IRELAND'S DRINKING WATER

A SUMMARY REPORT ON ITS QUALITY IN 1994

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Introduction

The summary report on Ireland's Drinking Water for 1993 was the first to be produced in a "question and answer" format, the aim being to raise in the minds of readers - who are also the consumers of drinking water - the most relevant aspects of an important topic in everyone's life, and to respond to the more commonly asked questions. The format has proved attractive to the general reader and many favourable comments have been made to the E.P.A. Accordingly, it has been retained for the present summary which covers the 1994 monitoring.

However, the question may be asked why there are *annual* detailed and summary reports on drinking water quality; would an interval of two or three years between reports not be sufficient? There are various factors underlying the issue of reports on a yearly basis. First of all, the initiative in regard to the issue of regular reports was taken by the Minister for the Environment in 1988 when he announced, in association with the making by him of the Drinking Water Regulations, 1988 (as they are popularly known), that annual reports would be issued.

Second, the Commission of the European Union has put forward a proposal that the Member States should report yearly, on a Union-wide basis, within the calendar year immediately following a given year's monitoring. Third, the regular production of collated and analysed data is useful to the sanitary authorities which undertake the monitoring, in that they have available - both for their own reference and for the information of consumers - detailed information on the various water supplies in a convenient format. With the move towards greater availability of environmental information, the ready access to these regular reports is an important step forward.

It may also be queried whether or not there are sufficient changes or developments in drinking water quality from one year to the next to warrant the production of annual publications. While it is, of course, automatic that the series of reports will record changes (small or otherwise) in drinking water quality, it must be remembered that, while *change* must be reported fully, a record must also be kept a record of the actual *quality of drinking water* from year to year. This is a very important aim of the reports.

In the case of the summary reports, the information on both changes in and the state of drinking water quality will naturally be greatly condensed, but it is nonetheless considered important by the E.P.A. that the general reader, for whom reference to the detailed report might not be appropriate, should have the

opportunity to keep abreast of the overall state of our drinking waters with a minimum of effort.

It is also considered important, as a convenience to the general reader, that the contents of the summary reports should be self-explanatory. In other words, there should be no need to look elsewhere for an explanation of any of the points made. A consequence of this is that a significant proportion of the text will be carried forward from one report to the next, resulting in a degree of repetition. However, this is considered a minor disadvantage compared with the overall benefit of maximum convenience to the reader.

The Background

WHAT IS SO IMPORTANT ABOUT WATER ANYWAY?

Water is arguably the most precious of all substances. It is essential for life, and each day we consume and use significant volumes of it. Over 80 percent of our body weight is made up of water! However, it is often only in conditions where there is a scarcity of this valuable commodity that we may come to appreciate its indispensability.

We consume drinking water by taking it "straight", or in a variety of flavoured drinks, hot or cold, we use it extensively in cooking and baking, and we consume it in a wide range of foods. Clearly, it is of the utmost importance that the water we use at home (and, equally, that which is used in the food industry) is of the highest quality, so that it poses no risk whatever to the health and well-being of the consumer.

WHOSE RESPONSIBILITY IS IT TO PROVIDE GOOD WATER?

For well over a century strenuous efforts have been made by those who distribute water to the public at large for domestic and related purposes to ensure that from its source - be this a well, spring, lake, river or stream - right down to the tap in the consumer's kitchen the quality remains unimpaired. To achieve this aim can in fact be a major task, and it is certainly one which lies well beyond the capability of the individual.

The treatment of what is termed "raw water" in order to make it "potable" (that is, suitable for drinking) is very often a complex multi-stage process, involving such steps as filtration, removal of colour, disinfection and so on. While some supplies may be judged pure enough to supply directly to the consumer without any treatment, this is a relatively rare occurrence, and in the great majority of cases the raw waters will at least undergo disinfection before being distributed to the public.

The bodies whose function it is to provide us with drinking water are known as "Sanitary Authorities" and they comprise County and Borough Councils, City Corporations and Urban District Councils throughout the land. However, sometimes some of the bigger authorities, for example County Councils, act on behalf of smaller bodies, say Urban District Councils, in providing water supplies and/or in monitoring their quality.

FIGURE 1 : BREAKDOWN OF SUPPLIES EXAMINED IN 1994

Total Number of Supplies Examined : 1,664

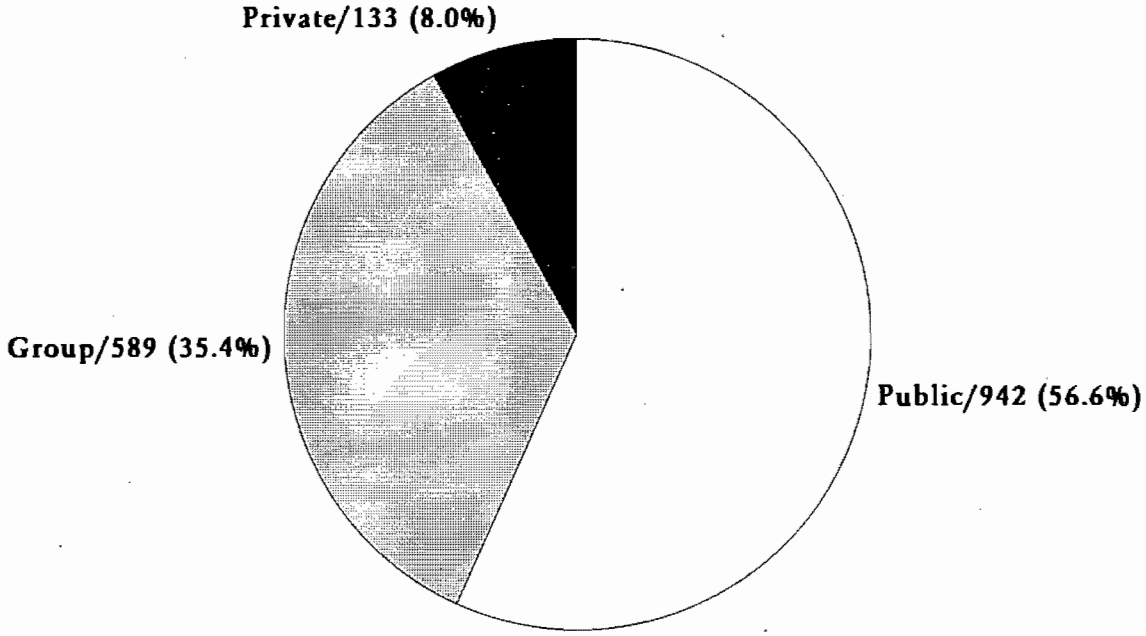
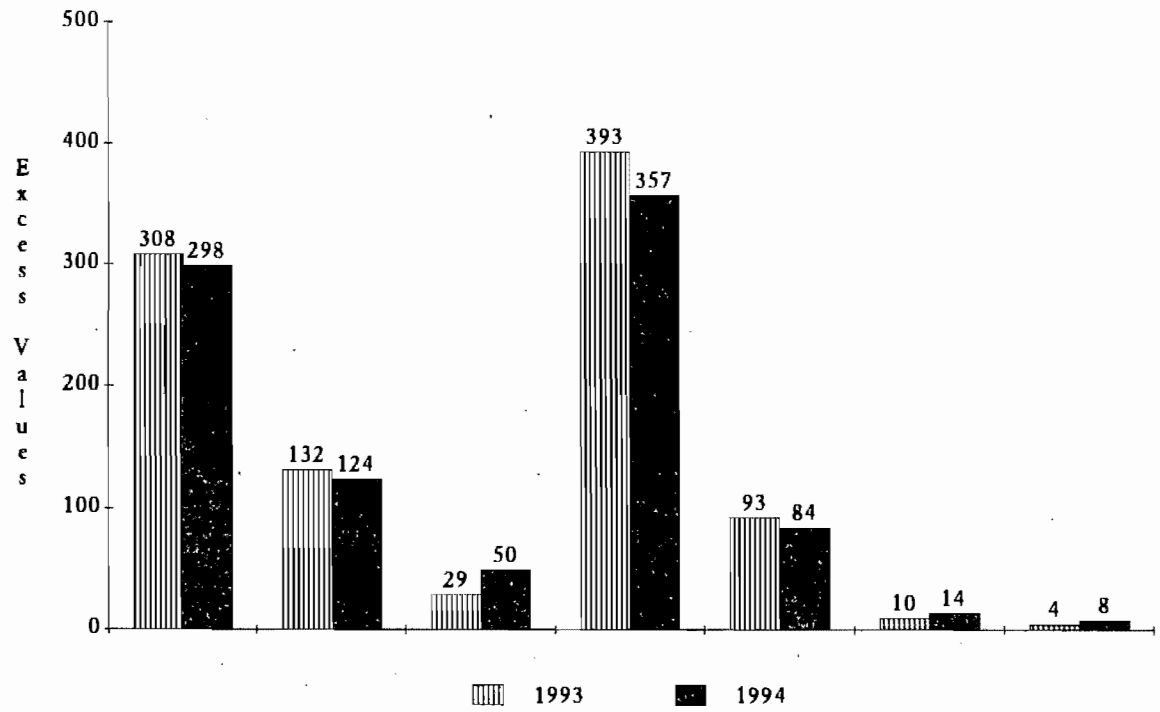


FIGURE 2 : COLIFORMS IN PUBLIC WATER SUPPLIES

Excess Values in 1994 : 935 [8.65% of Total Values (10,793)]

Excess Values in 1993 : 969 [9% of Total Values (10,725)]



Total Coli	**< 3**	**< 10**	**< 20**	**< 100**	**< 200**	**< 500**	**> 500**
Faecal Coli	**Zero**	**Zero**	**Zero**	**< 20**	**< 200**	**< 500**	**> 500**

Concentrations are expressed as Numbers/100 ml water

The task of monitoring is a most important one and its development to today's very sophisticated surveillance has its origins in the vital discovery, made in the middle of the last century, that water contaminated with human or animal waste can be a source of various contagious diseases.

IS THE QUALITY OF DRINKING WATER CHECKED REGULARLY?

The Drinking Water Regulations referred to in the Introduction set out detailed requirements for the assessment of drinking water quality, covering aspects such as the frequency of sampling and the extent and scope of the analyses carried out. An important aspect of the Regulations is that compliance with their requirements will guarantee a uniform minimum coverage throughout the country.

However, the sanitary authorities are still free to augment the prescribed monitoring, for example, by carrying out more frequent sampling and analysis or by extending surveillance to smaller supplies than those formally specified. Many of the authorities undertake considerable additional monitoring and as a result the overall coverage includes a large number of often very small supplies. The intention of most authorities is to provide quality assessment on as many water supplies as possible within their respective areas, in order to help guarantee the good health and well-being of the consumer.

This is one of the sanitary authorities' most important functions and in its discharge they are often assisted by the health authorities, public analysts and other support services. The success of the various authorities in ensuring the potability of water may be gauged by the fact that public health problems associated with contaminated water are very rare in Ireland.

HOW IS WATER QUALITY ASSESSED?

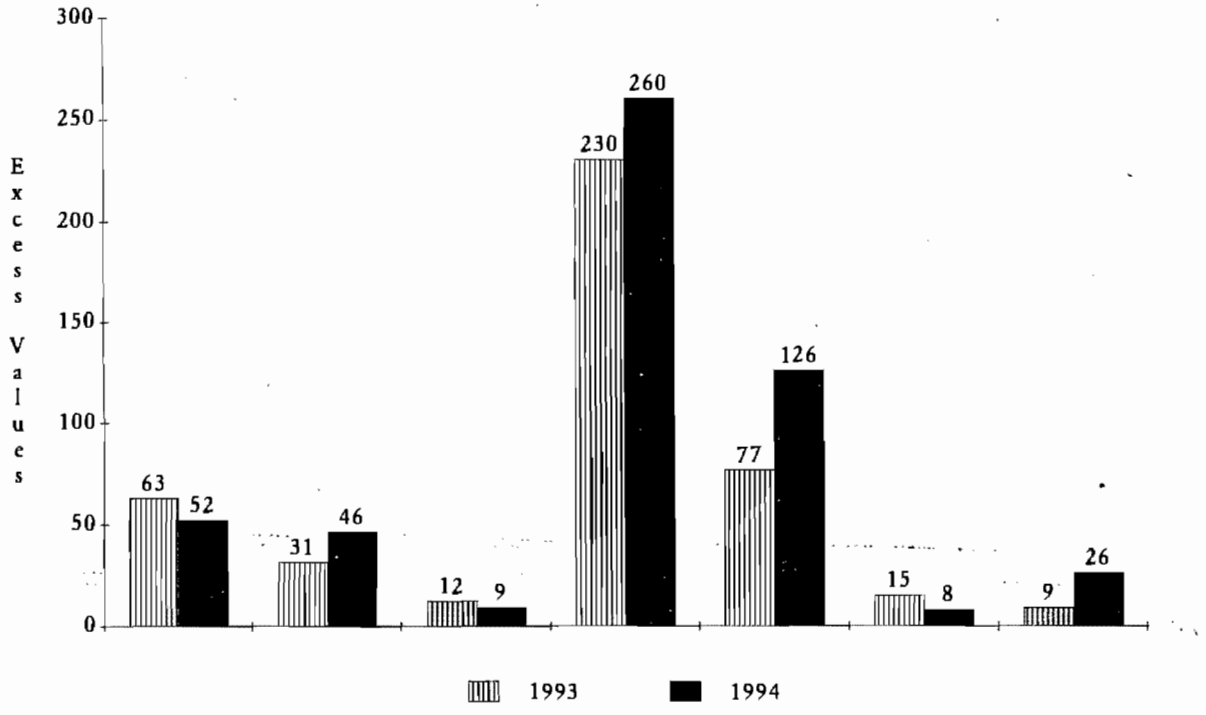
Regular sampling of water supplies is carried out by or on behalf of the authorities just mentioned, and the samples are analysed for a range of constituents, generally referred to as "parameters of water quality". The tests cover physical, chemical and bacteriological aspects of water quality and the results form the basis on which the overall quality is assessed.

The classification of a water as potable or otherwise is not just based on the opinion of an individual analyst. Over the years quality standards have been drawn up for drinking water, and guidelines on water quality have been issued regularly by the World Health Organization [W.H.O.]. So it is with reference to water quality standards that the suitability of a water for drinking is assessed.

FIGURE 3 : COLIFORMS IN GROUP WATER SUPPLIES

Excess Values in 1994 : 527 [45.5% of Total Values (1,158)]

Excess Values in 1993 : 437 [45% of Total Values (970)]



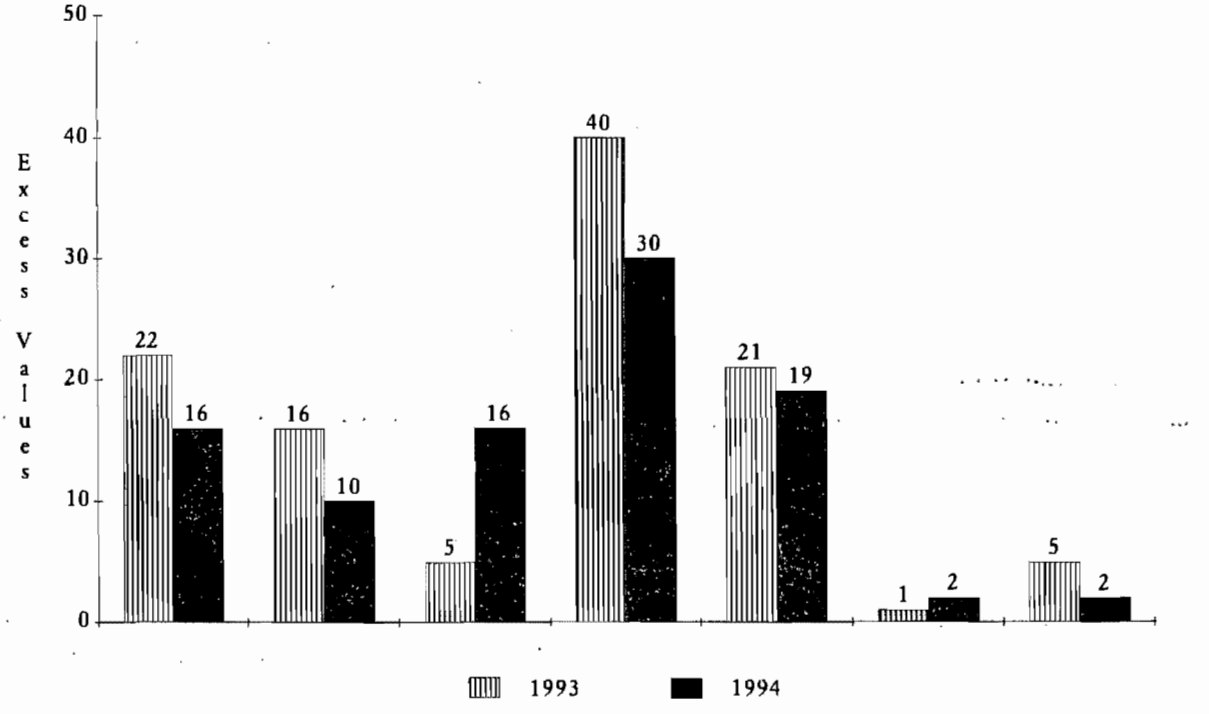
Total Coli	**< 3**	**< 10**	**< 20**	**< 100**	**< 200**	**< 500**	**> 500**
Faecal Coli	**Zero**	**Zero**	**Zero**	**< 20**	**< 200**	**< 500**	**> 500**

Concentrations are expressed as Numbers/100 ml water

FIGURE 4 : COLIFORMS IN SMALL PRIVATE [NON-GROUP] SUPPLIES

Excess Values in 1994 : 95 [48.5% of Total Values (196)]

Excess Values in 1993 : 110 [65% of Total Values (168)]



Total Coli	**< 3**	**< 10**	**< 20**	**< 100**	**< 200**	**< 500**	**> 500**
Faecal Coli	**Zero**	**Zero**	**Zero**	**< 20**	**< 200**	**< 500**	**> 500**

Concentrations are expressed as Numbers/100 ml water

These standards are in fact concentration limits for a variety of constituents of water (present naturally or otherwise) which must not be exceeded.

WHAT QUALITY STANDARDS APPLY IN IRELAND?

While the W.H.O. guidelines are invaluable to the authorities they are, of their nature, not obligatory and so it is clearly important that there be legal standards in force. The "quality of water for human consumption", as it is termed, is the subject of one of the earlier European Union Directives on water quality. Arising directly from its provisions the Minister for the Environment made the Drinking Water Regulations which transpose the requirements of the Directive into Irish Law.

Accordingly, the sanitary authorities must provide drinking water which conforms to the exact quality standards laid down in the Ministerial Regulations. At present, depending on circumstances, up to 53 different quality standards may have to be taken into account - a very significant analytical task. However, there is a smaller group of "core" parameters, between 8 and 14 in all, which form a suitable basis on which the potability of water may be judged in the majority of cases.

It may be noted that there are current E.U. proposals for the revision of the original Directive (to take account of experience gained in its implementation and to eliminate anomalies) which will involve a thorough recasting of the present requirements, in terms of monitoring categories, selection of parameters and the like. However, irrespective of the nature and extent of such changes when finally adopted, the consumer may rest assured that there will be no weakening of the primary aim of the Directive - the maintenance of good quality in the drinking water distributed to the consumer.

WHICH ARE THE MOST IMPORTANT QUALITY STANDARDS?

As just mentioned, the provision of water fit for human consumption is the paramount aim of the Directive and the Drinking Water Regulations, and, as mentioned below, the parameters with health connotations are clearly the most important. The relevance of the various other standards depends in large part on the local circumstances which apply to a given water supply.

For example, if the source is boggy surface water, considerations of colour and pH [i.e. acidity or alkalinity] may be very important. In a mineral-rich area the presence of iron or manganese may be a major influence on quality. If the

water is supplied, say, to a block of older urban housing with metallic piping the presence of lead will have to be taken into account.

While the authorities very carefully choose their abstraction points (the places where they take water into their mains, either for treatment first or for immediate distribution) there may be cases where these are subject to contamination. Unless an abstraction point on a river, for example, is so far upstream that there is no chance whatever of contamination resulting from farming or industrial activities, there is always the possibility (however remote) that discharges could cause pollution of the source. In like manner, unless septic tanks or animal slurry pits or other sewage outlets are kept far away from ground water sources - wells or springs - there is always some risk of contamination of the supply.

In Ireland, far and away the most important standards are those which relate to contamination by sewage or by animal slurries, as these are of direct relevance to public health. The appropriate standards are those for "Total Coliforms" and "Faecal Coliforms", though others may also be applied in particular circumstances.

WHAT ARE COLIFORMS?

The micro-organisms (microscopic species) which cause such water-borne diseases as gastroenteritis, cholera and typhoid, for example, come from the intestines of "carriers", as they are known. These are humans or farm animals which perhaps have had one or more of such diseases in their lifetime or which have become infected by the micro-organisms concerned without in fact manifesting symptoms of the disease. The number of carriers in any community is unknown, so that the exact risk to the consumer resulting from sewage contamination of the water supply cannot be ascertained.

Because of the possibility of the numbers of infectious micro-organisms ["pathogens"] being infinitesimal, with the consequence that their detection by the customary sampling and analysis procedures is likely to be very difficult, if not impossible, an indirect approach has had to be adopted. It happens that huge numbers of micro-organisms belonging to the "coliform" group are excreted from the intestines of all humans and farm livestock, effectively ensuring that the populations of coliforms in sewage or slurry will far outnumber the pathogens.

Water potability is therefore routinely and successfully assessed on the presence or absence of faecal coliforms. If none are present it follows that there is no sewage contamination. If faecal types are found then there is the *possibility* that pathogens may also be present and the water is judged unsuitable for drinking. There are other coliform-type organisms which are of non-intestinal

origin (e.g. from soil) and these are also determined in drinking water in a parallel test to that for faecal coliforms. Thus, the parameter "Total Coliforms" comprises both faecal and non-faecal types. As a further measure of safety in the assessment of quality of drinking water, there should be no "total" coliforms present, as well as no "faecal" coliforms.

BUT ARE COLIFORMS DANGEROUS?

In the context of water quality coliforms are of significance only as "indicator organisms", so-called. They are thus designated because they are determined only to ascertain the possible presence of pathogens; they are not hazardous in themselves and are suitable as indicators because they derive from the same source as the pathogens but are excreted in far greater numbers than the latter.

As just mentioned, "non-faecal" coliforms can originate in soil, for example, and the analytical procedures have accordingly been designed to differentiate between faecal and non-faecal types. In practice two separate analyses are carried out on each sample, one for "Total Coliforms" and the second for "Faecal Coliforms".

Although coliforms are not themselves a hazard, a major factor of safety is built into the assessment of potability by the application of the strictest possible standard - *a drinking water conforms to the Regulations only if there are NO Total and NO Faecal coliforms present.*

WHO DECIDES THE FREQUENCY OF SAMPLING?

While there are about 90 sanitary authorities in all, the number of separate bodies actually reporting individually on the quality of Irish water supplies is less, of the order of 50. [This is because several county councils include the results of monitoring for urban district councils with their own return, especially where the latter are supplied with drinking water by the former.]

Even so, with so many different bodies involved there is scope for great unevenness in the monitoring coverage across the country. Partly to counter this but, more importantly, to ensure that supplies are tested to at least a specified minimum frequency, as discussed earlier, the Ministerial Regulations also lay down minimum sampling frequencies, graded according to the size of the population served by the respective supplies.

HOW WELL HAVE THE SANITARY AUTHORITIES DONE THEIR JOB?

The best testament to the success of the sanitary authorities in providing the public with potable water is the virtual freedom in Ireland from water-borne diseases originating in public water supplies. As remarked earlier, for many years past drinking water quality has been monitored successfully, and potability safeguarded, although the nature and extent of surveillance programmes was not defined formally. The making of the Ministerial Regulations in 1988 imposed a regular framework for monitoring and from 1989 onwards the various sanitary authorities have adapted or extended their monitoring to conform with the requirements. With the Regulations in place, there is no scope for complacency on the part of the sanitary authorities, not that this has ever been the case in practice.

It may be noted that, as the Regulations (and, correspondingly, the E.U. Directive) relate the required frequency of sampling and analysis to the size of population served by the respective supplies, those large urban supplies will be assessed much more frequently than those serving small clusters of rural houses. Indeed, for supplies serving populations of less than 1,000 (which covers very many Irish supplies) the sampling frequency is at the discretion of the sanitary authorities.

To their credit, many of the authorities have extended their surveillance of quality far below this threshold and have examined some very small private rural supplies in addition to all their public supplies. To do this places a heavy burden on the monitoring resources of many authorities with the consequence that not all have been able to adopt a similar approach, leading to considerable unevennesses in the coverage.

But a major benefit of the Regulations is that they ensure that the public supplies are examined at a uniform minimum frequency throughout the country. While this mandatory level of monitoring is at quite a modest frequency the Regulations also cover monitoring in cases of accidents or emergencies. Thus if there is, for example, an accidental discharge of polluting matter to a river upstream of a water abstraction point, the sanitary authority on being notified will promptly set up a special surveillance programme to monitor the risk to its drinking water source.

WHAT TESTS ARE CARRIED OUT ON DRINKING WATER AND WHY?

The "core" range of 8-14 parameters has been referred to earlier. In the main they comprise the parameters set out below, which are generally determined routinely. It may be noted that the Regulations require an augmented frequency

of coliform analysis on supplies (the majority) which require disinfection before being distributed to the consumer.

Odour Consumers will not readily accept a water with an odour, for example, of chlorine. A major constituent of household bleach, chlorine is added to water in order to disinfect it, i.e. primarily to rid it of coliforms and pathogens which may be present in the "raw" water. However, when the dosage is correctly carried out there should be no odour of chlorine at the tap in the consumer's house.

Taste The same considerations apply as for odour.

Turbidity This is a measure of the clarity or otherwise of a water. A cloudy water is not acceptable to the consumer nor is it necessarily safe to drink. If there is turbidity present the disinfection process could be rendered less effective.

Temperature This has implications for palatability (the general "flavour" of the water - whether or not it is pleasant to drink) and for its microbiological quality. If the temperature is above the limit of 25 degrees C the growth of micro-organisms may be stimulated.

Conductivity This gives a general indication of the level of dissolved matter in the water, for example the natural constituents that cause hardness. The parameter is of greatest significance when values differ suddenly from those usually recorded.

pH This is an indication of how acid or alkaline a water is. Very few waters are "neutral" (with a pH value of 7.0), in some areas they are naturally acid [values below 7.0], at times very much so, but the majority of waters tend to be slightly alkaline with pH values in the range 7-8. While waters of extreme pH, either high or low, will be unpalatable, greater concerns are the tendency of acid waters to dissolve ("leach out") metals from pipework and of alkaline waters to deposit scale in pipes etc.

Nitrates This is a parameter with direct implications for public health, specifically that of infants up to 6 months old. Excess nitrates cause the so-called "blue baby" syndrome. The hazardous level for nitrates is quite high and the permitted limit [50 milligrammes nitrate/litre] reflects this. While the great majority of Irish drinking water supplies are well below this figure, there is a small number of waters which exceed the limit.

Nitrites In contrast to nitrates the limit for nitrites is relatively low, though again very few Irish drinking waters exceed it. Nitrites are a direct hazard to the health of the consumer.

Ammonia The main implication of excess ammonia levels is the possibility of associated faecal contamination. A major source giving rise to ammonia is urine and high ammonia levels may indicate sewage pollution.

Total and Faecal Coliforms The cardinal importance of testing for the presence of total and faecal coliforms has already been discussed.

Residual Chlorine This is the determination of the amount of chlorine remaining in the water as it reaches the consumer, having passed through the distribution system. The level of chlorine is not subject to any given limit but the test is mandatory for sanitary authorities which are anxious to ensure that a small, but significant, quantity of chlorine remains present in the water along the distribution system in order to provide continuing disinfection right down to the consumer's tap....

ARE THESE THE ONLY TESTS CARRIED OUT?

Not at all. The complete list of 53 parameters covered by the Regulations has been mentioned earlier and, while it would be exceptional for all 53 determinations to be made on an individual water, it is very often the case that parameters outside the "core" just discussed will be analysed. Several parameters which are routinely (or very frequently) determined are mentioned below in addition to those listed above.

One very widely determined parameter in drinking water is its **colour.** This is derived from the presence of vegetable matter either in or in contact with the raw water. The main objection to excessive colour in water is on aesthetic grounds - the water does not look "clean". Even though a coloured water may otherwise be quite potable it may be rejected by the consumer.

Wherever **aluminium** is used in the treatment of the raw water (mainly to remove colour) analysis for it will be carried out on the finished product; likewise in the case of **fluoride.** **Iron** and **manganese** are known as "nuisance" parameters because, while not a risk to health, high concentrations can cause severe domestic problems. Sometimes the metals settle out as solid matter in the water; or else they can cause severe staining of clothes being washed; or they can deposit as discolouration on food being cooked. Accordingly, wherever iron and manganese occur they will certainly be included in drinking water analysis.

Mention has been made of the possibility of water dissolving metals from pipework. While **copper** and **zinc** can arise from this cause, neither is a health problem but is, rather, a nuisance parameter. Of far greater significance is **lead**

which is both toxic and cumulative. Thus, if a consumer is exposed to a source of lead, for example, very small levels in drinking water, over a long period, there will be a progressive build-up in the body and ultimately toxic effects may occur. Hence the increasingly strict limits for this metal.

There are several other toxic metals, for example **cadmium, chromium** and **mercury,** which are the subject of very stringent limits, and which are analysed for as circumstances dictate. The same is true of different types of *synthetic organic compounds* such as **pesticides** and **hydrocarbons.** The main point about all such materials is that they are highly unlikely to occur naturally and their presence in raw water or drinking water is indicative of contamination arising from a source of such materials.

For these materials, which are often very difficult to determine, a common procedure is to carry out "background screening", i.e. a thorough "once-off" survey which will hopefully establish the absence of such undesirable substances. Subsequent partial monitoring and a thorough knowledge of any agricultural or industrial developments in its area will enable the sanitary authority to verify the continuing absence of such materials.

WHAT IS THE E.P.A. ROLE IN REGARD TO DRINKING WATER QUALITY?

The E.P.A., under its Act, has statutory responsibilities in regard to drinking water. The Agency has the duty of preparing an annual report on the quality of drinking water in Ireland. The report on drinking water for 1994 is the fourth such report to be compiled by the E.P.A.; the two earlier volumes in the series were produced on a non-statutory basis before the Agency was established. The tasks of providing potable water, distributing it and assessing its quality as it reaches the consumer, will still be the responsibility of the sanitary authorities.

The Environmental Management & Planning Division of the Agency also has the task of ensuring that the drinking water monitoring carried out by the sanitary authorities is both adequate in its coverage and competently executed. Close liaison between the authorities and the Agency is thus necessary and a good working relationship is being developed, with the common aim of overcoming whatever shortcomings there may be in the present monitoring programmes.

The Agency may also undertake sampling and analysis on its own account, for example, to supplement the activities of the sanitary authorities. In late 1995 the E.P.A. carried out, with the cooperation and assistance of the authorities, a specially designed "background" survey to determine the levels of certain pesticides (if any) in a representative selection of public water supplies. It is

anticipated that a short report on this study will be published by the E.P.A. in the first half of 1996.

ARE THE REPORTS ON DRINKING WATER COMPREHENSIVE?

They are both wide-ranging and specific, and they deal with each supply - small or large - for which quality data are returned by the sanitary authorities. While the reports do not contain complete analytical results for all samples taken (on the practical grounds that such a volume would be impossibly big), *full details are given for each parameter in every supply in the country which is in breach of the Regulations,* even to the slightest extent.

ARE THE REPORTS AVAILABLE TO THE PUBLIC?

Yes, without restriction. Copies are on sale by the Agency at the address given on the title page of this summary. They are also circulated to the Government, all sanitary authorities, and to the Commission of the European Union. All Irish reports from 1989 onwards have been forwarded to the Commission.

Drinking Water Quality in 1994

WHAT ARE THE STATISTICS OF THE 1994 SURVEY?

Countrywide monitoring returns were submitted to the E.P.A. by 50 sanitary authorities for 1994. The comprehensive data related to a total of 14,200 samples from some 1,660 drinking water supplies. The corresponding figures for 1993 were 13,100 and 1,500, respectively. The total number of individual analytical determinations carried out in 1994 was some 85,000, which, interestingly, was virtually identical to the figure for 1993.

WHAT ARE THE PRINCIPAL FINDINGS OF THE 1994 MONITORING?

The main point to note, as a matter of satisfaction, is that the 1994 survey shows that overall water quality continues to be satisfactory, especially in the public supplies. However, once again there are no grounds for complacency on anybody's part as examination of some of the detailed data shows that modest improvements in quality relating to some parameters are offset by slight losses in quality for others.

Although there was an increase of some 10 percent in the overall total number of samples taken in 1994 as compared with the previous year, many authorities having established the quality of some supplies again reduced the level of monitoring of these, in order to allow them investigate supplies which had not been examined previously. Thus there was an increased emphasis on monitoring of group schemes and small private supplies. In general, the latter supplies are examined for fewer parameters than the public supplies (though, of course, there is a continued emphasis on bacteriological quality), so that the increase in sample numbers is not always accompanied by a net rise in the number of analytical determinations, as indicated above.

The comparative breakdown of supplies by type is shown in the following table, while Figure 1 gives a visual picture of the 1994 data.

Table 1

BREAKDOWN OF SUPPLIES EXAMINED IN 1993 & 1994 [%]

Year	Public Supplies	Group Supplies	Small Private Supplies
1993	60.3	31.6	8.1
1994	56.6	35.4	8.0

WHY IS THE SIZE OF SUPPLY EXAMINED SIGNIFICANT?

The larger supplies are the public ones - those which provide water to our cities and towns, and large regional schemes in some rural areas. The great majority of such supplies are treated before distribution to consumers. Often this treatment is very elaborate but, whatever its scale, if it operates efficiently it ensures that the water reaching the consumer is free of problems. Although perfection is an ideal, and problems arise in practice, it is generally true that whatever their quality deficiencies the waters are potable and without risk to public health.

In the case of private supplies, which may be relatively large (e.g. extensive group schemes) or quite small (e.g. a well serving just a handful of people), in many cases there are either no treatment facilities or limited treatment capability. While the existence and proper use of disinfection equipment on its own should in most cases be enough to guarantee potable water, in many instances the chlorination equipment (where available) may be operated incorrectly or not at all, with sometimes grave consequences for water quality.

Furthermore, the chance of there being any treatment available to a small private supply is extremely slim. This is not to imply that private wells are not suitable sources of drinking water. Not at all, but the key to a good supply is its being free from the influence of pollution sources. All too often, the relative positions of private wells and septic tanks or farmyard slurry pits are such that significant pollution of the water produced is inevitable.

All the full reports in this series have made the general observation that the smaller a water supply is, the greater is the risk of its being polluted. The 1994 data have been analysed according to supply and offer support of this assertion. Coliforms were detected to greater or lesser extent in a total of some 8.7 percent of the public water supplies in 1994. [Many of the occurrences were slight but, it will be remembered, even a single non-faecal coliform presence is a breach of the Regulations and must be taken into account.] Applying the same criteria to the group supplies examined, the data show coliform presence in 45.5 percent of waters examined.

It may be added that the corresponding coliform percentage occurrence for the small private water supplies in 1994 was 48.5, significantly less than in 1993. However, the selection of such supplies for inclusion in monitoring programmes is less systematic than for other waters, and the numbers examined are fewer, so that no firm conclusions can be drawn from the data. However, the broad trend of the data supports the supply size/pollution incidence thesis.

FIGURE 5 : ALUMINIUM - AMMONIUM - COLOUR

Summary of the 1994 Findings

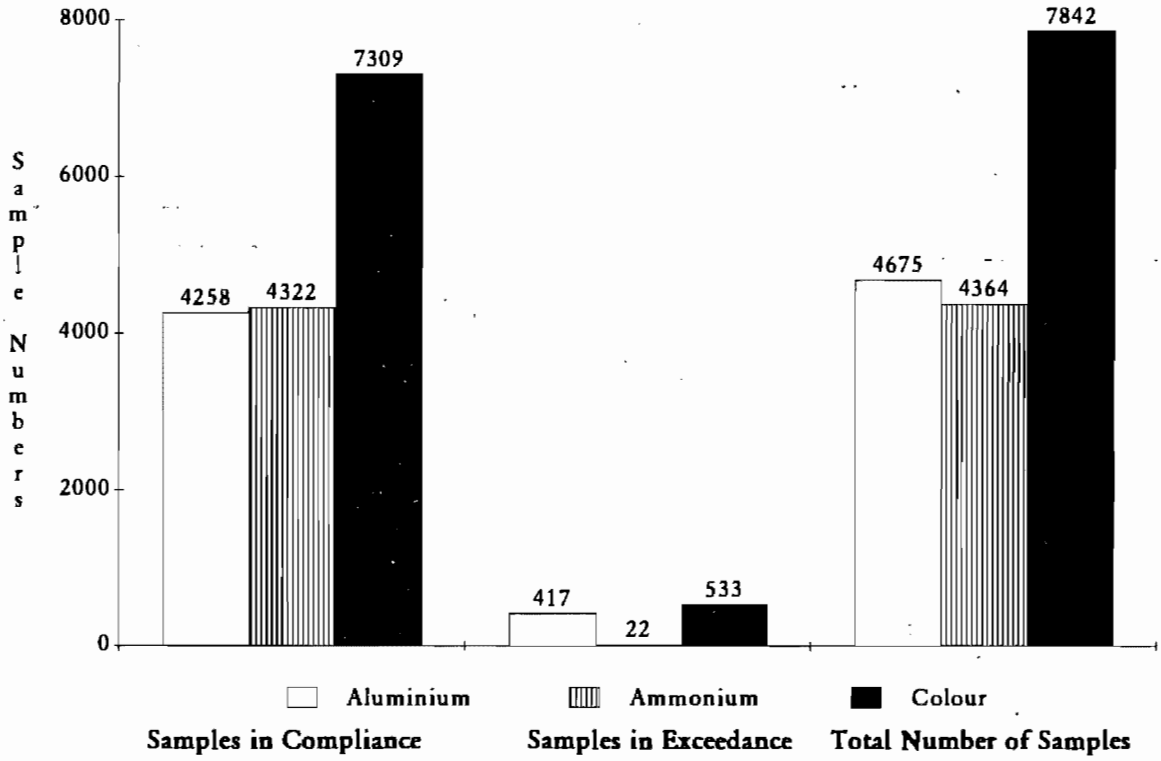
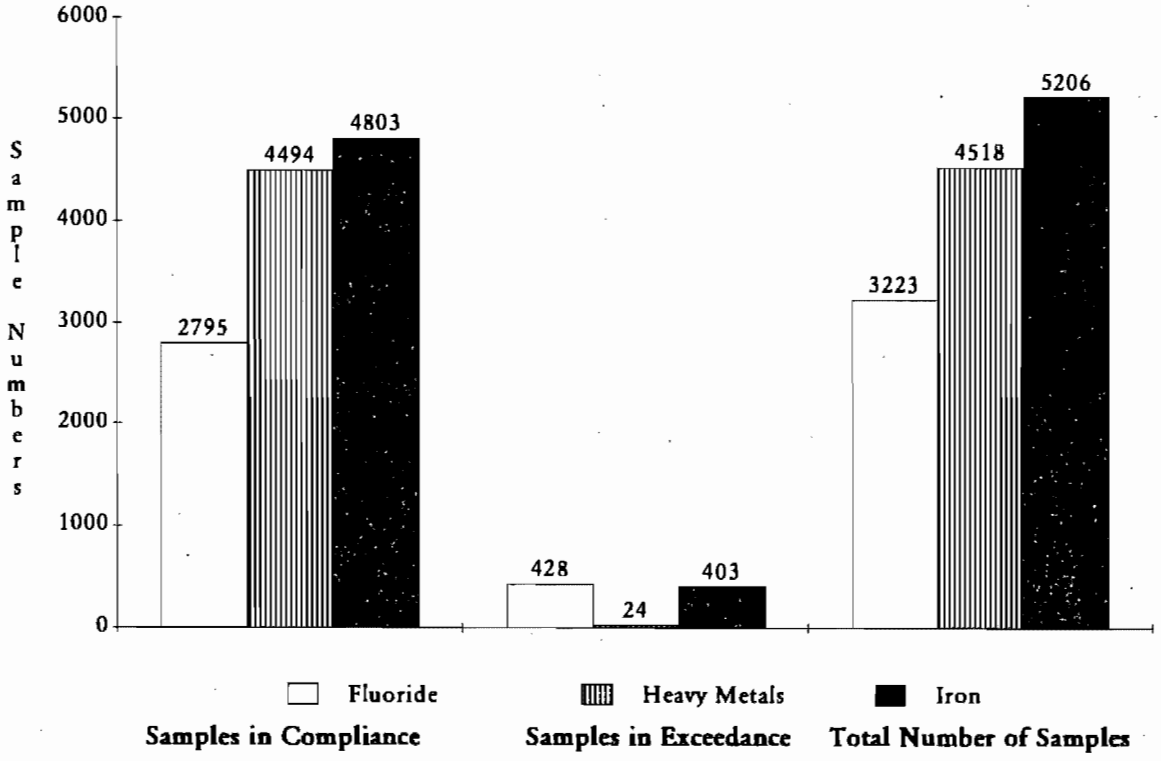


FIGURE 6 : FLUORIDE - HEAVY METALS - IRON

Summary of the 1994 Findings



ARE THERE SERIOUS PROBLEMS WITH OUR WATER SUPPLIES?

As discussed above, there is some serious coliform contamination of a number of supplies, especially the smaller ones. The limit, as we have seen, is NO Total and NO Faecal coliforms, so that there are numerous supplies which fail to meet the required standard. However, in order to take a balanced approach to problem supplies, the complete report for 1994 grades the water supplies which break the limit according to the extent of the excess. It is clear that a supply showing a few Total but no Faecal Coliforms poses less of a health risk than one where there is even minimal Faecal Coliform presence. *None, however, may be regarded as satisfactory.*

Aluminium was perceived by the public as a serious problem in drinking water some years ago, largely because of its possible connections with Alzheimer's Disease. Although subsequent scientific reports cast doubt on the possible relationship between the metal and the disease, its presence in water (derived from its use as a treatment additive) is clearly undesirable. However, in the past few years there has been a major reduction in the extent of aluminium excess, thanks mainly to improved treatment plant control. But there are still numerous cases of breaches of the Regulations, though few are very excessive. Also, most are non-recurrent, so that the public health consequences are negligible. However, the remaining problems of aluminium warrant prompt remedial action.

Nitrates and nitrites, along with fluoride, are the principal remaining parameters with public health connotations. It has been established that there is no significant problem with metals such as copper, lead and zinc, although iron and manganese are a major nuisance problem in specific supplies. Fortunately, the number of nitrates and nitrites values in breach of the Regulations is minuscule. However, a few supplies need attention urgently because of persistently high nitrates levels.

Fluoride is still frequently in excess. While it is added to drinking water in order to prevent dental decay, especially in children, the continued presence of excess levels [i.e. persistent values well above the permissible limit] can have a damaging effect on teeth. While few levels found are such as to cause concern on grounds of dental effects, there are too many cases of the Regulations being breached. This is difficult to understand as the addition of fluoride should be far more amenable to precise control than other treatment additives. Remedial measures to resolve this matter are needed urgently.

Most of the remaining breaches of the limits relate to colour, iron, manganese, odour and taste, each of which is of concern primarily for its nuisance value. Colour is a natural constituent of raw water and is very variable, so much so that it can defeat at times the efforts of treatment plant to remove it.

FIGURE 7 : MANGANESE - NITRATES - NITRITES

Summary of the 1994 Findings

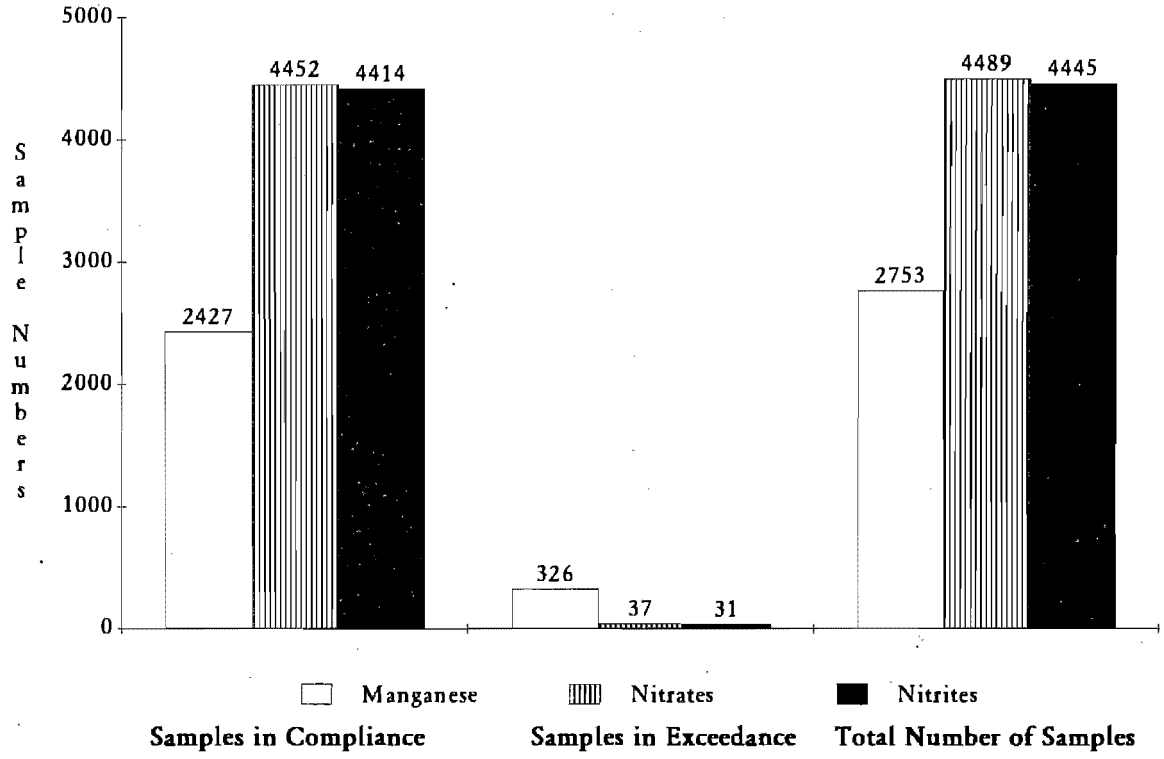
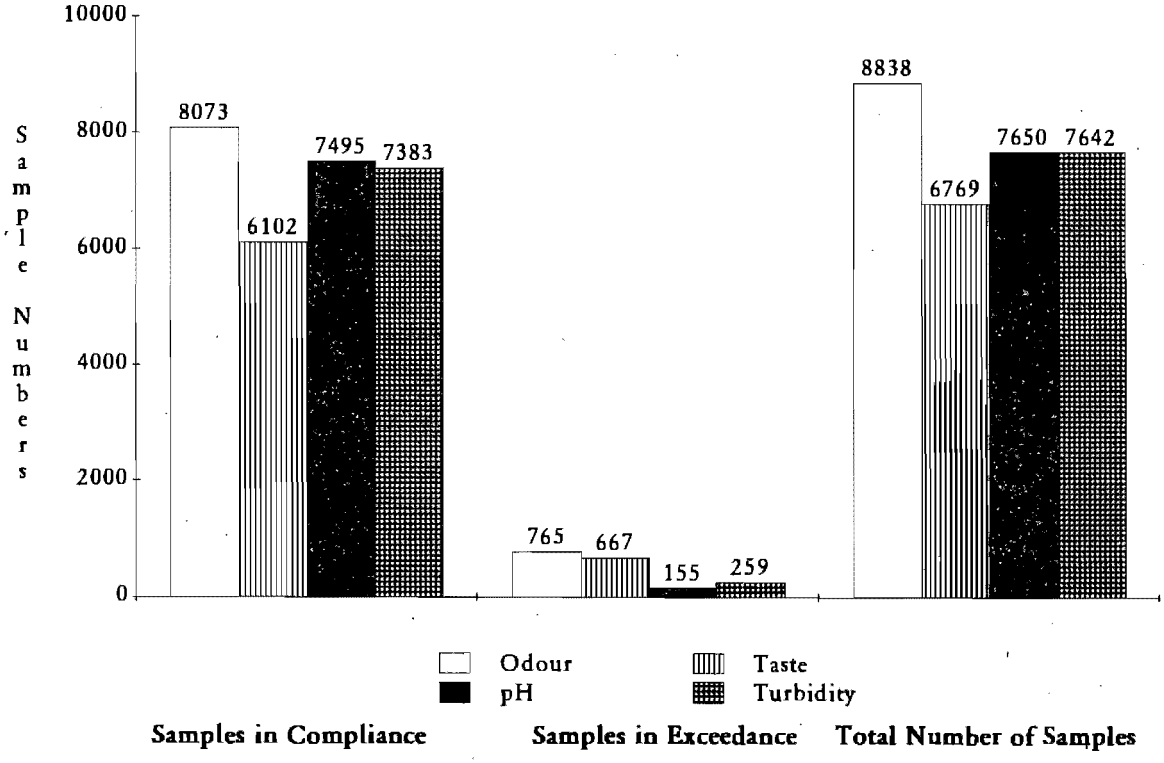


FIGURE 8 : ODOUR - TASTE - pH - TURBIDITY

Summary of the 1994 Findings



However, occasional residual colour is not a serious matter. Also of natural origin are iron and manganese, which can vary enormously in concentration according to circumstances. They are not usually a problem in the major public supplies but are a feature of many rural supplies.

Odour and taste can arise from many causes but the unquestionable factor underlying the large number of occurrences of odour and/or taste in Irish drinking waters remains the presence of excessive chlorine. While it is a fact that the whole process of chlorination in all its ramifications is far more complex than is fluoridation, it is simply the case that there are far too many instances of excess chlorine reaching the consumer. This is not a public health concern, rather is it a considerable nuisance to the consumer who may find the water unsuitable for everyday domestic purposes. Sanitary authorities should address this problem urgently.

WHAT IS THE OVERALL POSITION, IN SUM?

Public water supplies are very largely free of any problems relating to public health, which is a continuing important (and most welcome) finding. But there remain significant numbers of instances where nuisance parameters - colour/iron/manganese/odour/taste - are at unacceptable levels. Where such nuisances are not attributable to natural causes (primarily in connection with odour and taste, as just discussed) there is little excuse for their prevalence. The same holds for aluminium and fluoride which, though potential health hazards, occur mainly at nuisance rather than risk level. However, this in no way justifies their occurrence in many supplies.

More serious problems, almost exclusively the presence of coliforms, occur with private group schemes and with small private supplies. Some of these are very contaminated and are unfit for human consumption. Such supplies are not the responsibility of the sanitary authorities which are, however, charged with the duty of monitoring them. In addition, when an authority becomes aware of a supply which is unfit to drink it must notify those responsible for the supply (e.g. a local committee) of the position and of the remedial action necessary. This procedure is followed carefully by the authorities which also place appropriate public notices in the local press advising consumers of the problems.

Dealing with Problems

WHAT DO I DO IF THERE ARE PROBLEMS WITH MY DRINKING WATER?

First of all, establish as fully as possible the nature of the problem(s). Note if any perceptible changes occur when the water is run to waste for a minimum of *two minutes* - if there are visible solids, do they disappear or become more apparent? If there is an odour, does it improve or get worse as the water runs? Does the colour change at all? Note also if you have observed changes in the appearance of the water when it is boiled, or when it is let stand in contact with air. Does it become discoloured or do solids appear? Describe as fully as you can the taste and/or odour of the water. A useful way of doing this is to compare it with the odour, say, of some familiar substance like household bleach.

Next, having listed as precisely as possible the problems you are experiencing, contact the body responsible for supplying you with drinking water - the sanitary authority or the committee administering the group scheme - and report on the situation. Be as helpful as possible to those you contact about the matter. *Remember that both the consumer and the supplier have a mutual interest in ensuring the quality of the drinking water which they respectively use and provide. It is quite possible that your contact with the supplier of water might be the first indication that a problem exists.*

Follow carefully any advice given to you in regard to further use of the affected supply. Try to distinguish between those problems which might have a health connotation and those which are primarily a nuisance, however serious. Try also to group separately those activities which are dependent on and independent of water quality. For example, drinking, cooking, personal hygiene (especially oral hygiene) and the like must have potable water, whereas laundry, watering of livestock, exterior cleaning (of yards, cars and so on) do not require water of prime quality.

BUT IF MY PRIVATE SUPPLY IS UNFIT TO DRINK WHAT DO I DO?

Most importantly, consider the position coolly! Take the approach just mentioned of sorting out activities which do and do not require potable water. Remember that in small supplies and affected group schemes it is almost invariably sewage or slurry contamination, manifested as the presence of Faecal Coliforms, which is the source of the problems.

As a short-term measure make sure that you boil water for drinking, making tea, cooking and related purposes before you use it. Always remember that it is NOT enough simply to bring the water to the boil and allow it to cool. *The*

water MUST *be boiled vigorously for a minimum of 5 minutes or, preferably, 10 minutes in order to ensure it is free of micro-organisms and hence safe to drink.* Be patient; bear in mind that the time spent in boiling the water may save a member of the family becoming ill. Further, while the cooled, boiled water will not be as palatable to drink on its own as a fresh water, remember that it is safe to drink.

For advice on the long-term solution of the problems with your private water supply consult the sanitary authority and/or your local environmental health inspector. It may well be that your supply will have to be replaced or else the cause of the contamination eradicated. But you should ensure that you receive objective expert advice before taking action.