliance with the Enterococci Standard

The results of monitoring for enterococci (Table 2-2) mirror those of *E. coli* with a relatively high level of compliance in the public water supplies and the public group water schemes but with a much higher level of contamination evident in the private group water schemes and the private water supplies.

Table 2-2. Summary of Compliance with the Enterococci Parametric Value in 2006.

	No. of WSZs Monitored	No. of Non-Compliant WSZs	No. of Samples Analysed	No. of Non-Compliant Samples
Public Water Supplies	712	26 (3.7%)	2,342	29 (1.2%)
Public Group Water Schemes	153	2 (1.3%)	226	2 (0.9%)
Private Group Water Schemes	210	30 (14.3%)	303	33 (10.9%)
Small Private Supplies	193	33 (17.1%)	316	35 (11.1%)
Total	1,268	91 (7.2%)	3,187	99 (3.1%)

2.1.3 Actions to Eliminate *E. coli* and Enterococci Contamination

Local authorities must investigate the cause of each *E. coli* failure in each water supply and ensure that action is taken to prevent a reoccurrence of the failure. As an immediate measure, the EPA advises all local authorities to install continuous chlorine residual monitors on the treated waters to ensure that the levels of chlorine in the water supplied to the public do not drop to unacceptably low levels. Furthermore, these monitors should be linked to continuous recording devices and by telemetry to an alarm. This will ensure that, in the event of a drop in the levels of chlorine, a competent person in the local authority is alerted and can respond immediately. Analysis in the previous drinking water report indicated that up to 40% of incidents of contamination were due to chlorinator failures. Thus, the implementation of this relatively inexpensive measure could significantly reduce the incidence of contamination of water supplies. The Department of Environment, Heritage and Local Government circular L7/07 has indicated that a contingency fund is available for the installation of such equipment where funding has not already been provided for this purpose.

2.2 *Cryptosporidium*

2.2.1 *Cryptosporidium* in Drinking Water Supplies

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 drop in the number of cases of cryptosporidiosis reported to the Health Protection Surveillance Centre in 2006 (361 cases during 2006 down from 558 cases during 2005). However, the number of cases in the first eight months of 2007 has already exceeded that for the entire previous year (532 cases as of 1st September 2007) (<http://www.ndsc.ie/hpsc/NotifiableDiseases/WeeklyIDReport/>). This is primarily due to the outbreak in Galway, which was the largest recorded outbreak of *Cryptosporidium* in Ireland associated with a public water supply. A recent study on cryptosporidiosis surveillance and

water-borne outbreaks in Europe (Semenza and Nichols, 2007) indicated that of the 16 EU member states where the disease is notifiable, Ireland had the highest rate of incidence of the disease (13.7 per 100,000 persons).

The inadequacy of treatment plants in Ireland to remove *Cryptosporidium* is highlighted on the basis of monitoring results submitted to the EPA for 2006. 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 are having difficulty in complying with this parametric value (although limited monitoring was reported, 39% of treatment plants monitored reported levels of turbidity in excess 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 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.

2.2.2 Actions to Eliminate *Cryptosporidium* Contamination

In March 2007 the EPA advised all local authorities to carry out a risk assessment of all supplies that originate from surface water (i.e. rivers or lakes) and to report to the EPA all supplies where treatment provided no barrier to contamination with *Cryptosporidium*. A total of 64 supplies were identified as having inadequate treatment (i.e. chlorination only). These supplies collectively supply water to approximately 135,000 people. Until all local authorities complete a risk assessment of their supplies this figure must be viewed as a minimum number of at risk supplies.

Actions which must be taken to reduce the risk of future outbreaks of cryptosporidiosis include;

1. **Assessment of the risk of contamination of all other water supplies** - The EPA has circulated a revised risk screening tool to all local authorities. The EPA has requested all local authorities to complete the risk assessment and report the results to the EPA. 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 must upgrade the level of treatment 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 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 64 supplies which 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 EPA intends to report on an annual basis as part of the annual report on drinking water quality on the progress made in relation to reducing the risk of contamination with *Cryptosporidium*.

3 COMPLIANCE WITH THE CHEMICAL STANDARDS

The level of monitoring of the chemical parameters increased by 16% in 2006 compared to 2005. However, there is still a shortfall in the number of analyses carried out for many of the chemical parameters in several supplies.

Of the 26 chemical parameters included in this group of parameters, full compliance was reported in 2006 for 6 of the 26 parameters, while compliance in excess of 99% was reported for a further 14 parameters, while a further 3 do not require to be monitored (acrylamide, epichlorohydrin and vinyl chloride) (Table 3-1). The compliance issues are discussed below and a brief overview of the possible health effects of these chemicals (as outlined in the World Health Organisations "Guidelines for Drinking Water Quality") is given.

While compliance with the chemical standards in Ireland was relatively good in 2006 at 99.3%, standards for three chemicals, bromate, total trihalomethanes and lead are going to become more stringent from December 2008. Local authorities will need to take action to ensure that these standards can be complied with before these standards take effect.

Chemical contamination of water supplies occurs from three main sources, namely:

1. Natural contamination (e.g. naturally high levels of metals present in groundwater).
2. Contamination from improperly used treatment chemicals at the water treatment plant (e.g. chlorine disinfection by-products).
3. Pollution of the source of the supply (e.g. nitrates from agricultural activities or septic tanks).

Table 3-1. 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
Chemical⁸ Parameters						
Antimony	1,020	2	99.8%	1,684	2	99.9%
Arsenic	1,039	3	99.7%	1,824	3	99.8%
Benzene	1,025	0	100%	1,722	0	100%
Benzo(a)pyrene	950	0	100%	1,445	0	100%
Boron	921	1	99.9%	1,475	1	99.9%
Bromate	942	5	99.5%	1,398	5	99.6%
Cadmium	1,043	0	100%	1,855	0	100%
Chromium	1,042	0	100%	1,855	0	100%
Copper	1,115	3	99.7%	2,133	4	99.8%
Cyanide	883	0	100%	1,304	0	100%
1,2-dichloroethane	972	0	100%	1,599	0	100%
Fluoride	1,147	77	93.3%	4,336	145	96.7%
Lead	1,175	22	98.1%	2,206	27	98.8%
Mercury	956	1	99.9%	1,552	1	99.9%
Nickel	1,071	2	99.8%	1,906	2	99.9%
Nitrate	1,922	47	97.6%	6,793	64	99.1%
Nitrite (at tap)	1,853	12	99.4%	6,767	12	99.8%
Nitrite (at WTW)	233	7	97.0%	769	7	99.1%
Pesticides - Total	880	2	99.8%	1,342	2	99.9%
PAH	943	1	99.9%	1,444	1	99.9%
Selenium	1,011	1	99.9%	1,672	1	99.9%
Tetrachloroethene/Trichloroethene	1,047	1	99.9%	1,884	1	99.9%
THMs	1,223	50	95.9%	2,723	93	96.6%

⁸ 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 three parametric values is discussed separately later in this Section

3.1 Chemical Quality of Drinking Water

Antimony

Antimony concentrations in excess of the parametric value were detected in 2 water supplies (one public water supply and one private water supply) though this may be due to contamination from sample containers rather than from the supply itself.

Arsenic

There were three samples analysed for arsenic during 2006 (out of 1,824 samples) that exceeded the parametric value for arsenic. These exceedances were reported in the Clontibret public water supply (Monaghan), the Monamolín group water scheme (Wexford) and in one small commercial supply in Mayo.

Boron

All but one of the 1,475 samples analysed in 921 supplies were fully compliant with the boron parametric value. Elevated levels of boron were detected in the Askamore GWS in Wexford.

Bromate

Analysis for bromate was carried out in 1,398 samples analysed in 942 water supplies. Overall 99.6% of samples analysed complied with the standard and elevated levels of bromate were found in 5 supplies (4 of which were public water supplies). While this a welcome drop in the number of supplies contaminated with bromate (15 supplies were contaminated during 2005), 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 will take effect on 25th 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 3-2.

Table 3-2. 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 Non Compliant WSZs
Overall	99.6%	5	95.9%	56
Public Water Supplies	99.6%	4	95.7%	45
Public Group Water Schemes	100%	0	96.9%	3
Private Group Water Schemes	99.5%	1	96.1%	8

Clearly there are significant challenges facing many local authorities and water suppliers in the coming year, with 4.1% of samples (in 56 supplies) failing to meet the incoming parametric value. Investigations were underway at the time of reporting by a number of local authorities and it is imperative that corrective action is taken to ensure that the supplies in question are returned to compliance. Some local authorities have found it necessary to review their chemical usage and switch to an alternative (low bromide) form of disinfectant to ensure compliance with the parametric value.

Copper

Elevated levels of copper were found in three of the 1,115 water supplies monitored (all public water supplies) 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 2006 was 96.7%, which was a slight improvement from 95.9% in 2005. An examination of the data for 2006 is presented below and indicates that the majority of the exceedances are moderate (Figure 3-1). A single sample in 2006 was above the European Directive

parametric value of 1.5 mg/l, while there was also a reduction in the proportion of fluoride exceedances above 1.25 mg/l. In other words, the majority of fluoride non-compliances were marginally above the parametric value.

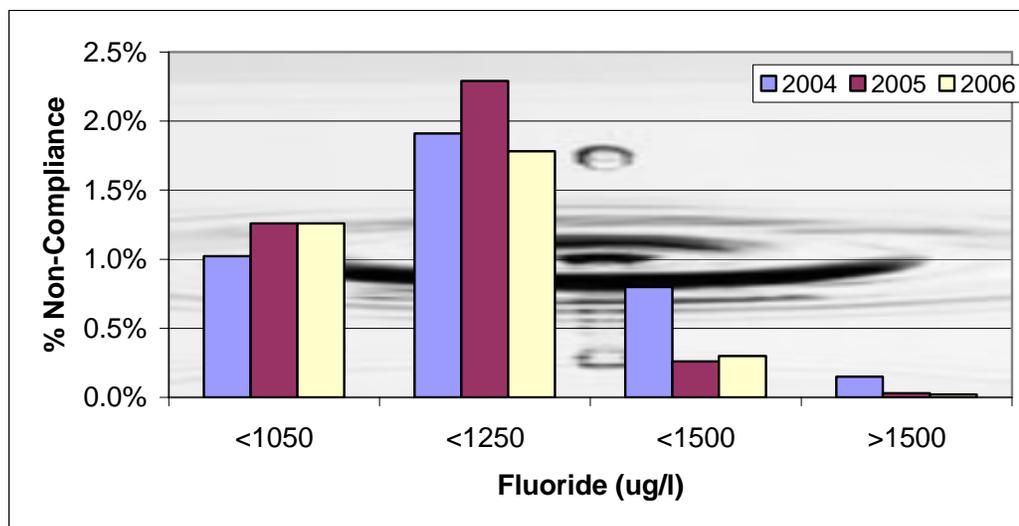


Figure 3-1. Fluoride Exceedances in 2006.

Equipment in some water treatment plants is in need of updating. 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

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 Sampling⁹ method be used. All local authorities should move to implement this method, if they have not already done so.

The Regulations impose a parametric value of 25 µg/l Pb until 25th December 2013, after which the parametric value of 10µg/l Pb becomes effective. The results for 2006 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 3-3. 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 Non-Compliant WSZs
Overall	98.8%	22	97.3%	46
Public Water Supplies	98.4%	20	96.5%	42
Public Group Water Schemes	100%	0	100%	0
Private Group Water Schemes	100%	0	99.3%	2
Small Private Supplies	98.7%	2	98.7%	2

⁹ 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.

A total of 22 supplies reported lead exceedances during 2006 (up from 17 in 2005), however 46 supplies are non-compliant with the 2013 parametric value of 10µg/l for lead (up from 43 in 2005). Local authorities must examine how compliance with the standard of 10 µg/l in 2013 is to be achieved. In particular, some local authorities may need to consider phosphate dosing to reduce the plumbosolvency of the water. This practice is widespread in the UK and in Europe but is currently not practised in Ireland. Results published by the Drinking Water Inspectorate for England and Wales show that compliance assessed against the interim parametric value of 25µg/l Pb improved from 98.00% in 2001 to 99.74% in 2005 as a result of the introduction of phosphate dosing (DWI, 2006). Implementation of this measure will assist the local authorities in achieving a higher level of compliance, but the only 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.

Mercury

There was one marginal non-compliance (in 956 supplies monitored) with the mercury standard in the Mooncoin Regional supply in Kilkenny, however, it is likely that this result is an anomaly as all 5 additional samples analysed in the same supply were well below the standard.

Nickel

There were 2 samples (of 1,906 samples analysed) that reported levels of nickel in excess of the parametric value (in 2 public water supplies). These non-compliances were likely due to the tap fittings at the sample point rather than nickel being present in the water supply.

Nitrate

Exceedances of the nitrate parametric value were reported in 47 supplies in 2006 (up from 29 in 2005). There were an increasing number of public water supplies with elevated levels of nitrates (Table 3-4). Seven of the non-compliant public water supplies: Castletownkinnagh (Cork), Durrow (Laois), Cloughjordan (North Tipperary), Dunkerrin, Mount Bolus (both Offaly), Kilmore-Kilbeg and Lismore/Cappoquin/Ballyduff (both Waterford) also failed to meet the standard during 2005. While four public water supplies that had elevated levels of nitrate in 2005 were returned to compliance in 2006, it is of concern that 8 supplies compliant in 2005 failed to comply in 2006. These supplies were Conna Village (Cork), Arles No.1, Ballinakill No. 2 (both Laois), Ballyragget (Kilkenny), Moynalty (Meath), Two Mile Borris (North Tipperary), and the Geoish and Shanacoole (both Waterford). It is imperative that local authorities take action in supplies that are at risk of failing to comply so that these schemes do not become contaminated.

Table 3-4. Summary of Water Supply Zones Non-Compliant with the Nitrate Parametric Value in 2006 and 2005.

	No. of WSZs with Exceedances in 2006	Population Affected in 2006	No. of WSZs with Exceedances in 2005	Population Affected in 2005
Public Water Supplies	16	10,209	11	10,972
Public Group Water Schemes	2	1,904	0	0
Private Group Water Schemes	17	3,204	13	2,986
Small Private Supplies	12	N/A	5	N/A
Total	47	15,317	29	13,958

Nitrite

There are two 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 (99.1%) and at the tap (99.8%).

Pesticides

There are two 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 all pesticides together) and also to report to the EPA all individual pesticides detected above the limit of detection. In total, 1,342 samples were analysed for pesticides in 880 water supplies, 1,152 of which did not detect any traces of pesticides. Of the remaining 190 samples where pesticides were detected, 2 reported total concentrations in excess of the parametric value of 0.5 µg/l. The affected supplies were the Clonee/Dunboyne (Meath) and the Clara/Ferbane (Offaly) supply. Furthermore, 11 of the individual pesticides detected were greater than the individual pesticides parametric value of 0.1 µg/l. 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 other relevant health based guidelines to determine whether there is a risk to health. Nonetheless, the presence of pesticides in water supplied for consumption is undesirable and should be eliminated. Table 3-5 presents a list of the pesticides detected in water supplies in Ireland, including those detected above the parametric value of 0.1 µg/l.

Table 3-5. Summary of Pesticides Detected in Water Supplies in 2006.

Name of Pesticide	No. of Samples Where Pesticide Detected	No. of Samples >0.1 µg/l
Atrazine	100	1
Simazine	86	1
Dichlorobenzil	29	
Terbuthlazine	19	
MCPA	16	3
Mecoprop	15	
2, 4 D	10	
Triclopyr	10	
Methoxychlor	9	5
Tebucanazole	9	
Trietazine	7	
DDD p,p	6	
Diuron	6	
Triadmefon	6	
Isoproturon	4	
Lindane	3	
Chlorpropham	2	
DDT p,p	2	
Hexachlorobenzene	2	
Malthion	2	1
Propazine	2	
2,4Db	1	
Bromoxynil	1	
Clopyralid	1	
DDE p,p	1	
Dieldrin	1	
Parathion-ethyl	1	
Unspecified	23	

Polycyclic Aromatic Hydrocarbons (PAHs)

There was just one marginal exceedance of the parametric value for PAHs in the 943 supplies monitored during 2006. This was in the Caherlistrane GWS in Galway.

Selenium

All but one of 1,672 samples analysed in 1,011 water supplies were fully compliant with the parametric value. This was in the Strand PWS in Laois.

Tetrachloroethene and Trichloroethene

All but one of 1,884 samples analysed in 1,047 supplies were fully compliant with the parametric value. This was in the Olivers Cross supply in North Cork.

Trihalomethanes – Total

There were 2,723 samples analysed for trihalomethanes in 1,223 water supply zones (an increase of one-quarter in the number of water supply zones monitored compared to 2005). The Regulations impose a parametric value of 150 µg/l until the 25th December 2008; thereafter the parametric value of 100µg/l is effective. The results for 2006 are examined in the context of compliance with the current standard of 150µg/l, as well as the future standard of 100µg/l (Table 3-6).

Table 3-6. 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 Non Compliant WSZs
Overall	96.6%	50	88.1%	162
Public Water Supplies	95.7%	39	86.5%	103
Public Group Water Schemes	98.1%	7	89.3%	38
Private Group Water Schemes	98.8%	4	94.2%	19

The results, as shown on Table 3-6 show that compliance with the trihalomethanes parametric value in 2008 is going to be problematic. Based on the monitoring carried out in 2006, over 15% of public water supplies nationally (103 of 676 supplies monitored) will be unable to comply with the parametric value of 100µg/l. Comprehensive monitoring of trihalomethanes in Galway County indicates that the problem in the county is widespread, with 15 (32%) of public water supplies, 4 (4%) of public group water schemes and 3 (3%) of private group water schemes currently not complying with the standard of 150 µg/l. However, when compared with the incoming standard of 100 µg/l a total of 23 (52%) of public water supplies, 26 (25%) of public group water schemes and 14 (14%) of private group water schemes in Galway will, unless the situation changes, be unable to comply with the incoming trihalomethanes standard. Local authorities need to review monitoring results and implement corrective action programmes for those supplies that are not complying with the parametric value at present and should examine all other supplies to ensure that they will be able to meet the parametric value of 100µg/l by 25 December 2008.

3.2 Actions to Eliminate Chemical Contamination

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. The EPA recommend 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 are 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. **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 ensure that the European Communities (Good Agricultural Practice for the Protection of Water) Regulations, 2007 are being fully enforced.
3. **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 replacing the source of the water.

4 COMPLIANCE WITH THE INDICATOR PARAMETRIC VALUES

The indicator group of parameters are a diverse group of parameters designed to provide information on 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 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 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 4-1.

Table 4-1. Total Number of Water Supply Zones (WSZs) Monitored and Samples Analysed for the Indicator 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
Indicator Parameters						
Aluminium	1,468	213	85.5%	8,450	607	92.8%
Ammonium	2,616	36	98.6%	14,291	43	99.7%
Chloride	1,059	3	99.7%	1,906	4	99.8%
Clostridium perfringens	1,802	223	87.6%	10,406	315	97.0%
Colour	2,636	356	86.5%	14,477	874	94.0%
Conductivity	2,639	5	99.8%	15,259	5	100.0%
pH	2,636	409	84.5%	14,579	723	95.0%
Iron	2,166	312	85.6%	7,957	622	92.2%
Manganese	1,653	168	89.8%	4,826	241	95.0%
Odour	2,192	89	95.9%	12,439	139	98.9%
Oxidisability	5	0	100%	5	0	100%
Sulphate	968	0	100%	1,621	0	100%
Sodium	1,045	7	99.3%	1,735	8	99.5%
Taste	1,161	15	98.7%	7,907	44	99.4%
Colony count 22C	952	140	85.3%	2,014	160	92.1%
Coliform bacteria	2,767	929	66.4%	15,203	1,711	88.7%
TOC	953	36	96.2%	1,566	39	97.5%
Turbidity (at tap)	2,448	143	94.2%	13,479	163	98.8%
Turbidity (at WTW)	266	104	60.9%	2,368	307	87.0%
Radioactivity						
Tritium	41	0	100%	81	0	100%
Total indicative dose	31	0	100%	82	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.

4.1 Indicator Parameter Quality of Drinking Water

Aluminium

Compliance with the aluminium parametric value has been problematic in a number of supplies in Ireland in the past. 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 2006 appeared to be due to the latter three causes. The local authority can control all three of these factors. The level of compliance with the aluminium parametric value fell to 92.8% in 2006 from 94.5% in 2005. The compliance rates in the different types of water supplies are presented below.

Table 4-2. Summary of Aluminium Monitoring in 2006.

	No .of WSZs Monitored	% of Samples Complying	No. of Non- Compliant WSZs
Overall	1,468	92.8%	213
Public Water Supplies	737	92.9%	120
Public Group Water Schemes	403	88.3%	82
Private Group Water Schemes	275	96.8%	12
Small Private Supplies	53	100%	0

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 2 local authorities (Galway City and North Tipperary) achieving full compliance with the standard (down from 4 in 2005), while 10 local authorities reported compliance rates of less than 90% (up from 8 in 2005). Particularly poor rates of compliance were reported in public water supplies in Limerick City (64%), Mayo (73%) and Longford (73%).

Ammonium

Overall, in 2006, 99.7% of the 14,291 samples analysed complied with the ammonium parametric value (up from 99.6% in 2005). 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 15 of the 14,291 samples analysed were above 0.5 mg/l (99.9% compliance).

Table 4-3. Summary of Ammonium Monitoring in 2006.

	No .of WSZs Monitored	% of Samples Complying	No. of Non- Compliant WSZs
Overall	2,616	99.7%	36
Public Water Supplies	926	99.9%	12
Public Group Water Schemes	627	99.9%	2
Private Group Water Schemes	663	99.3%	12
Small Private Supplies	400	97.7%	10

Chloride

All but 4 of the 1,906 samples analysed in 1,059 water supply zones during 2006 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, have 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 4-4. Summary of *Clostridium perfringens* Monitoring in 2006.

	No .of WSZs Monitored	% of Samples Complying	No. of Non- Compliant WSZs
Overall	1,802	97.0%	223
Public Water Supplies	709	98.6%	86
Public Group Water Schemes	524	98.4%	16
Private Group Water Schemes	390	85.5%	101
Small Private Supplies	179	89.9%	20

Conductivity

All but 5 of the 15,259 samples analysed in 2,639 water supply zones during 2006 complied with the parametric value for conductivity.

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 rose slightly from 94.6% in 2005 to 95.0 % in 2006. Of the 14,579 samples analysed in 2,636 water supply zones, 723 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 will 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 92.2% of samples were below the parametric value of 200 µg/l in 2006, representing an increase of 1.7% in compliance compared to 2005 (90.5% compliance). Compliance rates for iron in the different types of supplies are shown in Table 4-5.

Table 4-5. Summary of Iron Monitoring in 2006.

	No .of Supplies Monitored	% of Samples Complying	No. of Non-Compliant Supplies
Overall	2,166	92.2%	312
Public Water Supplies	819	92.9%	121
Public Group Water Schemes	475	91.9%	67
Private Group Water Schemes	512	90.7%	81
Small Private Supplies	360	89.4%	43

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 (95.0% in 2006, up from 94.7 in 2005) is greater than for iron. Compliance rates for manganese in the different types of supplies are shown in Table 4-6.

Table 4-6. Summary of Manganese Monitoring in 2006.

	No .of WSZs Monitored	% of Samples Complying	No. of Non-Compliant WSZs
Overall	1,653	95.0%	168
Public Water Supplies	639	96.4%	58
Public Group Water Schemes	357	97.0%	20
Private Group Water Schemes	469	92.2%	60
Small Private Supplies	188	84.7%	32

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 1,735 samples analysed in 1,045 water supply zones, with just 8 non-compliance reported in 2006.

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 4-7. Summary of Coliform Bacteria Monitoring in 2006.

	No .of Supplies Monitored	% of Samples Complying	No. of Non-Compliant Supplies
Overall	2,767	88.8%	929
Public Water Supplies	930	93.7%	294
Public Group Water Schemes	663	93.0%	74
Private Group Water Schemes	688	69.1%	377
Small Private Supplies	486	68.6%	186

The low level of compliance with the parametric value for coliform bacteria is of concern, particularly so in the private group water schemes of which 55% (377 of 688 schemes) contained coliform bacteria at least once during 2006. 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. The Regulations, however, require that a parametric value of 1.0 NTU must be strived for at the water treatment plant. It must be stressed that 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 and hence the higher level of turbidity considered.

Table 4-8. Compliance with the Turbidity Parametric Values in 2006.

Parameter	Overall	PWS	PuGWS	PrGWS	SPS
Turbidity (at the tap)	98.8%	99.4%	99.0%	97.2%	93.9%
Turbidity (at WTW)	87.0%	87.3%	86.7%	74.4%	N/A

Of concern, as illustrated in Table 4-8 is the low rate of compliance with the turbidity parametric value at the water treatment works. Although limited monitoring was reported, the results indicate that 39% (104 of 266) 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 indeed more stringent levels of turbidity in the final water may be necessary. 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 consumers are used to receiving. 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 are shown in the table below.

Table 4-9. Percentage of Samples below the Parametric Value for Colour, Odour, Taste, Colony Count at 22°C, Total Organic Carbon and Turbidity in 2006.

Parameter	Overall	PWS	PuGWS	PrGWS	SPS
Colour	94.0%	95.1%	95.2%	87.6%	94.1%
Odour	98.9%	98.9%	99.3%	98.2%	99.2%
Taste	99.4%	99.4%	100%	100%	99.2%
Colony count at 22°C	92.1%	94.2%	97.0%	73.6%	75.0%
Total Organic Carbon	97.5%	97.5%	99.1%	96.3%	100%

4.2 Actions to Improve Indicator Parameter Compliance

Local authorities will need to review the operation of water treatment plants to optimise the treatment processes present at the plant. Many of the non-compliances can be eliminated by improvements in the operation of the plant and associated network, e.g. reducing leakage in distribution networks leads to reduced stress on plants which allows improved treatment. Where remedial measures are inadequate to improve compliance local authorities will need to consider replacing the source of the supply or upgrading treatment to ensure compliance. Further advice in relation to specific actions for the improvement of compliance with the turbidity parametric value have been covered elsewhere in this report.

5 FINDINGS AND RECOMMENDATIONS

The main findings and recommendations presented in this chapter are based on an assessment of the monitoring results submitted for 2006 and on the findings of audits carried out by the EPA during 2006 and 2007.

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 while a smaller outbreak occurred in Portlaoise, County Waterford in December 2006 with 8 cases of the disease reported. These outbreaks 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.
2. *E. coli* was detected in 77 (8.3%) public water supplies at least once during 2006. The presence of *E. coli* in drinking water is unacceptable as it is an indication that the water supply has become contaminated with human or animal waste.
3. There was satisfactory compliance (99.3%) with the 26 chemical parameters across all water supplies, however, compliance is in need of improvement for some parameters (e.g. fluoride, nitrate, trihalomethanes and lead). Many public water supplies will be unable, without remedial action, to comply with the new, more stringent, quality standards for bromate and trihalomethanes coming into force from December 2008.
4. Compliance with the indicator parametric values was less than that of the microbiological or chemical parameters. Of concern was the high proportion of supplies with aluminium and turbidity (at the water treatment plant) exceedances (15% and 39% respectively).
5. A total of 64 treatment plants serving 135,000 persons which take their water from rivers or lakes have been identified 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 getting into the supply. While many plants have some form of treatment in place, many of these plants need to be vigilant and improve treatment and operational practices to prevent the *Cryptosporidium* from getting into the water supply if present in the raw water. In this regard the 39% of water treatment plants monitored that had elevated levels of turbidity are at risk.
6. The EPA has developed an initial list of 339 public water supplies representing 36% of all public drinking water supplies that require 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.

Recommendations

- Local authorities with supplies on the Remedial Action List, must develop an appropriate solution that will involve abandoning or replacing the source, upgrading the treatment facilities or improving management and operational practices.
- Local authorities should 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 1.0 NTU (and preferably below 0.2 NTU).

- 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 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 the 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 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 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 carry out a lead survey to determine the extent of lead piping in the distribution network and in the population served. Dosing with phosphate should be considered where the local authority is unable to ensure compliance with the lead standard in the short/medium term.
- Local authorities must prepare action programmes to deal with the exceedances of the bromate and trihalomethane parametric values. Such action programmes should consider the use of alternative disinfection chemicals where this has been identified as contributing to the exceedances. The standards for these parameters are currently being breached in a significant number of samples. The standards for these parameters will become more stringent on 25 December 2008 and local authorities must prepare action programmes to ensure that they can comply with these standards prior to their entry into force. Disinfection should not be compromised in attempting to control disinfection by-products.
- 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* remained unchanged from 2005 at 35.8%. In total 246 schemes were found to be contaminated with *E. coli* at least once during 2006.
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, 55% of private group water schemes failed to meet the coliform bacteria parametric value at least once during 2006.

Recommendations

- Local authorities should ensure each group water scheme (public or private), where microbiological quality problems were identified, has an action programme prepared to address the quality deficiency. 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 all the enforcement powers available to it to rectify the problems.
- 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.
- Operators of private group water schemes that are in breach of the nitrate standard should investigate the cause of this exceedance and should take the necessary steps to reduce the levels of nitrate in the water supply so as to comply with the parametric value. The first step to be taken should be the protection of the source of the supply.

5.1.3 Small Private Supplies

Findings

1. There was an increase in the monitoring of small private water supplies that supply water as part of a public or commercial activity. However, only 18 local authorities have identified these schemes within their functional area, hence there was insufficient monitoring of these supplies in 2006.
2. All small private supplies (serving <50 persons or <10m³/day) must comply with the requirements of the Regulations where such supplies provide water as part of a public or commercial activity.
3. The quality of drinking water supplied by a sizeable proportion of the small private supplies monitored was unsatisfactory, though an overall assessment of the quality of water in these supplies cannot be made due to the insufficient monitoring carried out by the local authorities.

Recommendations

- Owners of small private supplies that supply water 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. There was a 3% 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.
2. There was a 46% increase in the number of tests carried out in public group water schemes and a 15% increase in the number of samples analysed in private group water schemes in 2006.
3. There was no monitoring carried out at 1.3% of public water supplies, 15.8% of public group water schemes and 1.8% of private group water schemes during 2006.
4. There was an increase in the number of private water supplies identified from 395 in 2005 to 624 in 2006. Nine local authorities have not identified nor carried out any monitoring of small private supplies that supply water as part of a public or commercial activity as required by the Regulations.

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.
- 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.
- 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.

5.3 Safe and Secure Drinking Water

Findings

1. Audits carried out by the EPA indicated the need to improve awareness of the potential risks. Improvements are needed in the area of monitoring and testing for risks identified, operator training, operation of plants and corrective actions.
2. The level of ongoing maintenance and investment in many treatment plants is poor. This has resulted in the deterioration of plants to such a state that they are not capable of operating as originally designed.
3. Chemical storage at a number of plants was insufficient and presented a risk to the environment. Specifically, the majority of plants visited were storing chemicals in unsuitable conditions and chemicals were being stored in unbunded areas, inadequately banded areas or fill points were located outside banded areas.
4. Less than half of the plants visited had a residual chlorine monitor on the final water leaving the plant.

Recommendations

- 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 risk assessment, effective operational monitoring and effective management. The adoption of this approach will ensure the safety and security of water supplies from catchment to consumer.
- 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.
- 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 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.
- 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 new 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.
- 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.
- 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.
- Local authorities need to 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 recommend 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 are used for drinking water treatment in Ireland.
- 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.
- All local authorities should review current methods of handling and disposal of water treatment sludge to ensure that the practice is not in contravention of the Waste Management Act, 1996-2003. The discharge of water treatment sludge to receiving water, where practiced, should cease immediately. The mixing of water treatment sludges for subsequent spreading on land is not permitted under the Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 and therefore such practices, where they exist, should cease immediately.

5.4 Reporting and Communication

Findings

1. A significant proportion of local authorities (14 of the 34) did not submit the drinking water monitoring results for 2006 by the deadline of 28th February 2007. This late submission of results delays the preparation and publication of the Agency annual report.
2. The Agency receives requests for drinking water monitoring results from members of the public concerned about the quality of their supply.

Recommendations

- In accordance with Section 58 of the Environmental Protection Agency Act, 1992-2003 local authorities must submit the results of monitoring carried out accordance with the relevant drinking water legislation to the EPA on the template specified and by the deadline of 28th February each year.
- 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. Likewise the EPA is to review its procedures and publish inform on its website.

SUGGESTED FURTHER READING

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

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

Department of the Environment and Local Government. (1998). Protection of Water Supplies: Guidelines for Local Authorities on minimising the risk of *Cryptosporidium* in water supplies. Circular L7/98.

Drinking Water Inspectorate of England and Wales (2006). *Drinking Water 2005: A Report by the Chief Inspector, Drinking Water Inspectorate*.

EMAG (2003). *Clostridium perfringens as a Drinking Water Quality Parameter: A Summary Review Prepared by David Sartory on behalf of the European Microbiological Advisory Group (EMAG) for the Article 12 Technical Committee as a Contribution to the Rolling Revision of the Drinking Water Directive 1998*.

Environmental Protection Agency (2004). *European Communities (Drinking Water) Regulations 2000 (S.I. No. 439 of 2000): A Handbook on Implementation for Sanitary Authorities*. EPA, Ireland.

Environmental Protection Agency (2001). *Parameters of Water Quality: Interpretations and Standards*. EPA, Ireland.

Environmental Protection Agency Act, 1992 (No. 7 of 1992)

European Communities (Drinking Water) Regulations, 2000 (SI No. 439 of 2000)

European Communities (Drinking Water) Regulations (No.2), 2007 (S.I. No. 278 of 2007)

Health (Fluoridation of Water Supplies) Act, 1960 (No. 46 of 1960)

Irish Expert Body on Fluorides and Health (2007). *Code of Practice on the Fluoridation of Drinking Water 2007*.

National Federation of Group Water Schemes Co-Op Society Ltd. (2007). *Annual Report 2006*.

Semenza, JC and Nichols G. (2007) *Cryptosporidiosis surveillance and water-borne outbreaks in Europe*. Eurosurveillance Volume 12 Issue 5.

World Health Organisation (2004). *Guidelines for Drinking Water Quality*. (3rd Ed).

APPENDIX 1
SUMMARY REPORTS FOR ALL LOCAL AUTHORITIES

Carlow County Council

Summary of Water Supplies¹⁰

Type of Supply	No. of Supply Zones	Population Served
PWS	15	51,037
PuGWS	5	273
PrGWS	5	1,915
SPS	20	N/A

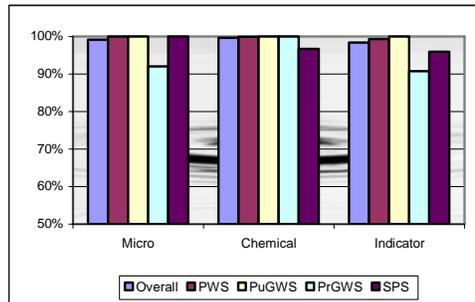
Assessment of 2006 Monitoring

Carlow County Council carried out analysis on 210 check and 50 audit samples during 2006. Though there was an increase in the number of samples analysed there was a slight deficiency in the parameters analysed in some samples.

Overall Compliance in 2006

The overall rate of compliance in County Carlow was 98.9%, an improvement from 98.0% in 2005 and was above the national average. Compliance in the public water supplies was good at 99.6% in 2006 (up from 99.0%).

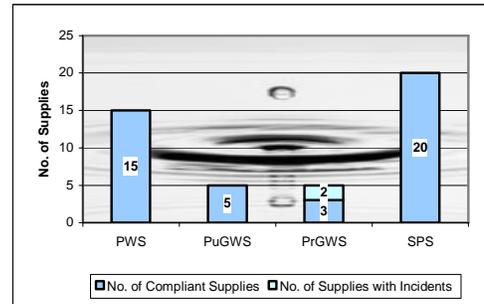
There were no microbiological parameter exceedances (i.e. *E. coli* or enterococci) in either the public water supplies or the public group water schemes in Carlow in 2006 although there were some samples analysed from private group water schemes that failed to meet the microbiological standards. Compliance with the different types of water supplies is shown below.



	Micro	Chemical	Indicator
Overall	99.1%	99.7%	98.4%
PWS	100%	99.9%	99.4%
PuGWS	100%	100%	100%
PrGWS	92.0%	100%	90.8%
SPS	100.0%	96.7%	95.9%

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 any of the public water supplies, public group water schemes or small private supplies in Carlow during 2006. However, *E. coli* contamination was detected in 2 private group water schemes both of which were also contaminated during 2005.

Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards in public water supplies and group water schemes was generally good with the exception of one lead exceedance (due to localised plumbing) in one public water supply. However, two of the private water supplies were found to have elevated levels of nitrate.

Similarly compliance with the majority of indicator parameters was above the national average. Although there was a slight improvement it is of concern that 43% of the samples analysed for coliform bacteria in private group water schemes were positive for this parameter (down from 50% in 2005).

¹⁰ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Cavan County Council

Summary of Water Supplies¹¹

Type of Supply	No. of Supply Zones	Population Served
PWS	15	22,301
PuGWS	0	0
PrGWS	25	21,845
SPS	1	20

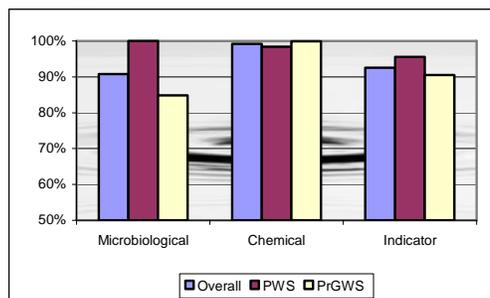
Assessment of 2006 Monitoring

Cavan County Council carried out analysis on 239 check and 50 audit samples during 2006. Cavan County Council were one of the limited number of councils that comprehensively monitored public water supplies and group water schemes and met the minimum monitoring requirements.

Overall Compliance in 2006

The overall rate of compliance in County Cavan during 2006 was below the national average at 94.3%, though did improve from 91.1% in 2005. This was primarily due to the poor microbiological compliance in the private group water schemes as well as a below average rate of compliance with the indicator parameters in both public water supplies and private group water schemes.

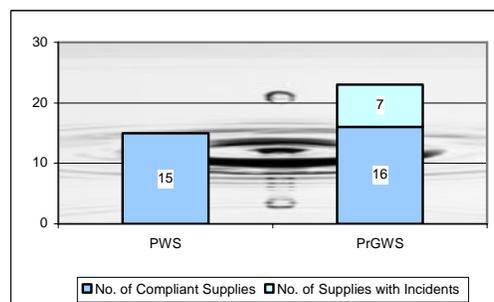
Compliance with the microbiological, chemical and indicator parametric values for the different types of water supplies is shown below.



	Micro	Chemical	Indicator
Overall	90.7%	99.2%	92.5%
PWS	100%	98.3%	95.5%
PrGWS	84.8%	99.8%	90.5%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



The microbiological quality of water supplied in public water supplies was good with no exceedances of any of the microbiological standards during the year. *E. coli* was detected in 7 of the 23 private group water schemes monitored (down from 13 in 2005) with the majority of these schemes reporting continuous and serious contamination and were thus of a poor quality.

Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was generally good (99.2%) though there were occasional moderate fluoride exceedances (4 of 101 samples analysed). Of concern were the elevated levels of bromate in the Dowra supply and trihalomethanes in the Gowra supply.

There was a reversal in the improvement in the level of compliance noted in 2005 with compliance dropping from 96.5% to 92.5% in 2006. This was due to a drop in the level of compliance with the colour parametric value (75% in 2006 down from 84%). Nonetheless, further improvements are necessary particularly in relation to the level of compliance with the aluminium parametric value (93% compliance reported in 2006).

Compliance with the indicator parameters in the private group water schemes was unsatisfactory though improved compared to 2005 (91% up from 83%). The level of compliance with the coliform bacteria parametric value was unsatisfactory (76%) though it did improve significantly compared to 2005 (37%). Compliance with the colour (73%), and manganese (83%) were also unsatisfactory and in need of improvement.

¹¹ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Clare County Council

Summary of Water Supplies¹²

Type of Supply	No. of Supply Zones	Population Served
PWS	24	77,313
PuGWS	103	23,031
PrGWS	11	14,083
SPS	16	700

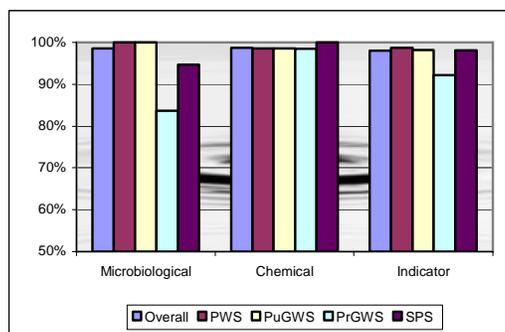
Assessment of 2006 Monitoring

Clare County Council carried out analysis on 529 check and 54 audit samples during 2006. No monitoring was carried out in one public group water scheme.

Overall Compliance in 2006

The overall rate of compliance in County Clare, 98.2%, was above the national average in 2006 and improved compared from 97.7% in 2005. However, of particular concern was the quality of the Ennis town supply which resulted in a partial boil water notice being issued. Compliance with the majority of chemical parameters was also good though there was one notable exception, as discussed below.

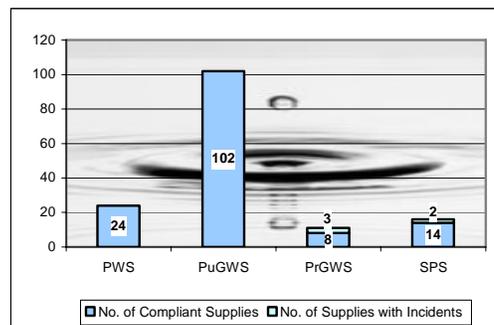
Compliance with the microbiological, chemical and indicator parametric values for the different types of water supplies is shown below.



	Micro	Chemical	Indicator
Overall	98.6%	98.7%	98.0%
PWS	100%	98.6%	98.7%
PuGWS	100%	98.6%	98.2%
PrGWS	83.7%	98.5%	92.2%
SPS	94.7%	100%	98.1%

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 of public water supplies in Clare during 2006. However, as noted above, the Ennis town supply was of an unsatisfactory quality with a partial boil water notice in place during the year. A temporary treatment plant was installed in June 2006 with a new permanent treatment plant anticipated for February 2009.

Although private group water schemes in Clare were generally of a higher quality than those in the majority of other local authorities, there were still a number of quality deficient schemes during 2006 with 3 of the 11 schemes monitored contaminated during the year (2 of which were also contaminated during 2005).

Compliance with the Chemical and Indicator Parametric Values

Water supplies in Clare were fully compliant with 23 of the 26 chemical standards. One failure to meet the fluoride standard and two failures to meet the lead standard (due to domestic plumbing) were reported in Clare during 2006. However, of greater concern was the relatively low level of compliance with the trihalomethanes standard (88% compliance). Four public water supplies (Ennistymon, Ennis, West Clare New and West Clare Old) reported concentrations of trihalomethanes that were unacceptably high. While the latter two were uncharacteristic exceedances (subsequent monitoring has indicated low levels of THMs) the latter two are in need of urgent corrective action particularly as the standard for trihalomethanes is tightening in 2008.

There were two exceedances of the chemical standards in private group water schemes. Elevated levels of bromate were detected in the Toonagh/Dysert scheme while concentrations of trihalomethanes in excess of the standard were detected in the Kilmaley/Inagh scheme.

Compliance with the indicator parametric values was above the national average in water supplies in Clare. However, there were some parameters for which compliance was less than satisfactory and in need of improvement, most notably iron (84% compliance) while there were some marginal aluminium exceedances in some supplies (93% compliance). Compliance with the coliform bacteria parametric value in private group water schemes remains problematic, and dropped from 63% compliance in 2005 to 58% compliance in 2006. New water treatment plants at four of the larger private group water schemes commenced operation in late 2006.

¹² PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Cork City Council

Summary of Water Supplies¹³

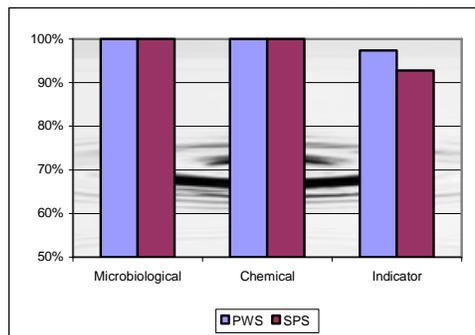
Type of Supply	No. of Supply Zones	Population Served
PWS	1	123,000
PuGWS	0	0
PrGWS	0	0
SPS	1	N/A

Assessment of 2006 Monitoring

Cork City Council carried out analysis on 228 check and 14 audit samples during 2006. Thus Cork City Council met the minimum monitoring requirements as outlined in the Regulations.

Overall Compliance in 2006

The overall rate of compliance in Cork City, 97.9%, was above the national average during 2006 and the microbiological and chemical quality of the water supply in Cork was excellent with no exceedances of these standards recorded. Compliance with the indicator parametric values was less than that of the microbiological and chemical parameters though was nonetheless above the national average (97.3%).



	Micro	Chemical	Indicator
PWS	100%	100%	97.4%
SPS	100%	100%	92.8%

Compliance with the *E. coli* Standard

Compliance with the *E. coli* and Enterococci parametric value was excellent in Cork City during 2006 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 97.3%. There were iron non-compliances (20 of 223 samples analysed) and coliform bacteria non-compliances were also detected (17 of 223 samples analysed).

¹³ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Cork (North) County Council

Summary of Water Supplies¹⁴

Type of Supply	No. of Supply Zones	Population Served
PWS	70	60,040
PuGWS	18	2,355
PrGWS	14	1,372
SPS	None Identified	

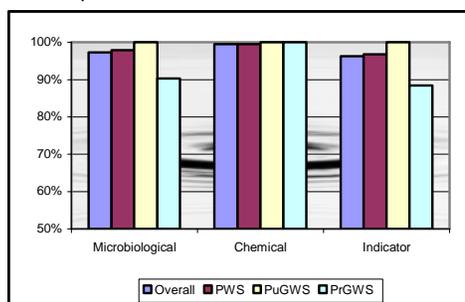
Assessment of 2006 Monitoring

Cork (North) County Council carried out analysis on 278 check samples and 42 audit samples. There was no monitoring carried out in 4 public water supplies, and 17 public group water schemes while no private supplies supplying water as part of a public or commercial activity were identified by the local authority.

Overall Compliance in 2006

The overall rate of compliance in Cork (North), 97.1% was close to the national average during 2006. However, the microbiological and indicator compliance in public water supplies was less than average.

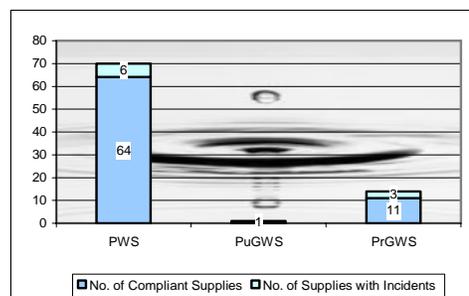
Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	97.3%	99.5%	96.2%
PWS	97.9%	99.5%	96.8%
PuGWS	100%	100%	100%
PrGWS	90.3%	100.0%	88.5%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were 6 incidents of *E. coli* contamination of public water supplies in Cork (North) during 2006 in the Burnfoot, Bartlemy, Doneraile, Glenduff, Rahan and Mitchelstown Galtee public water supplies, with the latter being serious (>20 cfu/100ml). All these incidents were caused by the failure or inadequacy of chlorine dosing equipment at the treatment plants. The continual failure of a large number of supplies (6 supplies were contaminated during 2005) is of concern. The Council should investigate and install chlorine monitors to allow detection of faulty chlorinators in advance of contamination of the water supply. *E. coli* was detected in 3 of the 14 private group water schemes monitored in Cork (North) during 2006 (at moderate levels).

Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was generally satisfactory though exceedances of the lead, nitrate and tetrachloroethene/trichloroethene standards were recorded in a small number of supplies. Two lead exceedances were reported in the Conna Regional and Killally (Kilworth) supplies though it is likely that these were due to the internal plumbing at the sample point and not indicative of the quality of the supplies as a whole. The Conna Village supply contained elevated levels of nitrate above the standard and was thus of concern while the Olivers Cross supply recorded a single exceedance of the tetrachloroethene/trichloroethene standard. There was just one sample analysed for the full suite of chemical parameters in the group water schemes which was fully compliant.

The level of compliance with the indicator parametric values was much less satisfactory in the public water supplies in Cork (North). Although compliance with the aluminium standard improved from 89% in 2005 to 99% in 2006, poor compliance was reported against the pH (89%) and coliform bacteria (92%) 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 (72% compliance) and coliform bacteria (52% compliance) standards. 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.

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

Cork (South) County Council

Summary of Water Supplies¹⁵

Type of Supply	No. of Supply Zones	Population Served
PWS	67	167,045
PuGWS	6	925
PrGWS	12	1,075
SPS	1	200

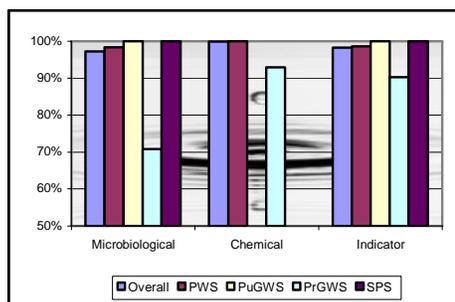
Assessment of 2006 Monitoring

Cork (South) County Council carried out analysis on 468 check and 52 audit samples during 2006. There was no monitoring carried out in 3 public water supplies and 3 public group water schemes.

Overall Compliance in 2006

The overall rate of compliance in Cork (South), 98.4%, was above the national average during 2006 due primarily to the above average rate of compliance in public water supplies while compliance in the private group water schemes was close to the national average.

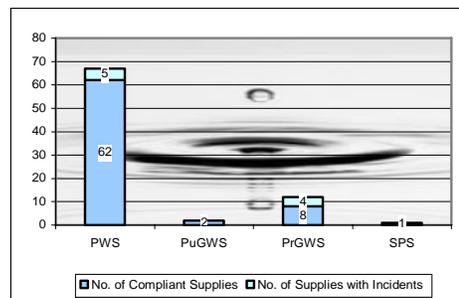
Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	97.2%	99.8%	98.2%
PWS	98.3%	100%	98.6%
PuGWS	100%		100%
PrGWS	70.8%	92.9%	90.2%
SPS	100%		100%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were 5 incidents of *E. coli* contamination of public water supplies in Cork (South) during 2006, in the Ballingearry, Ballincurrag/Lisgould, Donaghmore, Kilbrittain and Walshtown Beg supplies. All incidents were due to breakdowns in chlorination equipment. The Council should investigate and install chlorine monitors to allow detection of faulty chlorinators in advance of contamination of the water supply. *E. coli* was detected in 4 of the 12 private group water schemes monitored.

Compliance with the Chemical and Indicator Parametric Values

The chemical quality of public water supplies in Cork South was excellent and there were no exceedances of any of the 26 chemical parameters during 2006.

There was limited monitoring of the chemical parameters in private group water schemes in South Cork with just one sample analysed for the full suite of chemicals. However, nitrate was monitored in 8 of the 12 private group water schemes. On both occasions the Walterstown private group water scheme failed to comply with the nitrate standard and was thus of poor quality.

While compliance with the indicator parametric values in public water supplies was above the national average there were still some issues of concern in the monitoring results submitted to the EPA. Compliance with the aluminium parametric value was problematic in the Youghal (7 of 19 samples analysed exceeded). This supply has a historical problem in meeting the aluminium standard, though the Council reported the sand filters have been replaced and that a new settling tank and sand filter have been constructed to increase the capacity at the plant. This should reduce the pressure at the plant and therefore lead to improved compliance with the aluminium standard.

Compliance with the coliform bacteria standard in private group water schemes in South Cork in 2006 was poor with half of the samples analysed for coliform bacteria failing to meet the standards (6 of the 12 schemes monitored did not comply).

¹⁵ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Cork (West) County Council

Summary of Water Supplies¹⁶

Type of Supply	No. of Supply Zones	Population Served
PWS	34	31,420
PuGWS	15	2,500
PrGWS	10	870
SPS	None Identified	

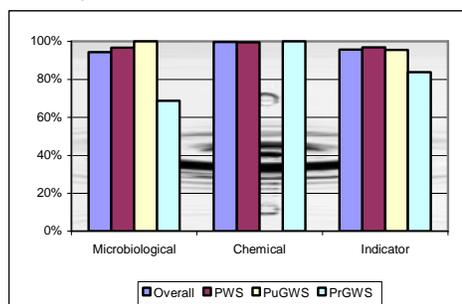
Assessment of 2006 Monitoring

Cork (West) County Council carried out analysis on 139 check and 28 audit samples during 2006. There was no monitoring carried out in 4 public water supplies, 9 public group water schemes and 1 private group water scheme while no private supplies supplying water as part of public or commercial activity were identified by the local authority.

Overall Compliance in 2006

The overall rate of compliance in Cork (West), 96.7%, 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 are shown below.

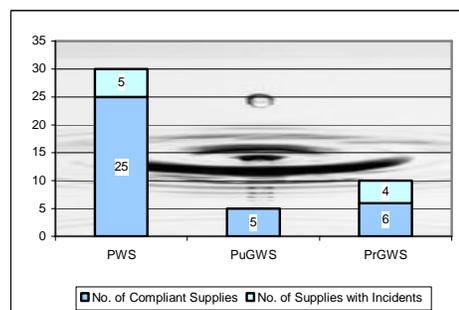


	Micro	Chemical	Indicator
Overall	94.5%	99.7%	95.8%
PWS	96.6%	99.6%	96.9%
PuGWS	100%		95.5%
PrGWS	68.8%	100%	83.9%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

The rate of compliance with the *E. coli* parametric value in West Cork was low, though there was a rise from 93.2% in 2005 to 95.9% in public water supplies.



There were 6 incidents of *E. coli* contamination of public water supplies in Cork (West) during 2006 in the Coppeen, Castletownbere New, Dromore Public (Bantry) (2 incidents), Kealkill and Snavel supplies. Of particular concern was the Dromore Public (Bantry) supply as both samples analysed in the supply failed to meet the standard. Four of the 10 private group water schemes monitored were contaminated with *E. coli* during 2006, a rise from 2 in 2005.

Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was acceptable in all but two supplies. The Castletownkinnagh supply contained elevated levels of nitrate once again and action is needed to reduce the levels of nitrate in this supply by examining source protection and treatment options. The Kealkill supply contained elevated levels of trihalomethanes, greatly in excess of the required standard. As the standard for trihalomethanes is to tighten in 2008 action will be necessary to deal with this non-compliance. All other public water supplies monitored complied with the chemical standards.

Monitoring of the chemical parameters in private group water schemes was restricted to one sample in one supply the results of which complied with the standards.

Compliance with the indicator parametric values in public water supplies during 2006 was marginally below the national average. This was due to a small number of exceedances with several of the parametric values, although there were a relatively large number of coliform bacteria and colour exceedances (92% and 93% compliance respectively).

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

Donegal County Council

Summary of Water Supplies¹⁷

Type of Supply	No. of Supply Zones	Population Served
PWS	44	135,027
PuGWS	10	4,770
PrGWS	23	3,903
SPS	16	493

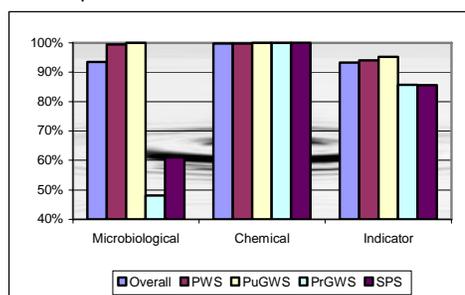
Assessment of 2006 Monitoring

Donegal County Council carried out analysis on 1,083 check and 86 audit samples during 2005. There was no monitoring carried out at 1 private group water schemes.

Overall Compliance in 2006

The overall rate of compliance in County Donegal, 95.1% was below the national average during 2006 and dropped slightly from 95.4% in 2005. While compliance with the chemical parametric values was above average, compliance with the microbiological and indicator parametric values was below average.

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

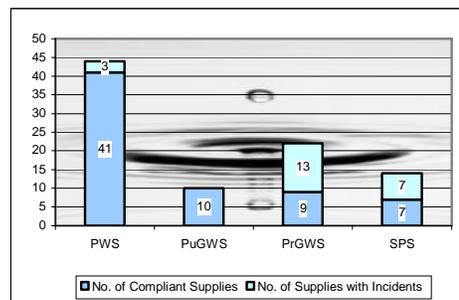


	Micro	Chemical	Indicator
Overall	93.5%	99.7%	93.3%
PWS	99.4%	99.7%	94.0%
PuGWS	100.0%	100.0%	95.2%
PrGWS	48.0%	100.0%	85.7%
SPS	61.1%	100.0%	85.6%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

There were three incidents of *E. coli* contamination of public water supplies in Donegal during 2005. They were in the Pollan Dam, Pettigo and Lifford (Old)¹⁸ supplies, however all were moderate (<20 cfu/100ml). Of the 22 private group water schemes monitored for *E. coli* 13 were found to be contaminated during 2006. The Council have reported that the majority of these schemes are in the process of being upgraded with the remainder at the design stage or planning.



Compliance with the Chemical and Indicator Parametric Values

Though the overall rate of compliance with the chemical parametric values was close to the national average, there were a number of issues of concern. There were a number of exceedances of the fluoride standard in the Cranford supply (3) while the formation of disinfection by-products was a problem in three supplies in Donegal with trihalomethane exceedances reported in the Portnoo-Nairn, Malinmore and Ballintra supplies. However, the more stringent standard, effective from 2008, was exceeded in a further 8 public water supplies. All group water schemes monitored were fully compliant with the chemical standards.

As in previous years, there were a large number of exceedances of the indicator parametric values in Donegal during 2006. Compliance was unsatisfactory with the aluminium (84%), colour (82%), iron (77%) and turbidity (80%) parametric values. The latter is of concern with 24 of the 42 treatment plants monitored reporting turbidity levels in excess of 1.0 NTU's. 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. Donegal County Council should continue to review operations at these treatment plants to ensure that the levels of turbidity in the treated water are reduced to an acceptable level. Aluminium continues to be a problem in water supplies in Donegal with exceedances reported in several supplies. Of concern is the failure of the Frosses-Inver supply to comply with the aluminium standard in any of the 11 samples analysed during the year. Concentrations up to 8 times the standard were reported in the supply during 2006. Donegal County Council reported that major capital works were imminent to resolve the aluminium issue.

In the private group water schemes, compliance with the colour parametric value was also problematic (60% compliance) though compliance with the coliform bacteria parametric value is of greater concern with just one in four samples complying with the standard (25% compliance). It is clear from the poor microbiological compliance with the standards that significant work is required to resolve the quality deficiencies in private group water schemes in Donegal.

¹⁷ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

¹⁸ The Lifford (Old) supply is not the main supply to Lifford. It is a small supply serving approx 40 persons

Dublin City Council

Summary of Water Supplies¹⁹

Type of Supply	No. of Supply Zones	Population Served
PWS	6	476,500
PuGWS	0	
PrGWS	0	
SPS	0	

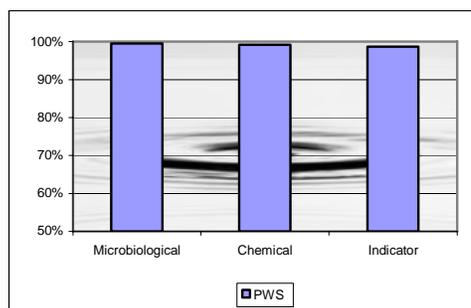
Assessment of 2006 Monitoring

Dublin City Council carried out analysis on 786 check and 41 audit samples during 2006. Thus Dublin City Council met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

Overall Compliance in 2006

The overall rate of compliance in Dublin City, 98.8%, was above the national average and the quality of water in Dublin was in general good. Compliance with the microbiological and chemical parametric values was particularly good.

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



	Micro	Chemical	Indicator
PWS	99.5%	99.2%	98.7%

Compliance with the *E. coli* Standard

Compliance with the *E. coli* and enterococci parametric values was good during 2006. Although *E. coli* was detected in one of the 827 samples analysed in 2006, it was at low levels (a single organism) and not indicative of contamination of the supply as a whole 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. One minor fluoride exceedance was reported marginally above the parametric value (though well below the EU standard). The remainder of the exceedances were with the lead standard. Lead can be present in drinking water from the internal plumbing of buildings (e.g. the pipework or taps) and were thus not representative of the supply

as a whole but were rather due to contamination at the sample point, usually from the internal plumbing.

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 and improved from 98.4% in 2005 to 98.7% in 2006. However, compliance with the coliform bacteria parametric value was relatively low at 89% though given the absence of *E. coli* from all samples analysed it is likely that the coliform bacteria was caused by sample point contamination rather than contamination of the supply as a whole.

¹⁹ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Dun Laoghaire Rathdown County Council

Summary of Water Supplies²⁰

Type of Supply	No. of Supply Zones	Population Served
PWS	8	182,489
PuGWS	0	
PrGWS	0	
SPS	0	

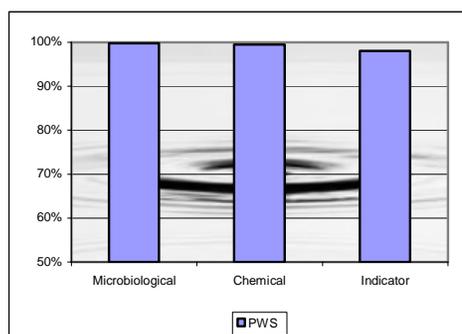
Assessment of 2006 Monitoring

Dun Laoghaire Rathdown County Council carried out analysis on 408 check and 30 audit samples during 2006. Thus Dun Laoghaire Rathdown County Council met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

Overall Compliance in 2006

The overall rate of compliance in Dun Laoghaire Rathdown, 98.4%, was above the national average and the quality of water in Dun Laoghaire Rathdown was in general good. Compliance with the microbiological and chemical parametric values was good while compliance with the indicator parametric values, while less than the microbiological and chemical was nonetheless satisfactory.

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



	Micro	Chemical	Indicator
PWS	99.8%	99.5%	98.1%

Compliance with the *E. coli* Standard

Compliance with the *E. coli* and enterococci parametric values was good during 2006. Although *E. coli* was detected in one of the 434 samples analysed in 2006, it was at low levels and not indicative of contamination of the supply as a whole but rather of a localised sample point contamination. Enterococci was not detected in any of the 29 samples analysed.

Compliance with the Chemical and Indicator Parametric Values

Full compliance was achieved with 25 of the 26 chemical parameters. The sole parameter exceeding the standards was lead in 3 samples (of 30

analysed). However, lead can be present in drinking water from the internal plumbing of buildings (e.g. the pipework or taps) and were thus not representative of the supply as a whole but were rather due to contamination at the sample point, usually from the internal plumbing.

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 (89% compliance) though the absence of *E. coli* in all samples analysed indicates that the coliform bacteria present were more likely due to sample point contamination.

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

Fingal County Council

Summary of Water Supplies²¹

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

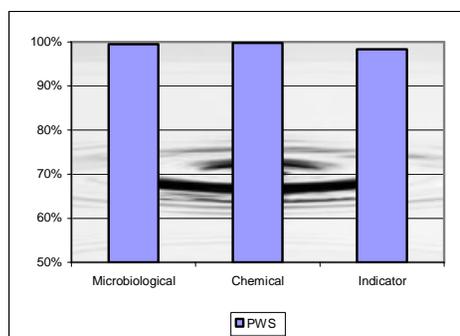
Assessment of 2006 Monitoring

Fingal County Council carried out analysis on 400 check and 19 audit samples during 2006. Fingal County Council met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

Overall Compliance in 2006

The overall rate of compliance in Fingal, 98.5%, was above the national average and the quality of water in Fingal was in general good. Compliance with the microbiological and chemical parametric values was also good while compliance with the indicator parametric values, while less than the microbiological and chemical was nonetheless satisfactory.

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



	Micro	Chemical	Indicator
PWS	99.5%	99.8%	98.3%

Compliance with the *E. coli* Standard

Compliance with the *E. coli* and enterococci parametric values was good during 2006. *E. coli* was detected in just 2 of the 413 samples analysed in 2006 while enterococci was not detected in any of the 19 samples analysed.

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 lead standard (a single sample of which failed to meet the standard). However, lead can be present in drinking water from the internal plumbing of buildings (e.g. the pipework or taps) and were thus not representative of the supply as a whole but were rather due to

contamination at the sample point, usually from the internal plumbing.

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 was lower than average at 91% compliance, however the absence of *E. coli* in these samples indicates that it was due to localised contamination of the sample point. Odour and taste exceedances were also reported, primarily due to an odour or taste of chlorine off the water which, although unpleasant to some, is not a risk to health.

²¹ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Galway City Council

Summary of Water Supplies²²

Type of Supply	No. of Supply Zones	Population Served
PWS	1	71,983
PuGWS	0	
PrGWS	0	
SPS	0	

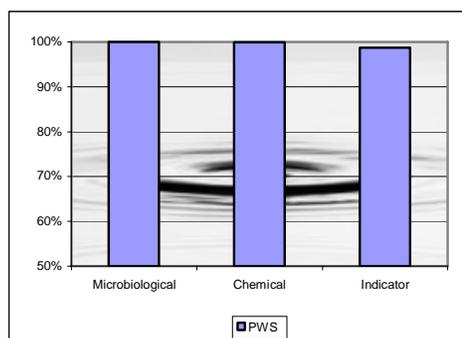
Assessment of 2006 Monitoring

Galway City Council carried out analysis on 497 check and 10 audit samples during 2006. Galway City Council has met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

Overall Compliance in 2006

The overall rate of compliance in Galway City, 99.1%, was above the national average and the quality of water in Galway City was in general satisfactory during 2006. Compliance with the microbiological and chemical parametric values was good while compliance with the indicator parametric values was satisfactory with the exception of turbidity at the Terryland Old water treatment plant, the implications of which are discussed below.

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



	Micro	Chemical	Indicator
PWS	100%	99.9%	98.7%

Compliance with the *E. coli* Standard

Compliance with the *E. coli* and enterococci parametric values was excellent during 2006. *E. coli* was not detected in any of the 316 samples analysed in 2006 while enterococci was not detected in any of the 109 samples analysed.

Compliance with the Chemical and Indicator Parametric Values

Full compliance was achieved with all the chemical parameters with the exception of one exceedance of the lead standard which was due to the presence of lead plumbing in the domestic dwelling sampled and thus not representative of the supply as a whole.

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 coming from the Terryland Old water treatment plant. 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*. This vulnerability of the supply to contamination with *Cryptosporidium* was highlighted in the EPA report on drinking water quality for 2005. In March of 2007 the largest outbreak of *Cryptosporidium* in Ireland was detected. 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). Completion of these works enabled the lifting of the boil water notice in the supply on 20th 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).

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

Galway County Council

Summary of Water Supplies²³

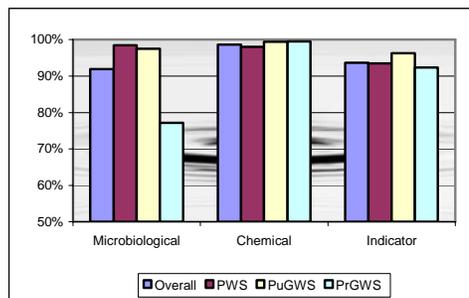
Type of Supply	No. of Supply Zones	Population Served
PWS	44	77,215
PuGWS	131	31,430
PrGWS	182	78,350
SPS	Incl. in PrGWS	

Assessment of 2006 Monitoring

Galway County Council carried out analysis on 1,328 check and 108 audit samples during 2006. There was no monitoring carried out in 2 public group water schemes and 2 private group water schemes.

Overall Compliance in 2006

The overall rate of compliance in County Galway, 95.0%, was below the national average and dropped from 95.7% in 2005. Compliance across the three categories of parameters, microbiological, chemical and indicator was unsatisfactory and there are some serious quality issues (as outlined below) that must be addressed in Galway County.



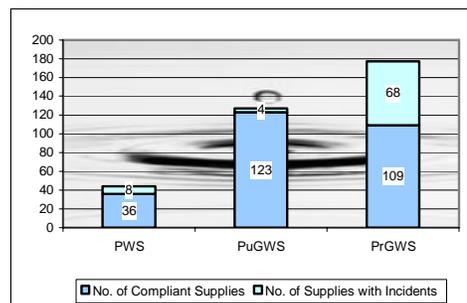
	Micro	Chemical	Indicator
Overall	91.9%	98.6%	93.7%
PWS	98.4%	98.0%	93.5%
PuGWS	97.5%	99.4%	96.3%
PrGWS	77.2%	99.5%	92.4%

Compliance with the *E. coli* Standard

Although the level of compliance with the microbiological parameters in public water supplies in Galway improved slightly to 98.4% in 2006 (up from 97.7% in 2005) it was nonetheless below the national average. A summary of the number of incidents of *E. coli* contamination reported during 2006 is provided in the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

There were an unacceptably high number of public water supplies in Galway contaminated with *E. coli* during 2006. In total 8 incidents of *E. coli* contamination of public water supplies in Galway County during 2006 in the Carroroe, Clarinbridge/Kilcolgan, Cleggan/Claggaduff, Galway City RWSS, Headford, Inishmore, Kilconnell and Teeranea/Lettermore supplies. Of concern is the fact that the Cleggan/Claggaduff water supply was contaminated with *E. coli* for the third year in a row. It is also of concern that 10 public water supplies in

Galway originate from surface water (i.e. rivers or lakes) and have no treatment other than chlorination. All such supplies have no treatment barrier to protect against contamination with *Cryptosporidium* and are thus vulnerable to contamination. The Council should urgently address this treatment deficiency and also deal with the large number of public water supplies contaminated with *E. coli*.



There was an increase in the number of private group water schemes contaminated with *E. coli* in Galway during 2006. A total of 68 private group water schemes (up from 50 in 2005) were contaminated during 2006. Thus, almost 40% of private group water schemes in Galway County were contaminated during 2006. Galway County Council must ensure that all contaminated schemes have an action programme in place to upgrade, replace or shutdown contaminated supplies. Particular attention should be paid to schemes not participating in the Galway DBO bundles.

Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parameters was below the national average. The main reason for this was the high number of schemes with elevated levels of trihalomethanes. In total, 15 public water supplies, 4 public group water schemes and 4 private group water schemes were contaminated with trihalomethanes during 2006. However, the standard for trihalomethanes is tightening in 2008 and it is clear, based on the 2006 results, that 23 (52%) public water supplies, 26 (25%) public group water schemes and 14 (14% of private group water schemes) monitored will not be able to meet this standard if this situation persists.

Compliance with the indicator parametric values in public water supplies was poor due to low rates of compliance with the turbidity (just 30% of treatment plants monitoring complied) and colour (78% compliance) and aluminium (78% 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. Galway County Council should continue to review operations at these treatment plants to ensure that the levels of turbidity in the treated water are reduced to an acceptable level. Though compliance with the indicator parametric values in private group water schemes was above the national average (92.4%) nonetheless compliance with the coliform bacteria parametric value was poor (68% compliance) and improved only slightly compared to 2005 (when it was 63%).

²³ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Kerry County Council

Summary of Water Supplies²⁴

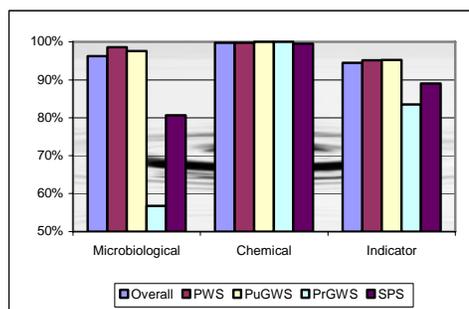
Type of Supply	No. of Supply Zones	Population Served
PWS	83	106,357
PuGWS	42	10,022
PrGWS	17	1,424
SPS	37	N/A

Assessment of 2006 Monitoring

Kerry County Council carried out analysis on 1,350 check and 210 audit samples during 2006. There was no monitoring carried out in 4 public group water schemes and 1 private group water schemes. In spite of this oversight Kerry County Council have analysed the largest number of samples nationally reflecting the large number of supplies present in the county.

Overall Compliance in 2006

The overall rate of compliance in County Kerry, 96.0%, was below the national average during 2006 though marginally up from 95.4% in 2005. This was due to below average compliance in the microbiological and indicator categories. Compliance with the microbiological, chemical and indicator parametric values are shown below, and there are some serious quality issues (as outlined below) that must be addressed by Kerry County Council.



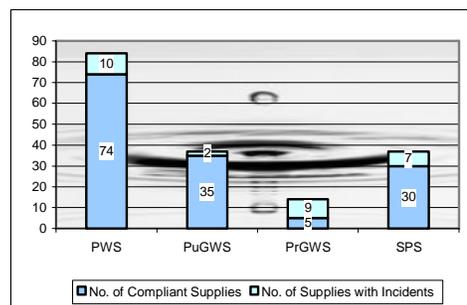
	Micro	Chemical	Indicator
Overall	96.2%	99.8%	94.5%
PWS	98.6%	99.8%	95.2%
PuGWS	97.6%	100.0%	95.3%
PrGWS	56.8%	100.0%	83.5%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

There were 12 incidents of *E. coli* contamination in 10 public water supplies in Kerry during 2006 in the Baile Breach, Ballinskelligs, Caragh Lake (2 incidents), Feoghanagh, Gearra, Glenbeigh (2 incidents), Lauragh, Liscarney, Murreigh Ballydavid and Sneem supplies. Five of these supplies were also contaminated during 2005 indicating ongoing and persistent problems with the supplies in question. The large number of water supplies in

Kerry contaminated with *E. coli* is unacceptable and action must be taken to ensure these supplies are capable of providing water fit for human consumption at all times. The situation is even worse in the private group water schemes with 9 of the 14 schemes monitored contaminated and with just 56% of samples analysed for *E. coli* compliant. The local authority must take action to ensure this situation is rectified.



Furthermore, 22 public water supplies in Kerry originate from surface water (i.e. rivers or lakes) which do not have any treatment other than chlorination. Therefore, these supplies have no treatment barrier to remove *Cryptosporidium* if the parasite contaminates the source water. This situation must be rectified to prevent the potential of a *Cryptosporidium* outbreak associated with these supplies.

Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was generally satisfactory. The proportion of fluoride exceedances reduced significantly with 99.3% of samples analysed compliant compared to 91% in 2005. Trihalomethanes were problematic in two supplies in Kerry (Dingle and Glen) down from 12 in 2005, however, a further 11 supplies reported levels of trihalomethanes in excess of the new standard of 100 µg/l coming into force in 2008. There were no exceedances of the chemical parametric values in either the public or private group water schemes during 2006.

There was a slight drop in compliance with the indicator parametric value in all categories of supplies in Kerry in 2006. Compliance with the coliform bacteria (89%), colour (88%) and pH (84%) parametric values were unacceptably low in public water supplies. Turbidity levels at the water treatment plant were also poor with almost 40% of treatment plants reporting turbidity levels in excess of 1.0 NTU indicating potential vulnerability to contamination with *Cryptosporidium*.

All but one of the 14 private group water schemes in Kerry tested contained coliform bacteria at least once during 2006 and there has been no improvement in the quality of private group water schemes in Kerry. Overall, the microbiological quality of both public water supplies and private group water schemes in Kerry is low.

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

Kildare County Council

Summary of Water Supplies²⁵

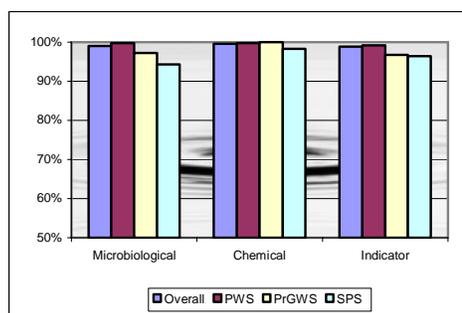
Type of Supply	No. of Supply Zones	Population Served
PWS	15	172,321
PuGWS	0	
PrGWS	5	2,110
SPS	22	1,460

Assessment of 2006 Monitoring

Kildare County Council carried out analysis on 363 check and 19 audit samples thus complying with the minimum monitoring frequencies, although a small number of the audit samples were not monitored for the full set of parameters.

Overall Compliance in 2006

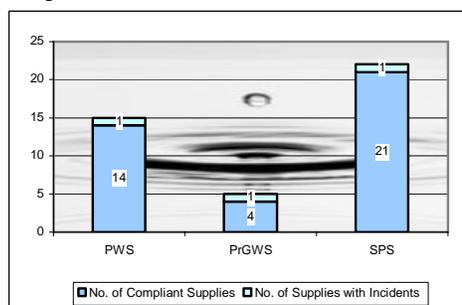
The overall rate of compliance in County Kildare, 99.1%, was well above the national average. Compliance with the standards in public water supplies, private group water schemes and private water supplies was generally good in the majority of supplies. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	99.1%	99.6%	98.9%
PWS	99.8%	99.8%	99.2%
PrGWS	97.2%	100%	96.8%
SPS	94.3%	98.3%	96.5%

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 was one incident of *E. coli* contamination of the Poulaphouca Regional supply. However, all other samples for this supply were free of *E. coli* and this one incident was an anomalous result.

Four of the 5 private group water schemes monitored were compliant with the *E. coli* standard with one scheme contaminated with moderate levels of *E. coli* on one occasion.

Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was generally good. There was just one lead and copper exceedance in the Leixlip Regional supply reflecting plumbing material at the sample point and these exceedances are not reflective of the overall quality of the supply which was good. There were no chemical exceedances of any other parameter nor were there any chemical exceedances in any of the private group water scheme. However, two of the private water supplies did contain elevated levels of nitrate.

Compliance with the indicator parametric values was also good and well above the national average. Apart from a small number of manganese exceedances in two supplies, compliance with the indicator parametric values was good.

Overall the quality of drinking water in Kildare, with the exception of one private group water scheme, and one private water supply was good.

²⁵ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Kilkenny County Council

Summary of Water Supplies²⁶

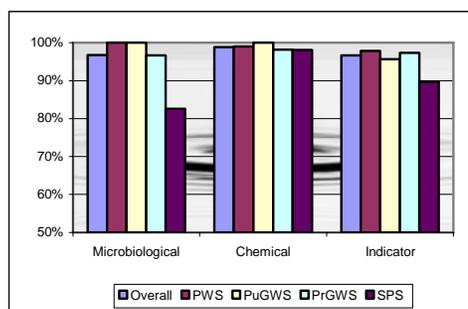
Type of Supply	No. of Supply Zones	Population Served
PWS	15	46,045
PuGWS	26	2,649
PrGWS	26	3,243
SPS	67	N/A

Assessment of 2006 Monitoring

Kilkenny County Council carried out analysis on 1,070 check and 62 audit samples during 2006. While there was a significant amount of monitoring carried out in Kilkenny there was a shortfall in monitoring in one public group water scheme and one private group water scheme.

Overall Compliance in 2006

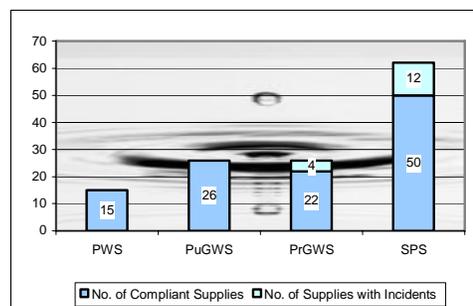
The overall rate of compliance in County Kilkenny, 97.3%, was close to the national average, though improved marginally compared to 2005 (up from 96.7% compliance). While compliance in most public water supplies and public group water schemes was satisfactory during 2006, the level of compliance in some private group water schemes and private water supplies was poor. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	96.8%	98.8%	96.7%
PWS	100%	99.0%	97.9%
PuGWS	100%	100%	95.7%
PrGWS	96.7%	98.2%	97.3%
SPS	82.6%	98.1%	89.7%

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 or public group water schemes in Kilkenny during 2006. The microbiological quality of the majority of private group water schemes was good, however, 4 of the 26 schemes monitored were contaminated with *E. coli* during the year. This is a drop in the number of contaminated schemes compared to 2005 (when 7 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 (11 of 84 samples analysed exceeded). There was a high number of fluoride exceedances in the Kilkenny (Radestown) supply though there were fluoride exceedances in most of the fluoridated supplies in Kilkenny. An elevated level of nitrate was detected in the Ballyragget WS in one sample during 2006 while there was also two significant exceedances of the trihalomethanes standard in the Clogh-Castlecomer and Inistioge supplies. There was also one marginal exceedance of the mercury standard in Mooncoin Regional supply though all five other samples (taken both before and after this exceedance) in this supply were well below the standard, and it is likely that this result was an anomaly.

Compliance with the nitrate parametric value was problematic in a number of private group water schemes with 6 schemes reporting nitrate exceedances in 2006 (decrease from 7 schemes in 2004). The cause of contamination of these schemes must be investigated and action taken to return the supplies to compliance.

Though compliance with the indicator parametric values in public water supplies in Kilkenny was above the national average there were problems in complying with the iron (95% compliance) and pH (94% compliance) standards.

The poor rate of compliance with the coliform bacteria parametric value in both the private group water schemes and the private water supplies remains the most significant issue in relation to compliance with the indicator parametric values. 12 of the 26 private group water schemes and 25 of the 62 private water supplies monitored contained coliform bacteria.

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

Laois County Council

Summary of Water Supplies²⁷

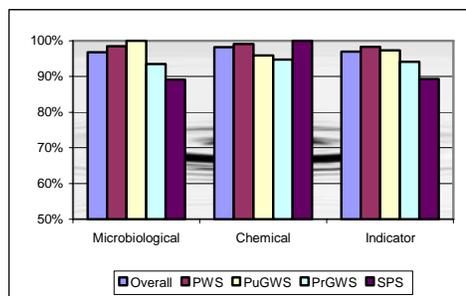
Type of Supply	No. of Supply Zones	Population Served
PWS	29	57,999
PuGWS	21	4,249
PrGWS	43	4,496
SPS	71	N/A

Assessment of 2006 Monitoring

Laois County Council carried out analysis on 552 check and 83 audit samples during 2006. Although the correct number of check and audit samples were taken in Laois, insufficient parameters were analysed in the audit samples in Laois during 2006. Limited analysis was carried out for benzo(a)pyrene, bromate, cyanide, pesticide, PAHs and trihalomethanes.

Overall Compliance in 2006

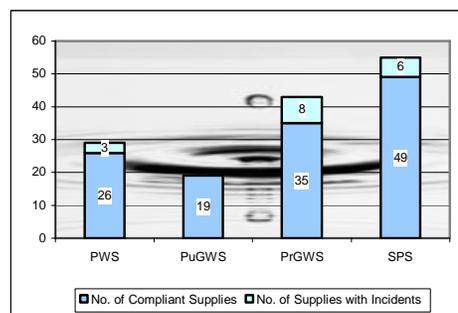
The overall rate of compliance in County Laois, 97.2%, was close to the national average in 2006. While in general compliance was average there were some significant issues as outlined below that are of concern. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	96.8%	98.2%	97.0%
PWS	98.5%	99.1%	98.3%
PuGWS	100%	95.9%	97.3%
PrGWS	93.5%	94.7%	94.1%
SPS	89.1%	100%	89.3%

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 was a drop in the microbiological quality of public water supplies in Laois during 2006. Whereas in 2005, *E. coli* was not detected in public water supplies in Laois, it was detected in several supplies during 2006.



There were three incidents in three supplies during 2006. The Luggacurran, Modubeigh and Roundwood public water supplies were contaminated with *E. coli* with the former two the subject of enforcement action by the EPA in 2007. Of the 40 private group water schemes monitored for *E. coli* 8 were contaminated with *E. coli* in 2006 and were thus of an unsatisfactory quality.

Compliance with the Chemical and Indicator Parametric Values

While the overall rate of compliance with the chemical standards in public water supplies was generally satisfactory (though below the national average), it is clear that there are some quality issues with certain supplies. Three public water supplies, Arles (No.1), Ballinakill (No.2) and Durrow (No.1) supplies all reported elevated levels of nitrate during 2006 while the Mountmellick supply reported elevated levels of trihalomethanes (up to twice the standard).

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

Compliance with the indicator parametric values in public water supplies in Laois was above the national average. However, the Clonaslee supply was of poor quality and there were numerous exceedances of the aluminium standard (5 of 9 samples analysed) with one sample over 5 times the standard.

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 half (20 of 43 schemes analysed) to comply with the coliform bacteria standard.

²⁷ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Leitrim County Council

Summary of Water Supplies²⁸

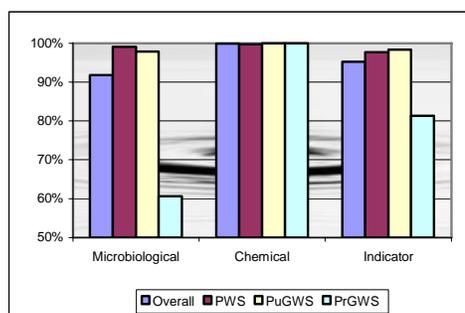
Type of Supply	No. of Supply Zones	Population Served
PWS	7	17,420
PuGWS	83	3,574
PrGWS	22	5,662
SPS	Incl. in PrGWS	

Assessment of 2006 Monitoring

Leitrim County Council carried out analysis on 801 check and 25 audit samples during 2006 thus complying with the minimum number of samples required in the Regulations. However, in a small number of these samples insufficient parameters were tested.

Overall Compliance in 2006

The overall rate of compliance in County Leitrim, 96.4%, was below the national average during 2006, though improved from 94.8% in 2005. However, compliance in the public water supplies and public group water schemes was actually above the national average. The below average rate of compliance was due the poor quality of the private group water schemes during 2006. Compliance with the microbiological, chemical and indicator parametric values are shown below.

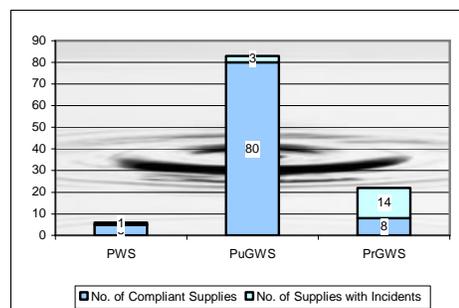


	Micro	Chemical	Indicator
Overall	91.8%	99.9%	95.2%
PWS	99.1%	99.8%	97.7%
PuGWS	97.8%	100%	98.3%
PrGWS	60.7%	100%	81.3%

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 was one incident of contamination of the Fivemilebourne public water supply during 2006, though the levels of *E. coli* detected were moderate.



In contrast, the quality of private group water schemes was poor and was the poorest in the country, in terms of the proportion of non-compliant schemes. Although there was a drop in the number of private group water schemes contaminated during 2006 from 18 to 14 (of the 22 private group water schemes monitored) the situation remains unacceptable. The Council plan to connect these quality deficient schemes to public water supplies in Leitrim. In this regard, 8 of the 22 schemes monitored in 2006 were connected to the public mains before the end of 2006 with connections currently in construction for a further 7 of the 22 schemes. The Council should continue to progress action in relation to the outstanding quality deficient schemes as soon as possible.

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 2006 was good with just one exceedance of the nitrite standard in the South Leitrim Regional supply. 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 less satisfactory in public water supplies in Leitrim. In particular, compliance with the aluminium parametric value continued to be problematic though marginally improved from 83% compliance in 2005 to 84% compliance in 2006. There was a large number of aluminium exceedances in the South Leitrim Regional supply (11 of 56 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 and many of the private group water schemes were of an unacceptable quality. A large proportion of private group water schemes contained coliform bacteria during 2006 (15 of the 22 schemes monitored). The majority of private group water schemes in Leitrim were unfit for consumption during 2006.

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

Limerick City Council

Summary of Water Supplies²⁹

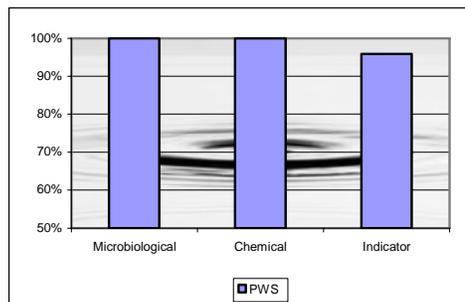
Type of Supply	No. of Supply Zones	Population Served
PWS	1	52,000
PuGWS	0	
PrGWS	0	
SPS	0	

Assessment of 2006 Monitoring

Limerick City Council carried out analysis on 291 check and 8 audit samples during 2006, thus meeting the minimum monitoring requirements in the Regulations.

Overall Compliance in 2006

The overall rate of compliance in Limerick City dropped from 99.4% in 2005 to 97.1% in 2006. This was due to a significant drop in compliance with the indicator parameters as the supply was fully compliant with the microbiological and chemical standards. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
PWS	100%	100%	95.9%

Compliance with the *E. coli* Standard

Compliance with the microbiological parametric values for *E. coli* and enterococci was excellent in Limerick City during 2006 and neither *E. coli* or enterococci were detected in any of the samples analysed during 2006.

Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was similarly excellent and the supply complied with all 26 of the chemical standards at all times that monitoring took place.

Although the supply complied with the microbiological and chemical standards, there was a worrying drop in compliance with the indicator parameters. There was a significant drop in compliance with the aluminium standard, with the percentage of samples complying with the standard dropping from 94% in 2005 to 64% in 2006 (107 of 299 samples analysed exceeded the standard), due to the age profile of the plant and increasing

demands on the water treatment plant. A new drinking water treatment plant is currently under construction to replace the old plant.

²⁹ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Limerick County Council

Summary of Water Supplies³⁰

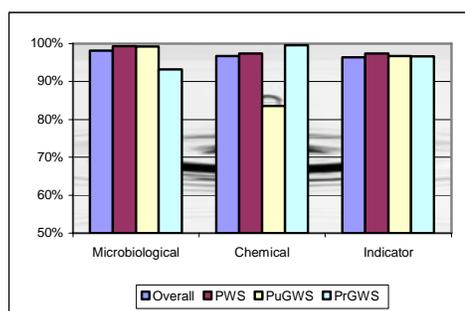
Type of Supply	No. of Supply Zones	Population Served
PWS	53	111,715
PuGWS	61	7,959
PrGWS	52	12,897
SPS	None Identified	

Assessment of 2006 Monitoring

Limerick County Council carried out analysis on 621 check and 84 audit samples analysed during 2006. There was no monitoring carried out in 1 public group water scheme and 1 private group water scheme.

Overall Compliance in 2006

The overall rate of compliance in County Limerick, 96.6%, was below the national average in 2006 and dropped from 98.6% in 2005. The main reason for this was the drop in compliance with the chemical standards, the reasons for which are explained below. Compliance with the microbiological, chemical and indicator parametric values are shown below.

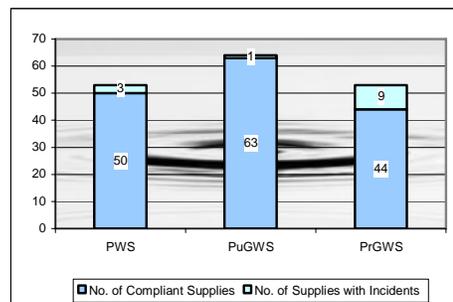


	Micro	Chemical	Indicator
Overall	98.1%	96.7%	96.4%
PWS	99.3%	97.4%	97.4%
PuGWS	99.2%	83.5%	96.7%
PrGWS	93.1%	99.5%	96.6%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

There were three incidents of *E. coli* contamination of public water supplies in the Adare, Foynes/Shannon Regional and the Oola supplies. All three exceedances were moderate (<20 cfu/100ml). Otherwise the microbiological quality of public water supplies and public group water schemes was good in Limerick County in 2006.



While above the national average, compliance with the microbiological standards in private group water schemes in Limerick County was poor with 9 of the 53 schemes monitoring contaminated during the year.

Compliance with the Chemical and Indicator Parametric Values

While the overall rate of compliance with the 25 of the 26 chemical standards was excellent in Limerick County in 2006 with no exceedances reported, there was a significant difficulty in Limerick in complying with the fluoride standard. Thirteen supplies monitored for fluoride reported exceedances of the standard. The overall compliance rate with the fluoride standard was 80%. Though the majority of exceedances were marginal (i.e. <10% above the standard) the repeated occurrence of fluoride exceedances is a cause for concern. A large number of exceedances were reported in the Abbeyfeale (7 of 17 samples analysed exceeded), Adare (5 of 10 samples analysed exceeded) and the South West Regional supply (8 of 13 samples analysed exceeded). There were also a large number of fluoride exceedances in several of the public group water schemes (19 of 42 monitored reported exceedances). This was due to elevated levels being present in the parent public water supplies.

Compliance with the indicator parametric values was less than satisfactory with a poor rate of compliance with the aluminium standard in public water supplies (77% compliance). The public group water schemes were of a similar quality to that of the public water supplies. Some of these exceedances were due to elevated levels of aluminium in water originating from the Limerick City supply. Elevated levels of turbidity were recorded in 7 of the 9 supplies monitored. Such plants are operating under conditions of high risk such that if *Cryptosporidium* is present in the source water of the supply then the treatment processes may not be adequate at removing them. Limerick County Council should continue to review operations at these treatment plants to ensure that the levels of turbidity in the treated water are reduced to an acceptable level.

Though compliance with the indicator parametric values in private group water schemes in Limerick County was above the national average, compliance was poor with the coliform bacteria (82% compliance) standard though an improvement was evident (72% compliance in 2005).

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

Longford County Council

Summary of Water Supplies³¹

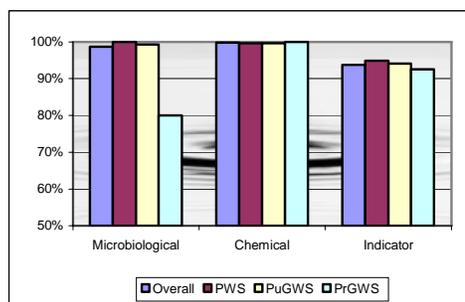
Type of Supply	No. of Supply Zones	Population Served
PWS	8	16,587
PuGWS	53	6,180
PrGWS	3	530
SPS	None Identified	

Assessment of 2006 Monitoring

Longford County Council carried out analysis on 156 check and 33 audit samples during 2006. Insufficient analysis was carried out on 6 public group water schemes. Furthermore, no monitoring was carried out in private water supplies that supply water as part of a public or commercial activity.

Overall Compliance in 2006

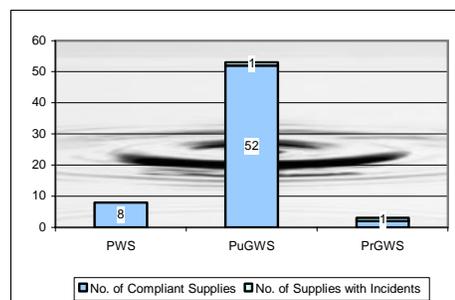
The overall rate of compliance in County Longford, 95.8%, though improved from 95.2% in 2005, was below the national average in 2006. While the microbiological and chemical compliance was relatively high in Longford, compliance with the indicator parametric values was less so. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	98.7%	99.8%	93.7%
PWS	100%	99.7%	94.9%
PuGWS	99.3%	99.6%	94.1%
PrGWS	80.0%	100%	92.5%

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 a public water supplies in Longford in 2006. With the exception of one public group water scheme and one private group water scheme, all others were of good microbiological quality with no exceedances of the *E. coli* or enterococci parametric values reported in the rest of the schemes during 2006.

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 satisfactory although there was one moderate fluoride exceedance in the Newtowncashel public water supply as well as elevated levels of trihalomethanes in one public group water scheme.

Compliance with the indicator parametric values in public water supplies in Longford was unsatisfactory and was below the national average. As in 2005 aluminium exceedances were reported in the Ballinalee/Edgeworthstown (3 of 5 samples analysed), Granard (3 of 5 samples analysed) and the Longford Central (5 of 10 samples analysed) supplies. The ongoing problem in the latter is due to a treatment plant consistently being required to produce quantities of water in excess of its design capacity. Elevated levels of iron in these three supplies was also reported (81% compliance). 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 (72% compliance).

There was deterioration in the quality of the private group water schemes in Longford with 2 of the 4 private group water schemes containing coliform bacteria during 2006. The private group water schemes in Longford had been fully compliant with the indicator parametric values in 2005.

³¹ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Louth County Council

Summary of Water Supplies³²

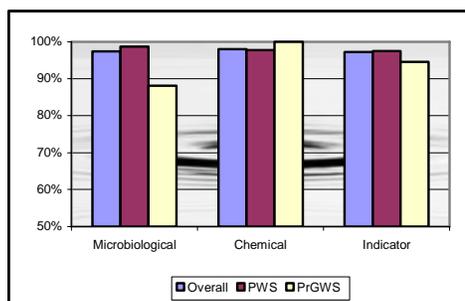
Type of Supply	No. of Supply Zones	Population Served
PWS	16	83,805
PuGWS	0	
PrGWS	9	3,565
SPS	None Identified	

Assessment of 2006 Monitoring

Louth County Council carried out analysis on 270 check and 35 audit samples during 2006. While the frequency of monitoring was sufficient in the public water supplies and private group water schemes monitored there was no analysis carried out on any private water supplies that supply water as part of a public or commercial activity.

Overall Compliance in 2006

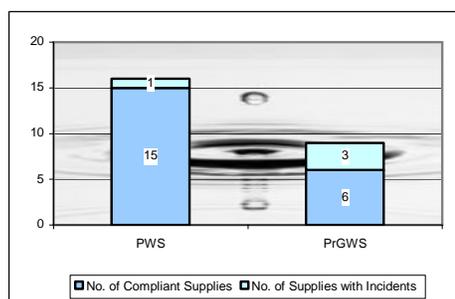
The overall rate of compliance in County Louth, 97.3%, was close to the national average. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	97.4%	98.0%	97.2%
PWS	98.7%	97.7%	97.5%
PrGWS	88.1%	100%	94.6%

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 was one incident of *E. coli* contamination in the Omeath public water supply in Louth during 2006

although enterococci exceedances were reported in two public water supplies (Cavan Hill and Staleen). Exceedances of the *E. coli* parametric value were recorded in 3 of the 9 private group water schemes monitored in 2006.

Compliance with the Chemical and Indicator Parametric Values

While all samples analysed in public water supplies and group water schemes were fully compliant for 25 of the 26 chemical parameters, compliance with the fluoride standard was poor at 81% in public water supplies. However, all these exceedances were less than 10% above the standard and all were within the EU standard. Nonetheless, action must be taken by Louth County Council to reduce the incidence of failure to meet the fluoride standard.

Although compliance with the aluminium parametric value was close to the national average, compliance with some indicator parameters was problematic. There were a number of aluminium exceedances in the Ardee supply (6 of 20 samples analysed exceeded) and the Staleen supply (12 of 52 samples analysed). Elevated levels of turbidity was recorded in 2 of the 14 supplies monitored indicating that these supplies are operating under high risk of *Cryptosporidium* being present in the drinking water if present in the raw water. The local authority should continue to review the operation of these plants to ensure that treatment is appropriate to reduce the risk.

The main issue of concern with regard to compliance with the indicator parametric values in the private group water schemes was coliform bacteria. Although there was a rise in compliance with the coliform bacteria parametric value from 50% in 2005 to 68% in 2006, coliform bacteria exceedances were recorded in 6 of the 9 private group water schemes monitored.

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

Mayo County Council

Summary of Water Supplies³³

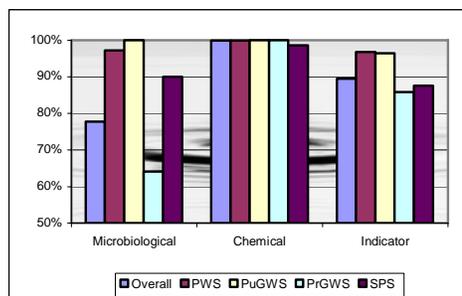
Type of Supply	No. of Supply Zones	Population Served
PWS	24	71,558
PuGWS	104	19,473
PrGWS	95	37,778
SPS	20	N/A

Assessment of 2006 Monitoring

Mayo County Council carried out analysis on 443 check and 49 audit samples during 2006. The monitoring programme as carried out by Mayo County Council during 2006 was insufficient and did not meet the requirements of the Regulations. The EPA met Mayo County Council in 2007 concerning this matter and the Council have agreed to review the monitoring programme to ensure that sufficient monitoring is carried out in 2007.

Overall Compliance in 2006

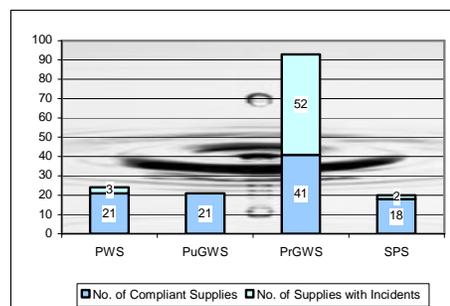
The overall rate of compliance in County Mayo, 91.7%, was well below the national average. The primary reason for this was the poor microbiological quality of the private group water schemes. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	77.8%	99.9%	89.5%
PWS	97.2%	99.9%	96.8%
PuGWS	100%	100%	96.4%
PrGWS	64.1%	100%	85.9%
SPS	90.0%	98.6%	87.6%

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. 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 Mayo during 2006, namely the Cappagh (2 incidents), Clare Island and Inisturk supplies. Both samples analysed for *E. coli* in the Cappagh supply were contaminated in 2006 however, this supply was connected to the Lough Mask scheme to resolve the quality deficiency. The sole sample analysed in the Inisturk supply was contaminated (albeit with 1cfu/100ml). Over half of the private group water schemes were found to be contaminated with *E. coli* during 2006, a situation which is of concern particularly as there has been little improvement compared to 2005. While 10 new treatment plants have since commenced operation and a further 14 will be operational by the end of 2008, it is of concern that Mayo County Council reported that 7 of these schemes have no action plans in place to address the quality deficiency. This situation must be rectified as soon as possible and Mayo County Council must use all enforcement powers necessary to ensure that action is taken to rectify the quality deficiency in these 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 elevated levels of arsenic were detected in one commercial supply that supplies water to the public. The Council reported carrying out a survey of the vulnerability of water supplies in the area to contamination with arsenic and have reported that a treatment system has been installed in the supply to remove arsenic and that bottled water was used for drinking in the interim.

Compliance with the indicator parametric values was unsatisfactory in public water supplies. Compliance with the aluminium parametric value was problematic in Mayo (73% compliance). Of concern was the failure of all samples tested to comply with the aluminium standard in the Mulranny (all 3 samples analysed exceeded) and the Shrulle (all 5 samples analysed exceeded) supplies while high levels of aluminium (up to 8 times the standard) were detected in the Westport supply (8 of 10 samples analysed exceeded). Mayo County Council must continue to review the operation of these plants to ensure that these plants are brought back into compliance with the Regulations.

There were a number of indicator parameters with low rates of compliance in the private group water schemes. In total, 65 of the 93 private group water schemes, monitored were found to contain coliform bacteria at least once during 2006 and were thus of an unacceptably poor quality.

³³ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Meath County Council

Summary of Water Supplies³⁴

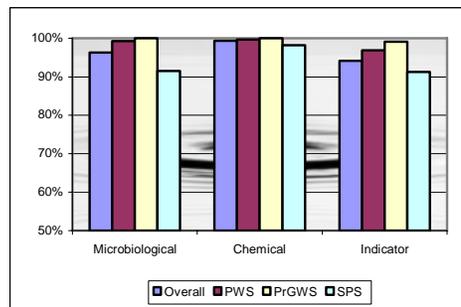
Type of Supply	No. of Supply Zones	Population Served
PWS	36	101,036
PuGWS	0	
PrGWS	2	1,600
SPS	115	N/A

Assessment of 2006 Monitoring

Meath County Council carried out analysis on 439 check and 68 audit samples during 2006. The monitoring deficiency in 2005 has been largely addressed and the Council has carried out extensive monitoring of private supplies that supply water as part of a public or commercial activity.

Overall Compliance in 2006

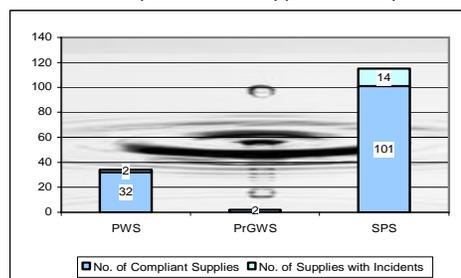
Although compliance with the standards was down slightly from 96.7% in 2005 to 95.8% in 2006 this is largely due to the inclusion of a large number of private supplies (which were of an inferior quality to the public or group water schemes in Meath). The quality of the majority of public water supplies and both group water schemes monitored was good. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	96.3%	99.4%	94.2%
PWS	99.3%	99.7%	96.9%
PrGWS	100%	100%	99.1%
SPS	91.5%	98.2%	91.3%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were two incidents of *E. coli* contamination in the Ballinaclose and East Meath supplies, however, both were due to the detection of a single *E. coli* organism which was not found in subsequent follow up samples. Both private group water schemes monitored in Meath during 2006 were found to be free of *E. coli* and Enterococci and were thus of a good microbiological quality. Of the 115 private water supplies monitored (including schools, public houses, private housing estates etc) 14 were contaminated with *E. coli*. Resamples were taken in all cases and Meath County Council reported taking action to assist these suppliers in identifying the cause of the contamination and resolving the water quality deficiency.

Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards in the majority of supplies was good. However, there were two supplies with elevated levels of trihalomethanes (East Meath and Trim) as well as one supply with elevated levels of pesticides (Clonee/Dunboyne – which originates from Fingal County Council). Follow up sampling in the Clonee/Dunboyne supply did not detect elevated levels of pesticides but vigilance will be required to ensure that the levels do not rise again. This will have to be done in liaison with Fingal County Council. Both the East Meath and Trim supplies reported several samples containing levels of trihalomethanes above the incoming standard (effective from 2008 onwards) and action will be necessary to ensure that the levels of trihalomethanes are reduced in these supplies to ensure compliance with this new standard. The Moynalty supply also contained levels of nitrate marginally above the standard. Meath County Council reported that this supply is being upgraded in 2007 with treatment to remove nitrate being installed.

Both private group water schemes were fully compliant with the chemical standards, however, there were 5 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 2006. though compliance with the aluminium standard was relatively low (88% in public water supplies). Though there were occasional exceedances of most indicator parameters in some supplies during the year, the rate of compliance for the majority of the indicator parameters was satisfactory. Compliance with the indicator parametric values for the two private group water schemes was good and there was just one manganese exceedance reported during 2006.

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 (75% compliance), iron (82% compliance) and manganese (66% compliance) was poor in the private water supplies.

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

Monaghan County Council

Summary of Water Supplies³⁵

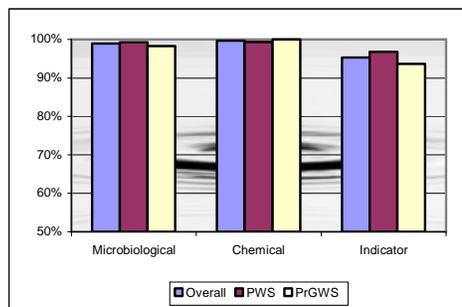
Type of Supply	No. of Supply Zones	Population Served
PWS	13	22,381
PuGWS	0	
PrGWS	13	19,624
SPS	None Identified	

Assessment of 2006 Monitoring

Monaghan County Council carried out analysis on 184 check and 41 audit samples in 2006 and thus fully complied with the minimum monitoring requirements in public water supplies and group water schemes. However, no monitoring was carried out in private water supplies that supply water as part of a public or commercial activity.

Overall Compliance in 2006

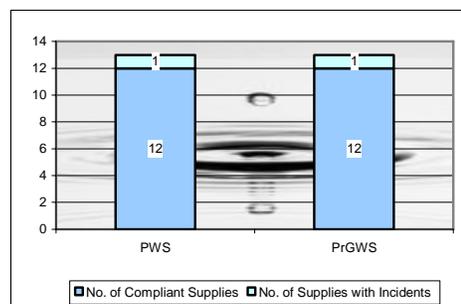
The overall rate of compliance in County Monaghan, 96.7%, was close to the national average and improved from 94.8% in 2005. While the quality of drinking water in the majority of supplies was satisfactory there were a small number of supplies with poor quality that brought down the overall average. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	98.9%	99.7%	95.3%
PWS	99.3%	99.4%	96.8%
PrGWS	98.3%	100%	93.6%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There was one serious incident (>20 cfu/100ml) of *E. coli* contamination of public water supplies in Monaghan during 2006, in Pullis Cottages supply. This is a very small supply (serving just a few houses) and is not representative of the quality of drinking water in Monaghan as a whole. The majority of upgrading being carried out under the Monaghan DBO project was completed during 2006 and the subsequent quality of group water schemes upgraded was good. There was just one of the 13 private group water schemes monitored contaminated with *E. coli* during 2006, the Donaghmoynne GWS, which was the only group water schemes in Monaghan which chose not to be upgraded as part of the Monaghan DBO.

Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parametric values was good though there were some issues of concern. Not for the first time antimony and arsenic were detected in the Clontibret supply. Lead was also detected in one sample in the Glaslough supply. Further investigation into the cause of the lead exceedance is necessary as this is the second year in a row this has occurred in the single sample analysed. There were no exceedances of the chemical standards in any of the group water schemes monitored in Monaghan during 2006.

Compliance with the indicator parametric values in public water supplies was satisfactory though there were a small number of aluminium exceedances in the Clones (4 of 18 samples analysed), Monaghan (3 of 25 samples analysed) and Stranooden (6 of 13 samples analysed) supplies. Elevated levels of turbidity were recorded in 2 of the 13 supplies monitored indicating that these supplies are operating under high risk of *Cryptosporidium* being present in the drinking water if present in the raw water. The local authority should review the operation of these plants to ensure that treatment is appropriate to reduce the risk.

Though compliance with the indicator parametric values in private group water schemes was marginally above the national average in Monaghan in 2006, it was nonetheless unsatisfactory and there were problems in complying with the aluminium (90% compliance), coliform bacteria (86% compliance) and turbidity at the water treatment plant (70% compliance) standards. Thus although the microbiological and chemical quality of the group water schemes was good, further improvement is necessary to reduce the number of non-compliances with the indicator parametric values.

³⁵ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

North Tipperary County Council

Summary of Water Supplies³⁶

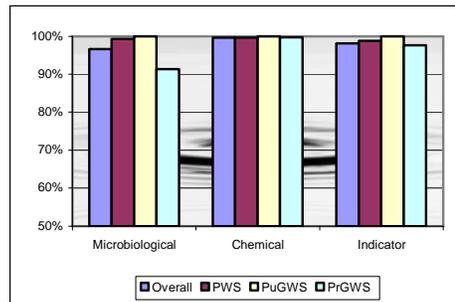
Type of Supply	No. of Supply Zones	Population Served
PWS	31	48,077
PuGWS	1	154
PrGWS	41	7,225
SPS	Incl in PrGWS	

Assessment of 2006 Monitoring

North Tipperary County Council carried out analysis on 645 check and 55 audit samples during 2006. North Tipperary complied with (and indeed exceeded) the required monitoring frequencies in the Regulations.

Overall Compliance in 2006

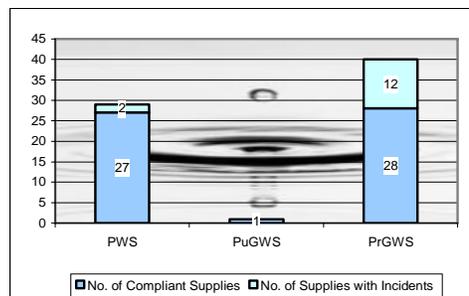
The overall rate of compliance in North Tipperary, 98.6% in 2006, was above average though dropped from 99.2% in 2005. The drop in compliance was largely due to the increase in the number of private group water schemes being contaminated with *E. coli*. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	96.7%	99.7%	98.2%
PWS	99.4%	99.7%	98.8%
PuGWS	100%	100%	100%
PrGWS	91.4%	99.8%	97.7%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were two incidents of *E. coli* contamination of public water supplies in North Tipperary during 2006 in the Templemore and Thurles supplies. The Templemore chlorination system was replaced in September 2006 while the Thurles failure was due to an air locked pump which was reported. It is of concern that these same two supplies also reported incidents of contamination during 2005.

There was a serious drop in the microbiological quality of the private group water schemes and it is of concern that 12 of the 40 private group water schemes monitored were contaminated during the year as compared to just one in 2005.

Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was above average in North Tipperary during 2006. However, there were some issues of concern. Nitrate exceedances were reported in the Cloughjordan and Two Mile Borris supplies while there were also copper and lead exceedances in the Roscrea supply, though these were likely to be localised in nature and due to plumbing in individual premises and unlikely to indicate a supply wide problem.

Full compliance with all the chemical parametric values was achieved in the private group water schemes with the exception of a single nitrate exceedance in the Laha/Castleiney B scheme.

Compliance with the indicator parametric value was above the national average in North Tipperary in 2006, though there was a significant drop in compliance in the private group water schemes largely due to a decline in compliance with the coliform bacteria standard (83% compliance in 2006).

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

Offaly County Council

Summary of Water Supplies³⁷

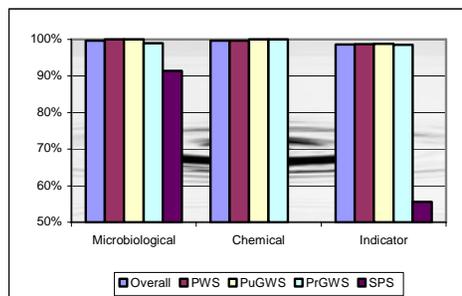
Type of Supply	No. of Supply Zones	Population Served
PWS	24	41,520
PuGWS	7	1,043
PrGWS	19	14,694
SPS	32	N/A

Assessment of 2006 Monitoring

Offaly County Council carried out analysis on 249 check and 48 audit samples during 2006 as well as 35 microbiological samples in small private supplies. While the correct number of check and audit samples were analysed in all supplies, some parameters were omitted from some of the audit samples in a small number of supplies.

Overall Compliance in 2006

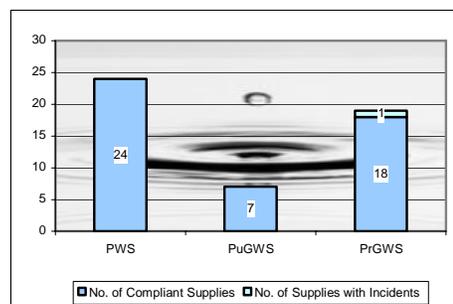
The overall rate of compliance in County Offaly, 99% was above the national average in 2006 and improved from 98.5% in 2005. The level of compliance with the indicator parametric values, while less than that of the microbiological and chemical parametric values, was nonetheless satisfactory. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	99.7%	99.7%	98.6%
PWS	100%	99.7%	98.7%
PuGWS	100%	100%	98.8%
PrGWS	98.9%	100%	98.5%
SPS	91.4%		55.6%

Compliance with the *E. coli* Standard

Compliance with the microbiological parametric values was good in both public water supplies and private group water schemes. 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 of public water supplies or public group water schemes in Offaly during 2006. The microbiological quality of the private group water schemes was also good in the majority of schemes with just one of the 19 schemes monitored failing to comply with the *E. coli* standard during 2006.

Compliance with the Chemical and Indicator Parametric Values

Although full compliance was achieved with 24 of the 26 chemical standards in public water supplies in Offaly, there were two significant issues during 2006. Elevated levels of nitrates were detected in two supplies, the Dunkerrin and Mount Bolus supplies. These were the same two supplies that contained elevated levels of nitrate in 2005. The former supply was the subject of enforcement action by the EPA in 2007. There was also one significant exceedance of the pesticides standard in the Clara/Ferbane supply due to high levels of mecoprop (above the World Health Organisation guideline value) although follow up samples were free of the pesticide. There was just one exceedance of the chemical standard in the private group water schemes. Elevated levels of nitrate were detected in the Rath group water scheme.

Though compliance with the indicator parametric value was less than that of the microbiological or chemical parametric values in 2006 it was above the national average. However, compliance with the aluminium parametric value in public water supplies remained low (94% compliance) and was mainly due to the continued failure of the Tullamore supply to comply with the aluminium parametric value (7 of 29 samples analysed exceeded) as well as failures in the Birr supply (4 of 15 samples analysed failed).

Compliance with the indicator parametric values in private group water schemes was higher than that in the public water supplies though compliance with the coliform bacteria parametric value was less than satisfactory (92%) and in need of improvement.

³⁷ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Roscommon County Council

Summary of Water Supplies³⁸

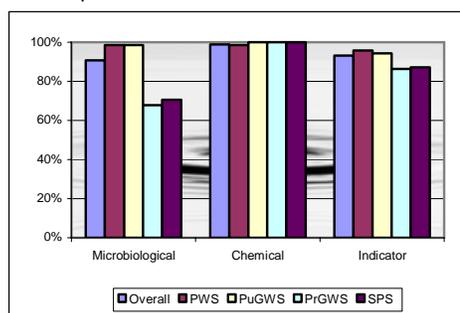
Type of Supply	No. of Supply Zones	Population Served
PWS	22	44,288
PuGWS	29	5,223
PrGWS	28	5,413
SPS	9	N/A

Assessment of 2006 Monitoring

Roscommon County Council carried out analysis on 236 check and 53 audit samples during 2006. There was a slight deficiency in the monitoring programme with insufficient check samples analysed in a small number of supplies while the full set of audit parameters were not monitored in some samples.

Overall Compliance in 2006

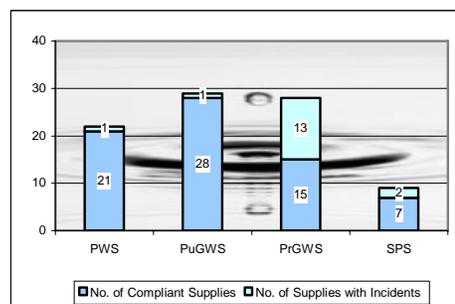
The overall rate of compliance in County Roscommon, 94.3%, down from 95.2% in 2005, was unsatisfactory and below the national average during 2006 and was due to below average compliance with the microbiological and indicator parametric values. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	90.8%	98.9%	93.2%
PWS	98.6%	98.6%	95.8%
PuGWS	98.6%	100%	94.3%
PrGWS	67.8%	100%	86.3%
SPS	70.6%	100%	87.2%

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. 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 the Boyle/Ardcarne public water supply. Enterococci was also detected in this supply during 2006. *E. coli* was also detected in one public group water schemes monitored in 2006.

Of the 28 private group water schemes monitored for *E. coli* in 2006, 13 (up from 9 in 2005) were found to be contaminated with *E. coli* at least once during the year. Compliance with the *E. coli* parametric value actually fell from 77% compliance in 2005 to 69% compliance in 2006. This deterioration in the quality of schemes in Roscommon is a cause for concern and must be reversed.

Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was below average in public water supplies in Roscommon, and there were some issues of concern. There was one very high exceedance of the bromate standard (almost 4 times the standard) in the Arigna supply. Chemical usage at this plant must urgently be reviewed to ensure that the incidence of failure is eliminated. There were also two lead exceedances in the North Roscommon and Roscommon Central Regional supplies, though it is likely that both were due to internal plumbing. Trihalomethanes were also a problem in the North East Regional supply (serving Roosky, Strokestown and Tarmonbarry). It is imperative that action is taken to deal with this problem as a more stringent standard for trihalomethanes is effective in 2008.

Although of poor microbiological quality there were no chemical problems in any of the private group water schemes during 2006 with all samples analysed complying with the standards.

Compliance with the indicator parametric values was below the national average in public water supplies in Roscommon during 2006 which was primarily due to low level of compliance with the colour standard. Though colour is not a concern for health it is undoubtedly a contributory factor in the trihalomethane exceedances in the North East Regional 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 *Clostridium perfringens* (77%), colour (72%) and coliform bacteria (62%) parametric values. The poor rates of compliance with these parametric values is of concern and the quality of the private group water schemes in Roscommon is in general unsatisfactory.

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

Sligo County Council

Summary of Water Supplies³⁹

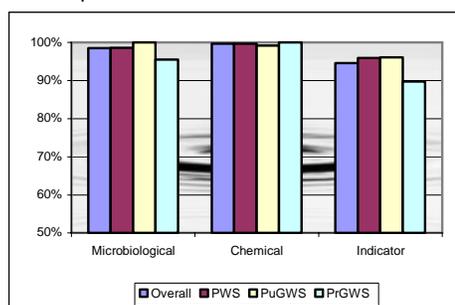
Type of Supply	No. of Supply Zones	Population Served
PWS	13	38,059
PuGWS	21	4,505
PrGWS	13	4,935
SPS	None Identified	

Assessment of 2006 Monitoring

Sligo County Council carried out analysis on 250 check and 43 audit samples during 2006. No monitoring was carried out in 2 public group water schemes while just one sample was analysed in almost all the remaining public and private group water schemes. Thus insufficient sampling was carried out in all group water schemes in Sligo during 2006. Furthermore, no monitoring was carried out in private water supplies that supply water as part of a public or commercial activity.

Overall Compliance in 2006

The overall rate of compliance in County Sligo, 96.5%, was slightly below the national average and fell from 97.2% in 2005. Compliance with the microbiological and chemical parametric values was satisfactory in most supplies though compliance with the indicator parametric values was less satisfactory. Compliance with the microbiological, chemical and indicator parametric values are shown below.

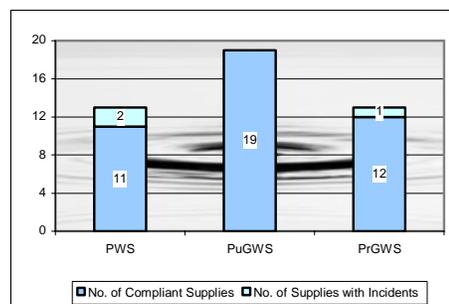


	Micro	Chemical	Indicator
Overall	96.5%	99.7%	94.6%
PWS	98.6%	99.7%	95.9%
PuGWS	100%	99.2%	96.1%
PrGWS	95.5%	100%	89.8%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

There were 3 incidents of *E. coli* contamination in 2 public water supplies, the Lough Talt Regional Supply (2 incidents) and the North Sligo Regional Water Supply during 2006.



Although there were insufficient numbers of samples analysed in private group water schemes in Sligo in 2006 there was a significant improvement in the quality of drinking water. One private group water scheme was contaminated with *E. coli* during the year down from 7 in 2005. This improvement was due to the completion of the North West and South East Sligo DBO bundles which has resulted in the construction of 11 new treatment plants which were brought into service in 2006. The sole scheme that was contaminated during 2006 was not part of either of these bundles.

Compliance with the Chemical and Indicator Parametric Values

Full compliance with 24 of the 26 chemical parametric values was achieved in Sligo during 2006. However, there was one nitrite exceedance in one public group water scheme and three trihalomethanes exceedances in the Kilsellagh (2 exceedances) and the Lough Gill Regional water supplies. It is imperative that action is taken to deal with this problem as a more stringent standard for trihalomethanes is effective in 2008.

There were no chemical exceedances in any of the 9 private group water schemes monitored in Sligo during 2006.

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 aluminium (89%), iron (80%) and coliform bacteria (92%) parametric values was low. Of concern was the failure of half the samples analysed (14 of 28 samples) in the Lough Easkey Regional Supply to meet the aluminium standard. The Council must investigate the cause of these failures and implement corrective action to reduce the incidence of failure. Elevated levels of turbidity were recorded in 2 of the 6 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 local authority should review the operation of these plants to ensure that treatment is appropriate to reduce the risk.

The upgrade of the private group water schemes in Sligo has resulted in an improvement in compliance with the coliform bacteria standard from 46% in 2005 to 77% in 2006 though it is still in need of further improvement. Sligo County Council must increase monitoring of the group water schemes in the county. It is imperative that there is verification that the significant sums of money spent upgrading these schemes have been worthwhile.

³⁹ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

South Dublin County Council

Summary of Water Supplies⁴⁰

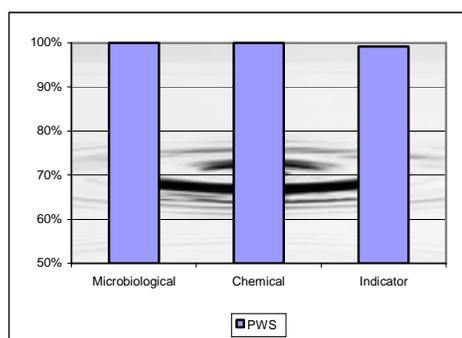
Type of Supply	No. of Supply Zones	Population Served
PWS	4	250,680
PuGWS	0	
PrGWS	0	
SPS	0	

Assessment of 2006 Monitoring

South Dublin County Council carried out analysis on 311 check and 17 audit samples in 2006. South Dublin County Council have met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

Overall Compliance in 2006

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



	Micro	Chemical	Indicator
PWS	100%	100%	99.2%

Compliance with the *E. coli* Standard

Compliance with the *E. coli* and enterococci parametric values was excellent during 2006. *E. coli* was not detected in any of the 326 samples analysed in 2006 while enterococci was 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 also excellent with no exceedances of any of the 26 parameters reported during 2006.

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 (93%) was reported though given the absence of *E. coli* in the water

supplies in South Dublin it is more likely that these exceedances were due to sample point contamination.

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

South Tipperary County Council

Summary of Water Supplies⁴¹

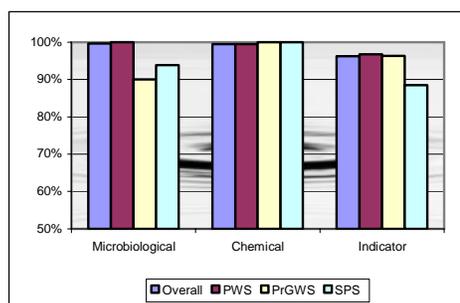
Type of Supply	No. of Supply Zones	Population Served
PWS	26	71,288
PuGWS	0	
PrGWS	3	360
SPS	12	N/A

Assessment of 2006 Monitoring

South Tipperary County Council carried out analysis on 368 check and 78 check samples during 2006. While adequate numbers of check and audit samples were analysed in all water supplies in South Tipperary, three parameters (benzo(a)pyrene, bromate and cyanide) were omitted from a number of audit samples.

Overall Compliance in 2006

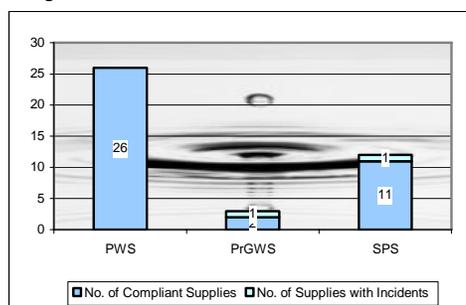
The overall rate of compliance in South Tipperary, 97.4%, was above the national average and was due to above average compliance with the microbiological and chemical parametric values. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	99.6%	99.4%	96.2%
PWS	100%	99.4%	96.7%
PrGWS	90.0%	100%	96.3%
SPS	93.8%	100%	88.5%

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 South Tipperary during 2006 with all 409 samples analysed free of *E. coli*. Furthermore, all 76 samples analysed for enterococci were also compliant and thus public water supplies in South Tipperary were of excellent microbiological quality in 2006. However, the Clonmel Glenary supply was found to contain *Cryptosporidium* in 2007, necessitating a boil water notice being placed on the supply, though the type found was not normally infectious to humans and (at the time of preparation of this report) no cases of cryptosporidiosis were detected in the population served by the supply.

One of the three private group water schemes and one of the 12 private water supplies monitored were found to contain *E. coli* during 2006 and were thus of an unsatisfactory quality.

Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values was good (99.4%) though there were some marginal exceedances of the fluoride standard, particularly in the Clonmel Glenary supply (5 of 34 samples analysed) and one trihalomethane exceedance in the Killurney supply. This exceedance was almost twice the standard and action must be taken as soon as possible to ensure that this supply is compliant in future.

Though there were a limited number of samples analysed for the chemical parameters in the private group water schemes all were compliant with the parametric values.

Though compliance with the indicator parametric values in public water supplies in South Tipperary improved from 96.1% in 2005 to 96.7% in 2006, there were still problems complying with certain standards. Though improving from 73% in 2005 to 81% in 2006, compliance with the aluminium standard remains low. The supplies with the worst level of compliance with the aluminium standard were the Ardfinnan Regional (13 of 31 samples analysed exceeded), Dundrum Regional (12 of 20 samples analysed exceeded) and the Galtee Regional (5 of 41 samples analysed exceeded). These supplies have been consistently reporting high numbers of aluminium exceedances over the past number of years and it is imperative that the Council improve treatment at these plants to ensure compliance with the aluminium standard.

Compliance with the indicator parametric values in private group water schemes in South Tipperary rose from 95.1% in 2005 to 96.3% in 2006 and apart from a single of pH, odour and coliform bacteria exceedances full compliance was achieved with the remaining indicator parameters.

⁴¹ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Waterford City Council

Summary of Water Supplies⁴²

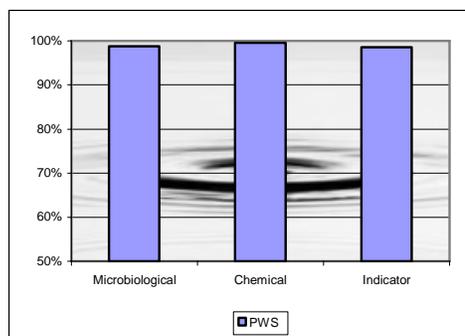
Type of Supply	No. of Supply Zones	Population Served
PWS	1	41,945
PuGWS	0	
PrGWS	0	
SPS	0	

Assessment of 2006 Monitoring

Waterford City Council carried out analysis on 46 check and 22 audit samples during 2006, thus complying with the minimum monitoring requirements.

Overall Compliance in 2006

The overall rate of compliance in Waterford City Council, 98.9%, was good, though dropped slightly from 99.4% in 2005. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
PWS	98.8%	99.6%	98.6%

Compliance with the *E. coli* Standard

Compliance with the *E. coli* and enterococci parametric values in 2006 in Waterford City was good though a single sample (of 68 samples analysed) failed to comply with the standard (this was due to the detection of a single organism).

Compliance with the Chemical and Indicator Parametric Values

Compliance with the indicator parametric values was good with just two exceedances of the chemical parametric values. One lead exceedance was reported though this was due to plumbing and was not due to elevated levels of lead in the water supply as a whole while there was also one nitrite exceedance.

Compliance with the indicator parametric values was similarly high and at 98.6% was above the national average.

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

Waterford County Council

Summary of Water Supplies⁴³

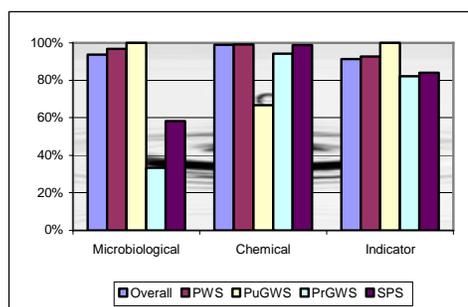
Type of Supply	No. of Supply Zones	Population Served
PWS	100	52,763
PuGWS	1	
PrGWS	5	310
SPS	8	N/A

Assessment of 2006 Monitoring

Waterford County Council carried out analysis on 245 check and 46 audit samples during 2006. There was insufficient analysis carried out in Waterford County with several incomplete check or audit samples analysed (i.e. the full suite of parameters was not monitored as required).

Overall Compliance in 2006

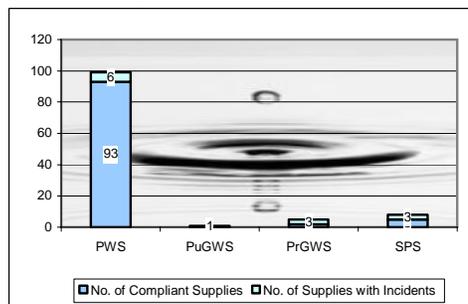
The overall rate of compliance in County Waterford, 94.2%, was below the national average and dropped marginally from 94.7% in 2005. The reason for was the lower than average microbiological quality of drinking water. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	93.6%	98.9%	91.3%
PWS	96.6%	99.0%	92.6%
PuGWS	100%	66.7%	100%
PrGWS	33.3%	94.1%	82.1%
SPS	58.3%	98.8%	84.1%

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. 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 8 public water supplies in Waterford County in 2006, in the Ballyshunnock, Graigenageeha, Inchileamy, Kilnafrehan, Rathgormuck and Tinkock/Tinnabinnna supplies. Although the number of supplies with incidents reduced compared to 2005 (9 were contaminated during 2005) the number is still unacceptably high. Furthermore, an outbreak of cryptosporidiosis occurred in December 2006 associated with the Portlaw supply. A total of 8 cases of the disease were reported and remedial action has been undertaken to reduce the likelihood of a recurrence.

Three of the 5 private group water schemes and 3 of the 8 private water supplies monitored were found to be contaminated with *E. coli*.

Compliance with the Chemical and Indicator Parametric Values

Though full compliance was achieved with the majority of chemical parameters, there were a small number of marginal fluoride exceedances (6 of 175 samples analysed). Of concern was the presence of elevated levels of nitrate in 5 public water supplies. The Adramone, Geoish, Kilmore-Kilbeg, Lismore/Cappquin/Ballyduff and Shanacoolle public water supplies all failed to comply with the nitrate standard during 2006. The cause of these failures must be investigated and appropriate source protection measures must be taken to prevent a recurrence.

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 one private group water scheme and one private water supply.

Compliance with the indicator parametric values in public water supplies in Waterford County was below the national average in 2006 at 93.8%. This was primarily due to the failure of two thirds of the public water supplies (64 of 99 monitored) to comply with the pH standard. 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. The Council should review monitoring results and install pH correction where necessary.

As with the chemical parameters, there was limited monitoring of the indicator parameters in private group water schemes during 2006. It is of concern that 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 2006.

⁴³ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Westmeath County Council

Summary of Water Supplies⁴⁴

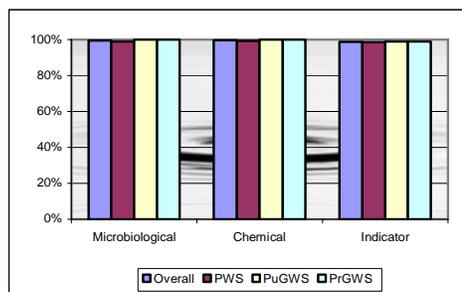
Type of Supply	No. of Supply Zones	Population Served
PWS	14	62,225
PuGWS	38	6,175
PrGWS	3	1,050
SPS	None Identified	

Assessment of 2006 Monitoring

Westmeath County Council carried out analysis on 161 check and 39 audit samples during 2006. Though adequate monitoring was carried out in the majority of supplies there was a shortfall in the number of check samples in 3 public group water schemes. Furthermore, no monitoring was carried out in private water supplies that supply water as part of a public or commercial activity.

Overall Compliance in 2006

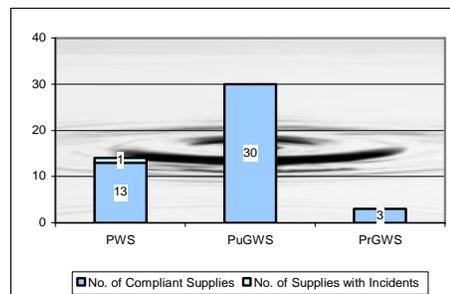
The overall rate of compliance in County Westmeath, 99.1% was above the national average during 2006. This was due to the high level of compliance with the microbiological and chemical standards of both public water supplies and group water schemes. Furthermore, compliance with the indicator parametric values was above the national average. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	99.5%	99.7%	98.7%
PWS	98.9%	99.4%	98.5%
PuGWS	100.0%	100.0%	98.8%
PrGWS	100.0%	100.0%	99.1%

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. 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. This was due to the detection of a single organism in one sample in the Athlone supply, which was reportedly due to the internal plumbing at the sample point. All 38 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 excellent microbiological quality.

Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values was good in public water supplies in Westmeath during 2006 with full compliance achieved with 25 of the 26 chemical parameters. However, there were a small number of exceedances of the fluoride standard (3 of 61 samples analysed) though all were only marginally above the standard. There were no exceedances of any of the chemical parametric values in private group water schemes during 2006.

Compliance with the indicator parametric value in public water supplies was good and was well above the national average at 98.5% in 2006 though there were a number of exceedances of the coliform bacteria standard (93% compliance).

Compliance with the indicator parametric values in group water schemes in Westmeath was good and compliance was above the national average at 99.1%, improving from 95.3% in 2005.

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

Wexford County Council

Summary of Water Supplies⁴⁵

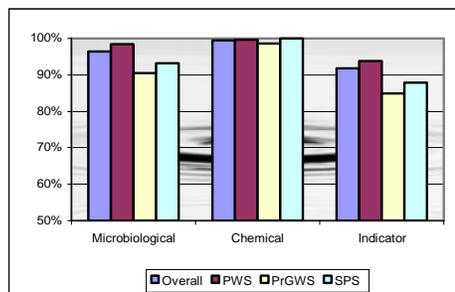
Type of Supply	No. of Supply Zones	Population Served
PWS	31	105,840
PuGWS	0	
PrGWS	10	4,340
SPS	117	N/A

Assessment of 2006 Monitoring

Wexford County Council carried out analysis on 216 check and 43 audit samples during 2005. No monitoring was carried out on 1 private group water scheme during 2006 and there was a deficiency in the testing of some parameters in a number of other water supplies. Furthermore, the Council did carry out analysis on a number of other samples, however these were not submitted to the EPA in time for inclusion in this report. Accordingly the assessment of compliance is based on only the results submitted.

Overall Compliance in 2006

The overall rate of compliance in County Wexford, 94.2% was below the national average during 2006 and was mainly due to the lower than average compliance with the indicator parametric values. Compliance with the microbiological, chemical and indicator parametric values are shown below.

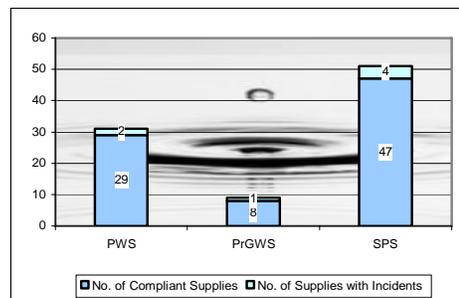


	Micro	Chemical	Indicator
Overall	96.4%	99.5%	91.8%
PWS	98.5%	99.7%	93.8%
PrGWS	90.5%	98.6%	84.9%
SPS	93.2%	100%	87.9%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

There were two incidents of *E. coli* contamination of a public water supply in Wexford during 2006 in the Kiltaley and New Ross supplies. The levels of *E. coli* detected were moderate (<20 cfu/100ml). 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 2006. Compliance with the microbiological standards was less satisfactory in the private water supplies as 4 of the 51 schemes were contaminated with *E. coli*.



Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values in public water supplies was good (99.7% compliance) and there were just two exceedances of the chemical standards. A nickel and a nitrite exceedance was reported in the Taghmon supply though the former was likely due to the tap fittings at the sample point and was not representative of the quality of the supply as a whole.

While compliance with the chemical standards was generally good there was one exceedance of the arsenic standard. Monitoring in December 2006 indicated that the Monamolin group water scheme had elevated levels of arsenic over 5 times the standard. It is clear that the local authority failed to identify a serious failure in the water supply, as consumers of this supply were not notified of this quality deficiency until August 2007. The Council has reviewed their procedures to ensure that all non-compliant results are immediately brought to the attention of senior management.

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. There was a slight drop in compliance from 75% in 2005 to 72% in 2006. The Council should investigate pH correction to ensure that this standard in being complied with in the relevant supplies.

Though there was a slight improvement (from 69% in 2005 to 76% in 2006) in compliance with the coliform bacteria standard in the private group water schemes it was nonetheless low. Furthermore, compliance with the pH standard deteriorated with just 25% of samples analysed complying with the standards. All 9 private group water schemes reported exceedances of the pH standard. Similarly low levels of compliance were reported in the private water supplies for pH (51%) and coliform bacteria (78%).

⁴⁵ PWS = Public Water Supply, PuGWS = Public Group Water Scheme, PrGWS = Private Group Water Scheme, SPS = Small Private Supply

Wicklow County Council

Summary of Water Supplies⁴⁶

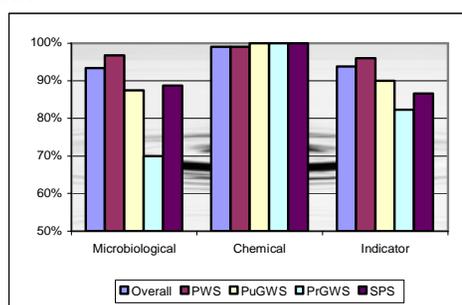
Type of Supply	No. of Supply Zones	Population Served
PWS	49	90,778
PuGWS	4	195
PrGWS	18	2,124
SPS	55	N/A

Assessment of 2006 Monitoring

Wicklow County Council carried out analysis on 360 check and 37 audit samples during 2006. No monitoring was carried out in one (small) public water supply, while insufficient monitoring was carried in many of the larger (i.e. serving >50 persons) private water supplies.

Overall Compliance in 2006

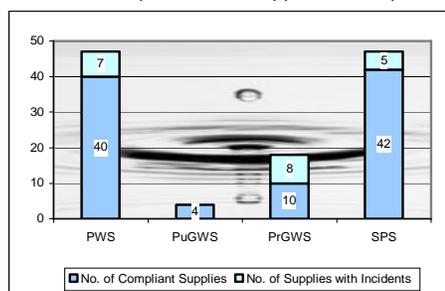
The overall rate of compliance in Wicklow County Council, 95.0%, was below the national average during 2006. This was mainly due to below average microbiological compliance in the private water supplies. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
Overall	93.4%	99.1%	93.8%
PWS	96.7%	99.1%	96.0%
PuGWS	87.5%	100%	90.0%
PrGWS	70.0%	100%	82.3%
SPS	88.7%	100%	86.6%

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. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were 10 incidents of *E. coli* contamination of 7 public water supplies in Wicklow in 2006, in the Avoca/Ballinaclesh, Donard (2 incidents), Kirikee Old, Knockanarrigan/Davidstown, Stratford (2 incidents), Thomastown (2 incidents) and Windgates/Templecarrig supplies. The number of incidents is a cause for concern and the Council must take action to prevent these exceedances from occurring in the future. Of particular concern is the fact that the Donard, Stratford and Thomastown supplies were also contaminated during 2005.

The microbiological quality of the private group water schemes in Wicklow was poor with 8 of the 18 schemes monitored contaminated with *E. coli* at least once during the year. The overall rate of compliance with the microbiological parametric values was poor at 70% compliance.

Many of the quality deficient public water supplies and group water schemes in Wicklow are to be upgraded as part of the South Leinster Design Build Operate (DBO) bundle and it is anticipated that when this occurs the quality deficiency in these schemes should be eliminated.

Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parametric values in Wicklow was satisfactory and improved from 98.5% in 2005 to 99.1% in 2006. Nonetheless, there was a relatively large number of fluoride exceedances in the Arklow supply (7 of 19 samples analysed) which brought overall compliance with the fluoride standard below the national average (92%).

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 2006.

Compliance with the indicator parametric values in public water supplies was below average at 96%. This was mainly due to the relatively poor compliance reported against the coliform bacteria (91% compliance) and pH standard (84% compliance). However, aluminium was problematic in the Enniskerry supply with 3 of the 7 samples analysed exceeding the standard with one result being greater than 6 times the standard.

Overall compliance with the indicator parametric values in private group water schemes in Wicklow was poor. Extremely poor compliance was reported against the pH (32% compliance) and coliform bacteria (32% compliance) and improved little compared to 2005.

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

APPENDIX 2
SUMMARY OF THE REQUIREMENTS OF THE DRINKING WATER
REGULATIONS

ROLES AND RESPONSIBILITIES

The sanitary authorities in Ireland are responsible for the production, distribution and monitoring of public water supplies. A sanitary authority is defined as one of the 34 city and county councils. The role of the Environmental Protection Agency, during 2006 was restricted to the activities defined under Section 58 of the EPA Act, 1992 (No. 7 of 1992) as well as some other functions assigned under the European Communities (Drinking Water) Regulations, 2000 (SI 439 of 2000).

In summary, the Environmental Protection Agency was responsible for:

- The collation and verification of monitoring results from all drinking water supplies covered by the European Communities (Drinking Water) Regulations, 2000 and the preparation of a national annual report on the overall quality of drinking water in Ireland;
- The provision of advice and assistance to local authorities both on a formal basis (e.g. the preparation of guidance documents) and on an ongoing basis;
- The authorisation of departures from the parametric values in respect of all drinking water supplies;
- Checking the analytical quality control systems that are in place in laboratories carrying out analysis of drinking water;
- Approval of microbiological methods of analysis other than those specified in Part 3 of the Schedule of the European Communities (Drinking Water) Regulations, 2000.

Under these Regulations the Environmental Protection Agency (the Agency) did not have the statutory power to take action against a local authority that was not complying with the requirements of the relevant drinking water legislation.

On 8th March 2007, the European Communities (Drinking Water) Regulations, 2007 (SI 106 of 2007) were passed into Irish law. These were subsequently replaced by the European Communities (Drinking Water) Regulations (No.2), 2007 (SI 278 of 2007). These Regulations were broadly similar with the latter being brought into law to amend the penalties and fines section of the legislation. While these Regulations do not change the monitoring requirements or the water quality standards (with the exception of fluoride) they do significantly change the enforcement of the regulations. In this regard new powers have been assigned to the Agency and to local authorities.

EUROPEAN COMMUNITIES (DRINKING WATER) REGULATIONS, 2000

Introduction to the 2000 Regulations

The European Directive on the quality of water intended for human consumption (98/83/EC) was transposed into Irish law on the 18th December 2000 and took effect on the 1st January 2004. The 2000 Regulations are substantially different from the previous Regulations (the European Communities (Quality of Water Intended for Human Consumption) Regulations, 1988). In summary, the 2000 Regulations:

- set standards in relation to the quality of water intended for drinking water, cooking, food preparation, other domestic purposes and food production (other than natural mineral waters, bottled water, certain medicinal products and exempted supplies);
- provide for temporary departures from the standard where there is no threat to human health; and

- require that information is made available to consumers in relation to various matters including water quality, exempted supplies, departures granted, precautionary measures and remedial action in case of non-compliant supplies.

In general, a wide-ranging overhaul of the original 1988 Regulations was carried out. As well as introducing a series of new or revised standards, termed "parametric values", and downgrading some existing standards to "*indicator*" status, the new Regulations introduce a revised regime for correcting breaches of standards.

Monitoring Requirements

The 2000 Regulations prescribe 48 parametric values which are classified as being either **microbiological**, **chemical** or **indicator** parameters. Furthermore, the Regulations outline two distinct monitoring categories, **check monitoring** and **audit monitoring**, the latter requiring fewer numbers of samples but being by far the more demanding in analytical terms.

The purpose of check monitoring is to provide information on the organoleptic and microbiological quality of the water supplied for human consumption, as well as information on the effectiveness of drinking-water treatment (especially of disinfection) where it is used.

The purpose of audit monitoring is to provide the information necessary to determine whether or not all the standards specified in Part I of the Schedule to the Regulations are being complied with. All such parameters must be subject to audit monitoring, unless it can be established by a sanitary authority, for a period of time to be determined by it, that a parameter is not likely to be present in a given supply in concentrations which could lead to the risk of a breach of the relevant parametric value. The table below provides the minimum sampling frequencies that apply.

Table: Minimum Monitoring Frequencies

Volume of water distributed/produced each day within a supply zone (m ³)		Estimated Population Served	Check monitoring Number of samples per year	Audit monitoring Number of samples per year
>10	≤ 100	50-500	2	To be determined by the sanitary authority
>10	≤ 1,000	500-5,000	4	1
>1,000	≤10,000	>5,000-50,000	4 +3 for each 1,000 m ³ /d [5,000 pop] and part thereof of the total volume	1 + 1 for each 3,300 m ³ /d [16,500 pop] and part thereof of the total volume
>10,000	≤100,000	>50,000-500,000		3 +1 for each 10,000 m ³ /d [50,000 pop] and part thereof of the total volume
>100,000		>500,000		10 +1 for each 25,000 m ³ /d [125,000 pop] and part thereof of the total volume

Corrective Action

Article 9 of the 2000 Regulations outline the specific actions that must be taken in the event of a failure to meet the microbiological, chemical or indicator parametric values. In essence,

the sanitary authority is required to investigate every breach of the parametric values to determine its cause and to instigate corrective action depending on the type of failure reported (i.e. whether it is a microbiological, chemical or indicator parameter), or whether there is a risk to public health and on the type of supply the failure is reported in (i.e. public water supply or a private water supply). Extensive guidance on this matter is provided in the EPA Publication "European Communities (Drinking Water) Regulations, 2000: A Handbook on Implementation for Sanitary Authorities" and it is not intended to repeat this guidance in its entirety. However, the most salient points are emphasised here.

The primary requirement on the sanitary authority is to investigate each exceedance of the parametric value that is reported. Where the failure is with the microbiological or chemical parametric standard, the sanitary authority is required to prepare an action programme within 60 days of receipt of the initial result. The measures proposed in the action programme must be in place within one year in relation to failures that present a risk to public health and within two years for those exceedances that do not present a risk to public health.

Where a microbiological or chemical failure occurs in a private water supply, such as a group water scheme, the sanitary authority is required to serve a notice on the person responsible for the supply within 14 days of receipt of the results. The notice must require the persons responsible to prepare an action programme within 60 days of receipt of the notice. The action programme must ensure that the supply is brought back into compliance with the Regulations within one year in relation to failures that present a risk to public health and within two years for those exceedances that do not present a risk to public health.

Where a failure to meet the indicator parametric values occurs, the sanitary authority is first required to determine whether the non-compliance poses a risk to human health. If such a risk exists then the sanitary authority is required to follow the corrective action procedures outlined in the previous two paragraphs.

There is one exception to the above requirements: where the sanitary authority has applied for and received authorisation for a departure under Article 5 of the 2000 Regulations.

EUROPEAN COMMUNITIES (DRINKING WATER) REGULATIONS (NO.2), 2007

The main changes in the European Communities (Drinking Water) Regulations (No.2), 2007 relate to the enforcement of the Regulations. Accordingly there are no changes to the monitoring frequencies, parameters to be monitored or the parametric values (with the exception of fluoride for which the parametric value has been reduced from 1.0 mg/l to 0.8 mg/l). The primary function of the revision of these Regulations was to establish an enforcement mechanism to ensure the Regulations are adhered to by both public water suppliers and private water suppliers. In summary, the main changes are:

- The designation of the EPA as the supervisory authority over sanitary authorities;
- The designation of the local authorities as the supervisory authority over private water supplies including group water schemes and private commercial supplies where water is supplied to the public or as part of a commercial activity.

While the sanitary authority (the City or County Council) is still responsible for producing, supplying and monitoring good quality drinking water from the 8th March 2007 the EPA is now responsible for:

- Ensuring the sanitary authorities are taking the appropriate action to ensure that public water supplies comply with the relevant quality standards;
- Ensuring that sanitary authorities take appropriate action to ensure the quality of water supplied in public buildings meets the relevant quality standards;

- Reviewing and approving monitoring programmes to ensure that adequate monitoring is carried out by sanitary authorities;
- Reviewing the actions taken by sanitary authorities in public water supplies where there has been a breach of a standard or any other risk to human health in a public water supply; and
- Publishing guidance on how sanitary authorities are to implement the Regulations including binding guidelines on auditing.

To implement these requirements the EPA now has powers of Direction which allow direction of a sanitary authority to:

- Submit monitoring programmes for approval of the EPA;
- Carry out additional monitoring where deemed necessary by the EPA;
- Prepare an action programme where there has been a failure to meet a standard;
- Amend an action programme submitted to ensure that a failure to meet a standard does not reoccur;
- Carry out remedial actions to prevent, limit, eliminate or abate any risk to human health that arises in a public water supply;
- Undertake specific measures to ensure that treatment, equipment and materials used at a plant are appropriate; and
- Carry out any actions that the EPA deem necessary for the purposes of its functions under these Regulations.

The sanitary authority will now be obliged to:

- Submit a monitoring programme to the EPA when directed to do so;
- Notify the EPA where there is a risk to human health associated with a public water supply;
- Notify the EPA where there is a failure to meet a standard in the Regulations;
- Prepare action programmes for approval by the EPA;
- Comply with any directions issued by the Agency;
- Carry out regular monitoring of private water supplies (including group water schemes);
- Maintain such records as deemed appropriate by the EPA; and
- Inform consumers of remedial action taken.

APPENDIX 3

**LIST OF MICROBIOLOGICAL, CHEMICAL AND INDICATOR
PARAMETERS MONITORED AND ASSOCIATED PARAMETRIC
VALUES IN THE EUROPEAN COMMUNITIES (DRINKING WATER)
REGULATIONS, 2000**

MICROBIOLOGICAL, CHEMICAL AND INDICATOR PARAMETRIC VALUES

	Parameter	Parametric value	Unit	Comments	Notes
Microbiological Parameters					
1	<i>Escherichia coli</i> (<i>E. coli</i>)	0	No./100ml	The <i>E. coli</i> 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. 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	1.0	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 the 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 (methaemoglobinemia). 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 methaemoglobinemia 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 two 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,	Note 10

	Parameter	Parametric value	Unit	Comments	Notes
				<p>CH₄ - in which three of the hydrogen atoms are substituted by halogen atoms. The principal halogens are fluorine (F₂), chlorine (Cl₂), bromine (Br₂) and iodine (I₂), 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 <i>chloroform</i> (CHCl₃), <i>bromodichloromethane</i> (CHBrCl₂), <i>dibromochloromethane</i> (CHBr₂Cl) and <i>bromoform</i> (CHBr₃).</p> <p>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.</p> <p>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(CHCl₃). 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.</p> <p>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 "<i>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</i>".</p>	
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	<p>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 the following:</p> <p><i>"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"</i>.</p>	

	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	<i>Clostridium perfringens</i> (incl spores)	0	No/100 ml	<i>Clostridium perfringens</i> is a member of the bacterial intestinal flora of humans and therefore serves as an indicator of faecal pollution. The spores of <i>Clostridium perfringens</i> 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	$\mu\text{S cm}^{-1}$ at 20 °C	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	≥ 6.5 and ≤ 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	$\mu\text{g/l}$	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	$\mu\text{g/l}$	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 O 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°C	No abnormal change		This is the number of organisms per millilitre when the water is stored at 22°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 <i>Cryptosporidium</i> 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 <i>Cryptosporidium</i> 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 $[\text{nitrate}]/50 + [\text{nitrite}]/3 < 1$, 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 000m³ 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 4
SUMMARY OF MONITORING CARRIED OUT IN 2006

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	931	77	91.7%	10,777	98	99.1%
Enterococci	712	26	96.3%	2,342	29	98.8%
Chemical Parameters						
Antimony	667	1	99.9%	1,258	1	99.9%
Arsenic	667	1	99.9%	1,372	1	99.9%
Benzene	667	0	100%	1,258	0	100%
Benzo(a)pyrene	662	0	100%	1,109	0	100%
Boron	648	0	100%	1,175	0	100%
Bromate	661	4	99.4%	1,090	4	99.6%
Cadmium	667	0	100%	1,396	0	100%
Chromium	666	0	100%	1,398	0	100%
Copper	679	3	99.6%	1,574	4	99.7%
Cyanide	641	0	100%	1,037	0	100%
1,2-dichloroethane	641	0	100%	1,177	0	100%
Fluoride	708	53	92.5%	3,723	118	96.8%
Lead	693	20	97.1%	1,597	25	98.4%
Mercury	653	1	99.8%	1,213	1	99.9%
Nickel	678	2	99.7%	1,420	2	99.9%
Nitrate	786	16	98.0%	4,416	19	99.6%
Nitrite (at tap)	727	8	98.9%	4,463	8	99.8%
Nitrite (at WTW)	189	6	96.8%	690	6	99.1%
Pesticides - Total	622	2	99.7%	1,037	2	99.8%
PAH	662	0	100%	1,108	0	100%
Selenium	660	1	99.8%	1,246	1	99.9%
Tetrachloroethene/Trichloroethene	674	1	99.9%	1,385	1	99.9%
THMs	676	39	94.2%	1,851	80	95.7%
Indicator Parameters						
Aluminium	737	119	83.9%	6,973	496	92.9%
Ammonium	926	12	98.7%	10,362	13	99.9%
Chloride	680	3	99.6%	1,452	4	99.7%
Clostridium perfringens	709	86	87.9%	7,984	115	98.6%
Colour	927	160	82.7%	10,429	512	95.1%
Conductivity	926	2	99.8%	11,174	2	100.0%
pH	925	221	76.1%	10,515	469	95.5%
Iron	819	121	85.2%	5,159	367	92.9%
Manganese	639	58	90.9%	2,856	102	96.4%
Odour	866	61	93.0%	9,503	104	98.9%
Oxidisability	2	0	100%	2	0	100%
Sulphate	675	0	100%	1,297	0	100%
Sodium	663	4	99.4%	1,275	5	99.6%
Taste	587	14	97.6%	6,651	43	99.4%
Colony Count 22C	660	81	87.7%	1,691	98	94.2%
Coliform Bacteria	930	292	68.6%	10,772	683	93.7%
TOC	606	27	95.5%	1,102	28	97.5%
Turbidity (at tap)	853	51	94.0%	9,688	62	99.4%
Turbidity (at WTW)	229	93	59.4%	2,299	293	87.3%
Radioactivity						
Tritium	29	0	100%	68	0	100%
Total Indicative Dose	29	0	100%	80	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	666	12	98.2%	1337	16	98.8%
Enterococci	153	2	98.7%	226	2	99.1%
Chemical Parameters						
Antimony	101	0	100%	132	0	100%
Arsenic	106	0	100%	137	0	100%
Benzene	149	0	100%	221	0	100%
Benzo(a)pyrene	91	0	100%	95	0	100%
Boron	67	0	100%	69	0	100%
Bromate	91	0	100%	94	0	100%
Cadmium	108	0	100%	139	0	100%
Chromium	108	0	100%	138	0	100%
Copper	123	0	100.0%	166	0	100.0%
Cyanide	63	0	100%	65	0	100%
1,2-dichloroethane	139	0	100%	197	0	100%
Fluoride	182	21	88.5%	298	24	91.9%
Lead	128	0	100%	168	0	100%
Mercury	86	0	100%	94	0	100%
Nickel	125	0	100%	165	0	100%
Nitrate	366	2	99.5%	712	6	99.2%
Nitrite (at tap)	399	1	99.7%	781	1	99.9%
Nitrite (at WTW)	17	1	94.1%	38	1	97.4%
Pesticides - Total	64	0	100%	67	0	100%
PAH	91	0	100%	95	0	100%
Selenium	101	0	100%	132	0	100%
Tetrachloroethene/Trichloroethene	157	0	100%	249	0	100%
THMs	260	7	97.3%	427	8	98.1%
Indicator Parameters						
Aluminium	403	82	79.7%	780	91	88.3%
Ammonium	627	2	99.7%	1346	2	99.9%
Chloride	76	0	100.0%	80	0	100.0%
Clostridium perfringens	524	16	96.9%	1085	17	98.4%
Colour	648	42	93.5%	1375	66	95.2%
Conductivity	647	0	100%	1405	0	100%
pH	649	36	94.5%	1375	45	96.7%
Iron	475	67	85.9%	970	79	91.9%
Manganese	357	18	95.0%	676	20	97.0%
Odour	521	7	98.7%	1069	7	99.3%
Oxidisability	0	0		0	0	
Sulphate	76	0	100%	78	0	100%
Sodium	119	0	100.0%	154	0	100.0%
Taste	249	0	100%	541	0	100%
Colony Count 22C	95	3	96.8%	99	3	97.0%
Coliform Bacteria	663	74	88.8%	1436	100	93.0%
TOC	140	2	98.6%	213	2	99.1%
Turbidity (at tap)	584	12	97.9%	1258	12	99.0%
Turbidity (at WTW)	8	3	62.5%	30	4	86.7%
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	688	246	64.2%	2282	408	82.1%
Enterococci	210	30	85.7%	303	33	89.1%
Chemical Parameters						
Antimony	205	0	100%	237	0	100%
Arsenic	211	1	99.5%	250	1	99.6%
Benzene	199	0	100%	232	0	100%
Benzo(a)pyrene	189	0	100%	232	0	100%
Boron	192	1	99.5%	216	1	99.5%
Bromate	182	1	99.5%	205	1	99.5%
Cadmium	211	0	100%	253	0	100%
Chromium	210	0	100%	251	0	100%
Copper	192	0	100%	247	0	100%
Cyanide	172	0	100%	194	0	100%
1,2-dichloroethane	184	0	100%	216	0	100%
Fluoride	219	3	98.6%	267	3	98.9%
Lead	223	0	100%	285	0	100%
Mercury	199	0	100%	224	0	100%
Nickel	211	0	100%	253	0	100%
Nitrate	515	17	96.7%	1331	26	98.0%
Nitrite (at tap)	461	0	100%	1138	0	100%
Nitrite (at WTW)	25	0	100%	35	0	100%
Pesticides - Total	187	0	100%	230	0	100%
PAH	182	1	99.5%	232	1	99.6%
Selenium	203	0	100%	237	0	100%
Tetrachloroethene/Trichloroethene	199	0	100%	232	0	100%
THMs	273	4	98.5%	430	5	98.8%
Indicator Parameters						
Aluminium	275	12	95.6%	629	20	96.8%
Ammonium	663	12	98.2%	2019	15	99.3%
Chloride	211	0	100%	264	0	100%
Clostridium perfringens	390	101	74.1%	1100	159	85.5%
Colour	668	128	80.8%	2118	263	87.6%
Conductivity	669	2	99.7%	2119	2	99.9%
pH	669	86	87.1%	2133	129	94.0%
Iron	512	81	84.2%	1339	124	90.7%
Manganese	469	60	87.2%	1059	83	92.2%
Odour	518	17	96.7%	1339	24	98.2%
Oxidisability	3	0	100%	3	0	100%
Sulphate	201	0	100%	229	0	100%
Sodium	211	0	100%	243	0	100%
Taste	252	0	100%	592	0	100%
Colony Count 22C	186	53	71.5%	212	56	73.6%
Coliform Bacteria	688	377	45.2%	2284	705	69.1%
TOC	200	7	96.5%	243	9	96.3%
Turbidity (at tap)	611	48	92.1%	1975	55	97.2%
Turbidity (at WTW)	29	8	72.4%	39	10	74.4%
Radioactivity						
Tritium	10	0	100%	11	0	100%
Total Indicative Dose	1	0	100%	1	0	100%

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	523	70	86.6%	747	80	89.3%
Enterococci	193	33	82.9%	316	35	88.9%
Chemical Parameters						
Antimony	47	1	97.9%	57	1	98.2%
Arsenic	55	1	98.2%	65	1	98.5%
Benzene	10	0	100%	11	0	100%
Benzo(a)pyrene	8	0	100%	9	0	100%
Boron	14	0	100%	15	0	100%
Bromate	8	0	100%	9	0	100%
Cadmium	57	0	100%	67	0	100%
Chromium	58	0	100%	68	0	100%
Copper	121	0	100%	146	0	100%
Cyanide	7	0	100%	8	0	100%
1,2-dichloroethane	8	0	100%	9	0	100%
Fluoride	38	0	100%	48	0	100%
Lead	131	2	98.5%	156	2	98.7%
Mercury	18	0	100%	21	0	100%
Nickel	57	0	100%	68	0	100%
Nitrate	255	12	95.3%	334	13	96.1%
Nitrite (at tap)	266	3	98.9%	385	3	99.2%
Nitrite (at WTW)	2	0	100%	6	0	100%
Pesticides - Total	7	0	100%	8	0	100%
PAH	8	0	100%	9	0	100%
Selenium	47	0	100%	57	0	100%
Tetrachloroethene/Trichloroethene	17	0	100%	18	0	100%
THMs	14	0	100%	15	0	100%
Indicator Parameters						
Aluminium	53	0	100%	68	0	100%
Ammonium	400	10	97.5%	564	13	97.7%
Chloride	92	0	100%	110	0	100%
Clostridium perfringens	179	20	88.8%	237	24	89.9%
Colour	393	26	93.4%	555	33	94.1%
Conductivity	397	1	99.7%	561	1	99.8%
pH	393	66	83.2%	556	80	85.6%
Iron	360	43	88.1%	489	52	89.4%
Manganese	188	32	83.0%	235	36	84.7%
Odour	287	4	98.6%	528	4	99.2%
Oxidisability	0	0		0	0	
Sulphate	16	0	100%	17	0	100%
Sodium	52	3	94.2%	63	3	95.2%
Taste	73	1	98.6%	123	1	99.2%
Colony Count 22C	11	3	72.7%	12	3	75.0%
Coliform Bacteria	486	186	61.7%	711	223	68.6%
TOC	7	0	100%	8	0	100%
Turbidity (at tap)	400	32	92.0%	558	34	93.9%
Turbidity (at WTW)	0	0		0	0	
Radioactivity						
Tritium	1	0	100%	1	0	100%
Total Indicative Dose	1	0	100%	1	0	100%