



# **The Quality of Drinking Water in Ireland A Report for the Year 2005**

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## **The Quality of Drinking Water in Ireland A Report for the Year 2005**

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## EXECUTIVE SUMMARY

This report reviews and reports on the monitoring of drinking water supplies carried out by the local authorities during 2005, in accordance with the European Communities (Drinking Water) Regulations, 2000. The review of the results of monitoring of drinking water supplies in Ireland in 2005 involved the assessment and review of over 200,000 individual tests carried out on over 16,500 samples of drinking water. These samples were taken from public and private water supplies.

The main findings of this report are:

1. The quality of drinking water provided to 83% of the population by the sanitary authorities in public water supplies and public group water schemes (which get their water from public water supplies) was satisfactory, while the quality of water provided to less than 7% of the population by private group water schemes was unsatisfactory. The remaining 10% was supplied via private wells serving single dwellings. Such supplies are not covered by the Regulations.
2. The overall rate of compliance with the 48 standards for drinking water in 2005 was 96.7%. Although the overall rate of compliance has improved from 96.4% in 2004, the improvement was not due to improving drinking water quality but rather due to a reduction in the amount of monitoring of poorer quality group water schemes in 2005.
3. The microbiological quality of public water supplies is far superior to that of the private group water schemes with 98.9% of samples analysed for *E. coli*, an indicator of whether a supply has become contaminated with human or animal waste, compliant with the standard. In particular, the quality of drinking water produced in the larger public water supplies (such as Dublin, Cork, Limerick, Galway and Waterford), serving more than 5,000 people, was high with 99.8% of samples analysed compliant with the *E. coli* standard.
4. The overall compliance rate for the *E. coli* standard in private group schemes fell marginally from 78.1% in 2004 to 77.5% in 2005. This fall in compliance was mainly due to the worrying drop in compliance in Mayo from 75% in 2004 to 58.9% in 2005. More than half of the private group water schemes in Cavan (65%), Kerry (60%), Leitrim (82%), Mayo (67%) Donegal (53%) and Sligo (54%) were contaminated with *E. coli* at least once during 2005. Overall, 36.2% of private group schemes were contaminated with *E. coli* at least once during 2005 (down from 40.4% in 2004).
5. No local authority audited by the Agency during the year had taken enforcement action to ensure compliance in the quality deficient group water schemes.
6. In 2005, there was a serious shortfall in the monitoring of water supplies in Ireland, particularly in the public and private group water schemes. 9% of public water supplies, 65% of public group water schemes and 41% of private group water schemes were not adequately monitored and in some cases not at all.
7. During 2005, there were 3 outbreaks of cryptosporidiosis, a gastrointestinal disease caused by the parasite *Cryptosporidium*, associated with drinking water supplies. They were in Carlow, Ennis and Roscommon.

A breakdown on the extent of monitoring in each individual supply and details of every individual analysis in each water supply zone is contained on the CD ROM that accompanies the report. County reports on water quality are detailed in Appendix 1, while a summary of the key statistics from this report are shown on Table 1.

**Table 1. Key Compliance Statistics for 2005.**

Key Compliance Statistics	Percentage in 2005	Percentage Change from 2004
<b>Overall Compliance</b>	96.7	+0.3
Microbiological Compliance	96.0	+0.9
Chemical Compliance	99.2	-0.1
<b>E. coli Compliance</b>		
Public Water Supplies	98.9	Unchanged
Private Group Water Schemes	77.5	-0.6
Supplies Serving > 5,000 persons	99.8	+0.4
<b>Monitoring Deficiency - Supplies Not Monitored</b>		
Public Water Supplies	1.2	-
Public Group Water Schemes	34.5	-
Private Group Water Schemes	10.2	-

In evaluating the data that has been submitted to the EPA for 2005 a number of trends are evident that give rise for concern:

- 40% of the incidents of *E. coli* contamination of public water supplies were due to the failure of chlorination equipment that was not detected immediately by the sanitary authority. A further 37% of the incidents of *E. coli* contamination were caused by either the absence of disinfection (9%) or the inability of the disinfection system to cope with the water being treated (28%). In summary, most of these incidents were avoidable with adequate investment in treatment, monitoring and alarm systems.
- Just under one in four samples taken from private group water schemes were found to contain *E. coli*. In spite of record levels of investment in the group water scheme sector, progress in upgrading schemes is simply not happening at a fast enough speed. Furthermore, while the majority of schemes have action plans in place to address the quality deficiency, a sizeable number of schemes have prepared no corrective action plan.
- The high number of supplies not having been monitored even once during the year is putting the health of people served by these supplies at risk, as they may be consuming contaminated water but are unaware of it.

Key recommendations of this report are:

1. Sanitary authorities must ensure that public water supplies, group water schemes and private supplies (other than exempted supplies) within their functional area are monitored to at least the minimum frequency required under the Drinking Water Regulations.
2. Sanitary authorities should ensure that each exceedance of the parametric values is investigated. For non-trivial exceedances, a corrective action plan should be prepared within 60 days and the action to be taken should be complete within one year if the exceedance presents a risk to public health or within two years if the exceedance does not present a risk to public health.
3. Sanitary authorities must use the enforcement options available to them to pursue persons responsible for the management of group water schemes that supply water to members of the public that is unfit for human consumption.
4. Sanitary authorities should carry out risk assessments to determine the vulnerability of public water supplies to contamination with *Cryptosporidium* on all public water supplies and take steps to reduce the risk of contamination of the water supply.

5. In relation to operation and maintenance of drinking water treatment and distribution systems, the following actions are required to be taken by sanitary authorities:
- a. carry out a lead survey to determine the extent of lead piping in the distribution network and in the population served and commence treatment of supplies to reduce plumbosolvency in supplies at risk from exceeding the lead parametric value.
  - b. investigate the cause of disinfection by-product exceedances (i.e. bromate and trihalomethanes) in public water supplies. In particular, sanitary authorities should examine the chemicals used in the disinfection process to ensure that these chemicals are not contributing to the exceedances. Alternative disinfection chemicals should be used where appropriate. However, care should be taken to ensure that the disinfection process is never compromised as a result of these actions.
  - c. ensure that fluoridation is carried out in accordance with the requirements of the Fluoridation Act and that levels in the final waters do not exceed 1.0 mg/l.
  - d. ensure that all treatment plants have adequate disinfection equipment in place and that all plants should have alarms fitted to immediately alert the sanitary authority to any failure of the disinfection equipment.





# 1 INTRODUCTION

## 1.1 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. As of 1<sup>st</sup> January 2004 sanitary functions which were formerly the responsibility of Town or Borough Councils now rest with the relevant County Council. The role of the Environmental Protection Agency is 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 is 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.

While the Environmental Protection Agency does not have the statutory power to take action against a sanitary authority that is not complying with the requirements of the relevant drinking water legislation, the Agency carried out audits of the sanitary authorities in relation to drinking water (see Chapter 7). These audits were used to verify the information that has been submitted to the Agency as part of the annual returns and also to provide advice and assistance to the sanitary authorities in the implementation of the Regulations.

The current report is the sixteenth report that the Environmental Protection Agency (and its predecessors) have produced in relation to the quality of drinking water in Ireland and it is the second such report under the 2000 Regulations.

## 1.2 The European Communities (Drinking Water) Regulations, 2000

### 1.2.1 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 18<sup>th</sup> December 2000 and took effect on the 1<sup>st</sup> 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 has been 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.

### 1.2.2 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. Table 1-1 provides the minimum sampling frequencies that apply.

**Table 1-1. Minimum Monitoring Frequencies**

<i>Volume of water distributed/produced each day within a supply zone (m<sup>3</sup>)</i>		<i>Estimated Population Served</i>	<i>Check monitoring Number of samples per year</i>	<i>Audit monitoring Number of samples per year</i>
>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 <sup>3</sup> /d [5,000 pop] and part thereof of the total volume	1 + 1 for each 3,300 m <sup>3</sup> /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 <sup>3</sup> /d [50,000 pop] and part thereof of the total volume
>100,000		>500,000		10 +1 for each 25,000 m <sup>3</sup> /d [125,000 pop] and part thereof of the total volume

### 1.2.3 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), on 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. This is dealt with in the section that follows.

### 1.2.4 Departures

Article 5 of the European Communities (Drinking Water) Regulations assigned the responsibility for the consideration of applications for departures from the parametric values specified in Table B in Part 1 of the Schedule of the Regulations to the Environmental Protection Agency. In the context of the Regulations, a departure is a temporary authorisation given to a sanitary authority (upon application) to exceed the limit for a specific chemical standard for a limited time period (not exceeding three years). Such a departure can only be granted by the Agency where "no such departure constitutes a potential danger to human health". The Agency has the authority to refuse any such application where it is not satisfied that there is no potential danger to human health.

An application for a departure from the parametric values specified in Table B (Chemical Parameters) in Part 1 of the Schedule of the Regulations must contain all the information contained in the Agency application forms, available either from the Agency website ([www.epa.ie/OfficeofEnvironmentalEnforcement/PublicAuthorityEnforcement/DrinkingWater](http://www.epa.ie/OfficeofEnvironmentalEnforcement/PublicAuthorityEnforcement/DrinkingWater)) or in Appendix 5 of the EPA Publication "European Communities (Drinking Water) Regulations, 2000 (SI No. 439 of 2000): A Handbook on Implementation for Sanitary Authorities". In summary the application must contain:

- the details of the departure sought (name of water supply, parameter concerned, grounds for the departure, duration of the departure sought and details of any possible alternative sources);
- an assessment of the impact of the departure (including the identification of sensitive sub-populations and details of how the sanitary authority intends to deal with such groups);

- details of past monitoring for the parameter in question (three years monitoring results if available); and,
- a remedial action plan (including a timetable for the completion of necessary works in order to bring the supply into compliance) and details of how the authority intends to communicate the details of the departure to the affected populations.

A key feature of the application process is the assessment of the health implications of the departure. To satisfy this requirement, the sanitary authority is required to consult the Health Services Executive and to submit with the application a letter stating that they are satisfied that there is no potential danger to human health as a result of the application sought.

The Agency did not receive any application for a departure from any sanitary authorities during 2005. Accordingly, no departures were authorised by the EPA during the year.

## 2 DRINKING WATER MONITORING IN 2005

### 2.1 Background

As discussed in Section 1.2 the European Communities (Drinking Water) Regulations, 2000 specify minimum monitoring frequencies that depend on the size of the supply in question. Though the 2000 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 sanitary authority operated schemes (though these may be run by a private contractor on behalf of the sanitary 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 sanitary 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 supplies 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.

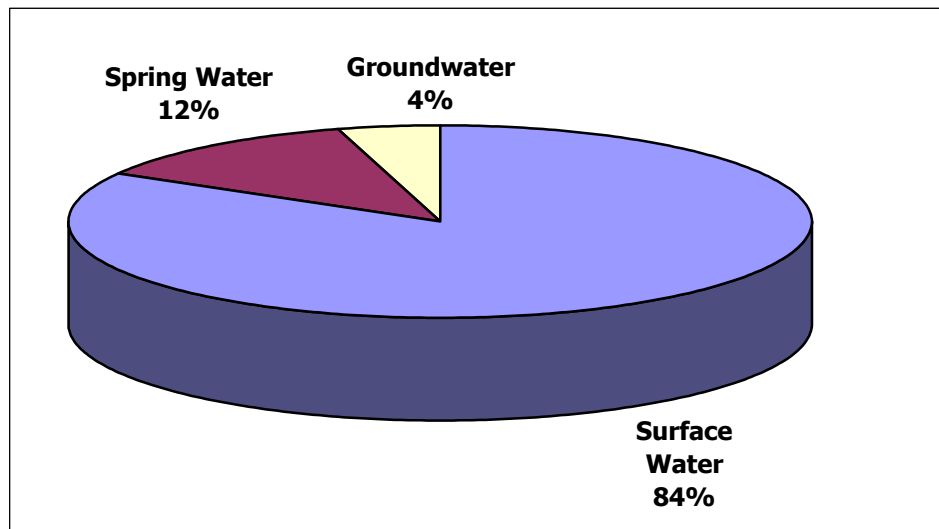
The number of water supply zones monitored during 2005 and falling into each of these categories and the percentage of the total population served is given in Table 2-1. There has been a rise in the number of public water supplies in 2005 compared to 2004. This is primarily due to the division of some large water supplies into water supply zones in accordance with the Regulations and the Agency guidance on this matter. The number of group water schemes (both public and private) has dropped as many local authorities are in the process of taking in charge many of the group schemes in their functional area (these become incorporated into a larger public water supply). There has been a threefold increase in the number of small private supplies identified by sanitary authorities in 2005 compared to the previous year. There are undoubtedly many more private water supplies that come within the remit of the Drinking Water Regulations in Ireland but many sanitary authorities have not identified these supplies in their functional area.

**Table 2-1. Water Supply Zones Monitored in 2005 and the Proportion of the Population Served.**

Type of Supply	No. of Water Supply Zones	Percentage of Total Population Served
<b>Public Water Supply (PWS)</b>	928	79.9%
<b>Public Group Water Scheme (PuGWS)</b>	765	3.4%
<b>Private Group Water Scheme (PrGWS)</b>	708	6.4%
<b>Small Private Supply (SPS)</b>	395	<0.1%
<b>Exempted Supplies<sup>1</sup></b>	Unknown	10.3%

<sup>1</sup> Exempted supplies are supplies that are provided from either an individual supply providing less than 10m<sup>3</sup> 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).

In Ireland, the majority of drinking water originates from surface water (i.e., rivers and lakes) (Figure 2-1). 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.

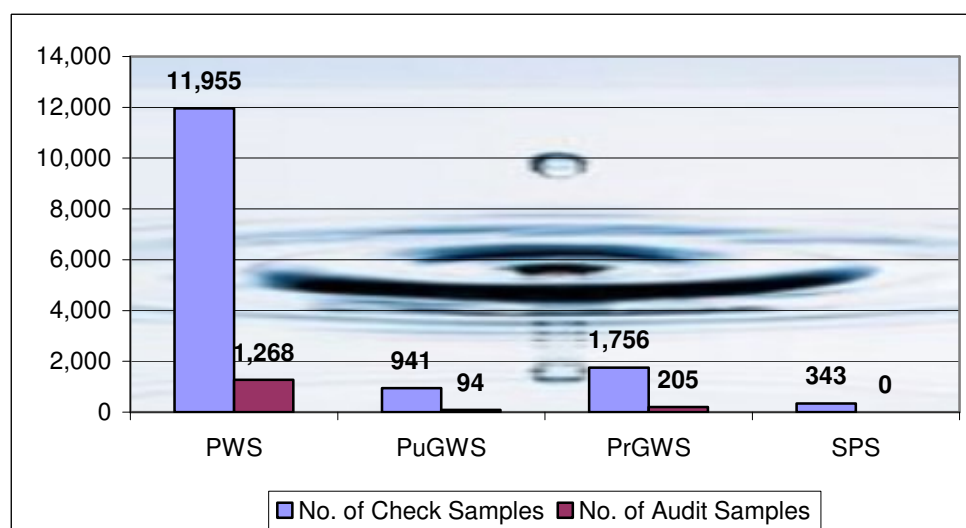


**Figure 2-1. Sources of Drinking Water in 2005.**

## **2.2 Sanitary Authority Monitoring of Drinking Water**

### **2.2.1 Minimum Monitoring Requirements**

As outlined in Section 1.2.2, sanitary authorities are required to monitor water supplies within their functional area a minimum number of times each year depending on the volume of water provided by the water supply. Sanitary authorities must take sufficient samples to ensure that the minimum number of check and audit samples are analysed for each supply each year. A summary of the number of check and audit samples analysed by each sanitary authority is given in Table 2-2, with the total numbers for each supply type shown on Figure 2-2. A breakdown of the number of check and audit samples analysed in each individual supply and details of every individual analysis in each water supply zone is contained on the CD ROM that accompanies this report. Water supply zones where no sampling was carried out are highlighted in red on the "Supply Information" file on this CD, while water supply zones sampled insufficiently (i.e. not enough samples were taken) are highlighted in red on the "No. of Check and Audit Samples" file.



**Figure 2-2. Total Number of Check and Audit Samples for Each Type of Supply**

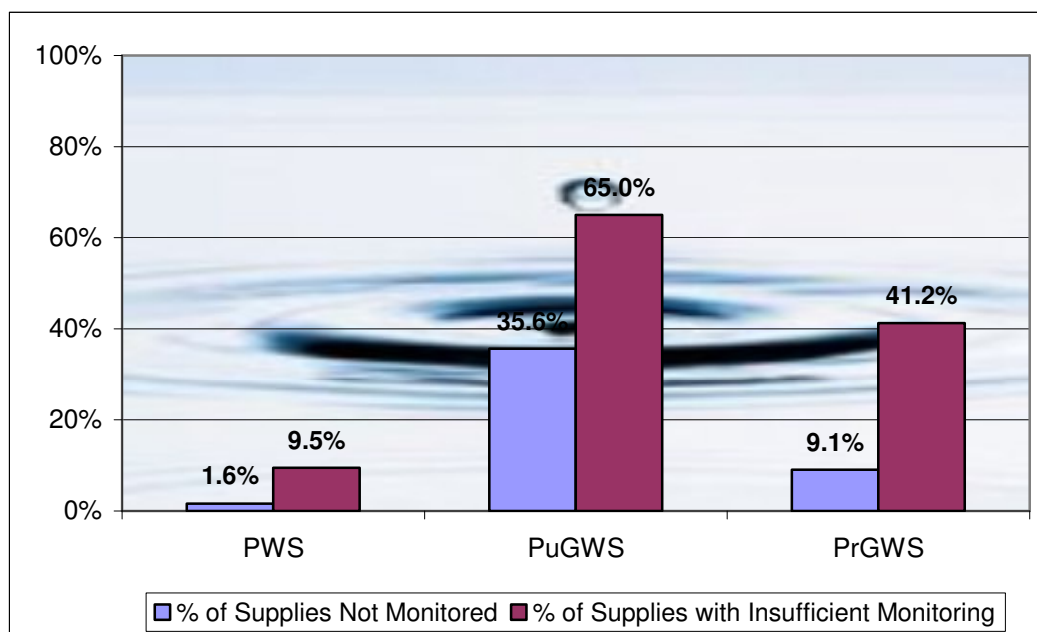
**Table 2-2. Number of Check and Audit Samples Analysed by Each Sanitary Authority**

Sanitary Authority	PWS		PuGWS		PrGWS		SPS	
	Check	Audit	Check	Audit	Check	Audit	Check	Audit
Carlow	100	58	6	0	12	6	25	0
Cavan	103	22	0	0	127	21	0	0
Clare	263	37	147	9	42	7	13	0
Cork City	223	13	0	0	0	0	0	0
Cork Co. Co. (North)	261	13	0	0	18	0	0	0
Cork Co. Co. (South)	468	54	0	0	22	0	0	0
Cork Co. Co. (West)	134	25	0	0	8	0	0	0
Donegal	1047	69	87	9	105	20	6	0
Dublin City	786	43	0	0	0	0	0	0
Dun Laoghaire Rathdown	460	27	0	0	0	0	0	0
Fingal	526	18	0	0	0	0	0	0
Galway City	349	10	0	0	0	0	0	0
Galway	634	51	192	26	292	44	0	0
Kerry	1020	173	112	17	51	1	0	0
Kildare	209	13	0	0	21	2	0	0
Kilkenny	877	17	2	1	147	2	80	0
Laois	266	48	15	2	62	16	1	0
Leitrim	54	17	168	4	56	3	0	0
Limerick City	346	6	0	0	0	0	0	0
Limerick	327	63	47	1	60	8	0	0
Longford	41	4	107	20	5	2	0	0
Louth	244	36	0	0	28	4	0	0
Mayo	676	26	0	0	278	28	0	0
Meath	162	29	0	0	7	2	82	0
Monaghan	105	22	0	0	90	15	0	0
North Tipperary	363	27	3	0	137	2	0	0
Offaly	168	34	0	0	67	10	0	0
Roscommon	85	49	40	2	45	6	9	0
Sligo	205	29	15	3	10	0	0	0
South Dublin	300	15	0	0	0	0	0	0
South Tipperary	341	74	0	0	9	2	8	0
Waterford City	71	16	0	0	0	0	0	0
Waterford	251	56	0	0	6	0	0	0
Westmeath	94	18	0	0	8	1	0	0
Wexford	133	22	0	0	27	3	58	0
Wicklow	263	34	0	0	16	0	61	0
<b>Totals</b>	<b>11,955</b>	<b>1,268</b>	<b>941</b>	<b>94</b>	<b>1,756</b>	<b>205</b>	<b>343</b>	<b>0</b>

While there has been a welcome rise in the number of check samples analysed in public water supplies and small private supplies, there has been a substantial drop in the number of check samples analysed in both public and private group water schemes. There was a drop of over 40% in the number of check samples analysed in public group water schemes and a drop of over 30% in the number of check samples analysed in private group water schemes. In summary, while there was insufficient monitoring carried out in 2004, this situation significantly deteriorated in 2005.

On the basis of the number of samples submitted to the Agency and a comparison with the minimum number of samples legally required to be analysed in water supplies in Ireland, it is

clear that the level of monitoring was significantly below the legal minimum in many supplies in Ireland (Figure 2-3). The inadequate level of monitoring in the group water schemes is a particularly unwelcome and worrying development, with 65.0% of the public group water schemes and 41.2% of the private group water schemes monitored insufficiently during 2005. Of great concern is the fact that over 9% of the private group water schemes, which are the highest risk of being contaminated, were not monitored in 2005. Therefore, the people supplied by these schemes may be drinking contaminated water but may not even be aware of the fact that their water is unfit for consumption.



**Figure 2-3. Percentage of Supplies Not Monitored or with Insufficient Monitoring in 2005.**

### 2.2.2 Overall Compliance with the Standards

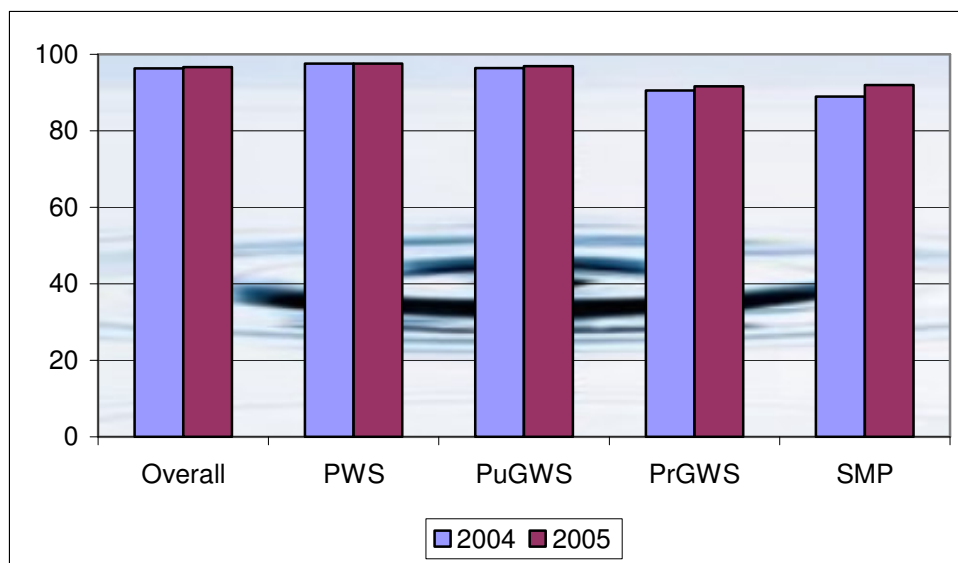
The overall rate of compliance with the 45<sup>2</sup> parametric values for drinking water in 2005 was 96.7%. This means that there has been an increase in the overall rate of compliance with the drinking water parametric values from 96.4% in 2004 to 96.7% in 2005. However, this increase in the overall rate of compliance was most likely due to the decreasing level of monitoring of the poorer quality group water schemes rather than an actual improvement in water quality. In other words, the generally higher quality public water supplies were monitored more frequently in 2005, while the generally poorer quality group water schemes were monitored less frequently in 2005, thus appearing to improve the overall rate of compliance.

Overall compliance rates for each of the microbiological, chemical and indicator parameters in the Regulations is outlined in the following sections, while compliance with the individual microbiological, chemical and indicator parameters is also discussed.

An examination of compliance with the parametric values in the four different categories of water supplies in Ireland reveals that the quality of drinking water in the public water supplies is generally higher than that of the group water schemes and the private supplies (Figure 2-4). It should be noted that although there appears to be an improvement in the quality of the small private supplies (SPS), the threefold increase in the level of monitoring in these schemes make comparison with the results for 2004 difficult.

<sup>2</sup> Compliance with the Acrylamide, Epichlorohydrin and Vinyl Chloride parametric values is considered separately, as direct analyses of drinking water for these parameters is not required but compliance is to be controlled by product specification.





**Figure 2-4. Overall Compliance in the Different Categories of Water Supplies**

As mentioned previously, the parameters in the Drinking Water Regulations are divided into three categories, microbiological, chemical and indicator. Compliance with each of the individual parameters in each of the four types of water supplies is illustrated on Tables 2-3 to 2-6, while a further discussion of compliance with the microbiological, chemical and indicator parameters is included in the sections that follow.

**Table 2-3. 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
<b>Microbiological Parameters</b>						
E. coli	894	87	<b>90.3%</b>	10848	121	<b>98.9%</b>
Enterococci	609	19	<b>96.9%</b>	1980	19	<b>99.0%</b>
<b>Chemical Parameters</b>						
Antimony	577	13	<b>97.7%</b>	1118	13	<b>98.8%</b>
Arsenic	584	3	<b>99.5%</b>	1246	4	<b>99.7%</b>
Benzene	584	1	<b>99.8%</b>	1112	0	<b>100.0%</b>
Benzo(a)pyrene	552	2	<b>99.6%</b>	990	0	<b>100.0%</b>
Boron	575	0	<b>100.0%</b>	1117	0	<b>100.0%</b>
Bromate	548	11	<b>98.0%</b>	977	13	<b>98.7%</b>
Cadmium	590	0	<b>100.0%</b>	1254	0	<b>100.0%</b>
Chromium	588	0	<b>100.0%</b>	1243	0	<b>100.0%</b>
Copper	628	2	<b>99.7%</b>	1431	2	<b>99.9%</b>
Cyanide	533	0	<b>100.0%</b>	934	0	<b>100.0%</b>
1,2-dichloroethane	561	0	<b>100.0%</b>	1038	0	<b>100.0%</b>
Fluoride	651	71	<b>89.1%</b>	3525	145	<b>95.9%</b>
Lead	622	17	<b>97.3%</b>	1402	22	<b>98.4%</b>
Mercury	569	1	<b>99.8%</b>	1086	1	<b>99.9%</b>
Nickel	605	8	<b>98.7%</b>	1273	8	<b>99.4%</b>
Nitrate	774	11	<b>98.6%</b>	3852	11	<b>99.7%</b>
Nitrite (at tap)	635	5	<b>99.2%</b>	4507	6	<b>99.9%</b>
Nitrite (at WTW)	212	5	<b>97.6%</b>	756	5	<b>99.3%</b>
Pesticides - Total	543	2	<b>99.6%</b>	975	2	<b>99.8%</b>
PAH	551	1	<b>99.8%</b>	987	1	<b>99.9%</b>
Selenium	576	0	<b>100.0%</b>	1118	0	<b>100.0%</b>
Tetrachloroethene/Trichloroethene	500	0	<b>100.0%</b>	1092	0	<b>100.0%</b>
THMs	588	40	<b>93.2%</b>	1434	55	<b>96.2%</b>
<b>Indicator Parameters</b>						
Aluminium	669	114	<b>83.0%</b>	6491	329	<b>94.9%</b>
Ammonium	892	23	<b>97.4%</b>	10253	26	<b>99.7%</b>
Chloride	623	1	<b>99.8%</b>	1319	1	<b>99.9%</b>
Clostridium perfringens	651	93	<b>85.7%</b>	7800	144	<b>98.2%</b>
Colour	891	144	<b>83.8%</b>	10382	375	<b>96.4%</b>
Conductivity	899	0	<b>100.0%</b>	11268	0	<b>100.0%</b>
pH	893	225	<b>74.8%</b>	10481	506	<b>95.2%</b>
Iron	767	138	<b>82.0%</b>	4811	392	<b>91.9%</b>
Manganese	658	67	<b>89.8%</b>	2798	112	<b>96.0%</b>
Odour	864	47	<b>94.6%</b>	10053	173	<b>98.3%</b>
Oxidisability	23	2	<b>91.3%</b>	30	2	<b>93.3%</b>
Sulphate	565	0	<b>100.0%</b>	1122	0	<b>100.0%</b>
Sodium	607	0	<b>100.0%</b>	1195	0	<b>100.0%</b>
Taste	608	17	<b>97.2%</b>	7762	101	<b>98.7%</b>
Colony Count 22C	587	81	<b>86.2%</b>	1533	97	<b>93.7%</b>
Coliform Bacteria	894	332	<b>62.9%</b>	10852	757	<b>93.0%</b>
TOC	463	0	<b>100.0%</b>	894	0	<b>100.0%</b>
Turbidity (at tap)	861	57	<b>93.4%</b>	9784	78	<b>99.2%</b>
Turbidity (at WTW)	205	72	<b>64.9%</b>	1552	243	<b>84.3%</b>
<b>Radioactivity</b>						
Tritium	13	0	<b>100%</b>	49	0	<b>100%</b>
Total Indicative Dose	18	0	<b>100%</b>	49	0	<b>100%</b>

**Table 2-4. 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
<b>Microbiological Parameters</b>						
E. coli	482	8	<b>98.34%</b>	937	9	99.0%
Enterococci	96	2	<b>97.92%</b>	142	2	98.6%
<b>Chemical Parameters</b>						
Antimony	54	0	<b>100%</b>	58	0	100%
Arsenic	55	0	<b>100%</b>	58	0	100%
Benzene	62	0	<b>100%</b>	67	0	100%
Benzo(a)pyrene	97	0	<b>100%</b>	103	0	100%
Boron	54	0	<b>100%</b>	58	0	100%
Bromate	78	2	<b>97.4%</b>	84	2	97.6%
Cadmium	55	0	<b>100%</b>	58	0	100%
Chromium	55	0	<b>100%</b>	58	0	100%
Copper	95	0	<b>100%</b>	102	0	100%
Cyanide	49	0	<b>100%</b>	53	0	100%
1,2-dichloroethane	66	0	<b>100%</b>	71	0	100%
Fluoride	99	12	<b>87.9%</b>	144	13	91.0%
Lead	84	0	<b>100%</b>	89	0	100%
Mercury	54	0	<b>100%</b>	58	0	100%
Nickel	83	1	<b>98.8%</b>	88	1	98.9%
Nitrate	288	0	<b>100%</b>	559	0	100%
Nitrite (at tap)	283	0	<b>100%</b>	627	0	100%
Nitrite (at WTW)	64	2	<b>96.9%</b>	38	2	94.7%
Pesticides - Total	69	0	<b>100%</b>	73	0	100%
PAH	95	0	<b>100%</b>	101	0	100%
Selenium	54	0	<b>100%</b>	58	0	100%
Tetrachloroethene/Trichloroethene	68	0	<b>100%</b>	78	0	100%
THMs	157	4	<b>97.5%</b>	235	4	98.3%
<b>Indicator Parameters</b>						
Aluminium	270	63	<b>76.7%</b>	469	70	85.1%
Ammonium	484	3	<b>99.4%</b>	927	3	99.7%
Chloride	64	0	<b>100%</b>	69	0	100%
Clostridium perfringens	361	7	<b>98.1%</b>	686	7	99.0%
Colour	484	32	<b>93.4%</b>	928	37	96.0%
Conductivity	483	0	<b>100%</b>	969	0	100%
pH	483	24	<b>95.0%</b>	928	37	96.0%
Iron	371	84	<b>77.4%</b>	739	99	86.6%
Manganese	284	19	<b>93.3%</b>	564	20	96.5%
Odour	448	5	<b>98.9%</b>	831	6	99.3%
Oxidisability	0	0		0	0	
Sulphate	118	0	<b>100%</b>	67	0	100%
Sodium	82	0	<b>100%</b>	88	0	100%
Taste	216	4	<b>98.1%</b>	413	4	99.0%
Colony Count 22C	81	6	<b>92.6%</b>	87	7	92.0%
Coliform Bacteria	482	56	<b>88.4%</b>	937	77	91.8%
TOC	118	0	<b>100%</b>	181	0	100%
Turbidity (at tap)	447	13	<b>97.1%</b>	875	13	98.5%
Turbidity (at WTW)	6	3	<b>50.0%</b>	45	10	77.8%
<b>Radioactivity</b>						
Tritium	0	0		0	0	
Total Indicative Dose	0	0		0	0	

**Table 2-5. 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
<b>Microbiological Parameters</b>						
E. coli	640	232	<b>63.8%</b>	1808	446	77.5%
Enterococci	201	26	<b>87.1%</b>	280	30	89.3%
<b>Chemical Parameters</b>						
Antimony	188	4	<b>97.9%</b>	212	4	98.1%
Arsenic	198	0	<b>100%</b>	226	0	100%
Benzene	182	0	<b>100%</b>	208	0	100%
Benzo(a)pyrene	186	0	<b>100%</b>	233	0	100%
Boron	184	0	<b>100%</b>	207	0	100%
Bromate	167	2	<b>98.8%</b>	183	2	98.9%
Cadmium	197	0	<b>100%</b>	225	0	100%
Chromium	196	0	<b>100%</b>	224	0	100%
Copper	218	2	<b>99.1%</b>	269	2	99.3%
Cyanide	168	0	<b>100%</b>	191	0	100%
1,2-dichloroethane	176	0	<b>100%</b>	199	0	100%
Fluoride	193	2	<b>99.0%</b>	213	2	99.1%
Lead	210	0	<b>100%</b>	248	0	100%
Mercury	180	0	<b>100%</b>	201	0	100%
Nickel	197	1	<b>99.5%</b>	225	1	99.6%
Nitrate	517	13	<b>97.5%</b>	1172	15	98.7%
Nitrite (at tap)	458	0	<b>100%</b>	1073	0	100%
Nitrite (at WTW)	53	2	<b>96.2%</b>	86	2	97.7%
Pesticides - Total	183	0	<b>100%</b>	227	0	100%
PAH	187	0	<b>100%</b>	232	0	100%
Selenium	185	0	<b>100%</b>	207	0	100%
Tetrachloroethene/Trichloroethene	172	0	<b>100%</b>	199	0	100%
THMs	234	1	<b>99.6%</b>	342	1	99.7%
<b>Indicator Parameters</b>						
Aluminium	268	11	<b>95.9%</b>	541	17	96.9%
Ammonium	620	15	<b>97.6%</b>	1710	17	99.0%
Chloride	203	1	<b>99.5%</b>	240	4	98.3%
Clostridium perfringens	362	77	<b>78.7%</b>	903	112	87.6%
Colour	619	128	<b>79.3%</b>	1710	287	83.2%
Conductivity	620	0	<b>100%</b>	1761	0	100%
pH	619	79	<b>87.2%</b>	1725	128	92.6%
Iron	493	96	<b>80.5%</b>	1209	141	88.3%
Manganese	454	78	<b>82.8%</b>	989	91	90.8%
Odour	547	17	<b>96.9%</b>	1491	18	98.8%
Oxidisability	28	11	<b>60.7%</b>	28	11	60.7%
Sulphate	187	1	<b>99.5%</b>	207	1	99.5%
Sodium	189	2	<b>98.9%</b>	213	2	99.1%
Taste	252	3	<b>98.8%</b>	676	4	99.4%
Colony Count 22C	183	51	<b>72.1%</b>	209	60	71.3%
Coliform Bacteria	631	353	<b>44.1%</b>	1813	736	59.4%
TOC	154	0	<b>100%</b>	194	0	100%
Turbidity (at tap)	569	40	<b>93.0%</b>	1625	66	95.9%
Turbidity (at WTW)	30	9	<b>70.0%</b>	69	18	73.9%
<b>Radioactivity</b>						
Tritium	2	0	<b>100%</b>	1	0	100%
Total Indicative Dose	1	0	<b>100%</b>	2	0	100%

**Table 2-6. 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
<b>Microbiological Parameters</b>						
E. coli	255	21	<b>91.8%</b>	320	23	92.8%
Enterococci	60	9	<b>85.0%</b>	78	9	88.5%
<b>Chemical Parameters</b>						
Antimony	2	0	<b>100%</b>	2	0	100%
Arsenic	2	0	<b>100%</b>	11	0	100%
Benzene	2	0	<b>100%</b>	2	0	100%
Benzo(a)pyrene	1	0	<b>100%</b>	1	0	100%
Boron	2	0	<b>100%</b>	2	0	100%
Bromate	1	0	<b>100%</b>	1	0	100%
Cadmium	11	0	<b>100%</b>	11	0	100%
Chromium	11	0	<b>100%</b>	11	0	100%
Copper	52	0	<b>100%</b>	70	0	100%
Cyanide	1	0	<b>100%</b>	1	0	100%
1,2-dichloroethane	2	0	<b>100%</b>	2	0	100%
Fluoride	6	0	<b>100%</b>	8	0	100%
Lead	50	0	<b>100%</b>	68	0	100%
Mercury	2	0	<b>100%</b>	2	0	100%
Nickel	11	0	<b>100%</b>	11	0	100%
Nitrate	102	5	<b>95.1%</b>	129	5	96.1%
Nitrite (at tap)	149	0	<b>100%</b>	185	0	100%
Nitrite (at WTW)	1	0	<b>100%</b>	1	0	100%
Pesticides - Total	0	0		0	0	
PAH	1	0	<b>100%</b>	1	0	100%
Selenium	2	0	<b>100%</b>	2	0	100%
Tetrachloroethene/Trichloroethene	2	0	<b>100%</b>	2	0	100%
THMs	1	0	<b>100%</b>	1	0	100%
<b>Indicator Parameters</b>						
Aluminium	98	3	<b>96.9%</b>	113	3	97.3%
Ammonium	218	8	<b>96.3%</b>	259	8	96.9%
Chloride	46	0	<b>100%</b>	60	0	100%
Clostridium perfringens	70	4	<b>94.3%</b>	88	4	95.5%
Colour	221	8	<b>96.4%</b>	257	12	95.3%
Conductivity	221	0	<b>100%</b>	257	0	100%
pH	222	49	<b>77.9%</b>	258	53	79.5%
Iron	199	27	<b>86.4%</b>	238	30	87.4%
Manganese	74	11	<b>85.1%</b>	97	11	88.7%
Odour	189	0	<b>100%</b>	218	0	100%
Oxidisability	0	0		0	0	
Sulphate	3	0	<b>100%</b>	3	0	100%
Sodium	12	0	<b>100%</b>	20	0	100%
Taste	60	0	<b>100%</b>	71	0	100%
Colony Count 22C	4	1	<b>75.0%</b>	7	2	71.4%
Coliform Bacteria	257	65	<b>74.7%</b>	322	78	75.8%
TOC	0	0		0	0	
Turbidity (at tap)	208	17	<b>91.8%</b>	234	20	91.5%
Turbidity (at WTW)	0	0		0	0	
<b>Radioactivity</b>						
Tritium	0	0		0	0	
Total Indicative Dose	0	0		0	0	



### 3 MICROBIOLOGICAL PARAMETER COMPLIANCE

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. 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. *E. coli* is not in itself a harmful organism but merely indicates that other harmful organisms may be present. 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. The overall rates of compliance with the microbiological parameters are shown in Table 3-1.

**Table 3-1. Total Number of Water Supply Zones (WSZs) Monitored and Samples Analysed for the Microbiological 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
<b>Microbiological Parameters</b>						
<i>Escherichia coli</i> ( <i>E. coli</i> )	2,271	348	<b>84.7%</b>	13,913	559	<b>96.0%</b>
Enterococci	966	56	<b>94.2%</b>	2,480	60	<b>97.6%</b>

#### *Escherichia coli* (*E. coli*)

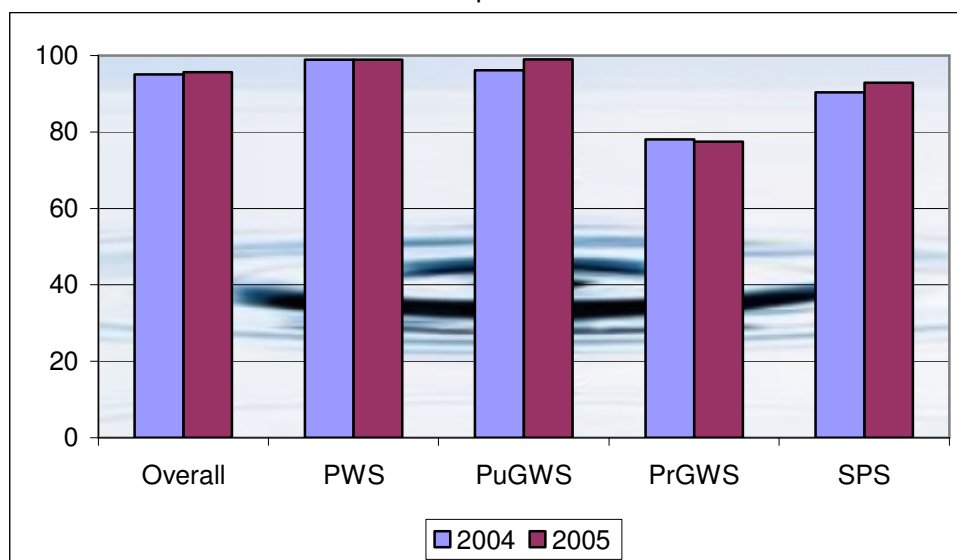
In 2005, a total of 559 samples in 344 supplies failed to meet the standard for *E. coli* at one time or more during the year. Overall, 15.3% of water supplies were contaminated with *E. coli* at least once during 2005, an improvement from 19.2% in 2004 (due to the reduction in the number of public group water schemes contaminated). The majority of the contaminated supplies were private group water schemes (Table 3-2). However, the majority of these exceedances were moderate (<20 cfu/100ml) and the majority were also one-off exceedances that were not detected in follow up samples. It is worthy of note that the majority of exceedances in public water supplies (those that serve 80% 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 99.8% in 2005 (up from 99.4% in 2004).

**Table 3-2. Summary of Water Supply Zones (WSZs) Contaminated with *E. coli* in 2005.**

	No. of WSZs Monitored	No. with Exceedances	No. with Serious Exceedances
Public Water Supplies	894	87 (9.7%)	20 (2.2%)
Public Group Water Schemes	482	8 (1.7%)	2 (0.4%)
Private Group Water Schemes	640	232 (36.2%)	74 (11.6%)
Small Private Supplies	255	21 (8.2%)	6 (2.4%)
<b>Total</b>	<b>2,271</b>	<b>348 (15.3%)</b>	<b>102 (4.5%)</b>

However, this table illustrates that although there has been a reduction in the percentage of private group water schemes contaminated during 2005 (36.2% of schemes in 2005 compared to 40.4% of schemes in 2004) the high proportion of schemes contaminated is completely unacceptable. Furthermore, the rate of improvement is too slow and must be accelerated.

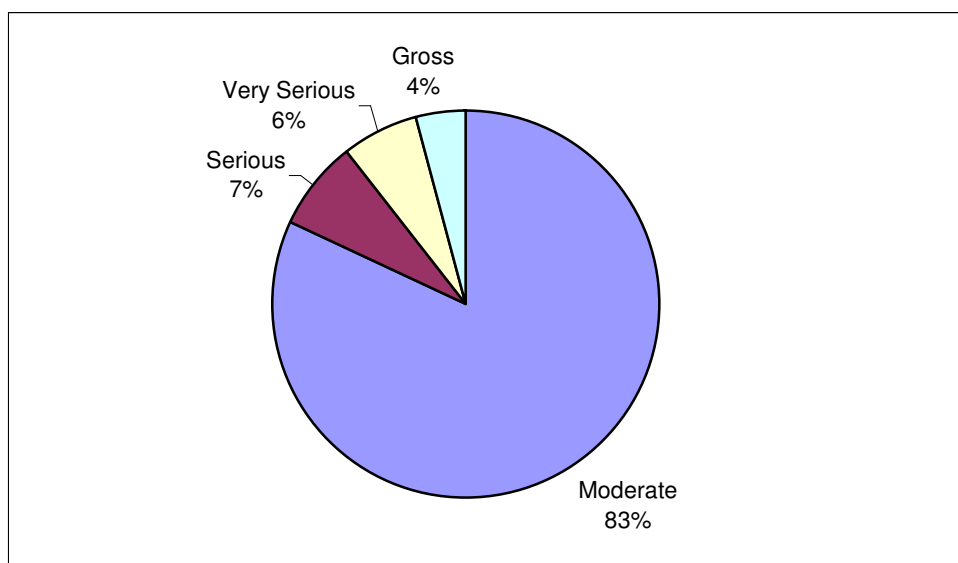
An examination of the rates of compliance with the *E. coli* parametric values (Figure 3-1) clearly shows that the quality of water depends, at least to some extent, on what type of water supply it comes from. It is evident that compliance with the *E. coli* parametric value in public water supplies and public group water schemes is satisfactory and improving slightly (98.9% and 99.0% respectively). However, the level of compliance with the *E. coli* parametric value in private group water schemes is unacceptably low at 77.5%, while that in the small private supplies was also unsatisfactory at 92.8%. The high percentage of samples indicating contamination with *E. coli* in the private group water schemes is of great concern. Furthermore, the monitoring results for 2005 indicate that for the first time in 5 years there has been an increase in the percentage of samples contaminated with human or animal waste. The results indicate an increase of 0.6% in the number of samples contaminated in 2005 (22.5% of samples in 2005 up from 21.9% in 2004). To compound the problem, it is clear from an analysis of the results that there has been a 25% drop in the number of samples analysed for *E. coli* during 2005. Sanitary authorities are failing in their responsibilities to adequately monitor the group water schemes (both the public and private group water schemes) and it will be impossible for sanitary authorities to ensure all group water schemes are meeting the drinking water standards if they are not even aware of the quality of water in a large proportion of these schemes. A significant increase in sanitary authority monitoring programmes is required and an acceleration in the programme of upgrading quality deficient group water schemes is required if Ireland is to ensure that its citizens all receive water that is fit for consumption.



**Figure 3-1. Compliance with the *E. coli* Parametric Value in 2005.**

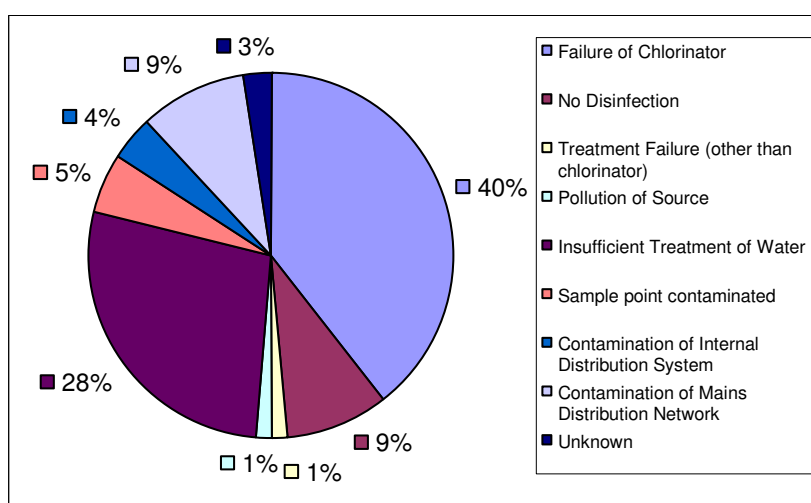
A detailed analysis of the causes of *E. coli* contamination of public water supplies was carried out by the Agency based on the results submitted for 2005. Each sanitary authority which reported an *E. coli* non-compliance in a public water supply in its functional area was requested to submit details of the cause of the failure. The results indicated 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 3-2).





**Figure 3-2. Classification of *E. coli* Non-Compliances in Public Water Supplies in 2005.**

The non-compliances in each public water supply were examined to determine the cause of the failure to meet the *E. coli* parametric value. The results of this are illustrated on Figure 3-3. The striking feature of this analysis is the fact that 40% of incidents of *E. coli* contamination of water supplies were due to the temporary failure of chlorination equipment. The most common cause of this failure is where a chlorinator or associated pumping equipment broke down and was not detected for a period of time (usually hours or days). The majority of these failures were in supplies where no chlorine alarms exist (in which case the non-compliance would not be immediately notified to the relevant personnel to allow immediate corrective action to be taken and hence avoidance of the contamination). It is also striking to note that 9% of the failures were in public water supplies where there was no chlorination equipment at all and a further 28% were due to insufficient water treatment (usually a chlorinator not capable of adequately disinfecting the water under all circumstances). It is clear that the majority of incidents of *E. coli* contamination detected during 2005 were avoidable if appropriate investment in disinfection and other treatment facilities had been in place and if such equipment was suitably alarmed to notify the relevant sanitary authority personnel of equipment failures as soon as a failure occurs.



**Figure 3-3. The Main Causes of *E. coli* Non-Compliances in Public Water Supplies in 2005.**

There was a significant regional variation in the quality of drinking water, with some sanitary authorities producing water that, in terms of *E. coli*, is excellent (100% compliance) or good (>99% compliance), while other sanitary authorities produce water that is less satisfactory. In a large number of sanitary authorities the quality of water supplied by the private group water schemes is unsatisfactory and in some cases poor. The highest and lowest performing sanitary authorities are shown on Table 3-3 and Table 3-4 for the public water supplies and the private group water schemes respectively. In 2005, 12 sanitary authorities reported that all public water supplies within their functional area were fully compliant with the *E. coli* parametric value, an increase from 11 in 2004, while a further 13 sanitary authorities reported compliance in excess of 99% (an increase from 10 in 2004).

It is quite apparent that, in general, the quality of drinking water supplied by public water supplies is superior to that provided by the private group water schemes. Table 3-4 shows that just 3 sanitary authorities (down from 4 in 2004) reported that all samples analysed for *E. coli* in private group water schemes were compliant. It is clear that the percentage of samples taken contaminated with *E. coli* in the majority of sanitary authority areas is unacceptable. Of serious concern is the fact that in Kerry, Leitrim and Sligo less than half of the samples analysed were free of contamination, while more than a quarter of samples analysed in Carlow, Mayo, Waterford and Wicklow were contaminated during 2005.

In terms of the number of schemes contaminated, more than half of the private group water schemes in Cavan (65%), Donegal (53%), Kerry (60%), Leitrim (82%), Mayo (69%) and Sligo (54%) were contaminated with *E. coli* at least once during 2005.

**Table 3-3. Compliance with the *E. coli* Parametric Value in Public Water Supplies – Highest and Lowest Performing Sanitary Authorities**

Sanitary Authority	% Compliance	Population Served	No. of Water Supply Zones	Compliance Trend
Carlow County Council	100%	42,659	15	No change
Cork City Council	100%	123,000	1	No change
Dun Laoghaire Rathdown County Council	100%	182,489	8	No change
Kildare County Council	100%	148,200	15	No change
Laois County Council	100%	56,315	22	No change
Leitrim County Council	100%	14,280	8	No change
Limerick City Council	100%	56,000	1	No change
Louth County Council	100%	86,530	18	+0.8%
Meath County Council	100%	101,028	31	+0.9%
Sligo County Council	100%	38,259	13	+3.9%
Waterford City Council	100%	41,945	1	No change
Westmeath County Council	100%	60,325	8	+3.2%
Fingal County Council	99.8%	293,546	4	-0.2%
Limerick County Council	99.7%	86,799	54	+0.1%
South Dublin County Council	99.7%	250,680	4	No change
Dublin City Council	99.6%	476,500	6	-0.1%
Donegal County Council	99.5%	119,003	46	No change
South Tipperary County Council	99.5%	71,388	27	+1.7%
Galway City Council	99.4%	65,774	1	-0.6%
North Tipperary County Council	99.4%	46,365	23	+0.3%
Wexford County Council	99.4%	78,670	30	+0.3%
Clare County Council	99.3%	78,013	25	+0.4%
Cavan County Council	99.2%	22,541	17	-0.8%
Cork Co. Co. (South)	99.0%	116,525	62	-0.3%
Offaly County Council	99.0%	42,334	24	+0.1%
Mayo County Council	98.9%	50,522	24	-0.5%
Kilkenny County Council	98.7%	51,320	15	+0.4%
Galway County Council	97.7%	77,315	45	-0.9%
Longford County Council	97.6%	16,897	8	-1.3%
Monaghan County Council	97.6%	22,381	13	+0.9%
Wicklow County Council	97.5%	89,841	48	+0.2%
Cork Co. Co. (North)	97.3%	58,275	70	-0.5%
Kerry County Council	96.8%	106,607	85	-0.2%
Roscommon County Council	96.4%	44,288	22	-1.5%
Waterford County Council	95.9%	50,911	101	-0.3%
Cork Co. Co. (West)	93.1%	31,085	33	-1.3%

**Table 3-4. Compliance with the *E. coli* Parametric Value in Private Group Water Schemes – Highest and Lowest Performing Sanitary Authorities.**

Sanitary Authority	% Compliance	Population Served	No. of Water Supply Zones	Compliance Trend
Longford County Council	100%	518	4	No change
Meath County Council	100%	1,600	2	No change
Westmeath County Council	100%	772	4	No change
North Tipperary County Council	99.2%	7,108	40	-0.8%
Offaly County Council	98.7%	14,094	18	No change
Kilkenny County Council	96.7%	3,463	35	+28.4%
Kildare County Council	95.8%	2,110	5	-0.6%
Cork Co. Co. (North)	94.4%	1,575	15	+0.1%
Laois County Council	93.3%	6,852	13	+0.8%
Monaghan County Council	93.3%	20,224	13	+0.2%
Louth County Council	87.5%	4,575	9	+0.4%
South Tipperary County Council	87.5%	360	3	+16.1%
Wexford County Council	86.7%	4,350	14	-4.7%
Limerick County Council	85.3%	12,976	47	-5.7%
Clare County Council	84.1%	15,054	16	+1.2%
Cork Co. Co. (South)	83.3%	820	11	-8.0%
Donegal County Council	77.5%	4,097	25	+28.4%
Roscommon County Council	77.1%	5,639	30	+0.1%
Galway County Council	76.1%	84,101	197	+5.0%
Cork Co. Co. (West)	75.0%	830	9	-1.3%
Carlow County Council	71.4%	1,891	4	-22.7%
Waterford County Council	66.7%	364	5	-6.6%
Wicklow County Council	64.7%	1,982	16	-11.5%
Cavan County Council	60.8%	21,007	20	-9.5%
Mayo County Council	58.9%	36,528	100	-16.1%
Sligo County Council	46.2%	5,853	15	-6.1%
Kerry County Council	44.2%	1,291	16	-5.1%
Leitrim County Council	42.4%	5,679	22	-1.7%

### Enterococci

Significantly less monitoring for Enterococci than *E. coli* was carried out by sanitary authorities during 2005 owing to the fact that Enterococci is an audit parameter (*E. coli* is a check parameter) and therefore the monitoring obligations are far less onerous. The results of monitoring for enterococci (Table 3-5) 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 3-5. Summary of Compliance with the Enterococci Parametric Value in 2005.**

	No. of WSZs Monitored	No. of Non-Compliant WSZs	No. of Samples Analysed	No. of Non-Compliant Samples
Public Water Supplies	609	19 (3.1%)	1,980	19 (1.0%)
Public Group Water Schemes	96	2 (2.1%)	142	2 (1.4%)
Private Group Water Schemes	201	26 (12.9%)	280	30 (10.7%)
Small Private Supplies	60	9 (15.0%)	78	9 (11.5%)
<b>Total</b>	<b>966</b>	<b>56 (5.8%)</b>	<b>2,480</b>	<b>60 (2.4%)</b>

## 4 CHEMICAL PARAMETER COMPLIANCE

The twenty-six chemical parameters covered by the Regulations are listed in Appendix 2. The level of monitoring of the chemical parameters increased by 16% in 2005 compared to 2004. However, there is still a shortfall in the number of analyses carried out for many of the chemical parameters in several supplies. Many local authorities did not carry out any monitoring for some of the parameters included in this group. While 2004 was the first year that the drinking water regulations were in force and many sanitary authorities reported difficulties in adjusting to the new monitoring requirements, this excuse cannot explain the shortfall of monitoring in 2005. In short, many sanitary authorities have simply failed to carry out the minimum legal monitoring of their water supplies for several of the chemical parameters covered by the Regulations.

Of the 26 chemical parameters included in this group of parameters, full compliance was reported in 2005 for 9 of the 26 parameters, while compliance in excess of 99% was reported for a further 9 parameters. The parameters for which monitoring indicated full compliance are reported on Table 4-1. A short description of the potential sources of these chemical parameters follows, as well as a brief overview of the possible health effects of these chemicals (as outlined in the World Health Organisations "Guidelines for Drinking Water Quality"). Those parameters for which compliance is less than 99% are discussed in more detail.

**Table 4-1. 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
<b>Chemical<sup>3</sup> Parameters</b>						
Antimony	821	17	<b>97.9%</b>	1,390	17	<b>98.8%</b>
Arsenic	839	3	<b>99.6%</b>	1,541	4	<b>99.7%</b>
Benzene	830	0	<b>100%</b>	1,389	0	<b>100%</b>
Benzo(a)pyrene	836	0	<b>100%</b>	1,327	0	<b>100%</b>
Boron	815	0	<b>100%</b>	1,384	0	<b>100%</b>
Bromate	794	15	<b>98.1%</b>	1,245	17	<b>98.6%</b>
Cadmium	853	0	<b>100%</b>	1,548	0	<b>100%</b>
Chromium	850	0	<b>100%</b>	1,536	0	<b>100%</b>
Copper	993	4	<b>99.6%</b>	1,872	4	<b>99.8%</b>
Cyanide	751	0	<b>100%</b>	1,179	0	<b>100%</b>
1,2-dichloroethane	805	0	<b>100%</b>	1,310	0	<b>100%</b>
Fluoride	949	85	<b>91.0%</b>	3,890	160	<b>95.9%</b>
Lead	966	17	<b>98.2%</b>	1,807	22	<b>98.8%</b>
Mercury	805	1	<b>99.9%</b>	1,347	1	<b>99.9%</b>
Nickel	896	10	<b>98.9%</b>	1,597	10	<b>99.5%</b>
Nitrate	1,681	29	<b>98.3%</b>	5,712	31	<b>99.4%</b>
Nitrite (at tap)	1,525	5	<b>99.7%</b>	6,392	6	<b>99.9%</b>
Nitrite (at WTW)	330	9	<b>97.3%</b>	881	9	<b>99.0%</b>
Pesticides - Total	795	2	<b>99.7%</b>	1,275	2	<b>99.8%</b>
PAH	834	1	<b>99.9%</b>	1,321	1	<b>99.9%</b>
Selenium	817	0	<b>100%</b>	1,385	0	<b>100%</b>
Tetrachloroethene/Trichloroethene	742	0	<b>100%</b>	1,371	0	<b>100%</b>
THMs	980	45	<b>95.4%</b>	2,012	60	<b>97.0%</b>

### Antimony

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.

<sup>3</sup> 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

Antimony concentrations in excess of the parametric value were detected in 17 water supplies (14 public water supplies and 3 private group water schemes). However, in most cases the results appear anomalous with all other results of analysis for antimony in these supplies compliant during 2005. Further follow up and testing of these supplies will be necessary to determine whether these results are representative of the quality of water in these supplies or whether they were one-off results.

### **Arsenic**

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. There were three public water supplies containing elevated levels of arsenic detected during 2005. The highest levels were detected in the Ballyogarty supply in Waterford, however of the four samples analysed arsenic was detected at high levels in two samples and not at all in the others. The other two supplies, Hollywood (Wicklow) and Clontibret (Monaghan) were both only marginally above the parametric value. The Hollywood supply has been blended with an additional source of low-arsenic water and thus no longer has elevated levels of arsenic.

### **Benzene**

The principle source of benzene is from vehicle emissions which may find their way into water. Benzene is carcinogenic to humans. All 1,389 samples analysed for benzene in 830 water supplies during 2005 were fully compliant with the parametric value.

### **Benzo(a)pyrene**

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. All 1,327 samples analysed in 836 supplies were fully compliant with the parametric value for benzo(a)pyrene.

### **Boron**

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. All 1,384 samples analysed in 815 supplies were fully compliant with the boron parametric value.

### **Bromate**

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).

There was an increase of over 50% of the number of samples analysed for bromate in 2005 compared to 2004. Analysis for bromate was carried out in 1,245 samples analysed in 794 water supplies. Three sanitary authorities did not carry out any monitoring for bromate in

2005 (Kilkenny, Laois and Meath). Overall compliance in the 31 sanitary authority areas that did carry out monitoring was 98.6% and elevated levels of bromate were found in 15 supplies (11 of which were public water supplies). However, it is most 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 25<sup>th</sup> December 2008. A comparison of compliance with this standard as well as a breakdown of compliance in the different supply types is shown on Table 4-2.

**Table 4-2. Compliance with the Bromate Parametric Value**

	25 µg/l PV		10 µg/l PV	
	% of Samples Complying	No. of Non Compliant WSZs	% of Samples Complying	No. of Non Compliant WSZs
<b>Overall</b>	<b>98.6%</b>	<b>15</b>	<b>93.6%</b>	<b>65</b>
Public Water Supplies	98.7%	11	94.1%	44
Public Group Water Schemes	97.6%	2	92.9%	6
Private Group Water Schemes	98.9%	2	91.3%	15

Clearly there are significant challenges facing many sanitary authorities and water suppliers in the coming years with 6.4% of samples failing to meet the incoming parametric value. Investigations were underway at the time of reporting by a number of sanitary authorities and it is imperative that corrective action is taken to ensure that the supplies in question are returned to compliance. Some sanitary authorities have found it necessary to review their chemical usage to switch to an alternative (low bromide) form of disinfectant to ensure compliance with the parametric value.

#### **Cadmium**

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. All 1,548 samples analysed in 853 water supplies fully complied with the cadmium parametric value.

#### **Chromium**

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. All 1,536 samples analysed in 850 water supplies in Ireland were fully compliant with the parametric value.

#### **Copper**

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. Elevated levels of copper were found in four water supplies (2 public water supplies and 2 private group water schemes) and were due to the internal domestic plumbing at the sample points.

#### **Cyanide**

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. All 1,179 samples analysed in 751 water supplies were fully compliant with the cyanide parametric value.



### 1,2-dichloroethane

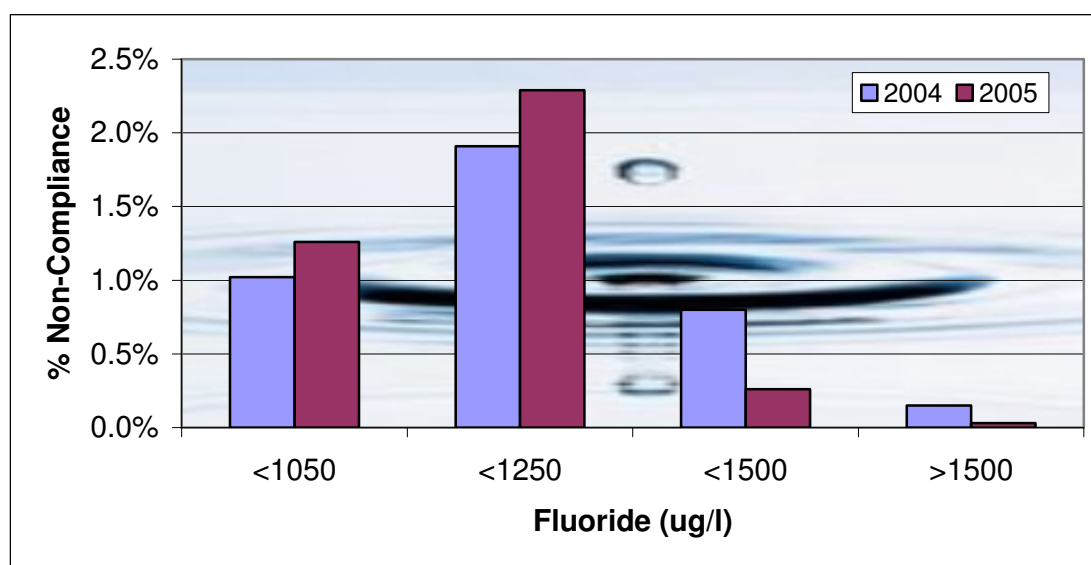
1,2-dichloroethane is a synthetic intermediate and organic solvent used in the manufacture of chemicals. It can enter water from discharges from facilities using the chemical. It is a toxic substance which can cause a variety of ill-effects including eye damage, dermatitis and narcotic effects. It has also been classified by the IARC in Group 2 (possible human carcinogen). All 1,380 samples analysed in 805 water supplies fully complied with the parametric value.

### Fluoride

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<sup>-</sup> 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. At levels markedly over 1.5mg/l an inverse effect occurs and mottling of teeth (or severe damage at gross levels) will arise.

The fluoride levels in fluoridated public water supplied in Ireland are legally restricted to the range 0.8-1.0 mg/l, though the recommendations of the Forum on Fluoridation regarding the lowering of this target level are to be introduced shortly. In making the 2000 Drinking Water Regulations, the then Minister for the Environment fixed 1.0 mg/l F<sup>-</sup> as the parametric value. This value is lower than the Parametric Value set in 1998 EC Drinking Water Directive, which set a value of 1.5 mg/l.

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 2005 was 95.9%, which was a slight disimprovement from 96.1% in 2004. An examination of the data for 2005 is presented below and indicates that the majority of the exceedances are moderate (Figure 4-1). A single sample in 2005 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 4-1. Fluoride Exceedances in 2005.**



Equipment in some water treatment plants is in need of updating and in this regard the code of practice to be issued as part of the work being done by the Irish Expert Body on Fluorides and Health should be followed to ensure that compliance with the fluoride parametric value improves. Notwithstanding this, publication of the Regulations amending the target dose to a range of 0.6 mg/l to 0.8 mg/l, with a target of 0.7 mg/l, as recommended by the Forum on Fluoridation, should reduce the incidence of exceedances of the drinking water regulations fluoride parametric value of 1.0 mg/l in the future.

## Lead

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 method used results can vary significantly. To date many samples tested for lead tend to have been fully flushed prior to sampling. However, this does not meet the requirements of the current Regulations and it is recommended that the Random Daytime Sampling<sup>4</sup> method be used. All sanitary authorities should move to implement this method, if they have not already done so.

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.

The Regulations impose a parametric value of 25 µg/l Pb until the 25<sup>th</sup> December 2013 after which the parametric value of 10µg/l Pb becomes effective. The results for 2005 are examined in the context of compliance with the current standard of 25µg/l Pb, as well as the future standard of 10µg/l Pb

**Table 4-3. Compliance with the Lead Parametric Value**

	25 µg/l PV		10 µg/l PV	
	% of Samples Complying	No. of Non Compliant WSZs	% of Samples Complying	No. of Non Compliant WSZs
<b>Overall</b>	<b>98.8%</b>	<b>17</b>	<b>96.7%</b>	<b>43</b>
Public Water Supplies	98.4%	17	95.9%	40
Public Group Water Schemes	100%	0	98.9%	1
Private Group Water Schemes	100%	0	99.6%	1
Small Private Supplies	100%	0	98.5%	1

Though full compliance was reported for group water schemes and private supplies, it must be noted that there was relatively little monitoring reported for lead in supplies other than public water supplies. Thus more sampling would be necessary before any firm conclusions about the level of compliance in non-public water supplies could be determined.

A total of 17 supplies reported lead exceedances during 2005 (up from 14 in 2004), however 43 supplies reported non-compliances with the 2013 parametric value of 10 µg/l for lead.

Sanitary authorities must consider this problem in more detail if compliance with the standard of 10 µg/l is to be achieved by 2013. In particular, some sanitary 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 practiced 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).

<sup>4</sup> 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.

Implementation of this measure will assist the sanitary 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 guidance on advice on their safe replacement.

### Mercury

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. There was one non-compliance (in 805 supplies monitored) with the mercury standard in Hollywood (Wicklow). All follow up testing of this source indicated non-detectable levels and in any event another well has been brought into operation in Hollywood reducing the amount of water the first well is supplying to the Hollywood area. Wicklow County Council report that mercury has not been detected in the Hollywood supply since its initial detection.

### Nickel

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. There were 10 samples (of 1,597 samples analysed) that reported levels of nickel in excess of the parametric value (all in different supplies). As previously stated, these non-compliance were likely due to the tap fittings at the sample point rather than nickel being present in the water supply as a whole.

### Nitrate

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. Elevated levels of nitrate in drinking water are not as common in Ireland as in other EU countries, however, exceedances of the nitrate parametric value were reported in 29 supplies in 2005 (up from 27 in 2004). This figure may be higher as some supplies with ongoing nitrate problems (e.g. Sheepgrange in Louth) were not monitored for nitrate in 2005. Although some longstanding nitrate issues have been resolved (e.g. the Glanworth supply complied with the nitrate parametric value for the first time since reporting to the EPA began) there are an increasing number of public water supplies with elevated levels of nitrates affecting a greater population than previously (Table 4-4). It is also worth highlighting that of the private water supplies monitored 5 (that were not monitored previously) failed to meet the nitrate parametric value. The private water supplies may be more likely to exceed the nitrate parametric value given their locations (primarily in rural agricultural areas) and hence more attention must be paid to this sector.

**Table 4-4. Summary of Water Supply Zones Non-Compliant with the Nitrate Parametric Value in 2005 and 2004.**

	No. of WSZs with Exceedances in 2005	Population Affected in 2005	No. of WSZs with Exceedances in 2004	Population Affected in 2004
Public Water Supplies	11	10,972	7	3,257
Public Group Water Schemes	0	0	1	76
Private Group Water Schemes	13	2,986	18	4,288
Small Private Supplies	5	N/A	1	N/A
<b>Total</b>	<b>29</b>	<b>13,958</b>	<b>27</b>	<b>7,621</b>

## Nitrite

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. 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 (99.0%) and at the tap (99.9%).

## 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. Sanitary authorities were requested to report compliance against the total pesticide parametric value (i.e. by adding the results of analysis of all pesticides together) and also to report to the Agency all individual pesticides detected above the limit of detection. In total, 1,275 samples were analysed for pesticides in 795 water supplies, 1,078 of which did not detect any traces of pesticides. Of the remaining 197 samples where pesticides were detected, 2 reported total concentrations in excess of the parametric value of 0.5 µg/l. Furthermore, 9 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. In all cases, the concentrations of pesticides detected did not represent a risk to health. Nonetheless, the presence of pesticides in water supplied for consumption is most undesirable and should be eliminated. Table 4-5 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 4-5. Summary of Pesticides Detected in Water Supplies in 2005.**

Name of Pesticide	No. of Samples Where Pesticide Detected	No. of Samples >0.1 µg/l
Atrazine	128	2
Simazine	98	2
2, 4 D	38	
Dichlorobenil	29	3
Bromoxynil	23	
Mecoprop	22	
MCPA	15	
Triclopyr	4	
Propazine	4	
Bromocil	2	
Lindane	2	
2,3,6 TBA	2	
Heptachlor Epoxide	1	
Hexachlorobenzene	1	
Pentachlorophenol	1	1
Dieldrin	1	
Metazachlor	1	1
Chlorothalonil	1	

## Polycyclic Aromatic Hydrocarbons (PAHs)

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. There was just one marginal exceedance of the parametric value for PAHs in the 834 supplies monitored during 2005.

### Selenium

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. All 1,385 samples analysed in 817 water supplies were fully compliant with the parametric value.

### Tetrachloroethene and Trichloroethene

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. All 1,371 samples analysed in 742 supplies were fully compliant with the parametric value.

### Trihalomethanes – Total

Trihalomethanes (THMs), as the name indicates, are derivatives of the simplest organic compound - methane,  $\text{CH}_4$  - in which three of the hydrogen atoms are substituted by halogen atoms. The principal halogens are fluorine ( $\text{F}_2$ ), chlorine ( $\text{Cl}_2$ ), bromine ( $\text{Br}_2$ ) and iodine ( $\text{I}_2$ ), but while many combinations are theoretically possible, the term trihalomethanes is applied to four specific compounds containing only chlorine and/or bromine as the halogen elements. The four compounds are *chloroform* ( $\text{CHCl}_3$ ), *bromodichloromethane* ( $\text{CHBrCl}_2$ ), *dibromochloromethane* ( $\text{CHBr}_2\text{Cl}$ ) and *bromoform* ( $\text{CHBr}_3$ ).

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.

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 ( $\text{CHCl}_3$ ). There is thus a fairly straightforward relationship between the degree of colour in the water prior to chlorination and the quantities of THMs present following chlorination. If colour is present at the point of chlorination, THMs are likely to be formed.

THM compounds are undesirable in drinking water for two reasons. Firstly the actual compounds themselves may pose a hazard to the health of the consumer if present in excessive amounts, as chloroform is a suspected carcinogen. Secondly, the presence of the THM group may be an indicator of the possible presence of other organic by-products of chlorination in trace amounts. The WHO advises that "*In controlling trihalomethanes, a multistep treatment system should be used to reduce organic trihalomethane precursors, and primary consideration should be given to ensuring that disinfection is never compromised*".

There were 2,012 samples analysed for trihalomethanes in 980 water supply zones (an increase of one-third compared to 2004). The Regulations impose a parametric value of 150  $\mu\text{g/l}$  until the 25<sup>th</sup> December 2008; thereafter the parametric value of 100  $\mu\text{g/l}$  is effective. The results for 2005 are examined in the context of compliance with the current standard of 150  $\mu\text{g/l}$ , as well as the future standard of 100  $\mu\text{g/l}$ .

**Table 4-6. Compliance with the Trihalomethanes (Total) Parametric Value**

	150 µg/l PV		100 µg/l PV	
	% of Samples Complying	No. of Non Compliant WSZs	% of Samples Complying	No. of Non Compliant WSZs
<b>Overall</b>	<b>97.0%</b>	<b>45</b>	<b>89.3%</b>	<b>138</b>
Public Water Supplies	96.2%	40	87.7%	98
Public Group Water Schemes	98.3%	4	88.5%	27
Private Group Water Schemes	99.6%	1	96.2%	13

The results, as shown on Table 4-6 show that compliance with the trihalomethanes parametric value in 2008 is going to be very problematic. Based on the monitoring carried out in 2005, over 16% of public water supplies nationally (98 of 588 supplies monitored) will be unable to comply with the parametric value of 100µg/l. Sanitary authorities will need to 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.

#### **Acrylamide, Epichlorohydrin and Vinyl Chloride**

Acrylamide can be present in water supplies from the use of polyacrylamides as coagulant aids in water treatment and in water works sludge treatment. 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. Vinyl chloride can be present in water supplies from the use of unplasticised polyvinyl chloride (uPVC) pipes in water distribution systems.

The Regulations sets out parametric values for all three of these parameters but states that *"the parametric value refers to the residual monomer concentration in the water calculated according to the specifications of the maximum release from the corresponding polymer in contact with the water"*. In other words, sanitary authorities should not be sending samples of water to the lab to be analysed for these three parameters but are required to determine compliance by product specification.

Sanitary authorities can assume that the standards for these three parameters are met provided that the products that contain these parameters are included in the latest "List of Approved Products and Process" published by the Drinking Water Inspectorate for England and Wales under their Regulations [or any equivalent approval system] and that the sanitary authorities or private water suppliers are using the products in accordance with any conditions of approval. The latest list is posted on the Drinking Water Inspectorate's website: <http://www.dwi.gov.uk.cpp>. If sanitary authorities and private water suppliers are using products containing these parameters that are not listed, sanitary authorities must obtain information about the content of the parameters in the products and the leaching of the parameters from the product under the conditions of use and calculate whether the standards for these parameters are met.

In spite of this 6 sanitary authorities analysed samples for acrylamide and epichlorohydrin, while 14 analysed samples for vinyl chloride. In the majority of these samples analysed the limit of detection of the method used was higher than the parametric value in the Regulations. Therefore, the results of analysis did not inform the sanitary authority as to whether the sample complied with the parametric value or not. However, in two cases, the levels detected were above the parametric value for acrylamide and therefore chemical dosing at these plants needs to be reviewed.

In total 12 sanitary authorities determined compliance with the parametric values for acrylamide, epichlorohydrin and vinyl chloride in the correct manner and all complied. However, this means that 22 sanitary authorities are unable to state whether they comply or not with the parametric values for acrylamide, epichlorohydrin and vinyl chloride.



## 5 INDICATOR PARAMETER COMPLIANCE

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 consumers acceptability, 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 sanitary 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. A discussion of the monitoring results for each of the parameters follows. In the following section parameters with specified parametric values are discussed individually, while parameters with no quantitative parametric value are discussed collectively.

**Table 5-1. 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
<b>Indicator Parameters</b>						
Aluminium	1,305	191	<b>85.4%</b>	7,614	419	<b>94.5%</b>
Ammonium	2,214	49	<b>97.8%</b>	13,149	54	<b>99.6%</b>
Chloride	936	2	<b>99.8%</b>	1,688	5	<b>99.7%</b>
<i>Clostridium perfringens</i>	1,444	181	<b>87.5%</b>	9,477	267	<b>97.2%</b>
Colour*	2,215	312	<b>85.9%</b>	13,277	711	<b>94.6%</b>
Conductivity	2,223	0	<b>100%</b>	14,255	0	<b>100%</b>
Hydrogen Ion Concentration	2,217	377	<b>83.0%</b>	13,392	724	<b>94.6%</b>
Iron	1,830	345	<b>81.2%</b>	6,997	662	<b>90.5%</b>
Manganese	1,470	175	<b>88.1%</b>	4,448	234	<b>94.7%</b>
Odour*	2,048	69	<b>96.6%</b>	12,451	197	<b>98.4%</b>
Oxidisability	51	13	<b>74.5%</b>	58	13	<b>77.6%</b>
Sulphate	873	1	<b>99.9%</b>	1,399	1	<b>99.9%</b>
Sodium	890	2	<b>99.8%</b>	1,516	2	<b>99.9%</b>
Taste*	1,136	24	<b>97.9%</b>	8,869	109	<b>98.8%</b>
Colony count 22°C*	855	139	<b>83.7%</b>	1,836	166	<b>91.0%</b>
Coliform bacteria	2,264	806	<b>64.4%</b>	13,924	1,648	<b>88.2%</b>
Total organic carbon (TOC)	735	0	<b>100%</b>	1,269	0	<b>100%</b>
Turbidity (at the tap)*	2,085	127	<b>93.9%</b>	12,518	177	<b>98.6%</b>
Turbidity (at Water Treatment Works)	241	84	<b>65.1%</b>	1,666	271	<b>83.7%</b>
<b>Radioactivity</b>						
Tritium	15	0	<b>100%</b>	50	0	<b>100%</b>
Total indicative dose	19	0	<b>100%</b>	51	0	<b>100%</b>

\*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 sanitary authority may be concerned about the quality of the water and should investigate further.

### Aluminium

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:

*"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”*

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 2005 appeared to be due to the latter three causes. The sanitary authority can control all three of these factors. In particular, the practice of failing to upgrade a treatment plant in anticipation of housing and other development served by the supply is a major problem in many supplies in Ireland. It would appear that many local authorities are allowing development which is directly resulting in the deterioration of the quality of drinking water being supplied to those already connected to the supply. This situation cannot be allowed to continue. The level of compliance with the aluminium parametric value fell to 94.5% in 2005 from 94.9% in 2004. The compliance rates in the different types of water supplies are presented below.

**Table 5-2. Summary of Aluminium Monitoring in 2005.**

	<b>No .of WSZs Monitored</b>	<b>% of Samples Complying</b>	<b>No. of Non Compliant WSZs</b>
<b>Overall</b>	<b>1,305</b>	<b>94.5%</b>	<b>191</b>
Public Water Supplies	669	94.9%	114
Public Group Water Schemes	270	85.1%	63
Private Group Water Schemes	268	96.9%	11
Small Private Supplies	98	97.4%	3

The higher proportion of non-compliances in the 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. While the majority of public water supplies have a programme of regular scouring and flushing, many of the public group water schemes (which are not managed by the sanitary authority) had infrequent (if any) programmes of scouring and flushing. As a consequence, aluminium builds up in the distribution network and eventually leads to aluminium non-compliances at the tap.

The rates of compliance vary significantly from county to county, with 4 sanitary authorities achieving full compliance with the standard (down from 5 in 2004), while 8 sanitary authorities reported compliance rates of less than 90% (down from 11 in 2004). Particularly poor rates of compliance were reported in public water supplies in Mayo (69%), South Tipperary (73%) and Longford (74%).

### **Ammonium**

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. The parametric value of 0.3 mg/l in the Regulations is more stringent than that in the European Directive, which sets out a parametric value of 0.5 mg/l. Overall, in 2005, 99.6% of the 13,150 samples analysed complied with the ammonium parametric value (up from 99.5% in 2004). Analysis of the results in comparison with the EU parametric value indicates that just 27 of the 13,150 samples analysed were above 0.5 mg/l (99.8% compliance).



**Table 5-3. Summary of Ammonium Monitoring in 2005**

	No .of WSZs Monitored	% of Samples Complying	No. of Non Compliant WSZs
<b>Overall</b>	<b>2,214</b>	<b>99.6%</b>	<b>49</b>
Public Water Supplies	892	99.8%	23
Public Group Water Schemes	484	99.7%	3
Private Group Water Schemes	620	99.0%	15
Small Private Supplies	218	96.9%	8

### Chloride

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. The parametric value of 250 mg/l is based on taste rather than on health grounds, as levels close to this value are detectable in drinking water and may be objectionable. There were just 5 exceedances of the chloride parametric value in two supplies in 2005 (99.7% compliance).

### *Clostridium perfringens*

*Clostridium perfringens* is a member of the bacterial intestinal flora of humans and therefore serves as an indicator of faecal pollution. The spores of *Clostridium perfringens* are particularly resistant to unfavourable conditions in the environment and thus they survive for long periods. As such they can be useful indicators of water that is intermittently polluted.

**Table 5-4. Summary of *Clostridium perfringens* Monitoring in 2005.**

	No .of WSZs Monitored	% of Samples Complying	No. of Non Compliant WSZs
<b>Overall</b>	<b>1,444</b>	<b>97.2%</b>	<b>181</b>
Public Water Supplies	651	98.2%	93
Public Group Water Schemes	361	99.0%	7
Private Group Water Schemes	362	87.6%	77
Small Private Supplies	70	95.5%	4

*Clostridium perfringens* was included in the Directive (and hence 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*". Furthermore, the Department of Environment, Heritage and Local Government circular L8 of 1998 states that where monitoring for *Clostridium perfringens* indicates levels above the parametric value of 0/100ml, the sanitary authority should monitor the raw and treated water for *Cryptosporidium*. *Cryptosporidium* is discussed in detail in Section 6.1.3 of this report.

### Conductivity

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. All 14,255 samples analysed in 2,223 water supply zones during 2005 complied with the parametric value for conductivity.

### Hydrogen Ion Concentration (pH)

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.

The pH of drinking water at the tap should lie between 6.5 and 9.5. Overall compliance with the pH parametric value dropped slightly from 94.9% in 2004 to 94.6% in 2005. Of the 13,392 samples analysed in 2,217 water supply zones, 724 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 sanitary authorities will need to adjust pH levels so that they comply with the parametric value.

## Iron

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. Hence the reason for the parametric value is primarily aesthetic rather than health based.

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 90.5% of samples were below the parametric value of 200 µg/l in 2005, representing a drop of 3.4% in compliance compared to 2004 (93.9% compliance). Compliance rates for iron in the different types of supplies are shown in Table 5-5.

**Table 5-5. Summary of Iron Monitoring in 2005.**

	No .of Supplies Monitored	% of Samples Complying	No. of Non Compliant Supplies
<b>Overall</b>	<b>1,830</b>	<b>90.5%</b>	<b>345</b>
Public Water Supplies	767	91.9%	138
Public Group Water Schemes	371	86.6%	84
Private Group Water Schemes	493	88.3%	96
Small Private Supplies	199	87.4%	27

## Manganese

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.

As with iron, a significant number of groundwater supplies in Ireland have levels of manganese in excess of the parametric value, though the percentage of samples with levels of manganese below the parametric value (94.7% in 2005 – unchanged from 2004) is greater for manganese than for iron. Compliance rates for manganese in the different types of supplies are shown in Table 5-6.

**Table 5-6. Summary of Manganese Monitoring in 2005.**

	No .of WSZs Monitored	% of Samples Complying	No. of Non Compliant WSZs
<b>Overall</b>	<b>1,470</b>	<b>94.7%</b>	<b>175</b>
Public Water Supplies	658	96.0%	67
Public Group Water Schemes	284	96.5%	19
Private Group Water Schemes	454	90.8%	78
Small Private Supplies	74	88.7%	11

### Oxidisability

Oxidisability is a measure of the organic (and other oxidisable) matter present in a water. There were just 58 samples analysed for oxidisability in 2005, of which 13 failed to comply. The reason for the low number of samples is the fact that the Regulations state that this parameter need not be measured if the sample has been analysed for Total Organic Carbon.

### Sulphate

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). There were 1,399 samples analysed in 873 water supply zones, with just a single non-compliance reported in 2005.

### Sodium

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. 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 1,516 samples analysed in 890 water supply zones, with just two non-compliance reported in 2005.

### Coliform Bacteria

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. The coliform bacteria include *E. coli* as was discussed previously.

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 5-7. Summary of Coliform Bacteria Monitoring in 2005.**

	No .of Supplies Monitored	% of Samples Complying	No. of Non Compliant Supplies
<b>Overall</b>	<b>2,264</b>	<b>87.9%</b>	<b>819</b>
Public Water Supplies	894	93.0%	332
Public Group Water Schemes	482	91.8%	56
Private Group Water Schemes	631	59.4%	353
Small Private Supplies	257	75.8%	65

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 56% (353 of 631 schemes) contained Coliform Bacteria at least once during 2005. 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.

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

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, taste and turbidity 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 example, consumers of a chlorinated supply will accept a drinking water that has a slight chlorine taste or odour but consumers whose supply has only recently commenced chlorination will be less tolerant of the same degree of odour or taste. For the purposes of this report the parametric value was only considered to be exceeded in respect of odour and taste 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 and turbidity (at the tap) arbitrary values of 20 mg/l Hazen and 4 NTU’s respectively were taken as values above which consumers may begin to question the acceptability of the water supplied (these were the Maximum Admissible Concentrations from the 1988 Regulations). However, there is a parametric value for turbidity (leaving the water treatment works). 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 5-8. Percentage of Samples below the Parametric Value for Colour, Odour, Taste, Colony count at 22°, Total Organic Carbon and Turbidity in 2005.**

Parameter	Overall	PWS	PuGWS	PrGWS	SPS
Colour	<b>94.6%</b>	96.4%	96.0%	83.2%	95.3%
Odour	<b>98.4%</b>	98.3%	99.3%	98.8%	100%
Taste	<b>98.8%</b>	98.7%	99.0%	99.4%	100%
Colony count at 22°C	<b>91.0%</b>	93.7%	92.0%	71.3%	71.4%
Total Organic Carbon	<b>100%</b>	100%	100%	100%	No results
Turbidity (at the tap)	<b>98.6%</b>	99.2%	98.5%	95.9%	91.5%
Turbidity (at WTW)	<b>83.7%</b>	84.3%	77.8%	73.9%	No results

Of greatest concern, as illustrated on the above table, 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 over one-third 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.

## 6 MAIN ISSUES RELATED TO DRINKING WATER IN IRELAND

### 6.1.1 Monitoring Programmes

A review of the monitoring carried out in 2005 indicates that the majority of sanitary authorities failed to carry out the minimum monitoring required to satisfy the requirements of the Regulations. Examples of these failures to carry out adequate monitoring include:

- No monitoring carried out on some public water supplies and group water schemes;
- Failure to include private supplies that supply water as part of a commercial or public activity in the monitoring programme;
- Insufficient check samples being analysed;
- Insufficient audit samples being analysed; and,
- All parameters not being monitored as part of the audit sample.

An estimate of the total number of water supplies in the country was made by examining the supplies identified in the Drinking Water National Monitoring Programme (DWNMP) and including supplies identified by sanitary authorities subsequent to the publication of this programme (via the returns submitted to the Agency). A summary of the number of supplies in Ireland and the number actually monitored is presented in Table 6-1.

**Table 6-1. Summary of the Water Supply Zones Monitored in 2005.**

Parameter	Estimated No. of Supplies	No. of WSZs Not Monitored	No. of WSZs Insufficiently Monitored
Public Water Supplies	928	15 (1.6%)	88 (9.5%)
Public Group Water Schemes	765	273 (35.6%)	498 (65.0%)
Private Group Water Schemes	708	64 (9.1%)	291 (41.2%)
<b>Overall</b>	<b>2,401</b>	<b>352 (14.7%)</b>	<b>877 (36.5%)</b>

Table 6-1 indicates that over 14% of water supplies in Ireland were not monitored at all during 2005, the majority of which were public group water schemes and thus 21 sanitary authorities are failing in their statutory duty to oversee the quality of drinking water supplied to the public in Ireland. However, it should be noted that 13 sanitary authorities were fully complying with the requirements of the drinking water regulations with regards to monitoring and indeed some are carrying out monitoring far in excess of that required by the Regulations.

There has been significant increase in the number of private supplies that supply water as part of a public or commercial activity identified by sanitary authorities in 2005. A total of 395 such supplies have been identified by 10 sanitary authorities as being required to meet the requirements of the Drinking Water Regulations, of which 255 were monitored during 2005. While there are no legal minimum monitoring requirements for these supplies (provided they supply less than 10 m<sup>3</sup>/day), it is recommended that these supplies be monitored twice per year by the sanitary authority.

Notwithstanding the improvements in the identification and monitoring of these private water supplies, a large proportion of sanitary authorities have still not even identified such supplies. The remaining 12 sanitary authorities (assuming there are no such supplies in the City Councils functional areas) have failed in their statutory duty under Article 7 to develop a monitoring programme that meets the full requirements of 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. Agency audits of sanitary authorities during 2006 (see Section 7) indicated that the majority of sanitary

authorities had developed monitoring programmes that outlined their intention to carry out monitoring at the minimum frequency required by the Regulations. Therefore, it is clear that sanitary authorities are aware of their monitoring obligations but are simply failing to implement the programmes they have in place to monitor these schemes.

Though in the majority of cases the appropriate numbers of audit samples were analysed in water supplies by sanitary authorities, several sanitary authorities are failing to monitor all of the parameters required in the audit sample. Though it is difficult to quantify the exact deficit in this regard, Table 2-2 indicates that 1,567 audit samples were analysed in all supplies during 2005, however, Table 4-1 indicates that for many of the parameters listed significantly less analyses were made. For example, 1,390 samples were analysed for antimony. This shortfall is because several sanitary authorities completely omitted certain parameters from their monitoring programme or did not analyse for all of the parameters required in all of their samples.

### **6.1.2 The Quality of Water in Private Group Water Schemes**

The quality of group water schemes has historically been inferior to that of the public water supplies. This fact has been reported on since the first drinking water annual report was published in 1991. Up to 2002 the group water schemes (public and private) had always been reported together. However, it was always understood that the private group water schemes were the main cause of concern in the group water scheme sector. In the 2003 report, the Agency distinguished between the private group water schemes from the public group water schemes and reported on them separately. This clearly indicated that the quality of drinking water (in terms of compliance with the *E. coli* standard) in public group water schemes was similar to that of the public water supplies themselves, while the quality of water supplied by private group water schemes was of an inferior status. The results for 2005 clearly show the same situation. For the first time in 5 years the percentage of samples in private group water schemes contaminated with *E. coli* actually increased slightly (from 21.9% in 2004 to 22.5% in 2005), however, the percentage of schemes contaminated reduced marginally by 4.2% in 2005 (36.2% in 2005 compared to 40.4% in 2004).

This slow pace of improvement is all the more significant as it occurred during a period of substantial investment in private group water schemes treatment facilities, as a record €125 million was provided by the Minister for Environment for this purpose. In this regard, there has been considerable activity in the group water scheme sector. The National Federation of Group Water Schemes (NFGWS, 2006) reported that in 2005 Design Build Operate (DBO) contracts had been underway or were completed involving 107 group water schemes serving 26,000 households, while several other DBO projects are expected to commence construction in either 2006 or 2007 covering a further 129 group water schemes serving 15,000 households. However, as indicated in Table 3-2, 228 private group water schemes were contaminated during 2005, with the quality status of a further 64 unknown (as they were not monitored by the sanitary authorities during 2005). This indicates that several contaminated schemes are outside this process and, as EPA audits of sanitary authorities have indicated, several sanitary authorities have reported that many group water schemes did not have any plans in place to address the quality deficiency problems at the time of the audit (e.g. there were 20 such schemes identified in Galway County). Particular attention must be paid by the relevant sanitary authority to these schemes as the majority of the schemes within the NFGWS are part of Design Build Operate (DBO) bundles, while those outside it are "going it alone" and may in many cases not be planning any upgrading works. The sanitary authorities must use their powers under Article 14 of the Regulations to ensure that these schemes are fully compliant with the quality requirements of the Regulations. In particular, where a group water scheme is unwilling to address a quality problem, the sanitary authority must consider using all the enforcement options available to it, including, where necessary, prosecution. It is unacceptable for persons responsible for the management of group water schemes to supply water to members of the public that is contaminated with human or animal waste.



If the situation is allowed to continue as is at present, it is unlikely that compliance with the drinking water Regulations is going to be achieved in the group water scheme for many years.

### 6.1.3 *Cryptosporidium*

*Cryptosporidium* is a microscopic protozoan parasite that can be present in faecal material that has pathogenic effects in both children and adults when it enters the gastrointestinal tract and causes an infection called cryptosporidiosis. Cryptosporidiosis can cause fever, stomach upsets, weight loss and diarrhoea and can be fatal in the young and old and those with weak immune systems. *Cryptosporidium* is protected by an outer shell (cyst) permitting it to survive for long periods outside the body. The cyst is very resistant to destruction by chlorine and other disinfectants, although it is destroyed by boiling water. The first recorded outbreak of *Cryptosporidium* in Ireland associated with a public water supply occurred in April 2002, in Co. Westmeath. Since 1<sup>st</sup> January 2004, Cryptosporidiosis has been made a notifiable disease. This means that where a case of the disease is detected it must be reported to the Health Protection Surveillance Unit (formerly the National Disease Surveillance Centre). There were 558 cases of cryptosporidiosis reported to the HPSC in 2005, an increase from 432 cases in 2004. In total, three outbreaks of cryptosporidiosis were reported in public water supplies in Ireland during 2005. These were in the Carlow Town, Ennis and Roscommon Town supplies. In all cases prolonged boil notices were in place during the outbreaks ranging from 3 to 7 weeks, with the outbreak being detected due to an increase in cases of the disease in the affected supplies.

A key recommendation of the European Communities (Drinking Water) Regulations, 2000 (S.I. 439 of 2000) A Handbook on Implementation for Sanitary Authorities (EPA, 2004), and the successive EPA Drinking Water reports is that risk assessment should be carried out by each sanitary authority, to determine the vulnerability of public water supplies to *Cryptosporidium*, commencing with the larger water treatment plants. A summary of the risks assessments carried out by sanitary authorities during 2005 (or before) was included in the previous years drinking water report and it is not intended to repeat the findings here. As a consequence of the results of this survey and as a response to the outbreaks that occurred in 2005 a *Cryptosporidium* Working Group is to be set up under the EPA Environmental Enforcement Network. It is intended that this group will involve representatives from the local authorities with experience in dealing with *Cryptosporidium* outbreaks, the Health Services Executive and the EPA. The purpose of this group will be to:

- Identify the high-risk supplies nationally;
- Assess the main contributory factors to the high-risk supplies;
- Develop source protection guidelines;
- Identify the main treatment related corrective actions that can be taken to reduce risk; and,
- Provide advice on implementing the recommendation that a risk assessment should be carried out by each sanitary authority, to decide the vulnerability of public water supplies to *Cryptosporidium*, commencing with the larger water treatment plants.

In recognition of the risk of contamination of water supplies by *Cryptosporidium*, many sanitary authorities have carried out monitoring of public water supplies for *Cryptosporidium*. Eighteen sanitary authorities submitted to the Agency a total of 889 monitoring results for *Cryptosporidium* in drinking water in 2005 (representing a significant increase from 139 samples in 2004). Results were reported for 50 drinking water supplies, 44 of which were public water supplies and the remaining 6 were private group water schemes. 765 of the results were reported as 0, while 21 results were reported above the UK threshold for investigation of 0.1 oocyst<sup>5</sup>/10L. 3 of these results were above 1 oocyst/10L (the statutory

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<sup>5</sup> An oocyst is the thick walled resistant outer shell that encases the parasite when it is excreted by humans or animals.

limit in the UK). These results above 1 oocyst/10L were all in the Roscommon Town supply. However, it must be noted that intensive sampling was done in the three supplies where outbreaks of cryptosporidiosis were detected and therefore the results of sampling above should not be taken to be representative of the national situation.

Following the outbreak in Carlow Town, Carlow County Council carried out a very detailed investigation into the cause of the outbreak including a detailed analysis of measures that could be taken to reduce the future risk of an outbreak. This report is available to download from the Carlow County Council website at the following location: ([www.carlow.ie/services/healthwarnings/reports/CryptosporidiumReportFinal.doc](http://www.carlow.ie/services/healthwarnings/reports/CryptosporidiumReportFinal.doc)). This document is an invaluable piece of work and all sanitary authorities should examine the report and review its implications for their own water treatment plants. As a result of their experience and the implementation of the measures identified in the risk assessment, Carlow County Council succeeded in reducing the affected treatment plant from a high risk to a low risk under the risk assessment model. The report makes 17 recommendations which all sanitary authorities should be aware of. While the Agency does not intend to repeat all the recommendations in this report some of the most pertinent recommendations include:

- Risk assessments should be carried out on all surface water supplies in accordance with the Scottish Model for *Cryptosporidium* Risk Assessments. The results of these assessments should be used as a basis for determining the prioritisation of funding for upgrade/improvement works to water treatment plants and also for consideration in setting action response levels for contamination by *Cryptosporidium* in drinking water supplies.
- Routine monitoring of water supplies for the presence of *Cryptosporidium* should be carried out by local authorities. The frequency of testing should be determined by the local authority, in consultation with the local health board - consideration to be given to the nature of the water source and the history of detecting *Cryptosporidium* in the water supply.
- Training for water treatment plant operators in *Cryptosporidium* awareness should be provided.
- The measurement of turbidity should be used as a real time indicator of the quality of water being produced in a water treatment plant. Consideration should be given to relaying this information via telemetry to a central Water Quality Office with the results recorded to provide a daily record of plant performance. Carlow County Council propose an acceptable turbidity level of 0.25 NTU post sand filtration.

The final recommendation above is highly relevant in the Irish context. On the basis of results submitted to the Agency, many water treatment plants not equipped to measure turbidity at levels below 1.0 NTU and indeed a large number of treatment plants are having difficulty in complying with this parametric value (35% of treatment plants monitored reported levels of turbidity in excess of 1.0 NTU). Therefore, it would appear, on the basis of the experience in Carlow, 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.



## 7 LOCAL AUTHORITY AUDITS

In 2001, the EPA first undertook the auditing of a limited number of sanitary authorities, focusing in particular on the management of reported exceedances of the drinking water standards. These audits were extended to other sanitary authorities in the following years. The Agency intends to continue the process of auditing sanitary authorities in future years and to include the findings in the annual drinking water report. This section of the report provides the background and the results of the recent series of EPA audits.

The EPA carried out a total of 8 audits during the period September 2005 to August 2006, to determine the conformity of the sanitary authorities with the Regulations and to assess the performance of the sanitary authorities with regard to their statutory duties pertaining to drinking water. The audit criteria included:

- The European Communities (Drinking Water) Regulations 2000 (S.I. No 439 of 2000);
- The European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989;
- The recommendations specified in the Handbook on Implementation for Sanitary Authorities in relation to the European Communities (Drinking Water) Regulations 2000;
- The recommendations specified in the Handbook on Implementation for Sanitary Authorities in relation to the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989;
- The recommendations specified in The Quality of Drinking Water in Ireland reports;
- The recommendations specified in the EPA Publications 'Water Treatment Manuals – Filtration', 'Water Treatment Manuals – Disinfection' and 'Water Treatment Manuals – Coagulation, Flocculation and Clarification'; and,
- The observations and recommendations raised in previous audits carried out by the Agency.

The following table lists the progress made by the EPA auditing of sanitary authorities and details the sanitary authorities which were audited during 2005 and 2006.

**Table 7-1. Sanitary Authorities Audited During the Period 2001 – 2006.**

Sanitary Authority	2001	2002	2003	2004	2005	2006 <sup>6</sup>
Carlow County Council		√		√		
Cavan County Council			√		√	
Clare County Council	√		√		√	
Cork City Council				√		
Cork County Council	√			√		
Donegal County Council		√		√		√
Dublin City Council	√*					√
Dun Laoghaire Rathdown County Council	√*	√		√		
Fingal County Council	√*		√			
Galway City Council			√	√		
Galway County Council		√		√		√
Kerry County Council				√		
Kildare County Council			√		√	
Kilkenny County Council	√		√	√		
Laois County Council	√			√		√
Leitrim County Council		√		√		√
Limerick City Council		√			√	
Limerick County Council		√		√		
Longford County Council			√	√		√
Louth County Council		√	√		√	
Mayo County Council		√			√	
Meath County Council			√	√		
Monaghan County Council		√		√		
North Tipperary County Council			√		√	
Offaly County Council			√	√		
Roscommon County Council			√	√		
Sligo County Council	√			√		
South Dublin County Council	√*			√		
South Tipperary County Council		√			√	
Waterford City Council	√		√		√	
Waterford County Council	√		√	√		
Westmeath County Council	√			√		√
Wexford County Council	√			√	√	
Wicklow County Council	√		√		√	
<b>Total</b>	<b>11</b>	<b>11</b>	<b>15</b>	<b>22</b>	<b>11</b>	<b>7</b>

Note;

√\* All four Dublin local authorities were assessed as part of one audit with a single report being issued to Fingal County Council.

As can be seen from Table 7-1, all local authorities are audited on a regular basis, either every two or three years.

The audit procedure consists of an opening meeting with senior management of the sanitary authority, a review of relevant documentation and a site inspection of a selected plant. At the opening meeting the scope and objectives of the audit are reviewed and outlined. The site inspection is used to review the general operation of a selected plant. A closing meeting is held in which the main findings of the Agency auditors are presented and discussed with senior management of the sanitary authority. Subsequent to the audit, a report is issued to each authority. This audit report sets out the *observations* noted during the audit and *recommended actions* to be taken by the authority concerned. These actions form part of the criteria to be used in future audits.

There were four main aspects covered in the audits carried out by the Agency during the period September 2005 to August 2006. These were:

- the overall management and control system for the production, distribution and monitoring of drinking water in the sanitary authority area;
- the sampling and monitoring arrangements;
- the procedures for dealing with exceedances of the drinking water standards; and,

<sup>6</sup> Audits listed below were carried out to the end of August 2006

- the management of an individually selected water treatment plant which is inspected on the day of the audit including associated environmental issues.

### **Overall Documented Management and Control System**

The audits carried out in 2005 and 2006 indicate that there has been improvement in the development of documented management and control systems in sanitary authorities compared to the previous period. All of the sanitary authorities had at least some aspects of a documented management and control system in place.

A welcome observation noted is the improvement and development of such systems at the plant level. Several sanitary authorities have tailored systems to suit the needs of the specific treatment plant. Of particular note was the approach taken by Dublin City Council. At the time of the audit the Council were found to be fully implementing the requirements of the Drinking Water Regulations and the recommendations of the EPA Handbook on the Regulations. A very comprehensive monitoring and reporting system was found to be in place with evidence of full compliance with the requirements of Article 9 of the Regulations regarding investigations and corrective action.

### **Sampling and Monitoring Programmes**

All sanitary authorities visited had developed a documented sampling and monitoring programme at the time of the audit although all sanitary authorities require further work on their sampling manuals to ensure that they are meeting the recommendations of the EPA Handbook. Notwithstanding this all sanitary authorities had identified and quantified the sampling requirements for public water supplies and group water schemes within their functional areas. There were a number of common shortcomings noted in the sampling manuals prepared by the different sanitary authorities.

The majority (6 of the 8 sanitary authorities audited) failed to identify the small supplies (serving less than 50 people or providing less than 10 m<sup>3</sup> per day) that supply water as part of a public or commercial activity. Consequently these supplies were not included in the documented monitoring programme in 6 of the 8 sanitary authorities audited. Only one sanitary authority audited had identified these small supplies (Leitrim) while there are no such supplies in Dublin City Council.

Only three (Dublin City, North Tipperary and Westmeath Councils) had developed a protocol for determining compliance with the parametric values for acrylamide, epichlorohydrin and vinyl chloride. Sanitary authorities are not required to analyse drinking water for these parameters but are required to determine compliance with these parameters by product specification in accordance with the guidance given in Section 4.8 of the EPA "Handbook on Implementation for Sanitary Authorities". As in 2004, the majority (5 of 8 sanitary authorities) were not able to demonstrate whether they were complying with these parametric values or not.

### **Protocols for dealing with Exceedances of the Parametric Values**

All 8 sanitary authorities audited had developed a documented procedure for dealing with exceedances of the parametric values, however, in only four sanitary authorities were these procedures found to be complete and fully outlining the sanitary authorities obligations under Article 9 of the Regulations. Two of the sanitary authorities (Longford and Westmeath) had protocols for initially dealing with the detection of an exceedance but were lacking on specifics when it came to the corrective action to be carried out while one sanitary authority had a detailed protocol for dealing with microbiological exceedances but not with chemical or indicator exceedances (Galway). In the other sanitary authority (Laois) the protocol was lacking in detail although there was documented evidence that corrective actions were being taken by the Council. Of greatest concern is the fact that in two sanitary authorities (Galway and Westmeath) there was evidence of chemical exceedances being detected and not being investigated fully to determine the cause of the exceedance. Hence, in both cases there was

no evidence of any corrective action being taken by the Councils to deal with the non-compliance.

### **Management of Water Treatment Plants**

In general the management of water treatment plants has improved and the majority of the plants visited had documented management systems in place. However, there were a number of recurring problems identified at the plants visited which are in need of corrective action. These include:

- inadequate source protection;
- inadequate secondary containment in chemical storage areas;
- inadequate alarms on treatment process to identify system failures or errors; and,
- inappropriate means of dealing with wastes generated at treatment plants.

There was little evidence of the implementation of source protection measures at the majority of plants visited although the carrying out of *Cryptosporidium* Risk Assessments at many of the plants visited is a welcome step in the right direction. Only two sanitary authorities (Leitrim and Dublin) had documented plans for dealing with source protection issues. Source protection was lacking in the majority of plants visited and major issues of concern were noted at some plants including cattle having access to the water source 200m upstream of the intake (Ballaly, Westmeath) and the location of a piggery in the zone of contribution of a well with nitrate exceedances (Durrow, Laois). In the majority of other plants the focus was on treatment of the water once it enters the plant rather than inspection of the catchment or source of water to prevent pollution.

Chemical storage at a number of plants was inadequate and in some cases presented an unacceptable risk to the water supply and to the environment. In only two of the treatment plants visited (Roundwood, Dublin and Durrow, Laois) was the means of storing chemicals to the satisfaction of the Agency. Examples of bad practice observed included the storage of fluoride, sodium hypochlorite and aluminium sulphate in unbunded areas, inadequate bunds (e.g. non-acid resistant bunds used for the storage of fluoride tanks) and fill points located outside bunds. In one case (Crolly, Donegal) the fluoride bulk storage fill point was located directly above a surface water drain that led to a nearby stream.

Only two of the plants visited (Roundwood, Dublin and Portumna, Galway) had continuous residual chlorine alarms capable of detecting any problems with the chlorination of the water supply and calling out a caretaker in the event of a problem. In the majority of plants audited there was no alarm on the treated water to indicate situations where the water is not being treated properly. Thus a sudden drop in the chlorine residual (due to a rise in chlorine demand or failing pumps) will not be detected until the plant is attended the next morning. As such there is the potential for several hours of undisinfected water to enter the distribution system before it is detected. Of particular note in this regard is the work being done by Galway County Council. The Council was in the process of installing chlorine analysers at 32 water treatment plants and pumping stations in the county. These alarms are being linked by telemetry (and satellite where telemetry is not effective) to caretakers who will be able to address any issues that arise as soon as they are detected.

The final area of concern identified at the inspection of the treatment plants was the manner in which some treatment plants are dealing with waste generated at the plants. At one of the inspections carried out (Crolly, Donegal) sludge was observed discharging from the treatment plant into receiving water causing serious pollution of the Keel Lough Stream. Correspondence with the sanitary authorities following the audits indicated that sludge was discharging from a further two treatment plants to receiving waters (Ballinasloe, Galway and Newport, North Tipperary). A summary of the EPA actions taken in relation to water treatment sludge management is presented in Table 7-3. Furthermore, as a result of information published in the EPA Biological Reports a further three discharges were identified that warranted enforcement actions by the Agency.

The Agency served 5 notices under Section 63 of the Environmental Protection Agency Act, 1992 (as amended by the Protection of the Environment Act, 2003) on sanitary authorities in 2006, The Agency has also served 2 Proposed Directions both of which were confirmed and issued as Directions in accordance with Section 63(5) of the EPA Acts, 1992 and 2003. At the time of publication one of the Directions (to Louth County Council) had been satisfactorily resolved while the Agency is in the process of verifying satisfactory compliance with the second (to Leitrim County Council) at the time of going to print. An update of actions taken/to be taken is presented in Table 7-2.

**Table 7-2. Current Situation Regarding Statutory Notices Served on Sanitary Authorities Prior to 2005.**

<b>Sanitary Authority</b>	<b>Name of Treatment Plant</b>	<b>Reason for Statutory Notice</b>	<b>Action Taken/To Be Taken by Sanitary Authority</b>
<b>Notices Issued as a Result of Audit</b>			
Cork County Council	Inniscarra	Direct discharge of filter backwash water to the River Lee at Inniscarra	Design team in Cork County Council are currently progressing the upgrading of sludge treatment facilities in Inniscarra.
Clare County Council	Milltown/Malbay	Direct discharge of aluminium sludge to river	On-site sludge thickening facilities to be provided and sludge to be transported to appropriate treatment facility.
Kerry County Council	Dromin	Unauthorised storage of sludge at the treatment plant	Council investigating options at present. Sludge disposal will depend on results of further study.
Kilkenny County Council	Troyswood	Direct discharge of sludge to the River Nore	Council failed to meet deadline of 17 <sup>th</sup> December 2004 for the cessation of the discharge. The Council was served with a Proposed Direction in August 2005 directing them to cease discharge which it complied with.
Louth County Council	Staleen	Overflow of sludge drying beds resulting in discharge of sludge to the River Boyne	Agency investigations indicated that discharge had not ceased as Council agreed. Direction served on Council obliging them to cease discharge. New sludge treatment facilities installed and discharge ceased in September 2006.
Meath County Council	Trim, Navan, Liscarton and Kilcarran	Unauthorised landspreading of waste sludge from treatment plants	This practice has ceased. Sludge being dewatered and landfilled.
Westmeath County Council	Athlone	Direct discharge of sludge to the River Shannon	The sludge treatment facilities are to be installed as part of the overall upgrade of the plant. At the time of preparation of the report the contract documents were with the Department of Environment, Heritage and Local Government.
Wexford County Council	Wexford Town	Sludge disposed of on lands at Carcur (former wastewater treatment plant lands).	The Council have removed the sludge from this site and disposed of it at Powerstown Landfill.
<b>Notices Issued as a Result of EPA Biological Reports</b>			
Donegal County Council	Crolly (Rosses Regional)	Direct discharge of sludge to the Keel Lough Stream causing serious pollution	This site is seriously polluted. The Council are intensively monitoring the site and the plant to be upgraded by 2009 including the installation of sludge treatment facilities.

**Table 7-3. Statutory Notices Issued to Sanitary Authorities in 2006.**

<b>Sanitary Authority</b>	<b>Name of Treatment Plant</b>	<b>Reason for Statutory Notice</b>	<b>Action Taken/To Be Taken by Sanitary Authority</b>
<b>Notices Issued as a Result of Audit</b>			
Galway County Council	Ballinasloe	Sludge being discharged from Ballinasloe water treatment plant to the River Suck	The Council is to collect the sludge discharge from the plant and discharge it into Ballinasloe town sewerage system. Work to commence in 2007.
Leitrim County Council	South and North Leitrim Regional Water Treatment Plants	Sludge from both plants being mixed with sewage sludge and landspread	Direction served on the Council requiring landspreading of sludge to cease and imposition of an appropriate method of disposal.
<b>Notices Issued as a Result of EPA Biological Reports</b>			
Dublin City Council	Ballymore Eustace	Siltation of River Liffey downstream of plant. Biological assessment indicates Q3 and river impacted from discharge	The Council is currently assessing the assimilative capacity of the Liffey and assessing the toxicity of the discharge. The Council is also upgrading wastewater treatment facilities at the plant with an upgrade due for completion in 2009.
Kilkenny County Council	Mooncoin Regional	Chronic discharge from Mooncoin Regional treatment plant causing pollution of River Pollanassa (Q3)	The Council are currently improving sludge treatment facilities at the Mooncoin plant. Final proposal to be submitted to the Agency.
Waterford County Council	Ballylaneen	Unightly discharge of alum sludge reported by biologist downstream of treatment plant	Sludge retention unit to be installed between water treatment plant sludge bleeds and the discharge point. Sludge will be removed and disposed of. Unit due for installation/commissioning in December 2006.





## 8 APPROVAL OF LABORATORIES PRODUCING DATA FOR INCLUSION IN THIS REPORT

Part 3 of the Schedule of the 2000 Regulations states that *"Each laboratory at which samples are analysed must have a system of analytical quality control that is subject from time to time to checking by a person who is not under the control of the laboratory and who is approved by the Agency for that purpose"*. Consequently, the Agency is required to establish a system of ensuring that each of the laboratories have been approved and is regularly checked.

In June 2004 the Agency wrote to all sanitary authorities requesting them to submit details of the laboratories they are currently using (or that they intend to use) for the purposes of carrying out compliance monitoring under the 2000 Regulations. A reminder was issued to sanitary authorities that had not replied in August 2004. The purpose of the questionnaire that was issued with the correspondence was to identify the laboratories each sanitary authority was using and to establish whether the laboratory was accredited or not. Responses were received from all the sanitary authorities indicating that 36 laboratories were being used by the sanitary authorities in Ireland. The Agency considers that laboratories that are accredited to ISO 17025 satisfy the requirements of Part 3 of the Schedule of the Regulations.

In July 2005 all sanitary authorities were reminded of their responsibilities to ensure that laboratories they use for drinking water analysis have in place a system of analytical quality control that is subject to checking by a person from the Agency or approved by the Agency to do so. They were requested to notify the Agency of any additional laboratories that were being used that were not in use at the time of the previous correspondence (many sanitary authorities had not sourced laboratories to do some of their analysis). The 34 sanitary authorities notified the Agency that they are collectively using 42 laboratories (not including laboratories that have been subcontracted to do analysis of particular parameters). The Agency is in the process of developing a plan of inspection of these laboratories to ensure they are producing data in a quality controlled manner. It is anticipated that the details will be finalised shortly and the work will be carried out by the Agency or by a person appointed by the Agency to do so.



## 9 CONCLUSIONS AND RECOMMENDATIONS

### 9.1 The Quality of Drinking Water

#### 9.1.1 Public Water Supplies

##### Conclusions

1. The quality of drinking water supplied by the majority of public water supplies was satisfactory while that in the larger public water supplies serving cities and large towns was good.
2. While the microbiological quality of public water supplies was satisfactory overall, *E. coli* was detected in just under 10% of public water supplies at least once during 2005, although the majority of these exceedances were moderate and once-off occurrences.
3. The majority of incidents of *E. coli* contamination in public water supplies were caused by the failure of chlorinating equipment (40%), followed by insufficient treatment of the water (28%) and absence of any disinfection in the supply (9%). These causes of *E. coli* contamination are all avoidable with appropriate investment in equipment and appropriate management of the water treatment plant.
4. Compliance with the chemical standards was good. However, compliance with the antimony, fluoride, lead, bromate and trihalomethanes parametric values was less than 99% and the causes of these exceedances must be investigated and addressed.
5. Compliance with the indicator parametric values was less than that of the microbiological or chemical parameters but was nonetheless satisfactory. While compliance with these indicator parametric values is not as significant from a health perspective as an exceedance of the microbiological or chemical parametric value from the consumers point of view these exceedances will often be the most obvious. As such, exceedances of the colour, turbidity, taste and odour parametric values have the potential to damage consumer confidence in the quality of drinking water supplied.
6. There were three outbreaks of *Cryptosporidium* in public water supplies in 2005. High-risk supplies have been identified by most sanitary authorities but action to reduce the risk has not yet been undertaken by many sanitary authorities.

##### Recommendations

- Sanitary authorities should ensure that each exceedance of the parametric values is investigated. For non-trivial exceedances, a corrective action plan should be prepared within 60 days and the action to be taken should be complete within one year if the exceedance presents a risk to public health or within two years if the exceedance does not present a risk to public health.
- The presence of *E. coli* in a public water supply is unacceptable and sanitary authorities must ensure that all such exceedances are investigated immediately and rectified as soon as possible. All treatment plants must have adequate disinfection equipment and should have alarms to immediately alert the sanitary authority to any failure of the disinfection equipment.
- Sanitary authorities should carry out risk assessments to determine the vulnerability of public water supplies to *Cryptosporidium* and should examine the results of the risk assessments in detail for those supplies that are high risk or very high risk, and take remedial action to reduce the risk.

- Sanitary authorities should ensure that fluoridation is carried out in accordance with the requirements of the Fluoridation Act and that levels in the final waters do not exceed 1.0 mg/l.
- Sanitary 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 sanitary authority is unable to ensure compliance with the lead standard in the short/medium term.
- Sanitary 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 sanitary 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.
- Sanitary 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.

### 9.1.2 Group Water Schemes

#### Conclusions

1. The quality of drinking water supplied to public group water schemes was satisfactory while the quality of drinking water supplied by private group water schemes was unsatisfactory.
2. The microbiological quality of the private group water schemes was unsatisfactory and there was a slight increase in the percentage of samples contaminated with *E. coli* during 2005 from 21.9% in 2004 to 22.5% in 2005. However, there was a marginal reduction in the percentage of schemes contaminated with *E. coli* from 40.4% in 2004 to 36.2% in 2005.
3. 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.
4. Compliance with the indicator parametric values in the public group water schemes was similar to that of the public water supplies.
5. Compliance with the indicator parametric values in the private group water schemes was unsatisfactory. In particular, over 40% of samples failed to meet the coliform bacteria parametric value.

#### Recommendations

- Sanitary 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. Sanitary 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 Article 9 of the Regulations and where there is little evidence of action being taken to improve the quality of the water supply, the sanitary authority should use all the enforcement powers available to it to rectify the problems including, where

necessary, prosecution.

- 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 sanitary 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.

### 9.1.3 Small Private Supplies

#### Conclusions

1. There was an increase in the number of small private water supplies that supply water as part of a public or commercial activity identified and monitored during 2005. However, only 13 sanitary authorities have identified these schemes within their functional area, hence there was insufficient monitoring of these supplies in 2005.
2. All small private supplies (serving <50 persons or <10m<sup>3</sup>/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 sanitary authorities.

#### Recommendations

- Owners of small private supplies that supply water as part of a public or commercial activity must be identified by the sanitary authority and the owners made aware of the obligation to meet the quality requirements of the Regulations.

## 9.2 Monitoring

#### Conclusions

1. There was an increase in the number of samples analysed 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 40% reduction in the number of samples analysed in public group water schemes and a 30% reduction in the number of samples analysed in private group water schemes in 2005.
3. There was no monitoring carried out at 1.6% of public water supplies, 35.6% of public group water schemes and 9.1% of private group water schemes during 2005. Furthermore, there was insufficient sampling (i.e. below the legal minimum number of samples) in 9.5% of public water supplies, 65.0% of public group water schemes and 41.2% of private group water schemes.
4. Though there was an increase in the number of private water supplies identified from 123 in 2004 to 395 in 2005 not all of these supplies have been identified by all sanitary authorities. 14 sanitary 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**

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

- All public water supplies and group water schemes covered by the Regulations have been identified and 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 Services 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 sanitary authority should ensure that all parameters in the audit group of parameters are analysed unless the sanitary 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.

## **9.3 The Management of Drinking Water**

### **Conclusions**

1. All sanitary authorities audited had developed a documented protocol for dealing with exceedances of the standards and there was evidence of the implementation and use of these protocols in most sanitary authorities. However, some protocols needed to be updated and revised to ensure that not only is retesting carried out but that corrective action is taken to eliminate the exceedance.
2. There was an improvement in the management systems in the drinking water treatment plants visited as part of the audits during 2005/6. There was an increase in the number of plants adopting a documented management systems approach to the treatment of drinking water.
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 bunded areas or fill points were located outside bunded areas.
4. The management of wastes generated at treatment plants was inappropriate at a small number of plants. In some cases sludge was discharged to the nearby receiving waters while at one plant the discharge was causing serious pollution of the receiving stream.
5. While disinfection by chlorination was practiced at all of the treatment plants visited, very few of the plants visited had a residual chlorine monitor on the final water leaving the plant.

### **Recommendations**

- All treatment plants should have a continuous chlorine residual monitor on the final water and such monitors should be alarmed 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 undisinfecting water entering the distribution mains.

- All sanitary authorities should develop a documented protocol for dealing with exceedances of the microbiological, chemical and indicator parametric values. Sanitary authorities should develop this protocol in conjunction with the local health authorities and should ensure that it is regularly reviewed to ensure it meets the requirements of the Regulations and that it accurately reflects the up to date situation.
- All sanitary authorities should develop a documented management system to assist in the management of drinking water in the sanitary authority area. Such a system should address the issues raised in Chapter 9 of the EPA Manual "Coagulation, Flocculation and Clarification".
- 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 group water scheme should prepare a protocol in order to reduce the risk of an unsafe drinking water supply.
- All sanitary 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 sanitary 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. 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 should cease immediately.

## 9.4 *Reporting and Communication*

### **Conclusions**

1. A significant proportion of sanitary authorities (25 of the 34) did not submit the drinking water monitoring results for 2005 by the deadline of 28<sup>th</sup> February 2006. One sanitary authority (Kilkenny County Council) submitted the returns 4 months late. This late submission of results delays the preparation and publication of the Agency annual report.
2. The Agency receives numerous 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 EPA Act, 1992 sanitary authorities must submit the results of monitoring carried out in accordance with the relevant drinking water legislation to the Agency on the template specified and by the deadline of 28<sup>th</sup> February each year.
- Drinking water results should be made more accessible to the public by the sanitary authority. In this regard the Agency recommends that sanitary authorities post up-to-date results of their monitoring on their websites on a regular basis.

## 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*.

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)

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

National Federation of Group Water Schemes Co-Op Society Ltd. (2006). *Annual Report 2005*.

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



**APPENDIX 1**  
**SUMMARY REPORTS FOR ALL SANITARY AUTHORITIES**

## Carlow County Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	15	42,659
PuGWS	6	575
PrGWS	5	1,891
SPS	15	N/A

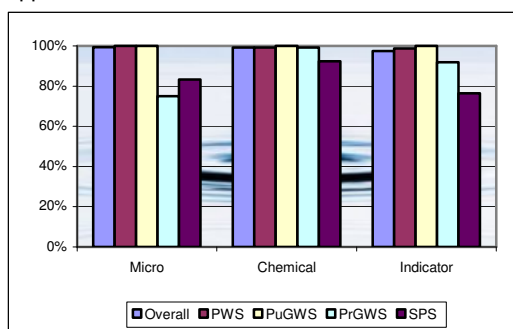
### Assessment of 2005 Monitoring

Carlow County Council carried out analysis on 143 check and 64 audit samples during 2005, though there was a slight deficiency in the number of check samples analysed in public group water schemes. Parameters omitted from the 2004 monitoring programme were included in the 2005 programme thus rectifying the previous years deficiencies. Furthermore, Carlow County Council identified and commenced monitoring of 15 private water supplies covered by the Regulations during 2005.

### Overall Compliance in 2005

The overall rate of compliance in Carlow County Council was 98.0%, a slight drop from 98.7% in 2004 though still above the national average. However, compliance in the public water supplies was 99.0% in 2005.

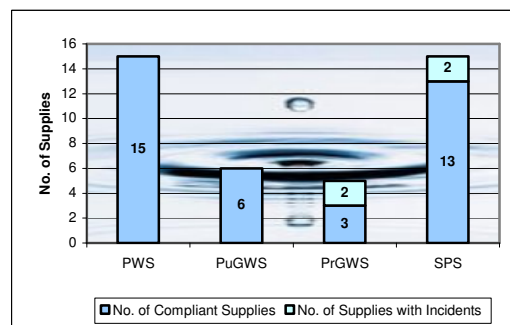
There were no microbiological parameter exceedances (i.e. *E. coli* or enterococci) in either the public water supplies or the public group water schemes in Carlow in 2005. However, there was an outbreak of cryptosporidiosis associated with the Carlow Town supply in April/May 2005 necessitating the imposition of a boil notice for a period of 4 weeks. Compliance with the different types of water supplies is shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	96.3%	99.3%	97.5%
<b>PWS</b>	100%	99.4%	98.7%
<b>PuGWS</b>	100%	100%	100%
<b>PrGWS</b>	75.0%	99.3%	92.0%
<b>SPS</b>	83.3%	92.3%	76.5%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below.



There were no incidents of *E. coli* contamination in any of the public water supplies or public group water schemes in Carlow during 2005. However, *E. coli* contamination was detected in 2 private group water schemes as well as 2 of the private water supplies, with one of the incidents in each of the supply categories being serious.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was generally satisfactory, however, there were elevated levels of nitrate in the Nurney public water supplies as well as in the Craan/Newstown group water scheme (which, as of July 2005 is longer in use). There were also a small number of moderate fluoride non-compliances as well as a single lead non-compliance in Bagnalstown.

Similarly compliance with the majority of indicator parameters was above the national average, however, it is of concern that 50% of the samples analysed for Coliform Bacteria in private group water schemes were positive for this parameter (down from 75% in 2004).

## Cavan County Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	17	22,541
PuGWS	0	0
PrGWS	20	20,007
SPS	None Identified	0

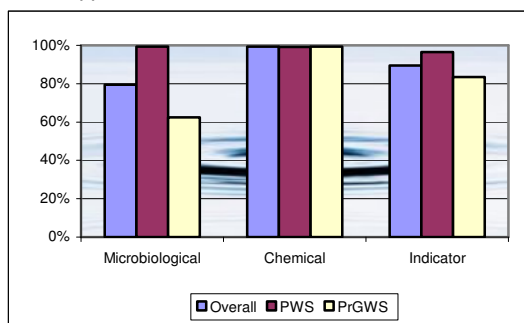
### Assessment of 2005 Monitoring

Cavan County Council carried out analysis on 230 check and 43 audit samples during 2005. It is notable that Cavan was one of the limited number of Councils that adequately monitored public water supplies and group water schemes. However, no monitoring was carried out on private water supplies that supply water as part of a public or commercial activity.

### Overall Compliance in 2005

The overall rate of compliance in Cavan County Council during 2005 was below the national average at 91.1%. This was primarily due to the poor microbiological compliance in the private group water schemes as overall compliance in the public water supplies was close to the national average at 96.4%.

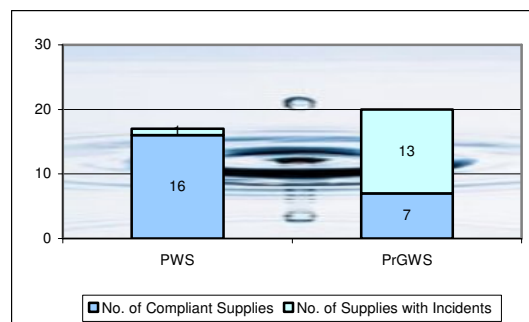
Compliance with the microbiological, chemical and indicator parametric values for the different types of water supplies is shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	79.5%	99.3%	89.5%
<b>PWS</b>	99.3%	99.2%	96.5%
<b>PrGWS</b>	62.5%	99.4%	83.4%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on 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 during 2005. High levels of *E. coli* were detected in the Shercock PWS on one occasion due to an operational difficulty with the chlorinator. *E. coli* was detected in 13 of the 20 private group water schemes monitored with the majority of these schemes reporting continuous and serious contamination and are thus of a poor quality.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was generally good (99.3%) though there were occasional moderate fluoride exceedances (3 of 98 samples analysed) as well as 2 antimony exceedances in one public water supply and one group water scheme.

There was an improvement in the level of compliance with the indicator parametric values from 92.7% in 2004 to 96.5% in 2005. This was due to improvements in the level of compliance with the colour parametric value (84% in 2005 from 60% in 2004) as well as the manganese parametric value (90% in 2005 from 76% in 2004). Nonetheless, further improvements are necessary particular in relation to the level of compliance with the aluminium parametric value at the Cavan Town water supply (8 of 22 samples analysed exceeded).

Compliance with the indicator parameters in the private group water schemes was unsatisfactory though marginally improved compared to 2004 (83.4% up from 82.2%). The level of compliance with the coliform bacteria parametric value was particularly poor (37% down from 47% in 2004) as was compliance with the colour (51%), manganese (62%) and iron (71%) parametric values.

## Clare County Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	25	78,013
PuGWS	100	20,981
PrGWS	16	15,054
SPS	12	N/A

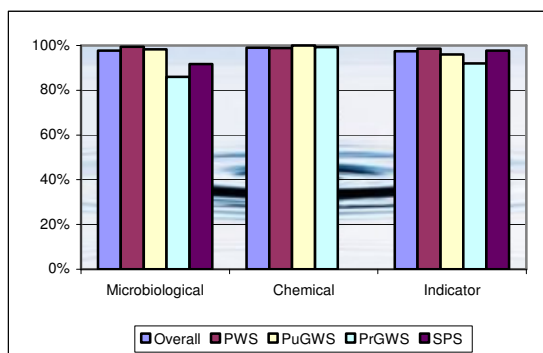
### Assessment of 2005 Monitoring

Clare County Council carried out analysis on 465 check and 53 audit samples during 2005. No monitoring was carried out in one public and one private group water scheme, however, 71 of the public group water schemes and 5 of the private group water schemes were not monitored at the required frequency. For the first time in 2005, 12 private water supplies covered by the Regulations were identified and monitored by Clare County Council.

### Overall Compliance in 2005

The overall rate of compliance in Clare County Council, 97.7%, was above the national average in 2005. This was due to the high level of compliance with the microbiological and indicator parameters in public water supplies. Compliance with the majority of chemical parameters was also excellent though there was one notable exception, as outlined further on.

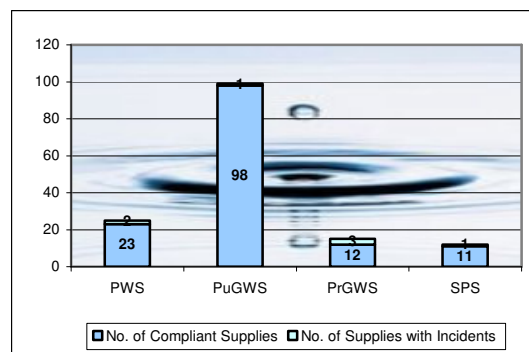
Compliance with the microbiological, chemical and indicator parametric values for the different types of water supplies is shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	97.7%	99.1%	97.4%
<b>PWS</b>	99.4%	98.8%	98.6%
<b>PuGWS</b>	98.3%	100 %	96.0%
<b>PrGWS</b>	86.0%	99.2%	92.1%
<b>SPS</b>	91.7%		97.7%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on 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 Clare during 2005. These were in the Ennis and Turlough water supplies. Both were due to malfunctioning chlorinating equipment and were moderate (<20 cfu/100ml). However, of far greater concern was the outbreak of cryptosporidiosis associated with the Ennis town supply. A boil notice was in place for three weeks as a consequence. The high-risk nature of the supply means that although the boil notice has been lifted, at the time of publication, restrictions still apply on the scheme with vulnerable persons still being advised to boil prior to consumption. An interim treatment plant to address the immediate concerns is imminent.

Although private group water schemes in Clare were generally of a higher quality than those in the majority of other sanitary authorities, there were still a number of quality deficient schemes during 2005 with 3 of the 16 schemes monitored contaminated during the year.

### Compliance with the Chemical and Indicator Parametric Values

Water supplies in Clare were fully compliant with 25 of the 26 chemical standards. The sole parameter failing to comply with the chemical standards was trihalomethanes. All of the trihalomethanes non-compliances in public water supplies were in Ennis where there was a serious problem in complying with this standard. Elevated levels of THMs were recorded in the Ennis supply particularly during October and November with some samples reporting values more than twice the standard. In total, 10 of 16 samples analysed failed to meet the standard for trihalomethanes.

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 (77% compliance). There was a marginal improvement in compliance with the aluminium parametric value (94% in 2005 compared to 90% in 2004). Compliance with the coliform bacteria parametric value in private group water schemes remains problematic, though did improve from 54% in 2004 to 63% in 2005.

## Cork City Council

### Summary of Water Supplies

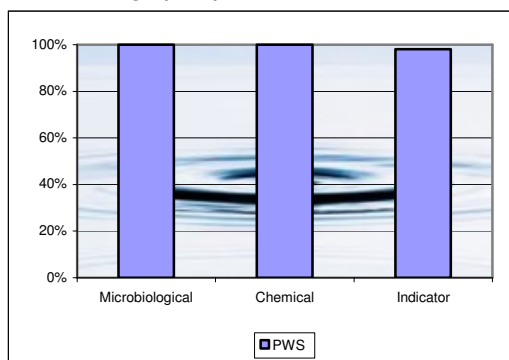
Type of Supply	No. of Supply Zones	Population Served
PWS	1	123,000
PuGWS	0	0
PrGWS	0	0
SPS	1	N/A

### Assessment of 2005 Monitoring

Cork City Council carried out analysis on 223 check and 13 audit samples during 2005. Thus Cork City Council have met the minimum monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2005

The overall rate of compliance in Cork City Council, 98.5%, was above the national average during 2005 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 (98%).



	Micro	Chemical	Indicator
<b>PWS</b>	100%	100%	98.0%

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

Compliance with the *E. coli* and Enterococci parametric value was excellent in Cork City during 2005 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 98.0%. There was a welcome drop in the number of aluminium non-compliances from 90% compliance in 2004 to 99% compliance in 2005. There were also iron non-compliances (14 of 221 samples analysed) and coliform bacteria non-compliances were also detected (13 of 223 samples analysed).

## Cork (North) County Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	70	58,275
PuGWS	18	2,255
PrGWS	15	1,575
SPS	None Identified	

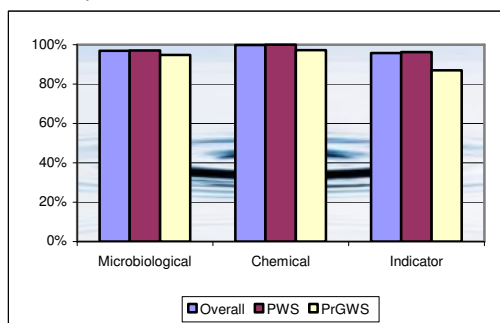
### Assessment of 2005 Monitoring

Cork (North) County Council carried out analysis on 279 check samples and 39 audit samples. There was no monitoring carried out in 3 public water supplies, 18 public group water schemes and 2 private group water schemes while no private supplies supplying water as part of a public or commercial activity were identified by the sanitary authority. Furthermore, there was insufficient monitoring in a further 10 public water supplies and 8 private group water schemes.

### Overall Compliance in 2005

The overall rate of compliance in Cork (North) County Council, 96.8% was close to the national average during 2005, however, the microbiological and indicator compliance in public water supplies was less than average.

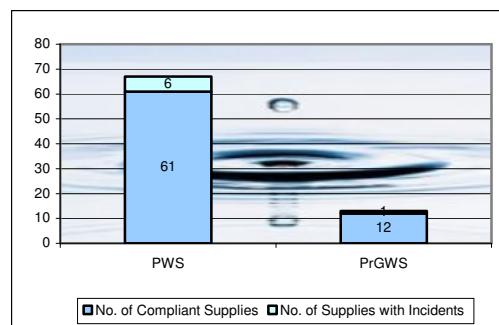
Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	96.9%	99.9%	95.8%
<b>PWS</b>	97.1%	100%	96.2%
<b>PrGWS</b>	94.7%	97.2%	86.9%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were six incidents of *E. coli* contamination of public water supplies in Cork (North) during 2005 in the Bweeng, Coolagown, Kildorrey Old, Knockragh, Mallow and Rahan public water supplies, with the latter two being serious (>20 cfu/100ml). All of these incidents were caused by the failure or inadequacy of chlorine dosing equipment at the treatment plants. The continual failure of so many supplies (5 supplies were contaminated during 2005, all different supplies from those in 2004) is of great concern. *E. coli* was detected in just one of the 13 private group water schemes monitored in Cork (North) during 2005 (at moderate levels).

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was excellent in public water supplies with no exceedances of the chemical parametric values in any of the supplies monitored. It is of note that the Glanworth supply was fully compliant with the nitrate parametric value for the first time in 2005. Just one sample was analysed for the full set of chemical parameters in the private group water schemes though several supplies were monitored for nitrate. One private group water scheme had elevated levels of nitrate, Kilcoran (this supply also was the sole private group water scheme containing *E. coli* in 2005).

The level of compliance with the indicator parametric values was much less satisfactory in the public water supplies in Cork (North). Less than satisfactory compliance was reported against the aluminium (89%), pH (87%) and coliform bacteria (87%) parametric values, however, compliance with these parameters has improved for aluminium and pH since 2004. The aluminium exceedances were confined to two supplies, Allow Regional (4 of 11 samples analysed exceeded) and Mallow (3 of 21 samples analysed exceeded).

While analysis for the majority of indicator parameters in private group water schemes was satisfactory, compliance with the pH (53%) and coliform bacteria (56%) were unacceptably low and need to be addressed. 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.

## Cork (South) County Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	62	116,525
PuGWS	5	Not Stated
PrGWS	11	820
SPS	None Identified	

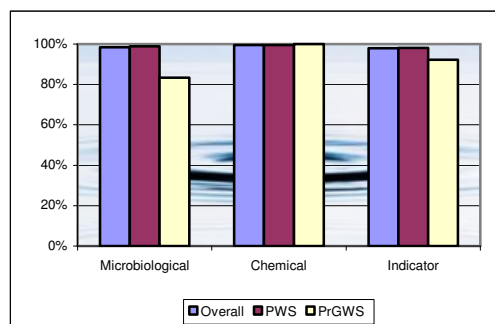
### Assessment of 2005 Monitoring

Cork (South) County Council carried out analysis on 490 check and 54 audit samples during 2005. There was no monitoring carried out in 3 public water supplies, 5 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 sanitary authority. Furthermore, there was insufficient monitoring in a further 8 public water supplies and 2 private group water schemes.

### Overall Compliance in 2005

The overall rate of compliance in Cork (South) County Council, 98.3%, was above the national average during 2005 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.

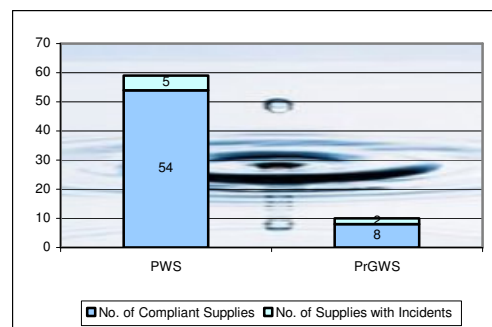
Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	98.5%	99.6%	98.0%
<b>PWS</b>	98.9%	99.6%	98.2%
<b>PrGWS</b>	83.3%	100%	92.2%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were five incidents of *E. coli* contamination of public water supplies in Cork (South) during 2005, in the Bilberry, Clash/Leamleara, Kilbrittain, Innishannon and Newcestown supplies though all were moderate (<20 cfu/100ml) with the exception of the Bilberry incident. While the cause of the Kilbrittain incident was unknown the other incidents were due to breakdowns in chlorination equipment. *E. coli* was detected in 2 of the 8 private group water schemes monitored. Both were moderate though *E. coli* was detected in Kilvoultra scheme on two separate occasions.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards in public water supplies was generally good (only nitrate and nitrites were monitored in the private group water schemes), though there were a small number of non-compliances of note. Elevated levels of bromate were detected in the single sample analysed for bromate in the Ballinaspittle New supply. The only other exceedances of the chemical parametric values were two marginal fluoride exceedances and one lead exceedance. Monitoring for the remaining chemical parameters indicated that there were no other exceedances.

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 Agency. Compliance with the aluminium parametric value continues to be problematic in the Youghal (12 of 21 samples analysed exceeded), Middleton (3 of 13 samples analysed exceeded) and Macroom (3 of 10 samples analysed). The latter is regrettable as the improvement reported in 2004 does not appear to have been sustained.

Compliance with the majority of indicator parametric values in private group water schemes was satisfactory. However, as in 2004, compliance with the pH (78% compliance) and coliform bacteria (56% compliance) parametric values remain problematic, though compliance with both parametric values did improve in 2005 (up from 65% and 44% in 2004 respectively).



## Cork (West) County Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	33	31,085
PuGWS	16	2,920
PrGWS	9	830
SPS	None Identified	

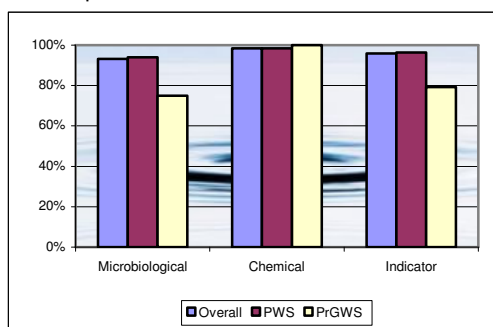
### Assessment of 2005 Monitoring

Cork (West) County Council carried out analysis on 142 check and 25 audit samples during 2005. There was no monitoring carried out in 1 public water supply, 16 public group water schemes and 2 private group water schemes while no private supplies supplying water as part of public or commercial activity were identified by the sanitary authority. Furthermore, there was insufficient monitoring in a further 4 public water supplies and 6 private group water schemes.

### Overall Compliance in 2005

The overall rate of compliance in Cork (West) County Council, 96.3%, 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.

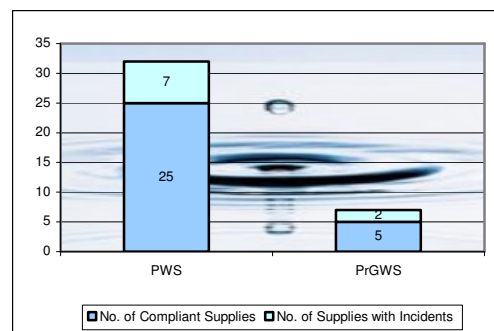


	Micro	Chemical	Indicator
<b>Overall</b>	93.2%	98.5%	95.9%
<b>PWS</b>	94.0%	98.5%	96.4%
<b>PrGWS</b>	75.0%	100%	79.2%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

Cork (West) had the lowest rate of compliance with the *E. coli* parametric value nationally. The rate of compliance fell from 94.9% in 2004 to 93.2% in 2005.



There were 9 incidents of *E. coli* contamination of public water supplies in Cork (West) during 2005 in the Cahermore (3 incidents), Drimoleague, Dursey Island, Johnstown, Trelton, Glengariff and Snavel supplies. Of serious concern is that Cork (West) County Council report that there is no disinfection of the Cahermore, Dursey Island, Johnstown and Trelton supplies. As these supplies were contaminated during 2005 it is imperative that these supplies are disinfected as a matter of urgency (if this has not already been done). Two of the 7 private group water schemes monitored were contaminated with *E. coli* during 2005, which although unacceptable is a welcome reduction from the 5 that were contaminated during 2004.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was below average in public water supplies in Cork (West). The main cause of the lower rate of compliance was the number of supplies with exceedances of the trihalomethanes (THMs) parametric value. Elevated levels of THMs were recorded in 4 public water supplies (Castletownbere New, Castletownbere Old, Crookhaven and Schull). Furthermore, the Castletownkinnagh supply continues to fail to meet the nitrate parametric value and exceeded once in 2005. There were also two fluoride samples that tested marginally above the parametric value during 2005.

Compliance with chemical parametric values in private group water schemes cannot be assessed as only one sample was analysed for one parameter (nitrate) during 2005.

Compliance with the indicator parametric values in public water supplies during 2005 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 large number of coliform bacteria exceedances (82% compliance). Similarly, a large proportion of the private group water schemes (5 of 7 schemes monitored) were found to contain coliform bacteria during 2005.



## Donegal County Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	46	119,003
PuGWS	10	3,050
PrGWS	25	4,097
SPS	8	268

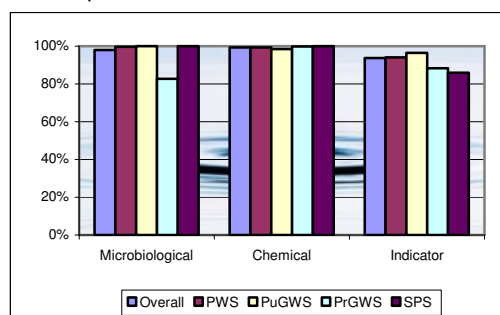
### Assessment of 2005 Monitoring

Donegal County Council carried out analysis on 1,245 check and 98 audit samples during 2005. There was no monitoring carried out in 2 public water supplies and 2 private group water schemes. Furthermore, there was insufficient monitoring in a further 1 public water supply, 1 public group water scheme and 2 private group water schemes.

### Overall Compliance in 2005

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

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

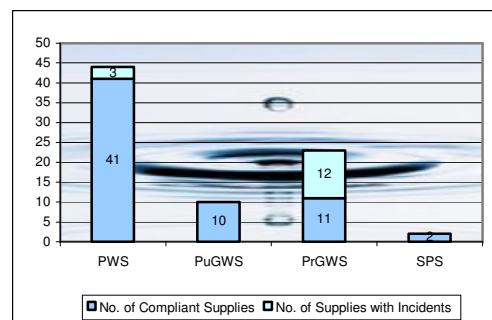


	Micro	Chemical	Indicator
<b>Overall</b>	98.0%	99.3%	93.7%
<b>PWS</b>	99.7%	99.4%	94.1%
<b>PuGWS</b>	100%	98.4%	96.4%
<b>PrGWS</b>	82.7%	99.8%	88.3%
<b>SPS</b>	100%	100%	86.0%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.

Though compliance with the microbiological parametric values was above average there were three incidents of *E. coli* contamination of public water supplies in Donegal during 2005. They were in the Carrick-Teelin, Glencolumbcille and Mountcharles Upper supplies, the first of which was a serious exceedance (>20 cfu/100ml). Of the 23 private group water schemes monitored for *E. coli* 12 were found to be contaminated during 2005.



### Compliance with the Chemical and Indicator Parametric Values

Though the overall rate of compliance with the chemical parametric values was above average there were a number of issues of concern. The formation of disinfection by-products was a problem in several supplies in Donegal with bromate and trihalomethane exceedances in 4 and 5 public water supplies respectively. Donegal has carried out an investigation into the cause of the bromate exceedances and has altered chemical usage at the affected treatment plants to reduce the number of exceedances though did not report any action taken with respect to the trihalomethanes exceedances during an audit carried out in early 2006. There was just one exceedance of the chemical parametric value in the private group water schemes in 2005. An exceedance of the nickel standard was reported which was most likely due to contamination from tap fittings at the sample point.

As in 2004, there were a large number of exceedances of the indicator parametric values in Donegal during 2005. Compliance was unsatisfactory with the aluminium (83%), colour (82%), iron (76%) and turbidity (79%) parametric values. Though there has been some improvement in compliance with some of these parametric values there were still problems evident in certain water supplies. In particular, aluminium exceedances were reported in the Ballyshannon (6 of 8 samples analysed), Cranford (2 of 5 samples analysed), Donegal (River Eske) (4 of 13 samples analysed), Frosses-Inver (8 of 8 samples analysed), Gortahork-Falcarragh (4 of 7 samples analysed) and Lough Mourne (12 of 35 samples analysed) supplies. However, it is of note that there were no aluminium exceedances in Lettermacaward in 2005 which is a welcome improvement from 2004. Colour and turbidity were problematic in a large number of supplies in Donegal and while the exceedances are not a risk to public health in themselves they may be the cause of other problems (e.g. the THMs exceedances).

In the private group water schemes, compliance with the colour parametric value is also problematic (64% compliance) though compliance with the coliform bacteria parametric value is of greater concern (40% compliance). In spite of modest improvements in compliance with these parametric values compared to 2004 (colour compliance improved from 42% in 2004 to 64% in 2005 while coliform bacteria compliance rose from 26% in 2004 to 40% in 2005) further substantial improvements are necessary.

## Dublin City Council

### Summary of Water Supplies

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

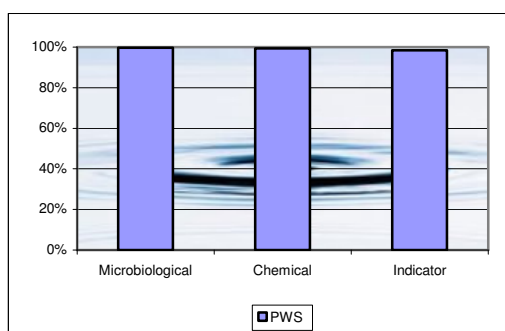
### Assessment of 2005 Monitoring

Dublin City Council carried out analysis on 786 check and 43 audit samples during 2005. Thus Dublin City Council has met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2005

The overall rate of compliance in Dublin City Council, 98.6%, 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
<b>PWS</b>	99.7%	99.4%	98.4%

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

Compliance with the *E. coli* and enterococci parametric values was excellent during 2005, excluding three localised issues not linked to the quality of the drinking water supplied. Though *E. coli* was detected in the supply in Dublin City on three occasions, in all cases, the results of the investigation carried out indicated that the exceedance was due to localised contamination of the sampling point or internal plumbing and were not due to the quality of treated drinking water supplied to the city as a whole.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was good and full compliance was achieved with 23 of the 26 chemical standards. The three parameters with which full compliance was not achieved were copper, lead and nickel. All three of these parameters 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. However, compliance with the coliform bacteria parametric value was relatively low at 90.2% though given the absence of *E. coli* from the majority of samples analysed (99.6% of samples analysed complied) it is likely that the coliform bacteria was caused by sample point contamination rather than contamination of the supply as a whole.

## Dun Laoghaire Rathdown County Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	8	182,789
PuGWS	0	
PrGWS	0	
SPS	0	

common with the other supplies in the greater Dublin area, compliance with the coliform bacteria parametric value was less than it should be (91.3% 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.

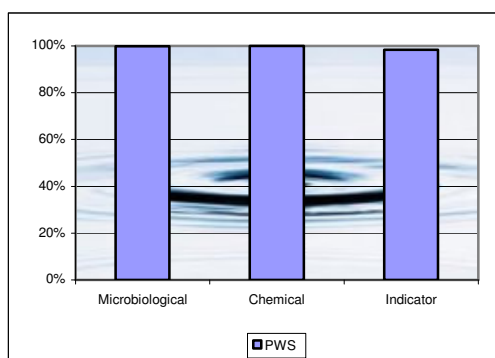
### Assessment of 2005 Monitoring

Dun Laoghaire Rathdown County Council carried out analysis on 460 check and 27 audit samples during 2005. Thus Dun Laoghaire Rathdown County Council has met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2005

The overall rate of compliance in Dun Laoghaire Rathdown County Council, 98.7%, 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 excellent while compliance with the indicator parametric values was satisfactory.

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



	Micro	Chemical	Indicator
<b>PWS</b>	99.8%	100%	98.4%

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

Compliance with the *E. coli* and enterococci parametric values was good during 2005. *E. coli* was not detected in any of the 483 samples analysed in 2005 and enterococci was detected in just one of the 25 samples analysed.

### Compliance with the Chemical and Indicator Parametric Values

It is noteworthy that there were no exceedances with any of the chemical parametric values in any of the water supplies Dun Laoghaire Rathdown during 2005 and the supplies were thus of excellent chemical quality.

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

## Fingal County Council

### Summary of Water Supplies

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

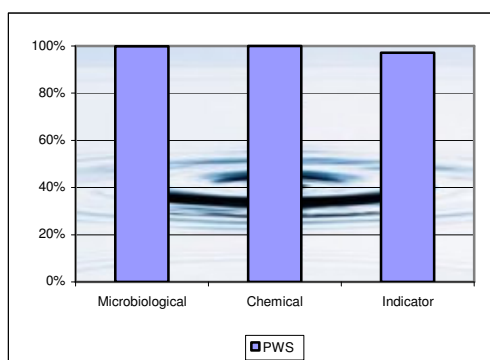
### Assessment of 2005 Monitoring

Fingal County Council carried out analysis on 526 check and 18 audit samples during 2005. Fingal County Council has met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2005

The overall rate of compliance in Fingal County Council, 97.5%, was above the national average and the quality of water in Fingal was in general satisfactory. Compliance with the microbiological and chemical parametric values was excellent while compliance with the indicator parametric values was satisfactory.

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



	Micro	Chemical	Indicator
<b>PWS</b>	99.8%	100%	97.1%

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

Compliance with the *E. coli* and enterococci parametric values was excellent during 2005. *E. coli* was detected in just one of the 534 samples analysed in 2005 while enterococci was not detected in any of the 18 samples analysed. The detection of *E. coli* was due to the use of an inappropriate sample point that was unsanitary and was not representative of the quality of the supply as a whole.

### Compliance with the Chemical and Indicator Parametric Values

It is noteworthy that there were no exceedances with any of the chemical parametric values in any of the water supplies in Fingal during 2005 and the supplies were thus of excellent chemical quality.

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. Odour

and taste were the main reasons for the lower level of compliance with the indicator parametric values in Fingal. In other words at times there was an odour or taste of chlorine off the water which, although unpleasant to some, is no risk to health.

## Galway City Council

### Summary of Water Supplies

Type of Supply	No. of Supply Zones	Population Served
PWS	1	65,774
PuGWS	0	
PrGWS	0	
SPS	0	

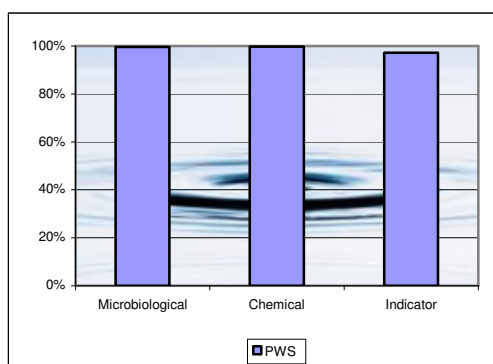
### Assessment of 2005 Monitoring

Galway City Council carried out analysis on 349 check and 10 audit samples during 2005. Galway City Council has met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2005

The overall rate of compliance in Galway City Council, 98.5%, was above the national average and the quality of water in Galway City was in general satisfactory. Compliance with the microbiological and chemical parametric values was good while compliance with the indicator parametric values was satisfactory.

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



	Micro	Chemical	Indicator
<b>PWS</b>	99.6%	99.7%	98.0%

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

Compliance with the *E. coli* and enterococci parametric values was good during 2005. *E. coli* was detected in just one of the 177 samples analysed in 2005 while enterococci was not detected in any of the 51 samples analysed. The detection of *E. coli* was due to the failure of the chlorinator in the distribution network that was promptly fixed.

### Compliance with the Chemical and Indicator Parametric Values

Full compliance was achieved with all of the chemical parameters with the exception of lead. There were three lead exceedances in Galway City in 2005, all of which were due to the presence of lead plumbing in the domestic dwellings sampled and are 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

satisfactory and above the national average. This lower rate of compliance was almost entirely due to the difficulty in achieving the turbidity parametric value at the old treatment works in Galway (73.6% of samples analysed complied with the parametric value). While turbidity is not a risk in itself it does indicate that the supply may be vulnerable in other areas (e.g. *Cryptosporidium*). The Council have been allocated funding for the improvement of treatment facilities in Galway City that should address this issue once complete.

## Galway County Council

### Summary of Water Supplies

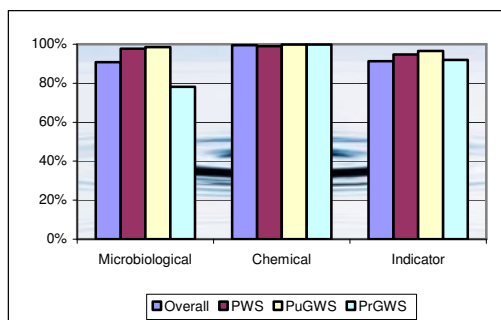
Type of Supply	No. of Supply Zones	Population Served <sup>7</sup>
PWS	45	77,315
PuGWS	151	38,269
PrGWS	197	84,101
SPS	None Identified	

### Assessment of 2005 Monitoring

Galway County Council carried out analysis on 1,118 check and 121 audit samples during 2005. There was no monitoring carried out in 30 public group water schemes and 30 private group water schemes while no private supplies supplying water as part of public or commercial activity were identified by the sanitary authority. Furthermore, there was insufficient monitoring in a further 97 public group water schemes and 105 private group water schemes. In short, the monitoring programme in Galway County in 2005 was severely deficient and more resources must be directed towards monitoring the large number of supplies in Galway.

### Overall Compliance in 2005

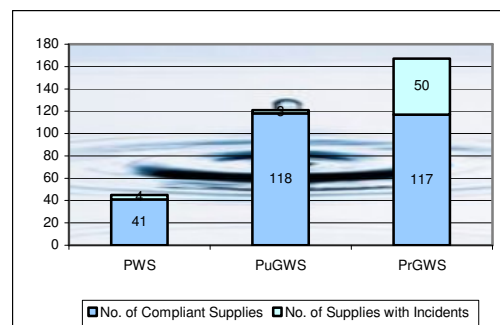
The overall rate of compliance in Galway County Council, 95.7%, was below the national average though an improvement from 94.8% in 2004. As in 2004, there was a low overall rate of compliance with the microbiological and indicator parametric values. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	90.8%	99.5%	91.2%
<b>PWS</b>	97.7%	99.0%	94.8%
<b>PuGWS</b>	98.6%	99.9%	96.6%
<b>PrGWS</b>	78.1%	99.9%	92.0%

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

The level of compliance with the microbiological parameters in public water supplies in Galway was below average at 97.7% in 2005 (a slight drop from 98.0% in 2004). A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on 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 public water supplies in Galway County during 2005 in the Cleggan/Claggaduff, Galway City RWSS, Dawros and Williamstown supplies with the latter incident being serious (>20 cfu/100ml). Of concern is the Cleggan/Claggaduff supply as *E. coli* was also detected in this supply in 2004. Though there was an apparent reduction in the number of private group water schemes contaminated with *E. coli* during 2005 compared to 2004 (74 were contaminated in 2004 compared to 50 in 2005) it must be noted that the majority of private group water schemes were not sampled sufficiently during the year and adequate sampling (in most cases just one sample was analysed in each scheme in 2005) may indicate a higher level of contamination than was apparent from the inadequate monitoring carried out by Galway County Council during 2005. The sanitary authority must ensure it is carrying out its monitoring obligations in accordance with the Regulations and must also take action to ensure quality deficient schemes are brought into compliance with the Regulations as soon as possible.

### Compliance with the Chemical and Indicator Parametric Values

Although the overall rate of compliance with the chemical parametric values in public water supplies, public group water schemes and private group water schemes was above the national average there were some issues of concern. Compliance with the disinfection by-products parametric values was problematic. In particular, exceedances of the trihalomethanes parametric value were reported in 7 public water supplies, namely, Carna/Kilkieran, Cleggan/Claggaduff, Derryinver, Gort, Portumna, Roundstone and Tully-Tullycross. Two public supplies reported elevated levels of bromate (Cleggan/Claggaduff and Roundstone).

Compliance with the chemical parametric values in the private group water schemes was higher (99.9%) though there was one scheme with elevated levels of bromate (Kilconly).

The lower than average rate of compliance with the indicator parametric values in public water supplies was due to low rates of compliance with the turbidity (70%) and colour (87%) parametric values. Though compliance with the indicator parametric values in private group water schemes was above the national average (92.0%) nonetheless compliance with the coliform bacteria parametric value was poor (63% compliance) and improved only slightly compared to 2004 (when it was 58%).

<sup>7</sup> The population figures reported by Galway County Council were an estimation based on volume supplied and thus are an overestimation of the population actually served.



## Kerry County Council

### Summary of Water Supplies

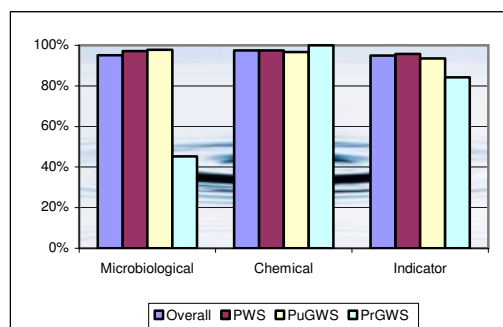
Type of Supply	No. of Supply Zones	Population Served
PWS	85	106,607
PuGWS	41	13,250
PrGWS	15	1,291
SPS	15 <sup>8</sup>	N/A

### Assessment of 2005 Monitoring

Kerry County Council carried out analysis on 1,183 check and 191 audit samples during 2005. There was no monitoring carried out in 3 public group water schemes while results for 15 private water supplies that supply water as part of a public or commercial activity were submitted (though not in time for inclusion in the statistics for this report). Furthermore, there was insufficient monitoring in 1 public water supply and 1 public group water scheme. However, monitoring for the remaining supplies was sufficient and in many cases exceeded the minimum monitoring requirements.

### Overall Compliance in 2005

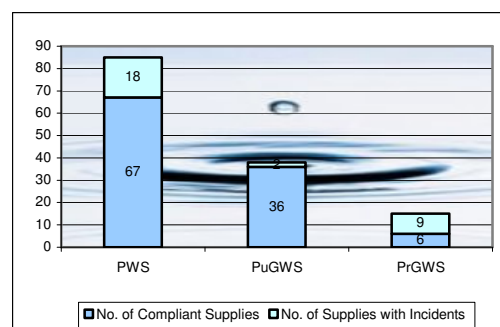
The overall rate of compliance in Kerry County Council, 95.4%, was below the national average during 2005. This was due to below average compliance in all three categories, microbiological, chemical and indicator. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	95.2%	97.5%	94.9%
<b>PWS</b>	97.1%	97.5%	95.7%
<b>PuGWS</b>	97.8%	96.7%	93.5%
<b>PrGWS</b>	45.3%	100%	84.4%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were 24 incidents of *E. coli* contamination in 18 public water supplies in Kerry during 2005 in the Baile Breach, Ballinloghig, Ballyferriter, Ballymacadam, Barraduff, Brandon, Breanlee (2 incidents), Caragh Lake (4 incidents), Castlecove, Glenbeigh (2 incidents), Lisloose, Lixnaw, Minard No.2, Murreigh Ballydavid, Sneem, Teeravane, Ventry and Waterville supplies. The majority of these exceedances were caused by failing chlorinators or insufficient treatment of the water being supplied. The large number of water supplies in Kerry contaminated with *E. coli* (up from 13 supplies in 2004) is completely unacceptable and urgent 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 15 schemes monitored contaminated and with just 44% of samples analysed for *E. coli* compliant. The sanitary authority must take action to ensure this situation is rectified.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was generally satisfactory with two notable exceptions. As in 2004 a high proportion of fluoride exceedances were reported in public water supplies in Kerry (91% compliance). These were not confined to any individual supply but were found in several public water supplies in Kerry. There was also a high proportion of samples analysed for trihalomethanes failing to meet the parametric value (90% compliance). In total 12 supplies recorded exceedances of the trihalomethanes parametric value in 2005.

Though there was an improvement in compliance with the indicator parametric value in all categories of supplies in Kerry in 2005, the improvement was marginal. Compliance with the coliform bacteria parametric value was particularly poor in the private group water schemes (23% compliance) though did improve compared to 2004 (up from 14%), nonetheless this low rate of compliance is unacceptable. There was also a relatively low level of compliance with coliform bacteria parametric value in public water supplies (83%). Overall, the microbiological quality of both public water supplies and private group water schemes in Kerry is unacceptably low and must be improved.

<sup>8</sup> There were 15 private water supplies identified and monitored in Kerry County Council during 2005. However, these results were only submitted to the Agency when this report was at an advanced stage of preparation and thus too late to be included in the statistics in this report.

## Kildare County Council

### Summary of Water Supplies

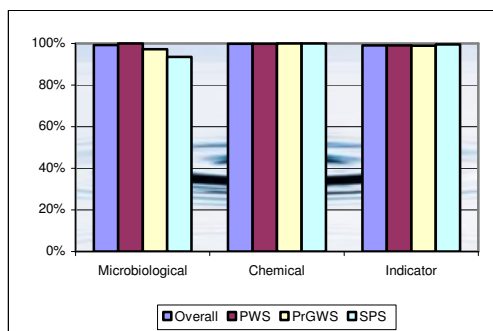
Type of Supply	No. of Supply Zones	Population Served
PWS	15	148,200
PuGWS	0	
PrGWS	5	2,110
SPS	10	1,400

### Assessment of 2005 Monitoring

Kildare County Council carried out analysis on 253 check and 16 audit samples thus complying with the minimum monitoring frequencies.

### Overall Compliance in 2005

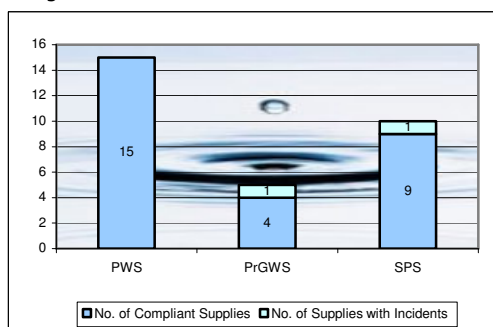
The overall rate of compliance in Kildare County Council, 99.3%, was well above the national average. Compliance with the standards in public water supplies, private group water schemes and private water supplies was good although there were microbiological exceedances in one private group water scheme and one private water supply. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	99.3%	99.9%	99.1%
<b>PWS</b>	100%	99.9%	99.1%
<b>PrGWS</b>	97.2%	100%	98.9%
<b>SPS</b>	93.6%	100%	99.6%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below.



Compliance with the microbiological standards in public water supplies in Kildare in 2005 was excellent and *E. coli* and enterococci were not detected in any of the 15 public water supplies in Kildare during the

year. The microbiological quality of the majority of the private group water schemes was good though *E. coli* was detected in one private group water scheme (a single organism was detected in one sample that was not detected in follow up sampling).

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was generally good and there was just one lead exceedance in the North Carlow South Kildare Regional Supply though this was likely due to lead originating from plumbing materials at the sample point and is not representative of the quality of the supply as a whole. There were no chemical exceedances of any other parameter nor were there any chemical exceedances in any of the private group water schemes or private water supplies.

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 and a small number of *Clostridium perfringens* exceedances (at very low levels) in some 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 of a good quality.



## Kilkenny County Council

### Summary of Water Supplies

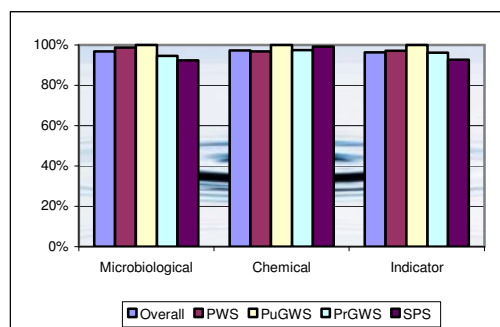
Type of Supply	No. of Supply Zones	Population Served
PWS	15	51,320
PuGWS	8	768
PrGWS	35	3,463
SPS	59	N/A

### Assessment of 2005 Monitoring

Kilkenny County Council carried out analysis on 1,106 check and 20 audit samples during 2005. No monitoring was carried out in 7 of the 8 public group water schemes in Kilkenny during 2005. While the number of check samples analysed was in some cases in excess of the requirements of the Regulations, no audit samples were analysed in 5 public water supplies. Furthermore, in those supplies where audit monitoring was carried out, no monitoring was done for benzo(a)pyrene, bromate, cyanide, pesticides and PAH's.

### Overall Compliance in 2005

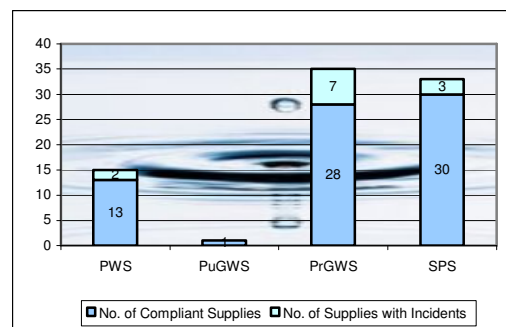
The overall rate of compliance in Kilkenny County Council, 96.7%, was above the national average (up from 94.6% compliance in 2004). Compliance in most public water supplies, public group water schemes and private group water schemes was satisfactory during 2005. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	96.9%	97.3%	96.4%
<b>PWS</b>	98.8%	96.8%	97.1%
<b>PuGWS</b>	100%	100%	100%
<b>PrGWS</b>	94.7%	97.5%	96.2%
<b>SPS</b>	92.5%	99.3%	92.8%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were 2 incidents of *E. coli* contamination in public water supplies in Kilkenny during 2005 in the Bennetsbridge and Callan supplies; however, both incidents were due to one-off detections of a single organism. The microbiological quality of the majority of private group water schemes was satisfactory although 7 of the 35 schemes monitored were contaminated with *E. coli*. This is a significant reduction in the number of schemes that were contaminated compared to 2004 when 28 of the 33 private group water schemes monitored were contaminated.

### Compliance with the Chemical and Indicator Parametric Values

The main feature of the below average level of compliance in public water supplies in Kilkenny with the chemical parametric values was the high number of fluoride exceedances (24 of 188 samples analysed exceeded). There were a particularly high number of fluoride exceedances in the Ballyragget WS (10 of 14 samples analysed) though there were moderate fluoride exceedances in most of the fluoridated supplies in Kilkenny. Elevated levels of nitrate were detected in the Urlingford-Johnstown WS in one sample during 2005 while there was also a single trihalomethenes exceedance in the Kilkenny (Radestown) supply.

Compliance with the nitrate parametric value was problematic in a number of private group water schemes with 7 schemes reporting nitrate exceedances in 2005 (an increase from 4 schemes in 2004). This trend is worrying and must be addressed by the sanitary authority.

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 aluminium parametric values in the Mooncoin supply (8 of 22 samples analysed exceeded).

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 overriding issue in relation to compliance with the indicator parametric values. 80% of samples analysed in private group water schemes (up from 52% in 2004) were compliant while 69% of the samples analysed in the private water supplies were free of coliform bacteria in Kilkenny in 2005.

## Laois County Council

### Summary of Water Supplies

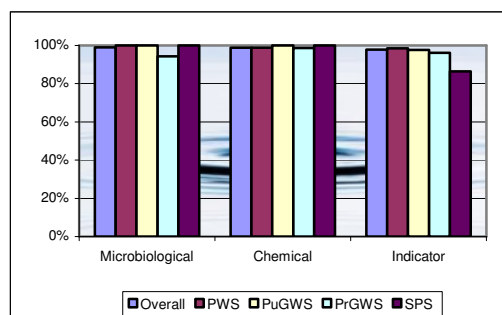
Type of Supply	No. of Supply Zones	Population Served
PWS	22	56,315
PuGWS	15	3,663
PrGWS	13	6,852
SPS	1	N/A

### Assessment of 2005 Monitoring

Laois County Council carried out analysis on 344 check and 67 audit samples during 2005. Although the correct number of check and audit samples appear to have been taken in public water supplies and private group water schemes in Laois insufficient parameters were analysed in the audit samples in Laois during 2005. More specifically, no analysis was carried out for benzo(a)pyrene, bromate, cyanide, pesticides and PAH's while a very small number of samples were analysed for trihalomethanes in Laois in 2005. This shortfall must be address by the Council.

### Overall Compliance in 2005

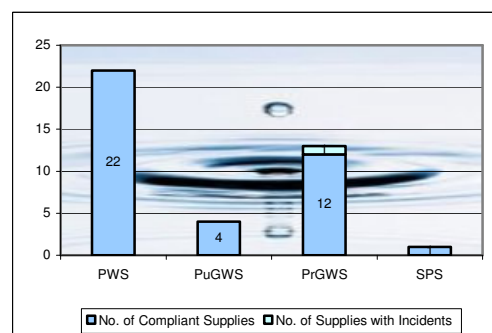
The overall rate of compliance in Laois County Council, 98.2%, was above the national average in 2005 and the quality of drinking water supplied in public water supplies and public group water schemes was satisfactory. Although the level of compliance with the parametric values in private group water schemes was less satisfactory, it was nonetheless above the national average. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	98.9%	98.9%	97.9%
<b>PWS</b>	100%	98.9%	98.4%
<b>PuGWS</b>	100%	100%	97.6%
<b>PrGWS</b>	94.3%	98.7%	96.2%
<b>SPS</b>	100%	100%	86.4%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. The microbiological quality of public water supplies in Laois was excellent during 2005 and there were no incidents of *E. coli* contamination in public water supplies or public group water schemes in Laois.



The majority of the private group water schemes were also of good microbiological quality with just one of the 13 schemes monitored contaminated during 2005 (a welcome reduction from 3 in 2004).

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was generally satisfactory (though below the national average). There were a small number of moderate fluoride exceedances in Laois (6 of 43 samples analysed) while elevated levels of nitrate and trihalomethanes were detected in the Durrow and Mountmellick supplies respectively.

Nitrate was a problem in three of the private group water schemes, Attanagh, Ballacolla and Killeaney, though plans are being progressed by these group schemes to address the quality deficiencies present. There were no other exceedances of the chemical parametric values in private group water schemes in Laois in 2005.

Compliance with the indicator parametric values in public water supplies in Laois was above the national average and while there were occasional exceedances of several of the indicator parameters at a low frequency there were no overriding issues of concern at a county level. The public group water schemes were of a similar quality.

The results of monitoring of the indicator parametric values in private group water schemes indicate that the only exceedances recorded were with the coliform bacteria parametric value. The level of compliance with the coliform bacteria parametric value was largely unchanged from 72% in 2004 to 73% in 2005.

## Leitrim County Council

### Summary of Water Supplies

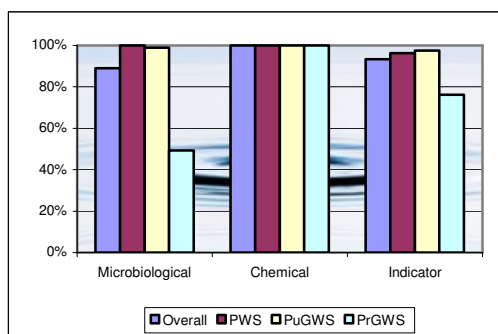
Type of Supply	No. of Supply Zones	Population Served
PWS	8	14,280
PuGWS	80	3,417
PrGWS	22	5,679
SPS	None Identified	

### Assessment of 2005 Monitoring

Leitrim County Council carried out analysis on 278 check and 24 audit samples during 2005 thus complying with the minimum monitoring requirements in the Regulations for those supplies monitored. However, there was no monitoring carried out in private water supplies that supply water as part of a public or commercial activity.

### Overall Compliance in 2005

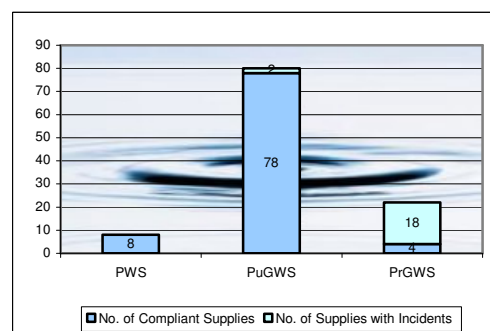
The overall rate of compliance in Leitrim County Council, 94.8%, was below the national average during 2005. However, compliance in the public water supplies and public group water schemes was actually above the national average and thus the below average rate of compliance in Leitrim was due to the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



	Micro	Chemical	Indicator
<b>Overall</b>	89.0%	100%	93.4%
<b>PWS</b>	100%	100%	96.3%
<b>PuGWS</b>	99.0%	100%	97.6%
<b>PrGWS</b>	49.3%	100%	76.2%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. The microbiological quality of public water supplies in Leitrim was excellent during 2005 and there were no incidents of *E. coli* contamination in public water supplies in Leitrim.



In contrast, the quality of private group water schemes was extremely poor and was the poorest in the country, in terms of the proportion of non-compliant schemes. In total, 18 of the 22 private group water schemes monitored were contaminated with *E. coli* during 2005. These quality deficient schemes must be improved as a matter of urgency by the group schemes and the Council must ensure that corrective action plans are in place for all quality deficient schemes.

### 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 2005 was excellent and there were no exceedances of the chemical parametric values in public water supplies, public group water schemes or private group water schemes.

However, as in 2004, compliance with the indicator parametric values was less satisfactory. Compliance with the aluminium parametric value continued to be problematic in Leitrim though did marginally improve from 78% compliance in 2004 to 83% compliance in 2005. In particular, there were a large number of aluminium exceedances in the South Leitrim Regional supply in 2005 (8 of 30 samples analysed) which must be addressed. 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 though did marginally improve from 73.6% in 2004 to 76.2% in 2005. However, the rate of compliance with the iron (53% compliance), colour (38% compliance) and coliform bacteria (29% compliance) was extremely poor and the majority of private group water schemes in Leitrim were not capable of supplying water fit for human consumption during 2005.

## Limerick City Council

### Summary of Water Supplies

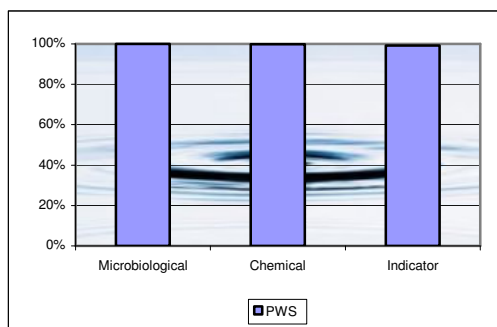
Type of Supply	No. of Supply Zones	Population Served
PWS	1	56,000
PuGWS	0	
PrGWS	0	
SPS	0	

### Assessment of 2005 Monitoring

Limerick City Council carried out analysis on 346 check and 6 audit samples during 2005, thus meeting the minimum monitoring requirements in the Regulations.

### Overall Compliance in 2005

The overall rate of compliance in Limerick City, 99.4%, was above the national average in 2005. The overall quality of drinking water in Limerick City in 2005 was good. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>PWS</b>	100%	99.9%	99.2%

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

Compliance with the microbiological parametric values for *E. coli* and enterococci was excellent in Limerick City during 2005 and neither *E. coli* or enterococci were detected in any of the samples analysed during 2005.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was similarly high with just one sample for fluoride marginally exceeding the parametric value in Limerick City in 2005. There were no exceedances of any of the other chemical parametric values during 2005.

Although compliance with the indicator parametric value was less than that of the microbiological or chemical parametric values it was still good. Though there were still a number of aluminium exceedances (21 of 346 samples analysed exceeded), compliance with the coliform bacteria parametric value improved from 97.9% in 2004 to 99.4% in 2005.

## Limerick County Council

### Summary of Water Supplies

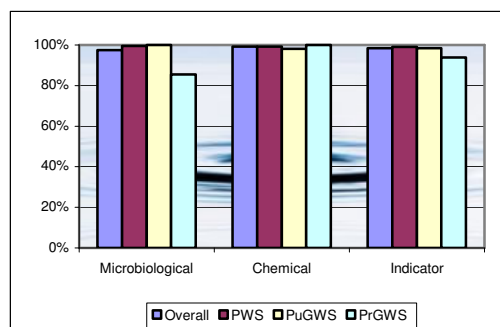
Type of Supply	No. of Supply Zones	Population Served
PWS	54	86,799
PuGWS	62	9,474
PrGWS	46	12,976
SPS	None Identified	

### Assessment of 2005 Monitoring

Limerick County Council carried out analysis on 434 check and 72 audit samples analysed during 2005. There was no monitoring carried out in 28 public group water schemes and 11 private group water schemes while no private supplies supplying water as part of public or commercial activity were identified by the sanitary authority. Furthermore, there was insufficient monitoring in a further 7 public water supplies, 24 public group water schemes and 25 private group water schemes.

### Overall Compliance in 2005

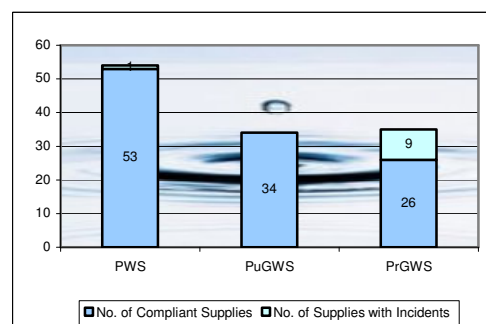
The overall rate of compliance in Limerick County Council, 98.6%, was above the national average in 2005 and an improvement compared to 2004 (up from 97.6%). This was due to the good quality of public water supplies as well as above average compliance with the standards in the private group water schemes. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	97.5%	99.3%	98.4%
<b>PWS</b>	99.5%	99.3%	99.1%
<b>PuGWS</b>	100%	98.1%	98.4%
<b>PrGWS</b>	85.5%	100%	93.9%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



The microbiological quality of public water supplies and public group water schemes was good in Limerick County in 2005. There was one incident of *E. coli* contamination of a public water supply in Limerick County in the Loughill supply though the exceedance was due to localised contamination of the mains and only a single *E. coli* was detected in one sample.

Compliance with the microbiological parametric values in private group water schemes was unsatisfactory with 9 of the 35 monitored for *E. coli* found to be contaminated in 2005.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parametric values was good in Limerick County in 2005. There were no exceedances with 25 of the 26 chemical parametric values in public water supplies, public group water schemes and private group water schemes. Fluoride exceedances were reported in 7 public water supplies though the largest number of exceedances were found in the Adare supply (3 of 8 samples analysed) with one result as high as 1.5 mg/l. The absence of nitrate exceedances in private group water schemes in 2005 (there were 4 non-compliant supplies in 2004) should not be taken to indicate an improvement; rather, these schemes were not monitored for nitrate in 2005 and therefore it is not possible to determine whether these supplies are compliant or not.

Compliance with the indicator parametric values was above the national average in Limerick County in 2005, though there were a significant number of aluminium exceedances (95.0% compliance) in some supplies. The public group water schemes were of a similar quality to that of the public water supplies.

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 iron (64% compliance), manganese (64% compliance) and coliform bacteria (72% compliance) parametric values.

## Longford County Council

### Summary of Water Supplies

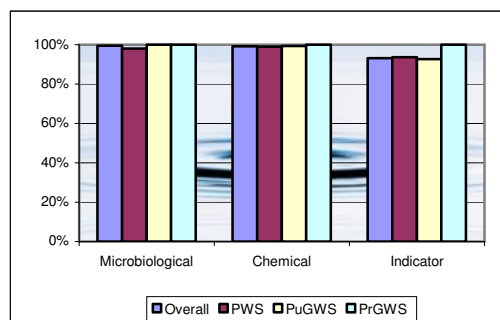
Type of Supply	No. of Supply Zones	Population Served
PWS	8	16,897
PuGWS	56	6,735
PrGWS	4	518
SPS	None Identified	

### Assessment of 2005 Monitoring

Longford County Council carried out analysis on 153 check and 36 audit samples during 2005. No monitoring was carried out on 1 public group water scheme and one private group water scheme while insufficient analysis was carried out on a further 5 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 2005

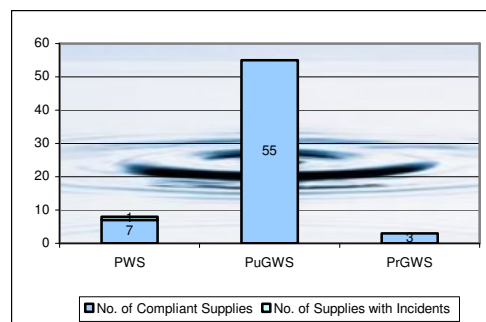
The overall rate of compliance in Longford County Council, 95.2%, was below the national average in 2005 (and represented a slight drop from 96.5% in 2004). While the microbiological and chemical compliance was relatively good in Longford, compliance with the indicator parametric values was less so. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	99.5%	99.2%	93.2%
<b>PWS</b>	98.0%	99.0%	93.6%
<b>PuGWS</b>	100%	99.3%	92.6%
<b>PrGWS</b>	100%	100%	100%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on 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 a public water supply in Longford in 2005. A moderate exceedance of the *E. coli* parametric value was recorded in the Gowra supply and though the value reported was low it is of concern that there was a similar incident in 2004. The public and private group water schemes were of excellent microbiological quality with no exceedances of the *E. coli* or enterococci parametric values reported in 2005.

### 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 both fluoride samples analysed in the Granard supply exceeded the parametric value. Apart from this there were no other exceedances of the chemical parametric value in public water supplies in Longford. The chemical quality of the private group water schemes was satisfactory and although there were a limited number of samples, there were no exceedances of the chemical parametric values in private group water schemes in Longford in 2005.

Compliance with the indicator parametric values in public water supplies in Longford was unsatisfactory and was below the national average. This was primarily due to aluminium exceedances at Ballinalee/Edgeworthstown (2 of 5 samples analysed), Granard (4 of 5 samples analysed) and the Longford Central (4 of 11 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. 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 (69% compliance).

The private group water schemes monitored were fully compliant with the indicator parametric values at all times during 2005.



## Louth County Council

### Summary of Water Supplies

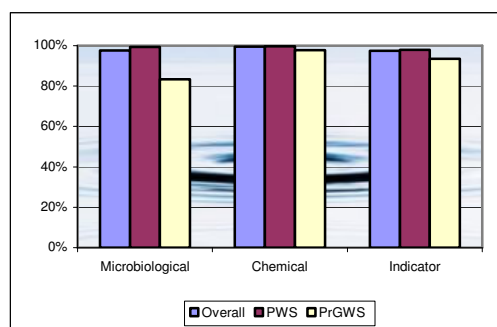
Type of Supply	No. of Supply Zones	Population Served
PWS	18	86,530
PuGWS	0	
PrGWS	9	4,575
SPS	None Identified	

### Assessment of 2005 Monitoring

Louth County Council carried out analysis on 272 check and 40 audit samples during 2005. 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 2005

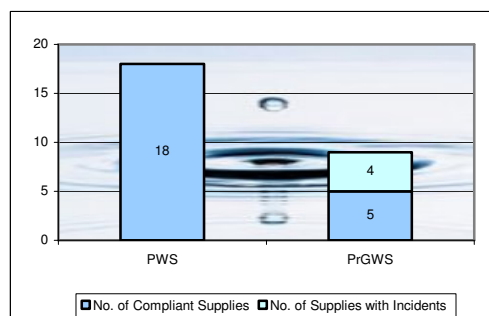
The overall rate of compliance in Louth County Council, 97.9%, was higher than the national average and improved slightly compared to 2004 from 97.6% and was thus of a satisfactory quality in most supplies. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	97.7%	99.5%	97.4%
<b>PWS</b>	99.4%	99.7%	97.9%
<b>PrGWS</b>	83.3%	97.7%	93.5%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below.



There were no exceedances of the *E. coli* parametric value in public water supplies in Louth during 2005 although enterococci exceedances were reported in

two public water supplies (Cavan Hill and Clogherhead/Termonfeckin). Exceedances of the *E. coli* parametric value were recorded in 4 of the 9 private group water schemes monitored in 2005.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical parametric values was generally satisfactory. Although there were occasional exceedances of the fluoride and nitrite parametric values in public water supplies, compliance was otherwise satisfactory.

A small number of samples (4) were analysed for the chemical parameters in private group water schemes in Louth. Most notably the Sheepgrange group water scheme was not monitored for nitrate in 2005 in spite of having a long history of non-compliance with this parametric value. Notwithstanding this omission from the monitoring programme compliance was generally satisfactory with the exception of one anomalous antimony and nitrite exceedance in the Reaghstown/Killany scheme.

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 (5 of 19 samples analysed exceeded).

The main issue of concern with regard to compliance with the indicator parametric values in the private group water schemes was coliform bacteria. There was a drop in the level of compliance with the coliform bacteria parametric value from 61% in 2004 to 50% in 2005 and coliform bacteria exceedances were recorded in 8 of the 9 private group water schemes monitored.

## Mayo County Council

### Summary of Water Supplies

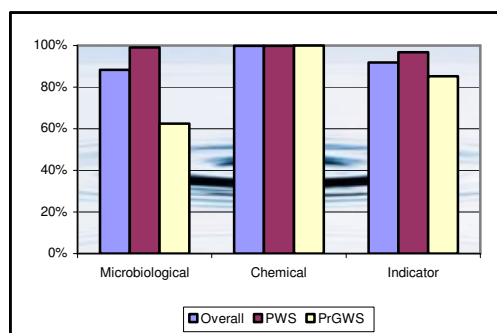
Type of Supply	No. of Supply Zones	Population Served
PWS	24	50,522
PuGWS	100	17,408
PrGWS	100	36,528
SPS	None Identified	

### Assessment of 2005 Monitoring

Mayo County Council carried out analysis on 954 check and 54 audit samples during 2005. No monitoring was carried out on any of the 100 public group water schemes while there was insufficient analysis carried out on 3 public water supplies and 25 private 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 2005

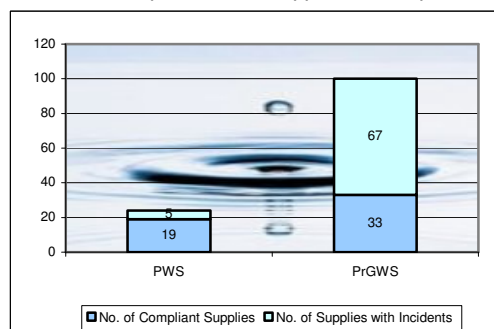
The overall rate of compliance in Mayo County Council, 93.8%, was well below the national average. The primary reason for this was the poor microbiological quality of the private group water schemes in Mayo. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	88.3%	99.9%	91.8%
<b>PWS</b>	99.0%	99.8%	96.7%
<b>PrGWS</b>	62.5%	100%	85.3%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on 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 5 public water supplies in Mayo during 2005, namely the Cong, Inishturk, Kilkelly, Louisburgh and Swinford supplies, although all exceedances reported were moderate (i.e. <20 cfu/100ml). Two thirds of the private group water schemes were found to be contaminated with *E. coli* during 2005, a situation which is of grave concern particularly as this represents a doubling of the number of private group water schemes contaminated compared to 2004 (67 schemes in 2005 compared to 32 schemes in 2004). Such a significant decline in the quality of private group water schemes in Mayo is most alarming and must be addressed with the utmost urgency by Mayo County Council.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was generally good though single exceedances of the acrylamide (Erris), fluoride (Shrule) and trihalomethanes (Lough Mask) parametric values were reported in 2005. There were no exceedances of the chemical parametric values in any of the private group water schemes monitored in 2005.

Compliance with the indicator parametric values was considerably less satisfactory in public water supplies. Compliance with the aluminium parametric value was problematic in Mayo (69% compliance). In particular, a number of aluminium exceedances were reported in the Louisburgh (9 of 12 samples analysed), Swinford (2 of 2 samples analysed) and Westport (2 of 2 samples analysed) supplies.

There were a number of indicator parameters with low rates of compliance in the private group water schemes. Compliance was poor with the *Clostridium perfringens* (74%), colour (72%), oxidisability (61%) and coliform bacteria (35%) parametric value. The latter is of grave concern particularly given the large proportion of schemes that were also contaminated with *E. coli*. In total, 80 of the 100 private group water schemes, monitored were found to contain coliform bacteria at least once during 2005.



## Meath County Council

### Summary of Water Supplies

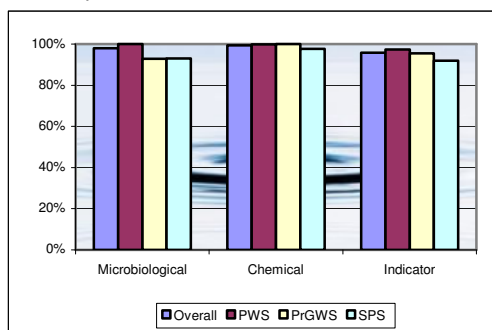
Type of Supply	No. of Supply Zones	Population Served
PWS	31	101,028
PuGWS	0	
PrGWS	2	1,600
SPS	79	N/A

### Assessment of 2005 Monitoring

Meath County Council carried out analysis on 251 check and 31 audit samples during 2005. There was insufficient monitoring carried out in 10 public water supplies and 1 private group water scheme in Meath in 2005. Furthermore, no monitoring was carried out in Meath for several of the chemical parameters namely, antimony, arsenic, benzene, benzo(a)pyrene, boron, bromate, cyanide, mercury, PAH, pesticides, selenium, tetrachloroethene & trichloroethene and 1,2-dichloroethane. Meath County Council must address this monitoring shortfall.

### Overall Compliance in 2005

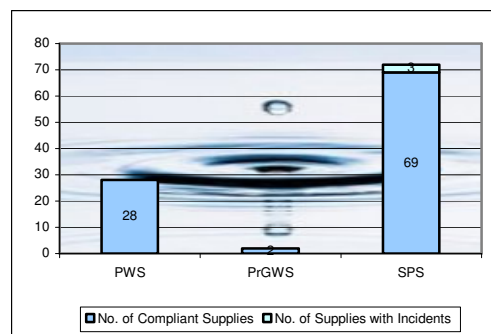
Of the parameters that were monitored the overall rate of compliance in Meath County Council, 96.7% was the same as the national average and compliance was thus satisfactory in 2005. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	97.9%	99.4%	95.8%
<b>PWS</b>	100%	99.8%	97.3%
<b>PrGWS</b>	92.9%	100%	95.5%
<b>SPS</b>	92.9%	97.7%	91.9%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were no incidents of *E. coli* contamination of public water supplies or private group water schemes in Meath during 2005 though a small number of private water supplies (3 of 72 monitored) were found to be contaminated.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was good, however, it must be highlighted that Meath County Council did not carry out monitoring for 13 of the 26 chemical parameters, therefore any discussion of chemical compliance in Meath has obvious limitations. Notwithstanding this, there was just one chemical exceedance in the public water supplies (nitrite) in 2005 while there were no chemical exceedances in the private group water schemes. In relation to the private water supplies three supplies recorded nitrate concentrations in excess of the parametric value. Of particular concern is that one of the affected supplies was a national school. This supply has since been taken over by the Council and a nitrate removal treatment system has been installed which has eliminated the problem.

Compliance with the indicator parametric values was close to the national average in Meath in 2005. 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 similarly satisfactory.

## Monaghan County Council

### Summary of Water Supplies

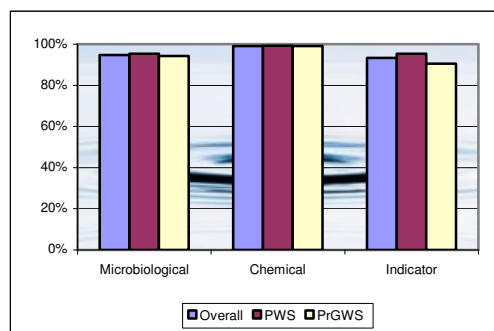
Type of Supply	No. of Supply Zones	Population Served
PWS	13	22,381
PuGWS	0	
PrGWS	14	20,224
SPS	None Identified	

### Assessment of 2005 Monitoring

Monaghan County Council carried out analysis on 195 check and 35 audit samples in 2005. No monitoring was carried out on 1 public water supply and 1 private group water scheme while insufficient analysis was carried out on a further 3 public water supplies and 2 private 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 2005

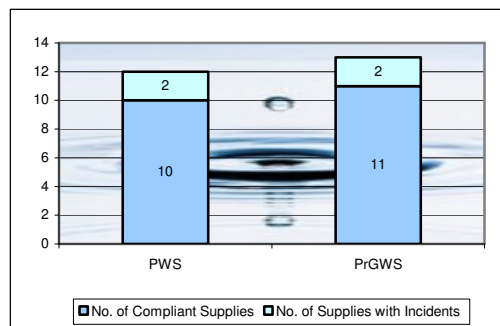
The overall rate of compliance in Monaghan County Council, 94.8%, was below the national average. While the quality of drinking water in the majority of supplies was satisfactory there were a small number of supplies with poor quality that bring down the overall average. Compliance with the microbiological,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



	Micro	Chemical	Indicator
<b>Overall</b>	94.8%	99.1%	93.3%
<b>PWS</b>	95.3%	99.2%	95.3%
<b>PrGWS</b>	94.2%	99.1%	90.6%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on 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 Monaghan during 2005, in the Drum and Emyvale supplies and although *E. coli* was detected at moderate levels (<20 cfu/100ml) in both supplies it was detected on two occasions in the former supply. Enterococci was detected in 4 public water supplies during 2005. Two of the 13 private group water schemes monitored were contaminated with *E. coli* during 2005, both supplies were contaminated on more than one occasion.

### 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. Antimony was detected in two public water supplies, the Carrickmacross and Clontibret supplies with the latter at quite high levels while arsenic was also detected in the Clontibret supply, albeit at a concentration marginally above the parametric value. Antimony and arsenic were detected in the Clontibret supply in 2004 also and Monaghan County Council must investigate the cause of this and instigate corrective action to return the supply to compliance with these standards. Lead was also detected in one sample in the Glaslough supply, though this is likely to be present due to contamination from the internal plumbing at the sample point and it is not present in the supply as a whole.

While compliance with the chemical parametric values in private group water schemes was generally satisfactory there were exceedances of the antimony (Donaghmoyn), bromate (Barraghy) and fluoride (Tydavnet) parametric values.

Compliance with the parametric values in public water supplies was less than the national average and was due primarily to low rates of compliance with the iron (86% compliance) and coliform bacteria (87% compliance).

Though compliance with the indicator parametric values in private group water schemes was marginally above the national average in Monaghan in 2005, it was nonetheless unsatisfactory and showed no improvement compared to 2004. Compliance with the *Clostridium perfringens* (82%), manganese (75%), coliform bacteria (72%) and turbidity at the treatment plant (67%) parametric values was unacceptably low and in need of improvement.

## North Tipperary County Council

### Summary of Water Supplies

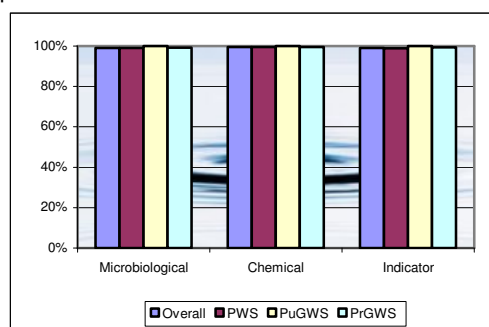
Type of Supply	No. of Supply Zones	Population Served
PWS	23	46,365
PuGWS	1	154
PrGWS	40	7,108
SPS	None Identified	

### Assessment of 2005 Monitoring

North Tipperary County Council carried out analysis on 503 check and 29 audit samples during 2005. With the exception of one private group water scheme North Tipperary County Council complied with the monitoring frequencies required under the Regulations. However, no monitoring was carried out in private water supplies that supply water as part of a public or commercial activity.

### Overall Compliance in 2005

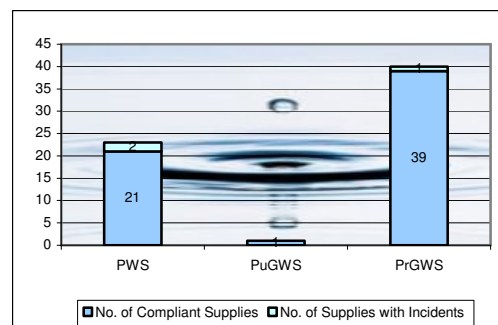
The overall rate of compliance in North Tipperary County Council, 99.2%, was good and was well above the national average. The quality of drinking water supplied in the majority of public water supplies, public group water schemes and private group water schemes was of a high quality and compliance with the microbiological chemical and indicator parameters was over 99%. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	99.1%	99.6%	99.1%
<b>PWS</b>	99.0%	99.5%	99.0%
<b>PuGWS</b>	100%	100%	100%
<b>PrGWS</b>	99.3%	99.6%	99.4%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on 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 2005 in the Templemore and Thurles supplies. While the latter was due to the detection of a single *E. coli* organism in one property (i.e. it was likely due to contamination of the sample point) the former was serious (>20 cfu/100ml) and was due to the mechanical failure of the chlorinator. However, it was fixed the same day and thus the exceedance was of a very limited duration.

The microbiological quality of the private group water schemes was good and it is notable that just one of the 40 schemes monitored was found to be contaminated with *E. coli* during 2005.

### Compliance with the Chemical and Indicator Parametric Values

The overall rate of compliance with the chemical standards was also good in North Tipperary during 2005. However, there were one off exceedances of antimony (Roscrea) and nitrate (Cloughjordan) parametric values. One off lead exceedances were detected in four supplies, all due to contamination from internal plumbing. Full compliance with all of the chemical parametric values was achieved in the private group water schemes with the exception of a single nitrate exceedance in the Ballycasey scheme.

Compliance with the indicator parametric value was good in North Tipperary in 2005 and was well above the national average.

With the exception of the exceedances highlighted above the quality of drinking water supplied in public water supplies, public group water schemes and private group water schemes in North Tipperary was good.

## Offaly County Council

### Summary of Water Supplies

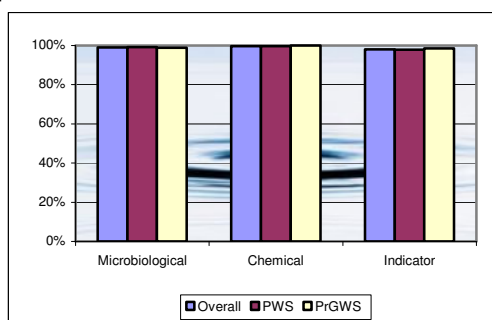
Type of Supply	No. of Supply Zones	Population Served
PWS	24	42,334
PuGWS	0	
PrGWS	18	14,094
SPS	None Identified	

### Assessment of 2005 Monitoring

Offaly County Council carried out analysis on 235 check and 44 audit samples during 2005. Sampling and analysis carried out in all but one of the public water supplies met the minimum monitoring frequencies as required in the Regulations. However, no monitoring was carried out in private water supplies that supply water as part of a public or commercial activity.

### Overall Compliance in 2005

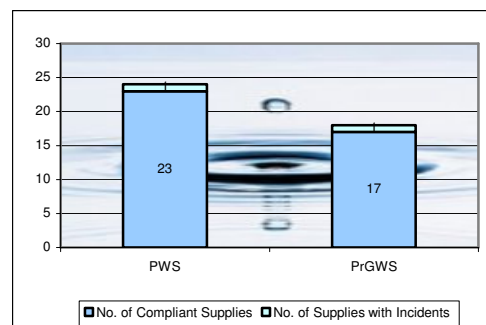
The overall rate of compliance in Offaly County Council, 98.5% was satisfactory and was above the national average in 2005. The level of compliance with the indicator parametric values, while less than that of the microbiological and chemical parametric values, was nonetheless satisfactory. Compliance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



	Micro	Chemical	Indicator
<b>Overall</b>	99.1%	99.8%	98.0%
<b>PWS</b>	99.1%	99.7%	97.8%
<b>PrGWS</b>	98.9%	100%	98.5%

### 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 2005 is provided on 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 Offaly during 2005, both in the Dungar supply. Both incidents were moderate exceedances (<20 cfu/100ml) and were due to mains contamination of the distribution network. A survey of the network has been carried out to rectify the problem. The microbiological quality of the private group water schemes was also good in the majority of schemes with just one of the 18 schemes monitored contaminated with *E. coli* during 2005.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was good in public water supplies in Offaly. However, elevated levels of nitrates were detected in two supplies, the Dunkerrin and Mount Bolus supplies while there was an exceedance of the pesticides parametric value in Birr supply on one occasion during 2005. There were no exceedances of the chemical parametric value in any of the private group water schemes monitored during 2005.

Though compliance with the indicator parametric value was less than that of the microbiological or chemical parametric values in 2005 it was satisfactory. However, compliance with the aluminium parametric value in public water supplies remained low (89% compliance) and was mainly due to the continued failure of the Tullamore supply to comply with the aluminium parametric value (12 of 26 samples analysed exceeded) and is due to the plant operating above capacity and the failure of the new source to come into operation as expected in 2005.

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 (88%) and in need of improvement.

## Roscommon County Council

### Summary of Water Supplies

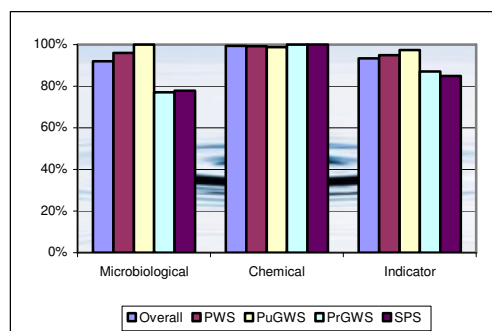
Type of Supply	No. of Supply Zones	Population Served
PWS	22	44,288
PuGWS	32	5,232
PrGWS	30	5,639
SPS	9	N/A

### Assessment of 2005 Monitoring

Roscommon County Council carried out analysis on 179 check and 49 audit samples during 2005. No monitoring was carried out in 7 public group water schemes and 4 private group water schemes during 2005 while insufficient numbers of check samples were analysed in a further 4 public water supplies, 12 public group water schemes and 9 private group water schemes.

### Overall Compliance in 2005

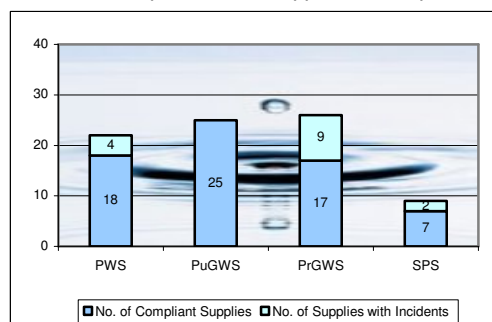
The overall rate of compliance in Roscommon County Council, 95.2%, was below the national average during 2005 and was due to below average compliance with the microbiological and indicator parametric values. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	91.9%	99.4%	93.4%
<b>PWS</b>	96.0%	99.3%	95.0%
<b>PuGWS</b>	100%	98.8%	97.4%
<b>PrGWS</b>	77.1%	100%	87.0%
<b>SPS</b>	77.8%	100%	84.9%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were four incidents of *E. coli* contamination of public water supplies in Roscommon during 2005, in the Ballyfarnan, Grangemore, Knockcroghery/Leacarrow (Leacarrow) and Knockcroghery/Leacarrow (Tober Og) supplies. Two of these incidents were due to the failure of chlorinating equipment while the other two were due to insufficient chlorine residual in the mains at the point of sampling. Furthermore, an outbreak of cryptosporidiosis was associated with the Roscommon Central supply in May/June 2005 which led to a boil water notice being in place for 5 weeks. The source of the contamination (a river used as one of the sources for the supply) was disconnected from the supply and is no longer in use. *E. coli* was not detected in any of the public group water schemes monitored in 2005.

Of the 26 private group water schemes monitored for *E. coli* in 2005, 9 were found to be contaminated with *E. coli* at least once during the year. Compliance with the *E. coli* parametric value showed no improvement compared to 2004 and remains at 77.1%. This low rate of compliance and the relatively high proportion of schemes contaminated is a cause for concern and must be improved.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical standards was good in public water supplies in Roscommon, however there were isolated exceedances of concern. There was one exceedance of the bromate and fluoride (a marginal exceedance) parametric values while 3 exceedances of the trihalomethanes parametric value were recorded in 2005. The bromate exceedance was recorded in the North East Regional Supply (Rooskey Zone) while the trihalomethanes parametric value was exceeded in three of the zones in the North East Regional Supply (Rooskey, Strokestown/Elphin and Tarmonbarry) while operational monitoring of the Arigna water supply indicated that trihalomethanes were still a considerable problem during 2005.

The private group water schemes and the private water supplies were of excellent chemical quality and no exceedances of the chemical parametric values were recorded in any of these supplies during 2005.

Compliance with the indicator parametric values was below the national average in public water supplies in Roscommon during 2005 and compliance with the iron (58%), coliform bacteria (87%) and turbidity (80%) parametric values were problematic and needs to improve.

Compliance with the indicator parametric values in private group water schemes was also below the national average and was due to poor compliance with the *Clostridium perfringens* (70%), colour (77%) and coliform bacteria (71%) 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.

## Sligo County Council

### Summary of Water Supplies

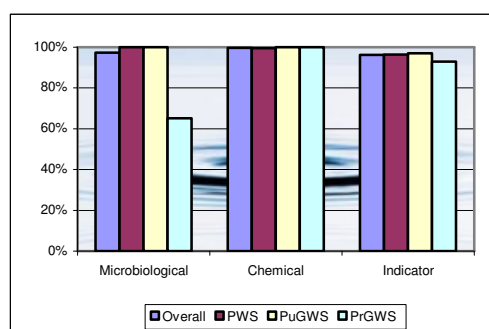
Type of Supply	No. of Supply Zones	Population Served
PWS	13	38,259
PuGWS	20	3,671
PrGWS	15	5,853
SPS	None Identified	

### Assessment of 2005 Monitoring

Sligo County Council carried out analysis on 223 check and 42 audit samples during 2005. No monitoring was carried in 3 public group water schemes and 2 private group water schemes while just one sample was analysed in all the remaining public and private group water schemes thus insufficient sampling was carried out in all group water schemes in Sligo during 2005. Furthermore, no monitoring was carried out in private water supplies that supply water as part of a public or commercial activity.

### Overall Compliance in 2005

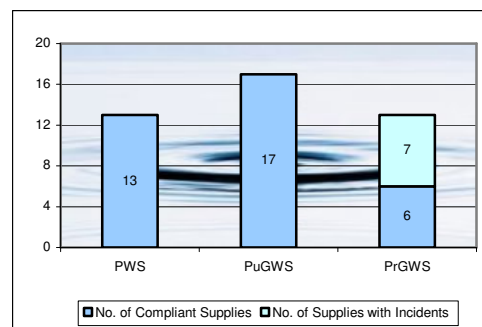
The overall rate of compliance in Sligo County Council, 97.2%, was slightly above the national average. Compliance with the chemical parametric values was good in all supply categories. While compliance with the microbiological parametric value was excellent in the public water supplies and public group water schemes it was poor in the private group water schemes in 2005. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	97.4%	99.6%	96.3%
<b>PWS</b>	100%	99.5%	96.4%
<b>PuGWS</b>	100%	100%	97.0%
<b>PrGWS</b>	65.2%	100%	93.0%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were no incidents of *E. coli* contamination of public water supplies or public group water schemes in Sligo during 2005 and they were thus of excellent microbiological quality. However, the same cannot be said of the private group water schemes with 7 of the 13 schemes monitored contaminated during 2005 and just 46% of samples analysed complying with the parametric value. Although the majority of private group water schemes were supplying very poor quality drinking water in 2005, it is anticipated that this situation should shortly be resolved as 11 new treatment plants were completed and brought into service in 2006 which should resolve the quality deficiencies in the private group water schemes in Sligo in the future.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values was high in Sligo with no exceedances reported in either the public group water schemes or private group water schemes in Sligo during 2005. The public water supplies in Sligo were also of a high chemical quality though there were a small number of exceedances of the fluoride parametric value in Lough Talt Regional Supply (3 of 12 samples analysed) as well as one trihalomethanes exceedance in the Kilsellagh (Farrancardy) supply.

Though compliance with the indicator parametric values was less than that of the microbiological and chemical parametric values it was nonetheless satisfactory. Notwithstanding this, the level of compliance in public water supplies with the aluminium (91%), iron (86%) and turbidity at the treatment plant (86%) parametric values was low. In particular, there was a large number of aluminium exceedances in the Lough Easkey Regional Supply (9 of 24 samples analysed).

The lower rate of compliance with the indicator parametric values in the private group water schemes was primarily due to the low percentage of samples complying with the coliform bacteria parametric value (46%) though this has improved since 2004 (when it was 18%). The overall bacteriological quality of private group water schemes in Sligo was poor though developments in 2006 (see above) should lead to the elimination of these exceedances in future years.



## South Dublin County Council

### Summary of Water Supplies

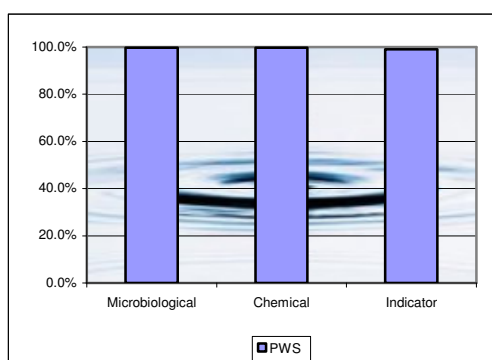
Type of Supply	No. of Supply Zones	Population Served
PWS	4	250,680
PuGWS	0	
PrGWS	0	
SPS	0	

### Assessment of 2005 Monitoring

South Dublin County Council carried out analysis on 300 check and 15 audit samples in 2005. South Dublin County Council have met (and indeed exceeded) the minimum monitoring requirements as outlined in the Regulations.

### Overall Compliance in 2005

The overall rate of compliance in South Dublin County Council, 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
<b>PWS</b>	99.7%	99.7%	99.0%

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

Compliance with the *E. coli* and enterococci parametric values was good during 2005. *E. coli* was detected in just one of the 308 samples analysed in 2005 while enterococci was not detected in any of the 15 samples analysed. The detection of *E. coli* was due to the use of a contaminated sample point in a building in which the water was not used for consumption. Sampling of the water in the vicinity of this sample point indicated that there were no quality issues in the supply.

### Compliance with the Chemical and Indicator Parametric Values

There was just one exceedance of the chemical parametric values in South Dublin in 2005. A single exceedance of the nickel parametric value was recorded. This was likely due to contamination from the sample point fittings and is not representative of the supply as a whole.

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 (92%) was the cause of this 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.

## South Tipperary County Council

### Summary of Water Supplies

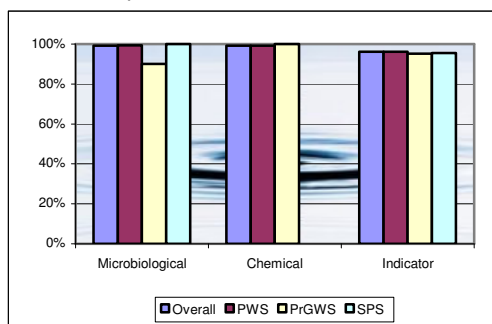
Type of Supply	No. of Supply Zones	Population Served
PWS	27	71,388
PuGWS	0	
PrGWS	3	360
SPS	6	N/A

### Assessment of 2005 Monitoring

South Tipperary County Council carried out analysis on 358 check and 76 check samples during 2005. While adequate monitoring was carried out in the majority of water supplies in South Tipperary, insufficient numbers of samples were analysed in one public water supply in 2005 while another, was not monitored at all.

### Overall Compliance in 2005

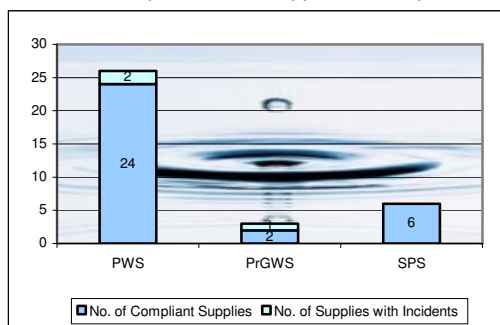
The overall rate of compliance in South Tipperary County Council, 97.1%, was above the national average and was due to above average compliance with the microbiological and indicator parametric values. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	99.2%	99.2%	96.1%
<b>PWS</b>	99.4%	99.2%	96.1%
<b>PrGWS</b>	90.0%	100%	95.1%
<b>SPS</b>	100%		95.5%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on 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 two public water supplies in South Tipperary during 2005. These were in the Galtee Regional and

Mullenbawn supplies. Both exceedances were moderate (<20 cfu/100ml) with the former being caused by failure of a chlorinator while the latter was caused by a failure in the treatment process. One of the three private group water schemes monitored was found to contain *E. coli* at least once during 2005, although the failure was due to the detection of low numbers of *E. coli* in a single sample.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values was good (99.2%) though there were some exceedances of the antimony, fluoride and trihalomethenes parametric values. There were three exceedances in three different supplies (Dundrum Regional, Kilcash and Poulavanogue) of the antimony parametric value, although all three were only marginally above the parametric value. There were also 8 (of 295 samples analysed) fluoride exceedances in a number of different supplies which were also only marginally above the parametric value. Finally 1 of 3 samples analysed in the Killurney water supply exceeded the trihalomethanes parametric value. 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.

There was a marginal improvement in compliance with the indicator parametric values in public water supplies in South Tipperary from 95.7% in 2004 to 96.1% in 2005. Although compliance with the aluminium parametric value rose from 67% in 2004 to 73% in 2005, it is still far from acceptable. A large number of aluminium exceedances were reported in the Ardfinnan Regional (11 of 27 samples analysed), Carrick-on-Suir/River Linguan (7 of 20 samples analysed), Dundrum Regional (9 of 22 samples analysed) and the Galtee Regional (17 of 39 samples analysed).

Compliance with the indicator parametric values in private group water schemes in South Tipperary rose from 89.5% in 2004 to 95.1% in 2005 and apart from a couple of pH and coliform bacteria exceedances full compliance was achieved with the remaining indicator parameters.



## Waterford City Council

### Summary of Water Supplies

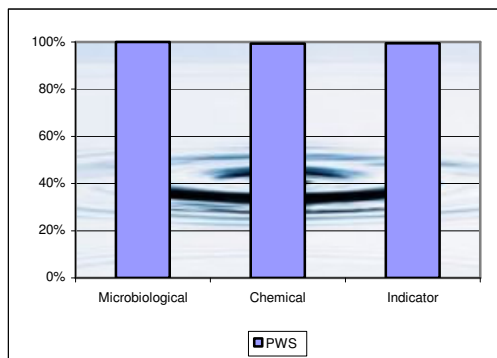
Type of Supply	No. of Supply Zones	Population Served
PWS	1	41,945
PuGWS	0	
PrGWS	0	
SPS	0	

### Assessment of 2005 Monitoring

Waterford City Council carried out analysis on 71 check and 16 audit samples during 2005.

### Overall Compliance in 2005

The overall rate of compliance in Waterford City Council, 99.4% was the highest in the country indicating that the quality of water supplied in Waterford City (produced by the County Council) was excellent. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>PWS</b>	100%	99.3%	99.4%

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

Compliance with the *E. coli* and enterococci parametric values in 2005 in Waterford City was excellent and there were no exceedances of either parametric value during the year.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the indicator parametric values was good with just three exceedances of the chemical parametric values. One antimony result in excess of the parametric value was recorded, however this result was anomalous and was not repeated in other sampling in the supply during the year. There was also one lead and one nickel exceedance both of which were likely due to contamination from either the internal plumbing (lead) or tap fittings (nickel).

Compliance with the indicator parametric values was similarly high improving from 98.9% in 2004 to 99.4% in 2005 with only a small number of iron, manganese and coliform bacteria exceedances recorded during the year.

Overall the quality of water in Waterford City was good.

## Waterford County Council

### Summary of Water Supplies

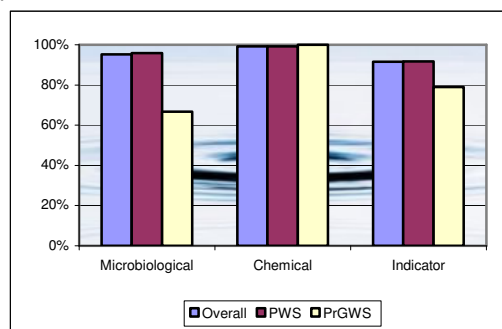
Type of Supply	No. of Supply Zones	Population Served
PWS	101	50,911
PuGWS	5	405
PrGWS	5	364
SPS	None Identified	

### Assessment of 2005 Monitoring

Waterford County Council carried out analysis on 259 check and 56 audit samples during 2005. No monitoring was carried out on 4 public water supplies, 5 public group water schemes and 1 private group water scheme during 2005 while insufficient monitoring was carried out in a further 6 public water supplies and 2 private 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 2005

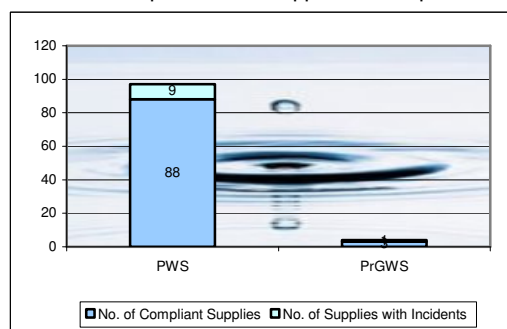
The overall rate of compliance in Waterford County Council, 94.7% was below the national average and dropped marginally from 95.1% in 2004. The reason for the lower overall quality is the lower than average microbiological quality of drinking water. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	95.3%	99.1%	91.6%
<b>PWS</b>	95.9%	99.1%	91.7%
<b>PrGWS</b>	66.7%	100%	79.0%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were 9 incidents of *E. coli* contamination in 9 public water supplies in Waterford County in 2005, in the Ardmore, Ballydasoon, Ballyduff/Kilmeady, Graigenageeha, Kilgobnet, Leagh Cross, Loskeran/Ballymacart, Ring/Helvick/Seaview and Smoorbeg (Carrigphilip) supplies. Although the number of supplies with incidents reduced compared to 2004 the number is still unacceptably high.

One of the 4 private group water schemes monitored was found to be contaminated with *E. coli* on both occasions that it was monitored during 2005.

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values in public water supplies was generally good. However, elevated levels of arsenic detected in the Ballyogarty supply (as highlighted in the 2004 report) are still a concern and must be addressed. Elevated levels of nickel (likely the result of sample point contamination) and fluoride were found in the Ballinacourty/Deelish supply while there was a nitrate exceedance in the Kilmore-Kilbeg supply. Monitoring of nitrate and nitrite was the only monitoring of chemical parameters carried out in private group water schemes in 2005. No exceedances of either parameter were reported during 2005.

Compliance with the indicator parametric values in public water supplies in Waterford County was below the national average in 2005 and dropped from 93.2% in 2004 to 91.7% in 2005. Compliance with the pH parametric value remains very poor with just 51% of samples analysed complying with the parametric value. Compliance with the coliform bacteria parametric value in public water supplies was also unsatisfactory at 84% in 2005.

As with the chemical parameters, there was limited monitoring of the indicator parameters in private group water schemes during 2005. While the majority of parameters analysed were compliant there were a high proportion of samples analysed that did not comply with the coliform bacteria parametric value (4 of 6 samples analysed).

## Westmeath County Council

### Summary of Water Supplies

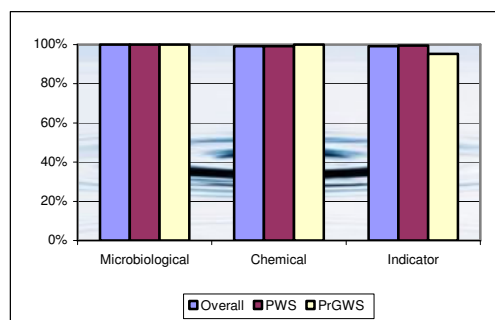
Type of Supply	No. of Supply Zones	Population Served
PWS	8	60,325
PuGWS	38	6,175
PrGWS	4	772
SPS	None Identified	

### Assessment of 2005 Monitoring

Westmeath County Council carried out analysis on 192 check and 19 audit samples during 2005. No monitoring was carried out in private water supplies that supply water as part of a public or commercial activity.

### Overall Compliance in 2005

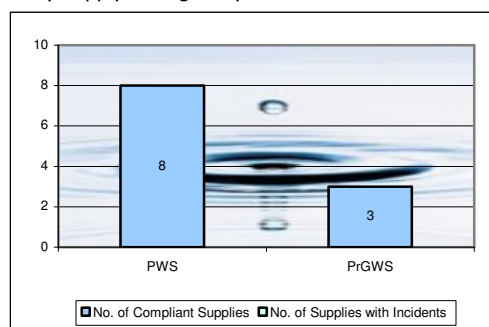
The overall rate of compliance in Westmeath County Council, 99.2% was above the national average during 2005. This was due to the excellent microbiological quality of both public water supplies and private group water schemes and the good chemical quality of these supplies also. Furthermore, compliance 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
<b>Overall</b>	100%	99.2%	99.2%
<b>PWS</b>	100%	99.2%	99.5%
<b>PrGWS</b>	100%	100%	95.3%

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

The microbiological quality of public water supplies and private group water schemes was excellent during 2005 and, as shown on the figure below *E. coli* was not detected in any of the samples analysed in any supply during the year.



### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values was good in public water supplies in Westmeath during 2005 although there were a small number of one off exceedances of the bromate (Castlepollard Low Level), fluoride (Athlone, Moate), lead (Mullingar Regional High Level) and PAH (Athlone) parametric values during the year. There were no exceedances of any of the chemical parametric values in private group water schemes during 2005 (though monitoring for the full set of chemical parameters was only carried out in one of the supplies in question).

Compliance with the indicator parametric value in public water supplies was good and was well above the national average at 99.5% in 2005 (up from 97.8% in 2004) and though there were a small number of isolated exceedances most were only marginally above the parametric values.

Although compliance with the indicator parametric values in the private group water schemes was less than that in the public water supplies it was nonetheless above the national average at 95.3%. There were a small number of exceedances of some of the parametric values in one of the private group water schemes (Mount Temple) while monitoring for the other supplies indicated full compliance with the indicator parametric values.

## Wexford County Council

### Summary of Water Supplies

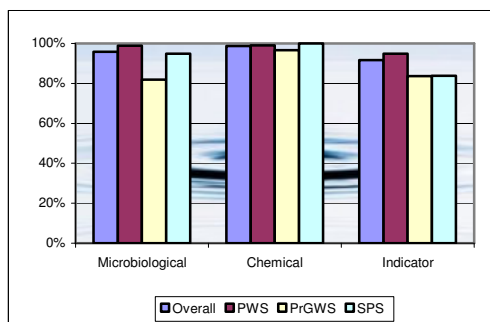
Type of Supply	No. of Supply Zones	Population Served
PWS	30	78,670
PuGWS	1	200
PrGWS	14	4,350
SPS	134	N/A

### Assessment of 2005 Monitoring

Wexford County Council carried out analysis on 218 check and 25 audit samples during 2005. No monitoring was carried out on 1 public group water scheme and 4 private group water schemes during 2005 while insufficient monitoring was carried out in a further 4 public water supplies.

### Overall Compliance in 2005

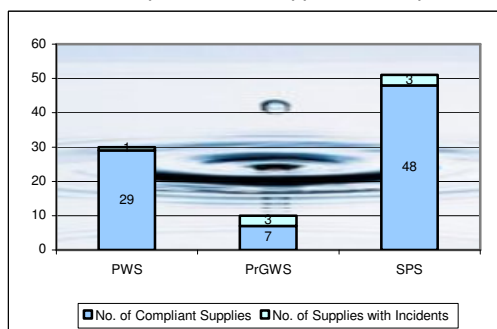
The overall rate of compliance in Wexford County Council, 93.4% was below the national average during 2005 and was mainly due to the lower than average compliance with the indicator parametric values. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	95.9%	98.7%	91.7%
<b>PWS</b>	98.9%	99.0%	94.8%
<b>PrGWS</b>	81.8%	96.6%	83.6%
<b>SPS</b>	94.8%	100%	83.7%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There was one incident of *E. coli* contamination of a public water supply in Wexford during 2005 in the Clonroche supply. However, the levels of *E. coli* detected were moderate (<20 cfu/100ml).

Compliance with the microbiological parametric values was generally satisfactory in the majority of private group water schemes in Wexford during 2005 with the exception of 3 schemes where *E. coli* was detected, two of which were at serious levels (the Ballymoney/Tara Hill and Mullawn schemes).

### Compliance with the Chemical and Indicator Parametric Values

Compliance with the chemical parametric values in public water supplies was good (99.0%) although there were a small number of exceedances of concern. Apart from two moderate fluoride exceedances there was one exceedance of the acrylamide (Kilmuckridge), antimony (Gorey) and trihalomethanes (New Ross) parametric values.

There was a relatively small amount of monitoring of the chemical parameters in private group water schemes carried out during 2005 in Wexford though exceedances of the acrylamide and antimony parametric values were reported in the Ballymoney/Tara Hill scheme while a single nitrite exceedance was reported in the Killinieran scheme during 2005.

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. Although there was a slight improvement from 71% in 2004 to 75% in 2005 compliance was still unacceptably low. In the private group water schemes there was a drop in compliance with the coliform bacteria parametric value from 69% in 2004 to 53% in 2005 while compliance with the pH parametric value was also unacceptably low at 54%.

Similarly low levels of compliance were reported in the private water supplies for pH (50%) and coliform bacteria (64%).

## Wicklow County Council

### Summary of Water Supplies

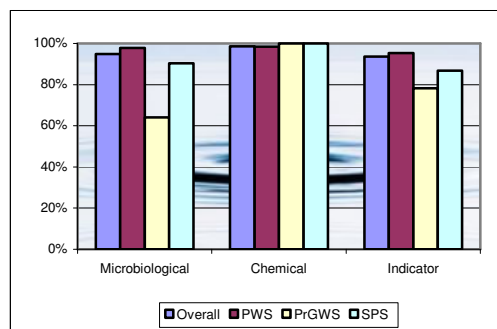
Type of Supply	No. of Supply Zones	Population Served
PWS	48	89,841
PrGWS	16	4,350
SPS	47	N/A

### Assessment of 2005 Monitoring

Wicklow County Council carried out analysis on 340 check and 34 audit samples during 2005. No monitoring was carried out in one private group water scheme while insufficient monitoring was carried out at 1 public water supply and 14 private group water schemes.

### Overall Compliance in 2005

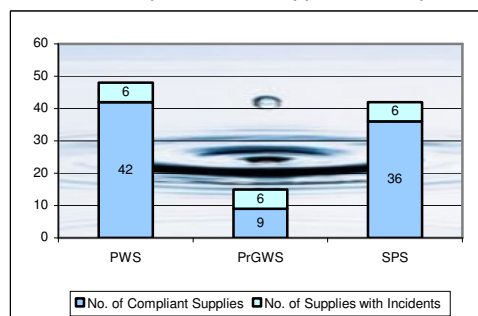
The overall rate of compliance in Wicklow County Council, 94.9% was below the national average during 2005. This was mainly due to below average microbiological compliance in the county and in particular in the private group water schemes. Compliance with the microbiological, chemical and indicator parametric values are shown below.



	Micro	Chemical	Indicator
<b>Overall</b>	94.9%	98.6%	93.6%
<b>PWS</b>	97.9%	98.5%	95.3%
<b>PrGWS</b>	64.0%	100%	78.2%
<b>SPS</b>	90.3%	100%	86.8%

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

A summary of the number of incidents of *E. coli* contamination reported during 2005 is provided on the figure below. A brief summary of the *E. coli* incidents in the public water supplies is also provided.



There were six incidents of *E. Coli* contamination of public water supplies in Wicklow in 2005, in the Barndarrig, Donard, Laragh/Annamoe, Rathdangan, Stratford and Thomastown supplies. The causes of

these exceedances were varied though were mostly due to either the failure of chlorinating equipment or inadequacy of the treatment plant to treat the water at the time of the incident.

The microbiological quality of the private group water schemes in Wicklow was poor with 6 of the 15 schemes monitored contaminated with *E. coli* at least once during the year. The overall rate of compliance with the microbiological parametric values dropped from 76.2% in 2004 to 64.0% in 2005. Many of the 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 though was below the national average at 98.5% (down from 99.0% in 2004). There were two causes for this drop in compliance. The first reason was the large number of fluoride exceedances (10% of samples exceeded), though this was due to a relatively large number of minor breaches of the fluoride parametric value in Arklow (8 of 22 samples analysed). Secondly there were a number of one off exceedances of different chemical parameters in different supplies. Exceedances of the antimony (Roundwood), arsenic (Hollywood), mercury (Hollywood), pesticides (Ballyknockan) and trihalomethanes (Blessington) parametric values were reported in 2005. All such exceedances were investigated thoroughly by Wicklow County Council and many are no longer an issue and have not been detected in follow up sampling. In relation to Hollywood, the source with the exceedances above has been blended with a new source to ensure compliance with the standards. Results carried out on the new mixed supply were compliant. No monitoring of the private group water schemes for any of the chemical parameters (with the exception of nitrate) was carried out during 2005.

The improvement in compliance with the indicator parametric values in Wicklow noted in 2004 has been maintained and although some supplies reported aluminium exceedances, compliance marginally improved from 96% in 2004 to 97% in 2005. However, compliance with the pH parametric value was low (78%) and in need of improvement.

Overall compliance with the indicator parametric values in private group water schemes in Wicklow was poor and dropped from 81.2% in 2004 to 78.2% in 2005. Extremely poor compliance was reported against the pH (25% compliance) and coliform bacteria (29% compliance) parametric values representing a substantial drop from 38% and 58% compliance in 2004 respectively.

## **APPENDIX 2**

### **LIST OF MICROBIOLOGICAL, CHEMICAL AND INDICATOR PARAMETERS MONITORED AND ASSOCIATED PARAMETRIC VALUES**

## MICROBIOLOGICAL, CHEMICAL AND INDICATOR PARAMETRIC VALUES

	Parameter	Parametric value	Unit	Comments
<b>Microbiological Parameters</b>				
1	<i>Escherichia coli</i> ( <i>E. coli</i> )	0	No./100ml	
2	Enterococci	0	No./100ml	
<b>Chemical Parameters</b>				
3	Acrylamide	0.10	µg/l	Note 1
4	Antimony	5.0	µg/l	
5	Arsenic	10	µg/l	
6	Benzene	1.0	µg/l	
7	Benzo(a)pyrene	0.010	µg/l	
8	Boron	1.0	mg/l	
9	Bromate	10	µg/l	Note 2
10	Cadmium	5.0	µg/l	
11	Chromium	50	µg/l	
12	Copper	2.0	mg/l	Note 3
13	Cyanide	50	µg/l	
14	1,2-dichloroethane	3.0	µg/l	
15	Epichlorohydrin	0.10	µg/l	Note 1
16	Fluoride	1.0	mg/l	Note 11
17	Lead	10	µg/l	Notes 3 and 4
18	Mercury	1.0	µg/l	
19	Nickel	20	µg/l	Note 3
20	Nitrate	50	mg/l	Note 5
21	Nitrite	0.50	mg/l	Note 5
22	Pesticides	0.10	µg/l	Notes 6 and 7
23	Pesticides – Total	0.50	µg/l	Note 6 and 8
24	Polycyclic aromatic hydrocarbons	0.10*	µg/l	Note 9
25	Selenium	10	µg/l	
26	Tetrachloroethene and Trichloroethene	10*	µg/l	
27	Trihalomethanes – Total	100*	µg/l	Note 10
28	Vinyl chloride	0.50	µg/l	Note 1
<b>Indicator Parameters</b>				
29	Aluminium	200	µg/l	
30	Ammonium	0.30	mg/l	
31	Chloride	250	mg/l	Note 12
32	<i>Clostridium perfringens</i> (including spores)	0	No/100 ml	Note 13
33	Colour	Acceptable to consumers and no abnormal change		
34	Conductivity	2500	µS cm <sup>-1</sup> at 20 °C	Note 12
35	Hydrogen ion concentration	≥ 6.5 and ≤9.5	pH units	Note 12
36	Iron	200	µg/l	
37	Manganese	50	µg/l	
38	Odour	Acceptable to consumers and no abnormal change		
39	Oxidisability	5.0	mg/l O <sub>2</sub>	Note 14
40	Sulphate	250	mg/l	Note 12
41	Sodium	200	mg/l	
42	Taste	Acceptable to consumers and no abnormal change		
43	Colony count 22°C	No abnormal change		
44	Coliform bacteria	0	No./100 ml	
45	Total organic carbon (TOC)	No abnormal change		Note 15
46	Turbidity	Acceptable to consumers and no abnormal change		Note 16
<b>Radioactivity</b>				
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 (NO<sub>3</sub>) and nitrite (NO<sub>2</sub>) 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 000m<sup>3</sup> 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.