Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

DUBLIN REGION PUBLIC ANALYST'S LABORATORY

ANNUAL REPORT 2011

Sir Patrick Duns

Health Service Executive
Dublin Mid-Leinster

Dublin Region

Public Analyst's Laboratory

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Annual Report

for the year ended 31st December 2011

CONTENTS

Acknowledgements

This Annual Report describes the multitude of analytical services that the laboratory provided in 2011. It reflects the high level of teamwork, commitment and expertise of our staff. I want to thank them all for their dedication and support during the year.

The number of accredited tests in the laboratory continues to expand. We now have over 115 accredited analyses, distributed between chemistry and microbiology. This is a major achievement by the staff and I want to fully acknowledge and complement them all for this. The robust quality system that we have in place is entirely due to the staff working to a high standard and complying with all the requirements of the quality system on a daily basis. This enables us to give to our numerous and wide-ranging customers a service with confidence and reliability, which is the fundamental of our role.

Currently we are dealing with a loss of 7.9 Whole Time Equivalents (WTE) in the laboratory that have not been replaced by the HSE. This loss of staff represents a major reduction in specialist knowledge and expertise and impacts greatly on the key testing service delivery. The laboratory is a small specialist operation with no capacity whatsoever for suppression of posts or redeployment of same. Continuing failure on an ongoing basis to fill staff vacancies is resulting in a real danger to Irish public and consumer health.

I thank Ms. Martina Queally, Integrated Service Area Manager for Dublin South/Wicklow, for her regular communication with, and careful attention to, the laboratory during the year. This supports us in our progress towards excellence in the analytical service we give to our many customers.

This Report is a full accountability to Ms. Queally and the HSE for the laboratory budget.

I want to underline the close key cooperation between the HSE Environmental Health Service (EHS) and the laboratory. Sampling and analysis is fundamental to food control and this is reflected in the beneficial and constructive collaboration between the laboratory and the EHS. I want to thank the Environmental Health Officers for providing the variety of samples, their communication with the laboratory and their full key contribution to the various programmes.

The laboratory is a complex business and it requires much teamwork and staff effort to achieve an efficient and smooth running organisation. In addition to the front-line analytical work, it embraces a multitude of other activities.

The success of the laboratory arises from all these and the success is the staffs' success.

Michael O'Sullivan.

Dr. Michael O'Sullivan
Public Analyst.

1. Introduction

1.1 Scope of the laboratory

The Dublin Public Analyst's Laboratory (PAL) is an Official Food Control laboratory within the Health Service Executive (HSE). It is administered by the HSE Dublin Mid-Leinster.

The laboratory provides both a chemical and microbiological analytical service to the HSE Dublin Mid Leinster and Dublin North East Areas which comprise the following counties:
Dublin, Kildare, Wicklow, Laois, Offaly, Longford, Westmeath, Cavan, Louth, Meath and Monaghan.

This ambit can be referred to as the Eastern Region and is equivalent to a population of over 2 million.

Additionally with the full implementation in 2011 of the agreed PALs specialisation in food chemical testing, the Dublin PAL provides a National service in its wide area of specialised testing.

In addition to the testing of foodstuffs, a substantial number of other sample types are analysed. These include water, clinical, cosmetics, environmental and miscellaneous samples. Water is a food ingredient and examination of potable water is an essential activity in official food control.

The PALD is unique amongst both PALs and the Public Health/Official Food Microbiology Laboratories (PHL/OFMLs) in providing a fully integrated and seamless multidisciplinary analytical service, both chemical analysis and microbiological examination, under one roof.

- **i)** it has a single budgetary cost-centre designation
- **ii)** there are multidisciplinary teams covering food safety control, water analysis, food complaints and food export certification testing
- **iii)** one Certificate of Analysis with multidisciplinary based conclusions is issued to our customers
- **iv)** it utilises a fully integrated LIMS incorporating both chemistry and microbiology utilising a single database
- **v)** the laboratory provides a comprehensive food safety and food quality analytical service
- **vi)** it gives an all-inclusive water analytical service
- **vii)** on a service-led and customer-led basis this powerful seamlessly integrated chemical and microbiological multidisciplinary service is fully consistent with HSE vision and policy and entirely accordant with any new health services structures, that have been announced by the Minister for Health.

1.2 Analytical services provided by the laboratory

The laboratory performs an extensive range of chemical and microbiological testing for a wide range of customer groups. Samples of food, water, clinical specimens, cosmetics, environmental and miscellaneous items are analysed. An important aspect of the laboratory service is performing substantial method research and development in response to new and emerging contaminants and toxins and extending existing parameters to new matrices and sample types.

Customers of the laboratory include

- **i)** the HSE
- **ii)** the HSE Environmental Health Service (EHS)
- **iii)** the Food Safety Authority of Ireland (FSAI)
- **iv)** the Department of Health & Children
- **v)** the EU
- **vi)** local authorities
- **vii)** *Safe*food
- **viii)** the general public
- **ix)** hospitals & GPs
- **x)** private food companies
- **xi)** Local Authority Veterinary Inspectors
- **xii)** Sea Fisheries Protection Authority
- **xiii)** other Government Departments (Agriculture, *et al*).

1.2.1 Monitoring Service Delivery to Customers

A key role of the monthly Laboratory Management Team meeting is monitoring the reporting deadlines policy for samples, SOP PALA 0018 Sample Reporting according to Timeframes and Deadlines Policy, which is reproduced in Appendix 1. The primary monitor is a LIMS Management Report (MR); the December one is shown in Appendix 2. In the MR the critical record is the column titled 'Unreported samples exceeding deadlines' in which entries of '0' reflect best customer service. In the MR presented, at year end only a small number of tests exceeded the reporting deadlines.

1.2.2 Official Control of Foodstuffs Legislation

The statutory role of the Public Analyst's Laboratory is to test food for compliance with the relevant legislation and guidelines. It plays a key role in public health and consumer protection by analysing the chemical and microbiological content of food in order to ensure that it is safe for human consumption. The laboratory has a vital role in food safety by providing objective scientific evidence for the safety and quality of the food that we eat. It provides data for the accurate risk assessment and risk analysis of food.

Accredited food testing is undertaken for:

- **i)** protection of public health
- **ii)** consumer protection
- **iii)** EU safeguard decisions
- **iv)** food safety alerts
- **v)** risk assessment
- **vi)** risk analysis
- **vii)** legislative compliance monitoring
- **viii)** targeted surveys
- **ix)** intake studies
- **x)** responses to emerging food safety issues
- **xi)** supporting the issuing of certificates for the export of food of non-animal origin to non-EU countries
- **xii)** nutritional purposes
- **xiii)** labelling
- **xiv)** quality checks.

In the chemical realm of analysis, the comprehensive analytical categories in 2011 comprised:

- **i)** contaminants
- **ii)** materials in contact with food
- **iii)** allergens
- **iv)** additives
- **v)** compositional
- **vi)** nutritional
- **vii)** quality components.

Microbiological testing comprises a broad range of enteric pathogens and indicator organisms across a wide range of foodstuffs.

The laboratory is an Approved Laboratory under the Control of Foodstuffs legislation. This means that the laboratory is approved to analyse any samples of food taken for the purposes of food control.

EU Regulation 178/2002 lays down the general principles and requirements of food law and procedures in matters of food safety. It established the European Food Safety Authority.

EU Regulation 882/2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules describes in detail how the principles in Regulation 178/2002 must be interpreted and implemented.

S.I. 117 of 2010 EC (Official Control of Foodstuffs) Regulations 2010 gives further effect to Regulation 882/2004.

The FSAI has responsibility for all National food safety. The FSAI fulfils this responsibility by means of Service Contracts between the Authority and the Official Agencies including the HSE. The fifth HSE-FSAI Contract came into force on the 1st January 2012 and is applicable for 3 years. The contract states that the Official Agency (i.e. HSE) shall carry out in its functional area on behalf of and as an agent for the Authority, (*inter alia*), the determination of compliance with food legislation by means of –

(*inter alia*) the inspection, sampling and analysis of food, including food ingredients and
the inspection and analysis of food labelling.

The Public Analyst's Laboratory provides this analytical service. It analyses foodstuff in the interest of public health and consumer protection. The production of safe food has important economic implications for Ireland as a major food exporter.

1.3 Administration of the laboratory

Distinctively, the Dublin Public Analyst's Laboratory comprises both a chemistry testing laboratory, and a microbiological laboratory that is one of the Official Food Microbiology Laboratories (OFMLs).

The Public Analyst's Laboratory is administered by the HSE Dublin Mid-Leinster and specifically within the Dublin South East/Wicklow Integrated Service Area.

1.4 Staffing and Budget

In order for this laboratory to fulfil its obligations under the HSE Service Contract with the FSAI and all its other customers it must have resources made available. The laboratory's success in a number of areas has led to pressure on resources. Our appointment as EU National Reference Laboratory (NRL) brings with it major new responsibilities which require proper resourcing by the Department of Health and the HSE.

The scope of accreditation is continuously expanding which, combined with the necessity for new method development makes it essential that resources are made available for staff and equipment.

Currently there is a loss of 7.9 WTEs in the laboratory comprising 3 following retirements, 3 maternity leave and non-discretionary WTE reductions. None of these have been filled due to the recruitment moratorium. This loss of staff represents a major reduction in specialist knowledge and expertise and impacts greatly on the key testing service delivery. The laboratory is a small specialist operation with no capacity whatsoever for suppression of posts or redeployment of same. The laboratory provides a front-line service to its customers in the critical areas of food and water safety. An important responsibility of the NRL is being the arbiter reference laboratory when analytical results are disputed by food businesses. Continuing failure on an ongoing basis to put in place replacements for staff vacancies is resulting in a real danger to Irish public and consumer health.

1.5 Developments in the laboratory

1.5.1 HSE Review of the Public Analyst and Public Health Microbiology Laboratories

The Report of the HSE Review of the PALs and PHLs was finalised in November 2008 and has been distributed to HSE management for their examination of the findings and recommendations contained therein. The Review Group took full cognisance of the recommendations of the 2004 Report "Strategic Developmental Review of Health Board Food Control Laboratories" which was commissioned by the Minister of Health & Children and undertaken by s*afe*food, the Food Safety Promotions Board.

None of the recommendations of the Reports have been implemented.

The HSE Review Report contains seven major Recommendations which if implemented would greatly benefit all service users and is a practical application of delivery reform, resulting in efficiency, integration and value for money within the HSE.

On the subject of laboratory facilities both the 2008 HSE and the 2004 Department of Health & Children (DoH&C) reports recommend that laboratory accommodation be reviewed to meet current and future requirements. This is particularly relevant to this laboratory which is providing a chemical and microbiological service to the expanding population of the Eastern, North Eastern and Midland region in addition to a National service in key areas of testing. As far back as 2000 the DoH&C proposed the relocation of the Dublin PAL because of the limitations of our present location and facilities. A planning brief for a new laboratory was completed in July 2003 and submitted to the then East Coast Area Health Board for presentation to the DoH&C.

Since moving to Sir Patrick Duns in 1996 our technical staff complement has doubled, resulting in our present accommodation being totally inadequate.

In view of the acute accommodation problem at this laboratory there is an urgent need for the HSE to advance the provision of additional laboratory facilities.

The 2008 PALs/PHLs Review Report has been considered, regarding the extent to which it falls within the scope of the work underway, by the HSE Laboratory Services Modernisation Group This Group has been charged with modernising Medical Laboratory Services, prompted by an external review of existing services.

1.5.2 Human Biomonitoring

The Public Analyst service has been invited to take part in the COnsortium to Perform Human Biomonitoring on a European Scale (COPHES), a European project which aims to monitor the environmental exposure of humans to certain chemicals by the analysis of biological material such as hair, blood and urine.

As an initial feasibility study a pilot project called DEMOCOPHES is being conducted to test whether human biomonitoring can be performed in a coherent and harmonised fashion throughout Europe, by means of developing common protocols, strategies and scientific tools. In this pilot study samples of urine and hair are being collected from 120 mother and child pairs from each participating country. The urine samples are to be analysed for cadmium, cotinine (a metabolite of nicotine to test for active and passive smoking), phthalates, and the hair for mercury. Many of these analytes are compounds already tested for in food and so human biomonitoring is a natural extension and will provide valuable information on actual exposure.

Dublin PAL is responsible for the analysis of phthalate metabolites and cadmium in urine.

The bulk of the preparation for this project took place throughout 2011 with the production of protocols and SOPs, selection of participants, training and proficiency testing. To verify the analytical competence of the selected laboratories a series of proficiency tests (PTs) were organised by DEMOCOPHES and success in these PTs was required before full participation was permitted.

The sampling was carried out by the Environmental Health Service with 60 pairs taken from an urban location (Tallaght and Blanchardstown, Dublin) and 60 pairs from a rural location (Leitrim). Along with the sample a detailed questionnaire was completed to correlate the analytical results with any environmental factors. The analysis commenced in the latter half of February 2012 and was completed within the deadline of April 2012.

The DEMOCOPHES team have advised that Ireland were the first country to send in the data for the project and this was seen as a key milestone in the project.

1.5.3 Efficiencies and Value for Money Initiatives

A continual review by the laboratory of workflows and processes, identifying and removing constraints and redundant dependencies, results in improved efficiencies. This has included employing aspects of the managerial tool Lean Six Sigma. These measures continued in 2011. In light of the overall increasingly stringent budgetary situation, value-for-money initiatives are a high priority comprising areas such as:

- **i)** engagement with HSE National Procurement for all maintenance contracts
- **ii)** planned requisitioning and bulk ordering resulting in negotiated discounts from suppliers
- **iii)** measures have been put in place to reduce supplier delivery charges
- **iv)** the benefits of the euro-sterling exchange rate are maximised for the significant amount of our supplies originating in the UK and sold through Irish agencies

v) an ongoing review of subscriptions to scientific journals and organisations leading to appropriate discontinuing of some and converting others to a more cost-effective on-line subscription.

1.5.4 EU National Reference Laboratory Responsibilities

This laboratory is the EU National Reference Laboratory (NRL) for Mycotoxins, Polycyclic Aromatic Hydrocarbons (PAHs) and Food Contact Materials (FCMs).

During 2011 the laboratory was involved in substantial NRL related work, comprising:

i) attending and contributing to workshops and plenary sessions for the NRL & Community Reference Laboratory (CRL) networks in each of the three areas of responsibility
ii) testing a number of proficiency samples, including a sample of olive oil and a herbal supplement sample, for 15+1 PAHs
iii) taking part in a proficiency test for aflatoxin B_1 in baby food, maize and animal feed
iv) taking part in a collaborative study to validate a method of analysis for *Fusarium* toxins in cereals
v) performing characterisation of pistachio and paprika samples for aflatoxin B_1 B_2, G_1, G_2 and ochratoxin A on behalf of the JRC in Geel
vi) participating in a proficiency test for formaldehyde in samples of 3% acetic acid simulant solutions from melamine kitchenware
vii) participating in a workshop on sensory analysis
viii) taking part in a proficiency test for the migration of plasticisers in Tenax
ix) taking part in a migration modelling exercise on a PET bottle
x) collaborating on an EU co-ordinated survey on gaskets in glass jars organised by the EURL for food contact materials
xi) considerable associated preparatory and post activity work.

The Cork PAL is the NRL for heavy metals.

1.5.5 Method Research and Development

The discovery of new contaminants in food together with new regulations or lower regulatory limits for existing contaminants mean there is a need for the research and development of reliable and robust analytical methods. These methods are required not just for enforcement purposes but for surveys used to assess dietary exposure. There is also a need to expand on existing methods to cover more analytes at one time to make more efficient use of finite and decreasing resources.

During 2011 method research and development was performed for the following parameters:

i) residual formaldehyde in kitchenware
ii) bisphenol A in food simulants
iii) melamine in kitchenware
iv) photo initiators
v) plasticisers in PVC gaskets

vi) mineral oil from food packaging
vii) mycotoxins, including patulin in apple juices, apple purée and other apple products
viii) ergot alkaloids
ix) PAHs (EU 15 PAHs & 1 JEFFA PAH)
x) additional honey parameters
xi) MCPD and MCPD esters
xii) solvent residues
xiii) coumarin in cinnamon-containing foodstuffs

Formaldehyde in Kitchenware

The laboratory completed the development work on the migration of formaldehyde from kitchenware and the method was accredited in 2011. Once again samples were analysed under the Food Sampling Programme (FSP). The accreditation of the method was timely in view of the introduction of the EU Regulation laying down specific conditions and detailed procedures for the import of polyamide and melamine plastic kitchenware originating in or consigned from the People's Republic of China and Hong Kong Special Administrative Region, China (Commission Regulation (EU) No 284/2011 of 22 March 2011). Some samples of melamine articles were received at the laboratory for analysis under this Regulation.

Bisphenol A (BPA) in Food Simulants

In 2011 samples of baby bottles and canned foods were examined for BPA content under the FSP. The analytical method for the determination of BPA in canned foods requires further development and this will be progressed in 2012. The analysis of the baby bottles assumed more relevance in 2011 in view of the introduction of the EU restrictions that came into force (Commission Implementing Regulation (EU) No 321/2011 of 1 April 2011 amending Regulation (EU) No 10/2011 as regards the restriction of use of BPA in plastic infant feeding bottles).

Melamine in Kitchenware

The laboratory continued its investigations into the analytical method for the determination of residual melamine in kitchenware and this work led to its accreditation during 2011.

Photo initiators

Printed food packaging is essential for the transmission of legally required information to the consumer, including nutritional content, indications of durability, presence of allergens, ingredients list, contact address in case of complaints. Food manufacturers also regard attractive packaging as a way of engaging the attention of shoppers. Photo initiators (PIs) are used in this modern printing technology.

However it has been found that the PIs can migrate from the printed material to food.

There is no specific EU legislation in place for control of PIs in food. Some such as benzophenone are listed as permitted additives in Commission Directive 2002/72/EC on plastic materials and articles intended to come into contact with foodstuffs and have a specific migration limit. Most however are not mentioned in the legislation and are therefore regarded as not permitted.

In 2011 there were 7 rapid alert notifications through the RASFF system, involving a wide range of compounds.

Development of methodology for the determination of certain PIs in foodstuff and packaging continued in 2011.

As part of our NRL responsibilities we successfully participated in a proficiency scheme organised by the CRL for FCMs. The scheme involved analysis of unknown solutions and a paper and board material impregnated with PIs.

Plasticisers in PVC gaskets

Development work continued in this important broad area of activity.

The twist off metal closures found on glass jars have a PVC gasket bonded to their inside surface that is essential for forming the air tight seal that protects the food inside from contamination. The gasket is formulated with a range of additives like plasticisers which make the PVC pliant enough to form a good seal with the glass rim. Other additives used include fillers, slip agents (which allow the lid to twist off relatively easily), antioxidants and thermal stabilisers that improve its stability with time and allow the gasket to be effective at high temperatures such as during hot filling and sterilising. These additives all have the potential to migrate from the gasket into the food.

Legislation is in place which sets maximum limits on the migration of specific plasticisers (ESBO, phthalates, certain adipates and polyadipates) into food and restricts the use of others.

Since the legislation continues to be amended to reflect changes in the technology associated with the manufacture and use of these gaskets we intend to extend the analysis to cover plasticisers in food. One such proposed legislative change will introduce a new category of total plasticisers. This may mean that to test for compliance samples will have to be analysed for a suite of analytes rather than individual compounds.

Mineral oil from food packaging

A method is under development for mineral oil in food and food packaging. A BfR conference on the subject was attended by a member of staff.

Mycotoxins

Mycotoxins are produced by many species of mould and have been found to cause contamination of foods such as cereals, nuts and dried fruit amongst many others. They cover a large number of compounds some of which like aflatoxins are highly carcinogenic. Their analysis has been carried out for many years but due to the specificity of the extraction and clean up techniques they are normally analysed as individual compounds or discreet groups. Due to advances in LC-MS/MS technology the analysis of food extracts for a wider range of analytes has become possible.

Research into developing a screening method for the analysis of a broader spectrum of mycotoxins continued during 2011, examining particularly trichothecene toxins such as T-2, HT-2, nivalenone (NIV), deoxynivalenone (DON), zearalenone (ZON) and fumonisins. This involves a large amount of work but there are substantial efficiency advantages of screening a single sample for a wider range of toxins. In addition this laboratory participated in the evaluation of a LC-MS method for the fusarium mycotoxins supplied by the JRC and this helped with the in-house development work.

During 2011 the analytical method for the additional matrices of black and white pepper, nutmeg, ginger, and turmeric, and red and white grape juice was completed and accredited.

Method development for T-2 and HT-2 in cereals is ongoing.

The zearalenone in sweet corn analytical method was accredited in 2011.

The laboratory began development work on the analysis of patulin in apple juices, apple purée and other apple products. Food samples had been analysed in previous years under the FSP but full validation and accreditation had never been performed for the method. The current work is being undertaken with a view towards eventual accreditation and also because this laboratory is the NRL for mycotoxins.

Ergot Alkaloids

The laboratory continued analytical development work during 2011 on ergot alkaloids and carried out analysis of some food products as part of the FSP. It is envisaged that the method will be submitted for accreditation at a future date, perhaps in 2013.

PAHs (EU 15 PAHs & 1 JEFFA PAH)

Polycyclic aromatic hydrocarbons (PAH) are a class of compounds, many of which are highly carcinogenic, with multiple fused aromatic rings that are formed during the incomplete combustion of organic material. They can enter the food chain during food processing, such as smoking (in the case of fish and meats) or the application of heat (in the case of extraction of edible oils from seed pulp), cooking (particularly over a naked flame) or forced drying.

As this group comprises hundreds of individual compounds, analysis has mostly focused on benzo[a]pyrene (BaP) because it was regarded as a marker compound for the others and it is also regarded as the most toxic. Commission Regulation (EC) No 1881/2006 currently in place controls the level of BaP in certain foods such as meats and seafoods, baby foods and edible oils and fats. This regulation was amended by Commission Regulation (EC) No 835/2011 to allow for an additional limit based on the sum of BaP, chrysene, benzo[b]fluoranthene and benzo[a]anthracene, as a marker for the total PAH content of food. Importantly the amendment also introduces maximum limits for some new food categories such as cocoa and derived products (chocolate), coconut oil, smoked sprats and cooked meat on sale to the final consumer. This last category covers cooked meats sold from restaurants, fast food outlets and similar.

To allow for a transition period the new limits do not come into force until the 1st September 2012 although for some of the new categories the date of implementation is extended. Also for some categories the limit will reduce over time without the need for amending legislation.

This laboratory is the EU NRL for PAHs and is INAB accredited for the analysis of the priority 15 PAHs in a wide range of foodstuffs; the most recent scope extensions cover beverages and babyfoods.

High levels of PAHs found in food are regularly reported through the EU rapid alert system (RASFF). In 2011 there were 24 such entries arising from many different foodstuffs such as food supplements, pumpkin and sesame seeds, a variety of edible oils, smoked fish products, seaweed and banana chips.

In addition to the food sampling work we took part in a method validation study organised by the European Reference Laboratory (EU-RL). The method involved setting up a system to analyse various food matrices primarily for the 4 PAHs which are to be legislated for but also where

possible for the 15+1 priority PAHs. The method involved solvent extraction using a pressurised liquid extraction (PLE) system, clean-up using gel permeation chromatography (GPC) and silica solid phase extraction (SPE) with the determination by GC-MS.

Additional Honey parameters: Diastase number, insoluble matter, acidity, conductivity

The work to develop methods for diastase, conductivity, insoluble matter in honey and free acid and acidity of honey was completed during 2011 and the methods accredited. Samples of honey were analysed for these parameters under the FSP.

MCPD and MCPD esters

Analytical methods are under development for 3-MCPD in soy sauce and MCPD esters in edible oils. The laboratory successfully participated in a FAPAS PT scheme.

Solvent residues

Methodology continues to be developed. A method for the analysis of these residues in decaffeinated coffee and oils has been validated.

Coumarin

The culinary spice cinnamon is derived from a number of sources including the aromatic bark of *Cinnamomum aromaticum*, also known as cassia cinnamon, an evergreen tree native to Asia. Coumarin (1,2-benzopyrone) is a flavouring which is found in higher concentrations in cassia cinnamon than in other types of cinnamon.

Coumarin may not be added as such to food but may be naturally present in certain foods to which cinnamon has been added. The maximum level of coumarin that may be present in cinnamon-containing foodstuffs is regulated under Regulation (EC) No. 1334/2008 on flavourings and certain food ingredients with flavouring properties for use in and on foods. The substance is regulated due to concerns regarding its hepatotoxicity. Relatively small amounts of coumarin have been shown to temporarily damage the liver of particularly sensitive individuals.

In 2011, a method was developed and validated for the analysis of coumarin in bakery products that contain cinnamon as an ingredient and was applied in the testing of a wide range of products.

1.5.6 EU Food and Veterinary Office Missions

In 2011, in response to invitations, Executive Chemist and Executive Microbiologist staff members accompanied the Food and Veterinary Office (FVO), which is based in Grange, Co. Meath, as National Experts on official missions to Portugal and Hungary and Bulgaria, respectively.

The FVO is part of the EU Directorate-General for Health and Consumer Protection.

Through its evaluations the mission of the FVO is to:

i) promote effective control systems in the food safety and quality, veterinary and plant health sectors
ii) check on compliance with the requirements of EU food safety and quality, veterinary and plant health legislation within the EU and in third countries exporting to the EU
iii) contribute to the development of EU policy in the food safety and quality, veterinary and plant health sectors

and to inform stakeholders of the outcome of such evaluations.

Each year the FVO implements an inspection programme, identifying priority areas and countries for inspection. In order to ensure that the programme remains up to date and relevant, it is reviewed mid-year. The programmes are published on the FVO website.

The purpose of the mission to Portugal was a follow-up mission to a 2010 mission that assessed the official control systems in place for food contact materials and food additives. The mission to Hungary was to assess the official control systems in place for food contact materials and food additives. The responsibility of the National Expert on the first mission was to assess the Portuguese response to the findings of the previous mission and, on the mission to Hungary, to assess that laboratories fulfil the criteria laid down in the relevant Articles of Regulation (EC) No 882/2004. To this end, the Expert examined food additive and food contact materials laboratories for compliance with official sampling and testing, auditing systems, practices and resources.

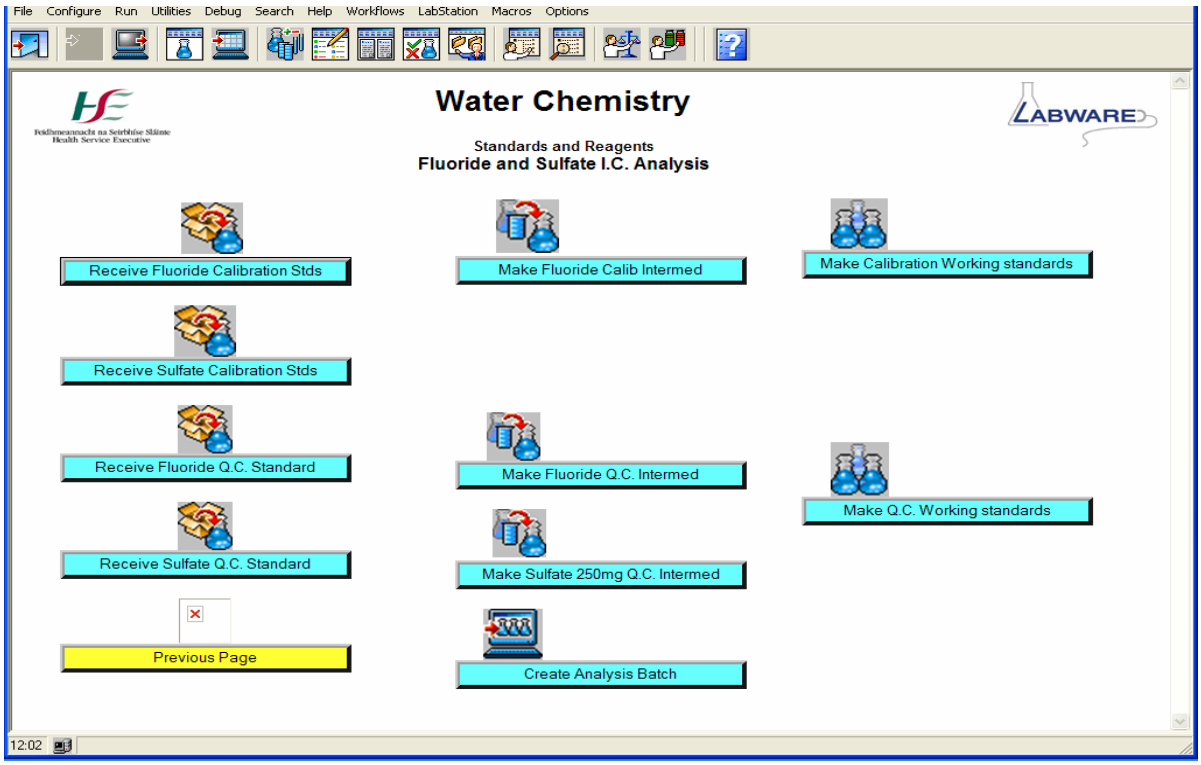
The mission to Bulgaria covered food hygiene and natural mineral waters. One of the aims was to assess laboratories performing microbiological tests.

1.5.7 Laboratory Information Management System (LIMS) and IT

LIMS development in 2011 focused on extending the LIMS implementation in the chemistry sections to make greater use of the system to record analytical data as well as sample data. To date, outside microbiology, LIMS has been used primarily as a sample data entry and reporting tool. During the year LIMS records for chemistry instruments were updated to enable the use of the LIMS Instrument Manager to record calibration, cleaning and service events electronically. Such records can now be imported directly into the LIMS-based auditing module. Work continued on a project to ensure that analytical methods are implemented through LIMS in all sections.

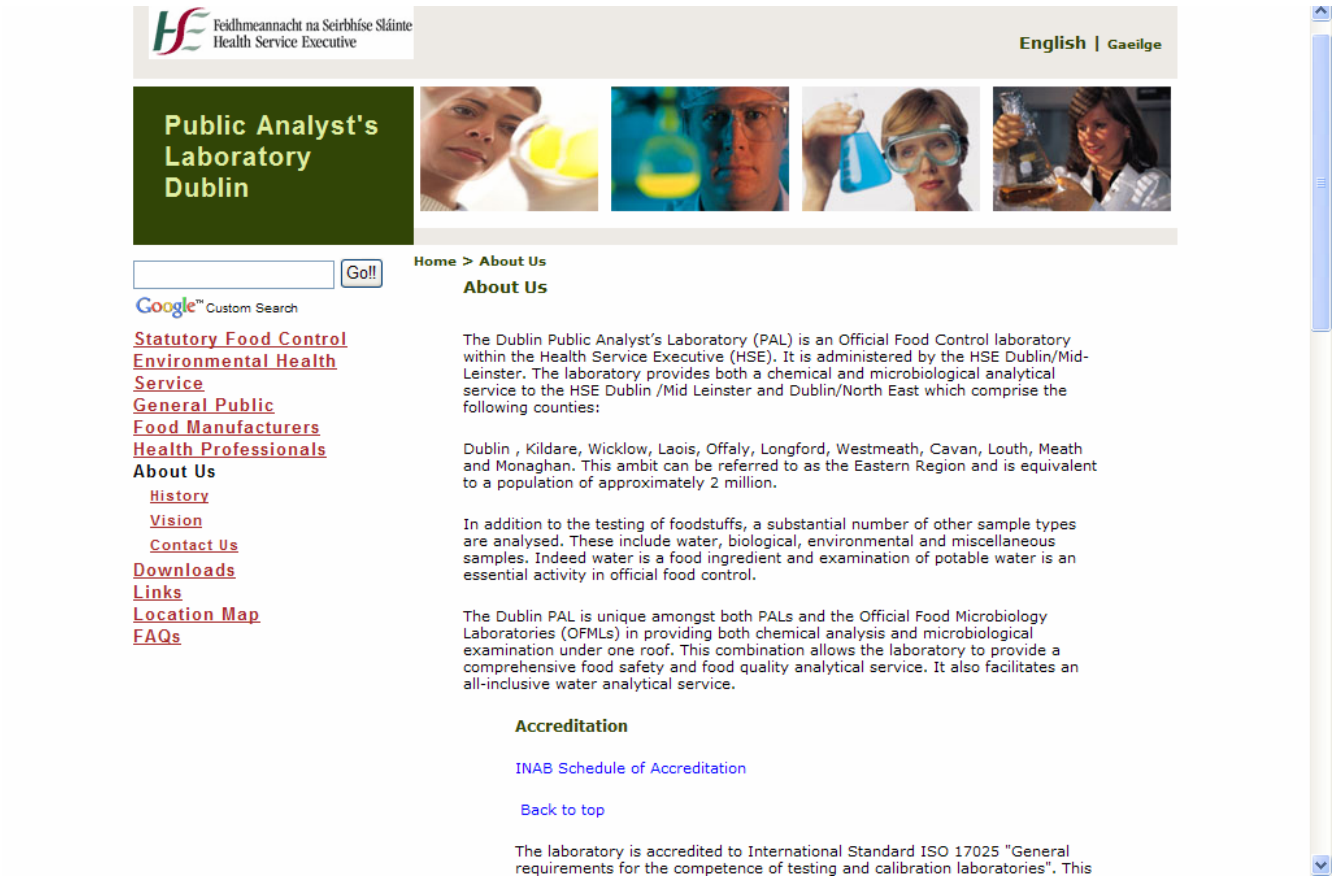
The commencement of microbiological testing of cosmetics lead to continued refinement of the LIMS implementation in this area. Some new LIMS solutions were developed for the cosmetic testing implementation. Some of these can be applied to existing food and water implementations to further improve them.

The laboratory purchased 5 days of LIMS consultancy to address routine system maintenance issues and in particular to improve the generation of test reports. In response to a request from a customer, a mechanism to generate suitable extracts to assist with electronic data transfer was developed and piloted.



1.5.8 Laboratory web page http://www.publicanalystdublin.ie/

The full content-rich web page for the laboratory is regularly updated to provide for our customers full information on our analytical services, costs thereof as appropriate, downloadable sample request forms & Annual Reports, and more.



2. Laboratory workload in 2011

In 2011 the laboratory analysed a total of **13,297** samples, comprising *c.* 70,000 individual tests. The following broad sample types, including both chemical and microbiological testing, were analysed:

Food	3455
Water – Chemical	4045
Water – Microbiological	3837
Clinical	1724
Cosmetics	154
Miscellaneous	82
Total	**13,297**

The total includes more than 400 samples analysed under Proficiency Schemes and other Quality Control programmes.

3. Food

The food testing performed by the laboratory in 2011 comprised:

- **i)** chemical analysis of Programmed Food Testing for the HSE Dublin Mid-Leinster and the HSE Dublin North East
- **ii)** a National chemical analysis service in its wide area of specialised testing.
- **iii)** microbiological examination of Programmed Food Testing and surveys for the HSE Dublin Mid-Leinster and the HSE Dublin North East
- **iv)** foodstuffs arising from the EU RASFF and Emergency Decisions
- **v)** surveys for the FSAI
- **vi)** foodstuffs from other Agencies
- **vii)** complaint samples
- **viii)** food export certification examination and analysis
- **ix)** miscellaneous food samples.

Sampling for the programmed testing was conducted by the Environmental Health Officers (EHO). Additionally certain samples were provided by Local Authority Veterinary Inspectors (LAVIs), the Sea Fisheries Protection Authority (SFPA) and the Department of Agriculture, Food and the Marine (DAFM).

3.1 Programmed Chemical Food Testing

The 2011 Chemical Food Sampling and Testing Programme was compiled following detailed discussions between the laboratory, the Cork and Galway PALs, the EHS and the FSAI. The three Regional Programmes now form a National Programme. This greater coordination of sampling and analysis has reached a new plateau with the PALs specialised testing.

The parameters and foodstuffs in the programme were drawn up on the basis of

- **i)** emerging food safety issues
- **ii)** the national obligations for monitoring of compliance with the regulations
- **iii)** NRL responsibilities
- **iv)** surveillance
- **v)** surveys
- **vi)** regional food production
- **vii)** regional concerns
- **viii)** results from previous years.

The Chemical Food Programme is available at the laboratory webpage - http://www.publicanalystdublin.ie/en/

Contaminants – Natural and anthropogenic

Organic, Inorganic, Process Contaminants

Mycotoxins

During their growth stage, many fungi have the ability to produce a diverse range of secondary metabolites which can be toxic and/or carcinogenic if ingested by animals or humans. These secondary metabolites include the mycotoxins.

Mycotoxins are very heterogeneously distributed in foodstuffs so proper sampling is critical. EC Regulation 401/2006 amended by Commission Regulation (EU) No 178/2010 specifies the sampling and analysis methods for the mycotoxins in foodstuffs for which legal limits are in place.

The National Mycotoxin Sampling Plan (NMSP) continued in 2011. Under the plan the focus of sampling points has changed from small retail samples, more the norm in previous years, to bulk or large scale samples taken according to the sampling regulations from shipments entering Ireland at the designated points of entry i.e. Dublin and Shannon and at distribution level. One of the consequent many benefits is that the analytical results are immediately actionable under the food control legislation without the necessity of repeat follow-up sampling.

In 2011 the laboratory tested a wide range of foodstuffs for the following mycotoxins:
aflatoxins, ochratoxin A, zearalenone, fumonisins, the trichothecenes DON, T-2 & HT-2, patulin.

Legislation for mycotoxins

Legislation for currently regulated mycotoxins was consolidated into Regulation EC No 1881/2006 amended by Commission Regulations (EU) No 165/2010 and 105/2010 while the *Fusarium* toxins in maize and maize products were updated in Regulation EC 1126/2007.

Aflatoxins

Aflatoxins are a group of compounds produced by strains of the fungi aspergillus flavus and aspergillus parasiticus. In certain conditions of moisture, pH and temperature the fungi can attack foods resulting in the production of a range of toxins. Food processing often inactivates the fungi but the toxins are stable and remain in the food. Aflatoxins are associated with liver cancer in humans and other mutagenic effects. The toxins are known as B1, B2 G1 and G2 with B1 being the most toxic and it is a powerful hepatocarcinogen, teratogen and mutagen. Mammals that eat food contaminated with B1 produce the toxic metabolite M1 which is then present in their milk and tissue.

Aflatoxin analysis in 2011.

82 samples in total were analysed for aflatoxins as part of the National Mycotoxin Programme. These samples were mainly taken from shipments entering the State at the designated ports.

348 tests for Aflatoxins B1, B2, G1, G2 & Total were carried out on the samples. 12 samples of dry cereal-based baby foods were analysed for aflatoxin B1. Additionally 53 samples were tested for aflatoxin M1. Details are given in Table 1.

Foodstuff	*No of samples received*	*No of samples exceeding limits for Aflatoxin B1*
	Aflatoxins B1, B2, G1,G2, Total	
Spices	23	Samples of fish fry mix, fish masala curry, red chilli powder were just above the B1 limit of 5.0 µg/kg. When measurement uncertainty was taken into account the samples did not exceed the limit and were therefore deemed satisfactory.
Whole Nuts	7	

Nut Products	16	3 Samples of peanut butter. 1 Sample of peanut cuttings - 8 times over the limit. 1 Sample of nut crackers - 5.5 times over the limit. 1 Sample of peanut candy exceeded the accredited range of the method; estimated to be 60 times over the limit.
Cereals	17 Rice 11 Popcorn 1 Cassava granules	0
Seeds	1 Melon seeds 2 Sunflower seeds	One sample of melon seeds exceeded the accredited range of the method; estimated to be 70 times over the limit.
Baby foods (Note 1)	12	0
Other	1 Coriander	No limit applies.
	Aflatoxin M1	
Milk and milk powder	28	2 Labelling
Baby foods (Infant formula and follow-on formula)	25 (Samples for DAFF)	0

Note 1: These samples were submitted for multi-parameter testing, with other suites of analysis including ochratoxin A and PAH analysis.

Table 1 Details of aflatoxin testing in 2011

Ochratoxin A

The ochratoxins are a group of mycotoxins produced by various *Penicillium* and *Aspergillus* species with the main analogue ochratoxin A (OTA) found in naturally contaminated foods such as cereals, coffee beans, cocoa beans and dried fruit all over the world. It has also been detected in cereal products, coffee, wine, beer, spices and grape juice, and in products of animal origin such as pig kidney. Foodstuffs are frequently contaminated. OTA has carcinogenic, nephrotoxic, teratogenic, immunotoxic and possibly neurotoxic properties.

Ochratoxin A analysis in 2011

123 samples were tested for ochratoxin A. The details are in Table 2.

Foodstuff	*No of samples*	*No of samples exceeding limits*
Coffee	8	0
Baby foods	12	0
Beer	8	0
Paprika & Chilli	10	2 Chilli
Turmeric	7	0
Ginger	3	0
Nutmeg	6	0
Black & White Pepper	10	0
Cereals	10	0
Dried vine fruits	7	0
Wine	12	0
Liquorice	5	0
Grape juice	5	1 Labelling
Chocolate	8	1 Labelling
Baby Foods	12	0
Mixed Spices	12	0

Table 2 Ochratoxin A analysis

In addition 2 large scale samples of dried vine fruit were analysed for Ochratoxin A under the National Mycotoxin Sampling Plan. Both were satisfactory.

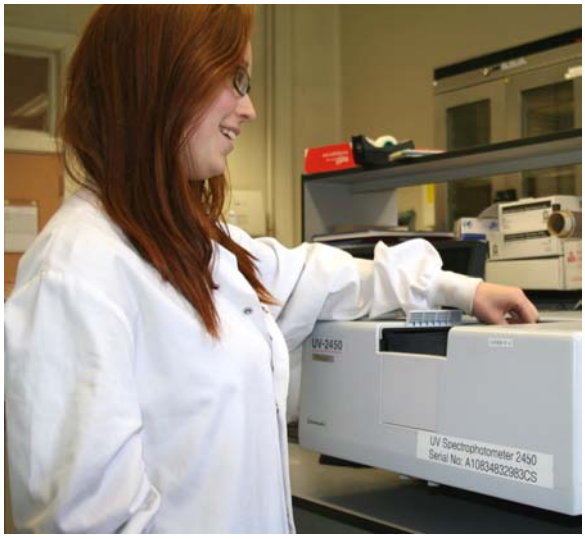
In 2011 due to the continued implementation of the National Mycotoxin Sampling Plan fewer retail samples of certain matrices were tested for ochratoxin A, compared to 2010. Nevertheless the number of samples analysed increased because of the introduction of additional matrices.

Where possible, because of the more extensive use of multi-parameter testing samples submitted for ochratoxin A analysis were additionally analysed for other relevant mycotoxins.

Other mycotoxins - Zearalenone, Fumonisins, Trichothecenes T-2, HT-2, DON.

These toxins are produced by various *Fusarium* species which are known to colonise cereals and which develop during cool and wet growing and harvest seasons. Zearalenone possesses strong oestrogenic properties. The most important effect of zearalenone is on the reproductive system, particularly of animals.

Fumonisins had been associated mostly with maize but have subsequently been found in other products, including rice, sorghum and navy beans, but so far in much lower concentrations than are common in maize.



Fumonisin B_1 has been shown to be causative of a number of syndromes and conditions in animals; in humans it has been statistically associated with the prevalence of oesophageal cancer.

Intake estimates indicate that the presence of T-2 and HT-2 can be of concern for public health. There is still no legislation for T-2 and HT-2 as the impact of these mycotoxins on public health continues to be the subject of debate.

Results from the investigations into the trichothecenes and the other fusarium mycotoxins in 2011 are given in Tables 3 and 4 respectively.

In accordance with the policy of further progressing the multi-parameter testing of samples, 3 analytical tests were performed on all samples listed in Tables 3 and 4.

The EU Commission states that more information is required as a priority on all aspects of these toxins.

International bodies continually assess the risk posed by mycotoxins as new information comes to hand. Therefore it is important that this type of monitoring continues to be performed.

Foodstuff	*Parameter*	*No of samples*	*No of non-complaint results*
Cereals	T-2, HT-2	18	0
Cereal based baby foods	T-2, HT-2	16	0
Cereals	DON	18	0
Cereal based baby foods	DON	16	0

Table 3 T-2, HT-2 & DON

Mycotoxin	*Foodstuff*	*No of samples*	*No of samples exceeding limits*
Zearalenone	Cereals, cereal products	21	0
Zearalenone	Cereal based baby foods	16	0
Fumonisins B_1, B_2	Cereals & cereal products (mainly corn)	21	0
Fumonisins B_1, B_2	Baby foods	20	2 (Labelling)

Table 4. Testing for further mycotoxins.

Patulin

In 2011 fifteen juices and ten other apple products were tested for patulin content. All were satisfactory bar one of the juice samples that contravened labelling legislation.

Ergot Alkaloids

In 2011 testing continued on samples of cereal products for their ergot alkaloid content. Samples were analysed for six alkaloids (ergometrine, ergosine, ergotamine, ergocornine, α-ergocryptine and ergocristine). There is currently no EU legislation for ergot alkaloids in cereal products. The details are given in Table 5.

Foodstuff	*Parameter*	*No of samples*	*No of non-complaint results*
Cereals	Ergot alkaloids (6)	24	N/A

Table 5 Ergot Alkaloids

Polycyclic Aromatic Hydrocarbons (PAHs)

In 2011 108 food samples were analysed for PAHs, including 3 samples analysed as received and prepared for consumption. This resulted in a total of some 1665 individual tests. The results are presented in Table 6.

Foodstuff	*Number of samples*	*BaP µg/kg*	*PAH range µg/kg*
Teas/Coffees (as received)	12		<1.0 – 45.5
Teas/Coffees (brewed)	3		<0.2
Drinking chocolate	6		<1.0
Food supplements/Chinese Medicines	15		<0.2 – 89.7
Smoked meat/fish and meat/fishery products	12	16.3	<0.2 – >20.0
Babyfoods	7		<0.2 – <0.8
Herbs/Spices	6		<0.2 – 9.4
Cocoa Butter	2		<0.2 – 18.6
Infant Formula and Follow-on-Formula	39		<0.2 – 0.7
Edible oils	9		<0.2 – 1.2
Totals:	**108**	**- resulting in 1665 individual tests.**	

Table 6 Summary of PAH sample results

The babyfood samples were submitted for multi-parameter testing, with other suites of analysis including ochratoxin A and aflatoxin B1 analysis. The samples of infant formula and follow-on-formula were also submitted for a range of test suites including taurine, aflatoxin M1, fat and protein analysis; 5 of these samples were also tested for ESBO and phthalates.

In the case of 3 of the tea samples analysed as received, the sum of PAH4 (benzo[*a*]pyrene, chrysene, benzo[*b*]fluoranthene and benzo[*a*]anthracene) exceeded 20 µg/kg. Although the legislation does not cover tea/coffee, these samples were brewed to establish the extent of the loss on preparation. All three brewed tea samples gave a PAH result range of <0.2 µg/kg indicating levels of PAH actually consumed are extremely low.

One sample of smoked smelts in oil was above the regulatory limit of 5.0 µg/kg for benzo[*a*]pyrene, as defined in Commission Regulation (EC) No 1881/2006 for smoked fish and smoked fishery products. The levels of cyclopenta[*cd*]pyrene, benzo[*a*]anthracene and chyrsene determined were 52.4, 31.2 and 24.5 µg/kg respectively and were reported for information only. As the sample exceeded the limit for benzo[*a*]pyrene it was deemed not compliant.

Perfluorinated Alkyl Substances (PFAS)

PFAS form a large class of chemicals that have been used for many years in various applications such as surfactants, fire retardants and foams, surface treatments, and as polymerisation aids in the manufacture of PTFE and other fluoropolymers. They are extremely stable and trace levels have been found in environmental water samples. They have also been found to accumulate in animals causing tumours and disturbing reproductive development.

Two environmentally persistent chemical compounds – perfluorooctane sulphonate (PFOS) and perfluorooctanoic acid (PFOA) – are being increasingly found in the environment, and the European Food Safety Authority (EFSA) was asked to evaluate the importance of food to human exposure to these substances. A scientific opinion from EFSA on PFOS, PFOA and their salts was published in February 2008.

Member States are recommended to perform monitoring on the presence of perfluoroalkylated substances and to preferably analyse the compounds PFOS and PFOA as well as their precursors (e.g., perfluorooctane sulphonamide (PFOSA), N-ethyl perfluorooctane sulfonamidoethanol (NEtFOSE) and 8:2 fluoroteleomer alcohol) in a monitoring programme. They are also to include, if possible, compounds similar to PFOS and PFOA but with different chain lengths (C4 – C15) and polyfluoroalkyl phosphate surfactants (PAPs) into the monitoring programme.

In 2011 20 samples of fish and crustaceans were analysed for a range of perfluoroalkyl acids and sulphonates. Of the 20 only 1 had levels marginally above the limit of quantification (1 µg/kg).

Inorganic contaminants (heavy metals)

In 2011, 134 samples of a wide range of foodstuffs were analysed for lead, total arsenic and total mercury.

The number of metal tests in the different sample types is given in Table 7, a total of 134 tests.

Matrix	*Total Arsenic*	*Lead*	*Total Mercury*	*Inorganic arsenic*	*No. exceeding limits*
Sweeteners		6			0
Fish & Shellfish			20		0
Herbs	27				0
Seeds	24				0
Spices	36				0
Gum Bases		21			0
Totals	**87**	**27**	**20**		**0**

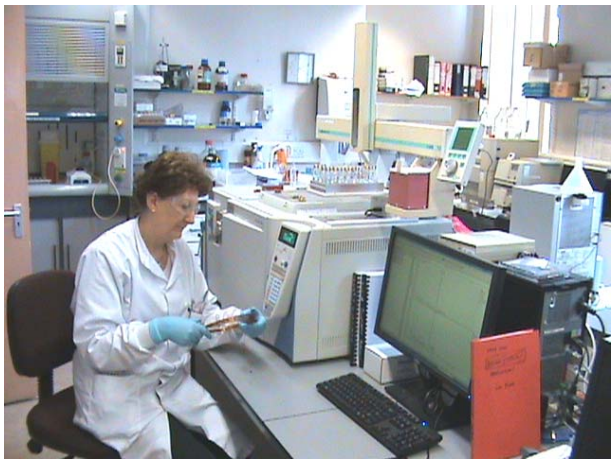
Table 7 Inorganic contaminants

Regulation EC No 1881/2006, amended by regulation EC No. 629/2008, specifies maximum levels for lead, cadmium, mercury and tin in foodstuffs.

S.I. No 44 of 1972 Health (Arsenic and Lead in food) Regulations 1972, amended by S.I. No 72 of 1992, specifies the maximum limit for arsenic in food.

Process contaminants

Acrylamide



Acrylamide is a genotoxic carcinogen produced when starchy food is heated, as first reported by Swedish scientists in 2002. Foods particularly susceptible are those made from potatoes or wheat, which are rich in reducing sugars and the amino acid asparagine.

A considerable risk of endometrial cancer was reported in a 2007 study in on the dietary intake of acrylamide.

Acrylamide levels in food have been monitored by Member States from 2007 – 2009 under Commission Recommendation 2007/331/EC. The monitoring exercise has been extended by Commission Recommendation 2010/307/EU. This exercise is targeted to those foodstuffs that are known to contain high acrylamide levels and/or contribute significantly to the human dietary intake.

Based on the EFSA monitoring data from 2007 – 2008, Commission Recommendation of January 2011 has set indicative acrylamide values. No indicative values are set for the category 'other products' as they tend to contain products that are relevant in certain Member States only. Where the acrylamide level found exceeds the indicative values, listed investigations are recommended. They are not safety thresholds; there are still no legislative limits on acrylamide in foods.

Under the Recommendation chips/french fries are analysed twice a year, in March and November, from the same outlet. This is to measure the seasonal effect on acrylamide formation in fresh potatoes versus stored ones. When potatoes are stored the level of free sugar increases leading to elevated acrylamide levels on cooking. Unlike in 2010 when it was found to be the case, this was not observed in 2011 e.g. chip samples taken from the same two suppliers in March and November were found to have 150 & 110 µg/kg respectively (Supplier 1) and 270 & 120 µg/kg respectively (supplier 2).

In 2011 55 samples were analysed, covering a range of foods. Table 8 presents the range of levels found and additionally an expression of the typical exposure having regard to estimated portion size. Six samples had acrylamide levels exceeding their indicative values

EFSA has published a scientific report which gives an update of results on the monitoring of acrylamide levels in food. This is at: http://www.efsa.europa.eu/en/efsajournal/doc/1599.pdf

Foodstuff	*Number of samples*	*Acrylamide range µg/kg*	*Indicative Values µg/kg*
French fries ready-to-eat	16	60 – 540	600
Potato crisps	3	390 – 2250 (A cheese & onion flavour crisp sample at 2250 µg/kg)	1000
Soft bread	4	30 – 160 (A brown bread sample at 160 µg/kg)	150
Breakfast cereals (excl.muesli and porridge)	4	60 – 170	400
Biscuits, crackers, wafers, crisp bread and similar, excl.ginger bread	6	130 – 2010 (3 ginger nut biscuit samples at 920, 1060 and 2010 µg/kg)	500
Roast coffee	4	140 – 230	450
Baby foods, other than processed cereal based foods	4	<20 – 70	80
Biscuits and rusks for infants and young children	5	<20 – 330 1 rusks (reduced sugar) sample at 330 µg/kg	250
Other (Including savoury-based corn snacks, cakes, pastries and potato-based products)	9	<20 – 1760	No indicative value set

Table 8. Acrylamide testing in 2011

Nitrate in various foods.

Table 9 summarises the testing for nitrate in 2011.

The publication of Commission Regulation (EU) No. 1258/2011 of December 2011 amending Regulation (EC) No. 1881/2006 as regards maximum levels for nitrates in foodstuffs has resulted in a slight increase in some of the maximum levels allowed for nitrate in lettuce and fresh spinach without endangering public health. Given the very high levels of nitrate sometimes found in rucola, it was considered appropriate to also set maximum levels for nitrate in rucola in the Regulation. These maximum levels for rucola are due to be reviewed in two years time with a view to a reduction in the levels once the factors giving rise to the presence of nitrate in rucola have been identified and good agricultural practice has been fully implemented to minimise the nitrate content.

The lettuce and spinach samples detailed in Table 9 were judged on the basis of maximum levels specified in Regulation (EC) No.1881/2006 as the testing was completed prior to publication of the amendment.

Parameter	*Foodstuff*	*No of samples*	*Non compliant samples*
Nitrate	Lettuce and spinach	27	4

Table 9 Nitrate

Furan

In 2004 the US-FDA reported finding furan in food in sealed jars and cans. Furan is a small molecule with a boiling point of 32°C and is a suspected carcinogen. Furan is a process contaminant; produced in situ in foods and beverages due to the heat degradation of naturally-occurring sugars, polyunsaturated fatty acids and ascorbic acid (vitamin C) during cooking/processing.

There is currently no legislation setting maximum levels for furan.

EFSA has requested data for dietary intake evaluation and has established a monitoring database. Of particular interest is the furan content in the food as prepared. Due to the highly volatile nature of furan, most of it will evaporate when an airtight sealed pack/pouch, can or jar is first opened and when the food is heated. The aim of the monitoring is to establish the extent of exposure of the consumer to the toxin, therefore establishing the loss on preparation is important. This necessitates analysing samples twice, once as received and again when prepared as directed. This allows the provision of data on actual consumption levels to EFSA for dietary exposure evaluation, as per Commission Recommendation 2007/196/EC.

In 2011 32 samples were analysed as received and prepared for consumption. Tables 10 and 11 present the results. The coffee samples were submitted for multi-parameter testing with them also being analysed for ochratoxin A.

Foodstuff	*Number of samples analysed (after preparation)*	*Furan range µg/kg*
Baby foods	15	< 5 – 78
Canned/Jarred Foods Including beans (5), sweetcorn (1), tomato pulp and paste (2), corned beef (1) and a sate sauce(1)	9	9 – 37
Coffee	8 consisting of	
Espresso	1	4297
Filter	7	2713 - 4993

Table 10 Furan - Samples as received

Foodstuff	*Number of samples analysed (after preparation)*	*Furan range µg/kg*
Baby foods	15	< 5 – 73
Canned/Jarred Foods Including beans (5), sweetcorn (1), tomato pulp and paste (2), corned beef (1) and a sate sauce(1)	9	< 5 – 39
Coffee	8 consisting of	
Espresso	1	139
Filter	7	24 - 66

Table 11 Furan - Samples after preparation

The level of furan generally increases with the degree of heating under pressure when the food is manufactured. Canned and jarred baby foods tend to be filled into their containers, sealed and heated at high temperature and pressure for varying lengths of time to sterilise the product. For coffee production, the high roasting temperatures (which can be in excess of 200°C) result in correspondingly high levels of furan in the roasted coffee bean, as shown in Table 9. As furan is highly volatile, much of the furan evaporates when the beverage is prepared using hot water, and so is not consumed, hence the much reduced levels shown in Table 11. The reduction in baby foods was less as these are usually just warmed.

Furan levels in the prepared product are a good indicator of the levels that consumers are being exposed to. In 26 of the tests where samples had been prepared, furan levels exceeded 20 µg/kg.

EFSA has published a scientific report, http://www.efsa.europa.eu/en/efsajournal/doc/2347.pdf, which gives an update of results on the monitoring of furan levels in food. This highlights the furan data contributed from Ireland to date and the importance of providing information, especially on furan levels in prepared foods. Ireland provided 10% of the data reported by Member States within

the period 2004 - 2010. Following this EFSA has requested more data on products for which little data has been received. Next year we plan to analyse dairy products, alcoholic beverages, chocolate beverages, snacks and bakery products.

Flavourings

In 2011, 45 samples of cinnamon-containing products including apple tart, apple strudels, carrot cake, muffins and cinnamon biscuits were analysed for coumarin content. All the samples tested complied with the maximum level of 50 ppm as specified in Regulation (EC) No. 1334/2008 on flavourings and certain food ingredients with flavouring properties for use in and on foods.

Food additives

Food additives are natural or manufactured substances that are intentionally added to foodstuffs during preparation or manufacture to perform a specified technological function or functions in the final product.

Some examples of functions and associated additives are:

- **i)** prevention of deterioration of foodstuffs during storage and protection against food poisoning - preservatives
- **ii)** provision of sweetness in low-sugar products - sweeteners
- **iii)** the restoration of colour to foods that lose natural colours during processing – colours.

In 2011, the laboratory tested a wide range of foodstuffs for the following additives:

- **i)** artificial sweeteners – aspartame, acesulfame-k, saccharin, sucralose.
- **ii)** the natural colour - annatto
- **iii)** preservatives – sodium nitrite, sodium nitrate, sulphur dioxide, benzoic acid, sorbic acid.
- **iv)** flavour enhancer – mono sodium glutamate
- **v)** caffeine
- **vi)** taurine
- **vii)** glucuronolactone

Table 12 gives the results of testing for additives in 2011. Where labelling is presented as the reason for a sample being not compliant, this can indicate either that an undeclared ingredient was detected or that the labelling was not presented in accordance with legislative requirements.

46 samples were not compliant, representing 9.2% of the 499 samples tested. This is a high percentage and it illustrates the need for continuing rigorous monitoring and surveillance.

In one case a strawberry syrup topping declared sodium benzoate as an ingredient and was found on analysis to contain 820 mg/kg benzoic acid. The product was not in compliance with Directive 95/2/EC as sodium benzoate is not permitted for such use.

Additive	*Foodstuff*	*No of samples*	*No of Tests*	*No of non-compliant samples*
Artificial sweeteners other than sucralose - Aspartame Acesulfame-K Saccharin	Non-alcoholic beverages, flavoured bottled waters and sauces	14	42	2 Labelling
Sucralose	Various categories of foodstuffs	73	73	0
Annatto	Cheese, spreads, smoked fish	37	74	1 Labelling
Sulphur dioxide (SO_2)	Dried fruit, wine, raw crustaceans, prepared vegetables, sausages and burgers	81	81	7 Excessive levels of SO_2
Sodium nitrite, sodium nitrate $NaNO_2$, $NaNO_3$	Cured meats and brines	87	174	28 Excessive additives
Benzoic & sorbic acids	Non-alcoholic beverages, cakes, jams, marmalades & sauces	46	92	1 Excessive level of sorbic acid 1 Benzoic acid not permitted for use 1 Labelling
Mono sodium glutamate (MSG)	Prepared meals, other foodstuffs	71	71	0
Taurine	Infant formula and follow-on formula	39 (incl. 20 from DAFM)	39	2 Labelling
Caffeine	Decaffeinated products	26	26	1 Labelling
Caffeine, taurine & glucurono-lactone	Soft drinks	25	75	2 Labelling
	Totals:	**499**	**747**	**46**

Table 12 Results of additives testing in 2011.

The highest number of non-compliant results continues to be for the preservatives sodium nitrate & sodium nitrite in cured meats and brines.

Regulation (EC) No 1333/2008 of the European Parliament and of the Council of 16 December 2008 on food additives has been in force since January 2010. This legislation replaces the previous Directives 89/107/EEC (the Framework Directive) and Directives 94/35/EC on sweeteners, 94/36/EC on colours and 95/2/EC on food additives other than colours and sweeteners.

These Directives have been repealed. However the Annexes to the latter three are still in force as the Annexes to Regulation 1333/2008 were only adopted in late 2011 and under transitional arrangements are not due to come into force until April 2013.

A key difference in the new legislation is that additive authorisations will be based on a food categorisation system. In the repealed legislation detailed above, sweeteners, colours and additives were listed with their uses and conditions of use. Regulation 1333/2008 sets out foods under a food categorisation system and all additives associated with a particular category will be detailed.

The following is a list of the contents of the new Annexes to Regulation 1333/2008:

Annex I: Functional classes of food additives in foods and of food additives in food additives and food enzymes.
Annex II: Food categories and the additives permitted for use within them and their conditions of use.
Annex III: Food additives permitted for use in food additives, enzymes and food flavourings and their conditions of use.
Annex IV: Traditional foods for which certain Member States may continue to prohibit the use of certain categories of additives.

Carbon monoxide

Carbon monoxide is a gas that forms an irreversible complex with haemoglobin to produce a cherry red colour. Carbon monoxide itself and "clean smoke", which is predominantly carbon monoxide, have been used to enhance the colour of red meats particularly fresh and frozen tuna to give the flesh a fresh appearance. Carbon monoxide is not on the list of permitted additives and its use is not authorised.

In 2011 11 samples of fish in total were analysed for carbon monoxide. These consisted of 6 swordfish and 5 tuna fish. No positives were found.

Compositional / Quality / Labelling analysis

In 2011 the laboratory performed testing for composition (fat and protein in infant formula and follow-on formula and for quality (acid value of in-use cooking oils). Multi-parameter testing was performed on the samples of infant formula and follow-on formula, with the samples being tested for fat, protein, taurine, aflatoxin M_1, ESBO and phthalate migration and PAHs.

22 Samples of honey were tested for sugars, HMF, moisture, diastase number, free acidity, conductivity, insoluble matter and also nitrofuran antibiotic residues. The DAFM supplied samples were not tested for the latter. The testing of honey is another excellent example of multi-parameter testing of samples – each sample can be tested for thirteen individual parameters.

Table 13 give the data for compositional testing in 2011.

Parameter	*Foodstuff*	*No of samples*	*No of tests*	*No of non-compliant samples*
Acid Value	In-use cooking oils	22	22	4 Acid values exceeded the guideline limit of 3.0 mg/g
Compositional tests (fat and protein)	Infant formula and follow-on formula	14	28	2 Labelling
Sugars, HMF, Moisture, Diastase number, free acidity, conductivity, insoluble matter, nitrofurans	Honey	22 (incl. 13 from DAFM)	163	2 (1 high HMF content, 1 for labelling), the nitrofuran testing was omitted for the DAFM samples)
	Totals:	**58**	**213**	**8**

Table 13 Compositional testing in 2011

In Table 13 of the 58 samples tested, 8 were non-compliant which is 13.8%. This is a high percentage and it illustrates the need for rigorous monitoring and surveillance.

Compositional analysis and checking of labelling is important in the context of the increasing level of lifestyle-related health problems in the Western world, including Ireland. It is paramount that consumers are fully informed of the content of their foods and that the declared nutrient values on labels are accurate. This enables consumers to make an informed choice regarding their food intake and provides the best opportunity for a nutritious diet and healthy lifestyle.

Food labelling

The purpose of food labelling is to inform and protect the consumer. Detailed labelling, which gives the exact nature and characteristics of a product, enables a consumer to make an informed choice when selecting a foodstuff. The principal rule of food labelling is that it must not be misleading regarding the characteristics of a foodstuff.

Labelling analysis in 2011

A substantial amount of labelling analysis was performed.

Infant formula and follow-on formula were tested for fat and protein content and the levels determined were compared to declared values to establish the accuracy of the nutrition labelling. The presentation of information on these products was examined to determine compliance with the appropriate labelling legislation.

Where analysis of additives was performed, the list of ingredients was checked for a declaration of the additives detected and the designation of these additives into the appropriate categories was also examined.

Certain ingredients or substances can give rise to allergic reaction or intolerance in consumers. Allergenic ingredients must be declared on the labels of pre-packages foodstuffs so that consumers who have allergies or intolerances can readily identify specific ingredients to which they have sensitivity. In this regard in 2011, a range of products was tested (see below) for the presence of peanut, egg and casein and the product labelling was examined for compliance with the legislative requirements.

Tables 12 - 13 and the following section on allergens contain information on labelling analysis in 2013.

Allergens

Food allergy is a major form of adverse reaction to foods. Food allergens are defined as those substances that initiate and provoke the immunological reactions of food allergy. Although any food may cause an allergic reaction in selected individuals, 90% of all food allergic reactions are caused by eight foods: peanuts, eggs, milk, shellfish, wheat, soy, fish and tree nuts. Directive 2007/68/EC lists allergenic ingredients whose presence in pre-packaged foodstuffs must be declared.

As susceptible individuals can react to mere traces of food allergens, accurate allergen labelling which details the presence of allergens in pre-packaged foodstuffs is vital to allow allergy sufferers to make informed choices about the food they consume.

Directive 2007/68/EC amending Annex IIIa to Directive 2000/13/EC lists 14 allergenic ingredients and their derivatives whose intentional addition to pre-packaged foodstuffs means that they must be declared on a product ingredient list. This allergen labelling requirement provides a level of protection to susceptible consumers. However, the labelling requirements are limited to the 14 food allergens listed in EU legislation and are only required where the ingredients are intentionally added to pre-packaged foods. Where allergenic substances are present as unintentional contaminants through, for example, cross contamination or in non-packaged foods, there will be no indication of a potential hazard for a susceptible individual and laboratory testing is of enormous value in this area.

In 2011, the laboratory undertook testing of 25 samples for peanut content. The samples were analysed using a sandwich-type enzyme immunoassay technique (ELISA) with a polyclonal antibody to conarachin (peanut protein). The samples were sandwiches that were requested to be peanut-free from sandwich bars, cafes and bakeries. The samples could have been prepared on-site at the catering premises or brought in from outside but had to be sold loose and not be individually pre-packaged or labelled. For transport and submission to the laboratory, the samples had to be packaged individually to prevent cross-contamination.

In any of the samples tested peanut was not detected in excess of the limit of quantitation of the technique i.e. 1.0 ppm.

The laboratory undertook testing of 25 samples for egg content. The samples were analysed using a sandwich-type enzyme immunoassay technique (ELISA) with a polyclonal antibody to ovomucoid (egg white protein). The samples requested were manufacturing and retail level samples of breads and baby foods that claimed to be egg-free and products that did not declare egg as an ingredient. Products that contained egg in the ingredient list, e.g. powdered egg, albumin, conalbumin, oralbumin, globulin and ovomucoid were not suitable. For transport and submission to the laboratory, the samples had to be packaged individually to prevent cross-contamination.
Egg was not detected in excess of the limit of quantitation of the technique i.e. 0.5 ppm in any of the samples tested.

The laboratory also tested 23 multi-parameter samples for both peanut and egg content using the same ELISA techniques detailed above. The samples requested were manufacturing and retail level samples of biscuits, cakes and ready meals that claimed to be egg-free and peanut-free and products that did not declare egg or peanut as an ingredient. For transport and submission to the laboratory, the samples had to be packaged individually to prevent cross-contamination.
Actionable levels of peanut or egg were not detected in any of the samples tested.

19 manufacturing and retail level samples of rice and soya-based drinks and yoghurts, that claimed to be milk-free, were tested for casein (a milk-protein) using an ELISA technique. The presence of casein is an indicator of the presence of milk, milk proteins or milk derivatives.
Casein was not detected in excess of the limit of quantitation of the technique i.e. 0.2 ppm in any of the samples tested.

Biogenic amines

Directive 91/493/EEC on fish hygiene specifies limits for histamine levels in the *Scombridae* and *Clupeidae* fish species. This states that nine samples must be taken from each batch of fish and that the histamine levels must meet the following requirements:

- the mean value must not exceed 100 mg/kg
- two samples may have a value between 100 and 200 mg/kg
- no sample may have a value exceeding 200 mg/kg.

Regulation (EC) No 1441/2007 on microbiological criteria for foodstuffs specifies similar histamine limits for fish and double the respective values for fermented fish products.

Foods normally may contain small amounts of biogenic amines which are metabolised easily in the body. However some foods, such as those that have undergone spoilage, aged fermented products and fish sauces/pastes can contain higher levels of the amines. The most important of these, from the food-borne illness perspective, are histamine and tyramine. Others, such as putrescine and cadaverine, are noteworthy because they are thought to exert a potentiating effect on the action of histamine. Histamine and tyramine are vasoactive agents with histamine being a vasodilator and tyramine a vasoconstrictor.

In 2011 the following biogenic amines were measured in a range of foodstuffs – histamine, tyramine cadaverine, putrescine, spermidine, spermine, agmatine, phenylethylamine, tryptamine and serotonin.

Table 14 gives the details.

Foodstuff	*No of samples*	*Histamine range ppm*	*Tyramine range ppm*	*No of non-compliant samples*
Fish, crustacean, molluscs	31 * (incl. 5 SFPA)	<10–46	<10–81	0 (1 sample had a cadaverine level of 230 ppm)
Sauces	20	<10–280	<10–135	0 (1 sample had a cadaverine level of 361 ppm)

* For 10 samples the number of sample units was 9 thus complying with the sampling regulations. Each individual unit of fish was analysed and the results assessed in accordance with the Regulation.

Table 14 Biogenic Amine analysis in 2011

Food Contact Materials (FCMs)

This laboratory is the specialist testing facility in Ireland and EU NRL for Food Contact Materials.

Primary Aromatic Amines

Primary Aromatic Amines (PAAs) are a series of compounds widely used in industry in the manufacture of products such as pesticides, pharmaceuticals, explosives, rubber, azo-dyes, epoxy polymers and polyurethane. They are not intended to be in the final product but residues are sometimes present due to incomplete reactions, as reaction by-products or as breakdown products of reaction intermediates or the final product. Some PAAs are highly toxic and/or carcinogenic.

High levels have been detected in certain plastics intended to come into contact with food such as kitchen cooking utensils. According to Directive 2002/72/EC food contact materials may not release PAAs into food simulant in detectable quantities.

In 2011 the laboratory analysed 20 black nylon kitchen utensils for six common PAAs. 2 Samples did not meet the requirements for specific migration and Rapid Alerts were raised with the FSAI for these.

No samples were received for analysis under the new emergency legislation introduced during 2011 and already referred to above.

Photo initiators (PIs)

In 2011 25 samples were analysed for a range of PIs. These consisted mainly of frozen convenience products. 9 PIs were tested for in the food packaging and in the food itself, including benzophenone and 4-methoxybenzophenone. A total of 450 individual tests were performed. The results are presented in Table 15

Foodstuff	*No of samples*	*PI range in packaging mg/dm2*	*PI range in food mg/kg*
Breakfast cereals	5	<0.02 – 0.03	<0.1
Chicken products	3	<0.02 – 2.34	<0.1
Fish products	5	<0.02	<0.1
Meat products	2	<0.02 – 0.61	<0.1
Vegetable-based products	1	<0.02	<0.1
Pizza	2	<0.02	<0.1
Potato-based products	3	<0.02 – 0.26	<0.1
Confectionary/Snacks	4	<0.02 – 0.08	<0.1

Table 15. Photoinitaitors testing in 2011

Based on the results above it is evident that for the samples analysed there is no transfer of PIs into the food from the food packaging.

Plasticisers in PVC gaskets

Epoxidised soybean oil (ESBO)

To ensure the integrity of foods sold in glass jars with metal lids, a PVC gasket seal is used between the metal lid and the rim of the jar. As PVC is a rigid plastic it has to be softened by the addition of 20-40% plasticiser to ensure a good seal.

ESBO is often used as this plasticiser. It has valuable hydrochloric acid scavenging properties and is fat soluble. However ESBO has the potential to migrate into the foodstuffs during sterilisation and storage, especially into fatty foods.

With effect from the 1st May 2011Commission Regulation (EU) No 10/2011 on plastic materials and articles intended to come into contact with food replaced Commission Directive 2002/72/EC. The legislation restricts the content of ESBO in food to 60mg/kg. In the case of PVC gaskets used to seal glass jars containing infant formulae and follow-on formulae or processed cereal-based foods and baby foods for infants and young children the SML is lowered to 30 mg/kg.

Use of ESBO in gaskets may be decreasing due to replacement with other plasticisers such as polyadipates.

The analytical method for the determination of ESBO has been accredited.

35 samples of infant food and other jarred foods were analysed in 2011 for ESBO. 5 of these were analysed for the DAFM. The samples comprised 5 infant formulas, 15 baby foods and 15 other jarred foods, the majority of which were sauces. The ESBO levels in 11 of the 13 sauces were <4mg/kg. The ESBO levels were all less than the legislated Specific Migration Limits (SML). The results are presented in Table 15A.

Foodstuff	*No of samples*	*ESBO range mg/kg*
Infant formula	5	<3
Baby foods	15	< 4– 20
General jarred foods	15 consisting of	<4 – 23
Sauces	13	<4 – 29
Marinades	1	<4
Prepared dish	1	22

Table 15A ESBO results

The samples of infant formula and follow-on-formula were also analysed for taurine, aflatoxin M1, fat, protein, phthalates and PAHs.

Other plasticisers

Gaskets from the lids of the samples tested for ESBO were also tested for the presence of the following phthalate plasticisers:

- **i)** diisodecyl phthalate (DIDP)
- **ii)** benzylbutylphthalate (BBP)
- **iii)** diethylhexylphthalate (DEHP)
- **iv)** di-iso-nonylphthalate (DiNP)
- **v)** dibutylphthalate(DBP)
- **vi)** di-iso-butylphthalate(DiBP)
- **vii)** di-n-hexylphthalate(DnHP)
- **viii)** di-n-octylphthalate(DnOP)
- **ix)** di-iso-octylphthalate(DiOP)
- **x)** di-cyclo-hexylphthalate(DcHP)
- **xi)** diexylphthalate(DEP)
- **xii)** dimetylphthalate(DMP)

The 35 samples that were analysed for phthalates resulted in 420 individual tests.

A range of other PVC additives were also monitored including:

- **i)** adipates
- **ii)** sebacates
- **iii)** diisononyl cyclohexanedicarboxylate (DINCH)
- **iv)** tributyl o-acetocitrate (TBAC which is a composition of 21 compounds),.
- **v)** oleamide and erucamide (slip agents).

The analysis is used to identify those additives permitted for use by the legislation and detect the presence of those not permitted.

Oleamide and erucamide were found in all gaskets many of which also contained the common plasticiser dibutyl sebacate. TBAC was also found. These are permitted additives in plastic materials and articles in contact with food with no SML assigned. Many samples contained traces of adipates which were probably breakdown products from the permitted polyadipate plasticiser.

Traces of diisodecyl phthalate (DIDP) was found in 1 sample of jarred sauce. This additive is legally permitted although there are restrictions on its use consisting of a SML of 9 mg/kg and a maximum quantity (Qm) of 0.1 % w/w in the raw gasket. The limit is based on the sum of the concentrations of DIDP and diisononyl phthalate (DINP). The food itself was analysed revealing that a little migration had taken place but levels found were well below the SML.

The permitted limit for di-iso-decylphthalate, 0.1% in the final product, also applies to benzylbutylphthalate, diethylhexylphthalate and di-iso-nonylphthalate. The permitted limit for dibutylphthalate is 0.05% in the final product. The other phthalates tested for are not on the list of permitted additives and are therefore not allowed. No non-permitted additives were found in these samples, thus the samples were deemed satisfactory.

This work will continue since the legislation continues to be amended to reflect changes in the technology associated with the manufacture and use of these gaskets.

EU Co-ordinated survey on plasticisers

As mentioned under the EU-RL Section above the laboratory participated in an EU co-ordinated survey organised by the CRL for FCMs in gaskets sealing glass jars containing fatty foods. Each participating Member State took 20 samples in February 2011, held them in storage in their respective laboratories for a number of months to give an opportunity for any plasticisers present to migrate. In August the samples were shipped to a laboratory in Germany where they were distributed between that laboratory and a laboratory in Switzerland for analysis. The results were received in late December 2011. Six samples had varying degrees of migration of both ESBO and/or plasticisers. Rapid Alerts were issued for these samples early in 2012. While this project took a almost a year to complete it was useful in highlighting the continuing problem of plasticiser migration from gaskets that are used to seal glass jars, despite the difficulty in taking any follow-up action due to the long gap between the sampling time and the analytical results being issued.

Melamine in foodstuffs

During 2011 a total of 35 samples were submitted to the laboratory for testing under the import control legislation. All were satisfactory.

Melamine and formaldehyde in kitchenware

Twenty samples of kitchenware were analysed for specific migration of melamine and residual formaldehyde giving 40 analytical tests. All were satisfactory.

In view of the completion of the development work and accreditation of the formaldehyde migration method this analysis was also performed on the samples. Two samples exceeded the legislative limit of 15 mg/kg for formaldehyde. This combined analysis represents a further increase in multi-parameter testing of samples.

In addition, three samples were received from the port for formaldehyde testing alone under the new emergency legislation. Two exceeded the limit of 15 mg/kg and the products were impounded.

Bisphenol A (BPA) in baby bottles and canned foods

As previously mentioned, new legislation in 2011 restricted BPA use in baby bottles. To check compliance with this new legislation ten baby bottles were checked. None contained BPA. Twenty samples of canned foods were analysed for BPA. All were satisfactory.

Migration of lead and cadmium from ware.

15 Samples of ceramic ware were analysed for the migration of lead and cadmium and none was found to exceed the limit.

Migration of chromium and nickel from kitchenware

In 2011 the laboratory implemented a method for the determination of the migration of chromium and nickel from kitchenware. There is no legislation governing these tests, nevertheless, these items are a potential source of heavy metals and therefore a concern for public health.

14 Samples of metal utensils & cutlery were analysed giving 28 analytical tests. No sample was found to have high levels of either metal migrating from it.

Research leading to a Ph.D. degree

Since autumn 2008 a postgraduate student has been conducting research for a Ph.D. degree in the field of FCMs. The project comprises the selection of one or more topics from the wide area of FCMs. By agreement with the college concerned the student developed a method for the analysis of PAAs in black nylon kitchen utensils. The method was used in the analysis of these items for the 2009, 2010 and 2011 FSPs. It was accredited in 2010 and a paper was published in 2011 in the journal 'Food Additives and Contaminants'.

Other topics, focussing on the development of analytical methods for FCM compounds, particularly screening methods by UPLC-QTof-MS for photoinitiators, and the application of these methods to the collection of data and the elucidation of the underlying chemistry between the foods and the materials in contact with them, are being pursued.

Antibiotic residues in honey

Nine samples of honey were analysed for the four nitrofuran antibiotic residues, AOZ, AMOZ, AHD and SEM. All were satisfactory. The samples submitted by DAFM were not analysed for the nitrofuran antibiotic residues as they did not request this testing.

Analysis associated with FSAI Guidance Note 25: Guidance for enforcement of legislation applicable to: Natural Mineral Waters, Spring Waters and Other Bottled Waters

Two new methods of analysis were developed to carry out analysis in this area. The methods are based on GC-MS and two variations of a sample preparation technique called solid phase micro extraction (SPME). The SPME variations are headspace SPME for the more volatile benzene and liquid SPME for the much less volatile PAHs. The SPME sampler is mounted on an auto-sampler and has the advantages of being fast, sensitive and automated.

6 bottling plants in counties Cavan, Monaghan and Meath were sampled and the broad range of parameters tested for included PAHs and Benzene.

PAHs

The PAHs that are applicable to water are benzo[a]pyrene and the sum of four specific ones namely, benzo[b]fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-cd]pyrene and benzo[g,h,i]perylene.

All samples were satisfactory and were within the parametric values. The parametric values for, Benzo[a]pyrene and sum of the four specific Polycyclic Aromatic Hydrocarbons (PAH) are 0.01 and 0.10 µg/L respectively.

Benzene

All bottled water samples were satisfactory as the levels found were < 0.025 µg/L. The parametric value for Benzene in bottled waters is 1.0 µg/L.

3.2 A Review of the Results of the Microbiological Food Sampling Programme 2011

Introduction

The food microbiology laboratory examined 1351 samples submitted by EHOs for Food Control purposes. This number comprised 1121 food samples and 230 hygiene swab samples.

Categories and testing purpose

The breakdown of categories recorded as the 'Reason for Analysis' for samples submitted varies from year to year. The core ones of 'Routine', 'Repeat' are always significantly represented.

In 2011, the FSAI performed 2 National Surveys (11NS1 and 11NS2). These were run simultaneously in different laboratories. This laboratory only tested samples for 11NS2. In addition to the FSAI surveys, the HSE performed 2 National Surveys (11HSE1 and 11HSE2). Thirteen samples which were taken at the Port were assigned as 'Port Survey' samples. Sixty nine samples fell into the 'Follow-up' category. 'Follow-up' samples are usually taken consequent to allegations of food poisoning or as a follow-up investigation into previously unsatisfactory or suspect results. All 'Port Survey' 'Repeat' and 'Follow-up' samples are non-programmed which has a major impact on laboratory time and resources.

Table 16 shows a breakdown of the samples according to the purpose of sampling, and also shows the overall outcome for the samples. Where legislative limits were not applicable, the judgement categories for samples were based on the criteria set out in the FSAI Guidance Note No. 3 for Ready-To-Eat (RTE) foods at the point of sale. Acceptable and Satisfactory samples under those guidelines are combined as 'Compliant' in this table. Unacceptable/potentially hazardous and unsatisfactory samples under the guidelines are combined as 'Non-compliant' in the Table. The judgement applied to any sample was determined by the worst result for any of the individual parameters tested for. Samples for which a judgement was not considered appropriate were classed as 'No Designation'.

Category	*Number*	*OUTCOME*		
		Compliant	*Non-compliant*	*No Designation*
Routine	613	509	65	39
Repeat	17	15	2	0
Follow up	69	41	5	23
Follow up(Swabs)	14	N/A	N/A	14
Port Survey	13	8	0	5
11NS2	228	N/A	N/A	228
11HSE1(Swabs)	216	N/A	N/A	216
11HSE2	181	180	0	1
Total	1351	753	72	526
Total Foods (excl swabs)	1121	753	72	296
Total swabs	230	0	0	230

N/A = Not applicable

Table 16 Microbiology Food Sampling Programme – General data on samples for 2011

Results of food testing

In 2011 26.4% of food samples did not have a judgement assigned compared with 9.3% in 2010. A judgement is not made on samples which have results that fall into the unsatisfactory category but where the temperature on receipt is not available or where the final result was an estimate. A judgement will also be omitted if there is no specific guideline for the sample type tested or if the sample category is not clear from the information provided/available when reported.

After removing the 'No Designation' category food samples, the satisfactory samples represented 91.3% of the remaining samples. Food samples judged to be unsatisfactory represented 8.7% of samples analysed against which there is a judgement. The proportion of unsatisfactory food samples was 1.3% lower in 2011 than in 2010 (10.0%). Unsatisfactory samples have been following a consistent downward trend.

Table 17 summarises the results found for each test parameter for routine food samples in 2011.

	Parameter	*Total tests*	*Unsatis-factory (UNSAT)*	*% Unsatis-factory (of samples tested for this parameter)*	*Unsatisfactory level*	*Range cfu/g for UNSAT*
Indicator Organisms (Enumeration)	ACC 30°C	425	52	12.2	N/A	N/A
	Enterobacteriaceae	395	10	2.5	$\geq 1.0 \times 10^4$	N/A
	E. coli	578	1	<1.0	$\geq 1.0 \times 10^2$	
Pathogens (Presence or Absence test)	*Salmonella*	597	0	0	Detected	N/A
	Campylobacter	0	N/A	N/A	Detected	N/A
Pathogens (Enumeration)	*B. cereus*	581	0	0	$\geq 1.0 \times 10^4$	N/A
	C. perfringens	581	0	0	$\geq 1.0 \times 10^2$	N/A
	Coagulase-positive Staphylococci	582	5	0.9	$\geq 1.0 \times 10^2$	$1.6 \times 10^2 - 5.2 \times 10^2$
	L. monocytogenes Enumeration	599	0	0	$\geq 1.0 \times 10^2$	N/A
	V. parahaemolyticus enumeration	4	0	0	$\geq 1.0 \times 10^2$	N/A
	Totals:	4342	68	1.6	N/A	N/A

N/A = Not applicable/available.

Table 17 Breakdown of results by parameter (test) for 2011 routine food samples

The majority of routine food samples that are found to be unsatisfactory fail for indicator organisms and most of these samples fail only for the Aerobic Colony Count (ACC) parameter. We found only 5 routine samples (0.9%) with unsatisfactory results due to food pathogens. These are listed in Table 18. The proportion of routine samples tested with unsatisfactory aerobic colony counts was 12.2% in 2011. The range over the past 6 years has varied, the highest being 25.6% in 2006. After ACC, the parameter that provides more unsatisfactory results than any other is *Enterobacteriaceae*. In 2011, 2.5% of samples were unsatisfactory for this parameter. *Enterobacteriaceae* are very widely distributed in the environment so this result is not surprising. *Enterobacteriaceae* are common on raw vegetable matter so high levels of *Enterobacteriaceae* in samples containing raw vegetables are not considered hygienically significant. For this reason we do not examine for this parameter on samples which are known to have a raw vegetable component.

Unsatisfactory *Escherichia coli (E. coli)* results for routine food samples were at <1.0% of samples tested.

Further pathogens

Coagulase-positive staphylococcus was the only pathogen found in routine samples tested in 2011 where the level could be deemed as unsatisfactory. Table18 shows summary data for this pathogen.

Food	*Analysis Reason*	*Pathogen*	*Unsatisfactory Pathogen Level cfu/g*
COLESLAW	ROUTINE	Coagulase-positive staphylococci	1.6×10^2
TUNA	ROUTINE	Coagulase-positive staphylococci	1.7×10^2
FERMENTED MEAT	ROUTINE	Coagulase-positive staphylococci	2.3×10^2
COLESLAW	ROUTINE	Coagulase-positive staphylococci	2.4×10^2
TUNA MAYONNAISE	ROUTINE	Coagulase-positive staphylococci	5.2×10^2

N/A = Not applicable/available.

Table 18 Unsatisfactory routine food samples containing pathogens

5 Routine samples tested positive for Coagulase-positive staphylococci, which represented 0.9% of routine food samples tested for this parameter. While this percentage shows a slight decrease on the 2010 level of 1.3%, the level has ranged from 0.3% (2008) to 1.6% (2005) over the past 6 years. However, when the total number of positive samples is very low annually, as is generally the case with some pathogens, considerable variation in percentages can be expected from year to year for purely statistical reasons. The level of Coagulase-positive staphylococci in the unsatisfactory samples in 2011 ranged from 160cfu/g to 520cfu/g for the 5 routine samples. *Staphylococcus aureus (S. aureus)* generally needs to grow to levels of 100,000 to 1,000,000cfu/g food for sufficient toxin to be produced to cause food poisoning. Not all *S. aureus* produce toxin. This parameter was previously reported as *S. aureus;* most Coagulase-positive staphylococci are *S. aureus*.

Samples which had Presumptive *Bacillus cereus* (*B. cereus*), *Clostridium perfringens* (*C. perfringens*) or Coagulase-positive staphylococci which were on or only slightly above the designated unsatisfactory level were considered satisfactory after measurement of uncertainty had been taken into account.

An additional 2 samples had *C. perfringens* at levels above 100cfu/g and 3 samples had Coagulase-positive staphylococci at levels above 100cfu/g, but as the count in each case could only be estimated, these samples were not designated as unsatisfactory.

The *Vibrio parahaemolyticus* (*V. parahaemolyticus*) parameter is only applied to fish and fish products. Most of our routine samples were not items for which it would have been appropriate for the laboratory to add this parameter. All 4 samples tested for this parameter were satisfactory.

One large follow-up sample of dehydrated onion powder was divided into 20 sub-samples in the laboratory at the request of the FSAI. 10 of the 20 sub-samples tested positive for *Salmonella* species. The serotype for the isolate was identified as *Salmonella* Mbandaka by the National *Salmonella* Reference Laboratory (NSRL). One port survey sample of dried mushroom tested positive for *Salmonella* species. The serotype for the isolate was identified as *Salmonella* Senftenberg by the NSRL.

Coleslaw samples were again a prominent food type in 2011 with 11.3% of the total routine samples submitted. The proportion of coleslaw samples was similar to the 2010 level of 11.9%. Table 19 shows some food types that are prominent in the database where the sampling reason was stated as "Routine".

Food Name	*Number*	*% of Total submitted*
Coleslaw	69	11.3
Egg mayonnaise salad	47	7.7
Cooked ham *	36	5.9
Tuna salad	26	4.2
Potato salad	9	1.5

* Excludes samples that had ham in combination with other ingredients

Table 19 Some prominent food types submitted as "Routine" samples.

National Surveys

There were 2 national survey topics for 2011 co-ordinated by the FSAI in conjunction with the laboratories and the EHS. These surveys take account of issues of particular interest under the EU Co-ordinated programme as well as issues of local interest.

The topic of the first survey was the microbiological safety of raw minced beef and beef burgers on retail sale in Ireland (11NS1). The survey ran from April to July, inclusive. The samples were tested for verotoxigenic *E. coli* and *Salmonella* species. This laboratory did not test samples for this survey as we do not have the facilities to test for verotoxigenic *E. coli.*

The second survey (11NS2) was run to collate up-to-date baseline information on the incidence of *Campylobacter* species and *Salmonella* species in raw chicken on retail sale in Ireland. The survey period was from June to August, inclusive. Samples were sourced from retail establishments selling raw chicken. The samples were tested for the enumeration of *Campylobacter* species and for the presence or absence of *Salmonella* species. Under 11NS2, 227 samples were tested in this

laboratory. *Salmonella* species was detected in three samples. *Campylobacter* species was enumerated at a level of >10cfu/g in 84 samples.

Table 20 summarises the results for the 11NS2 samples where *Salmonella* species were detected.

Food	*Analysis Reason*	*Result*	***Salmonella serotype***
Raw Chicken Fillet Portions Without Skin	11NS2	*Salmonella* species detected in 25g	*Salmonella* Infantis
Raw Chicken Fillet Portions Without Skin	11NS2	*Salmonella* species detected in 25g	*Salmonella* Enteritidis
Raw Chicken Fillet Portions Without Skin	11NS2	*Salmonella* species detected in 25g	*Salmonella* species unnamed

Table 20 11NS2 samples containing Salmonella species

2011 was the second year in which the HSE performed additional National surveys which were not co-ordinated by the FSAI. These surveys were aimed at targeting specific sample types for specific criteria of concern.

The 11-HSE-2 survey ran from February to April 2011 with 181 samples collected either from production establishments, retail or catering premises. The samples were tested for E. coli, Listeria monocytogenes and Salmonella species. 180 samples were compliant for all 3 parameters. The remaining sample was a single sample taken at retail level and was compliant for Listeria monocytogenes and Salmonella species but contained E. coli at a level of 800cfu/g. The FSAI Microbiological Guideline for E. coli could not be applied to this sample because the microbiological guide is stricter than the process hygiene criteria laid down in the regulation for this food type.

The 11-HSE-1 survey examined swab samples taken from food contact areas in premises manufacturing and producing Ready-To-Eat foods to collect baseline data on the detection of *Listeria monocytogenes* and the enumeration of *E. coli*. The sampling period for this survey was from September to November 2011, with 216 samples tested for the 2 parameters. Two samples were positive for *E. coli,* one with a level of 1.1E3cfu/swab and the other with an estimated level of

4.5E3cfu/swab. Three samples were positive for the presence of *Listeria monocytogenes*, while six samples were positive for *Listeria* species other than *Listeria monocytogenes.*

As in previous years, this overview of microbiological quality and safety of prepared foods provided by the sampling programme has again provided evidence of a continuing good standard in 2011.

3.3 Food Complaint samples

A total of 170 consumer complaint samples submitted by the Environmental Health Service (EHS) were received in 2011, a decrease of about 15% on the previous year.

In addition, a total of 27 samples were received from private customers related to the investigation of consumer complaint. The laboratory's private customer base comprises retail outlets, manufacturers, hospitals, hotels and the general public. The numbers of private complaint samples submitted to the laboratory has decreased steadily over the years.

The range and type of complaint samples received was similar to that received in other years.

Fungal growth was found in products such as milk shakes, fruit juices, soft drinks, ice-pop pre-mixes, processed cheese packs and canned fruit. The range of insects found included beetles, flies, weevils, psocids and moths in products as varied as take away meals, cheese, ice cream, dry and baked cereal products, popcorn, pasta and frozen spinach.

We dealt with fly eggs on meat and on fresh fruit, moth larvae in chocolate bars, drinking chocolate and in dried cereal products. There were several instances of spoiled chickens and 2 unrelated instances of spoiled potatoes among frozen potato wedges.

A variety of foreign bodies likely to have been from the production environment were encountered. These were typically small fragments of environmental plastic materials and or materials derived from packaging. Items of particular note included a substantial quantity of sausage casing present within a sausage, fragments of a filtration matrix in bottles of wine, an item of costume jewellery in a biscuit. Other foreign object complaints included suspected glass in wine, a capsule in bottled water, a suspected tooth in pasta sauce and fragments of glass, plastic, stone and wood.

In the case of suspected glass in wine crystal, deposits were evident adhering to the inside of the wine bottle. The deposit consisted of tartrate crystals. The crystals were golden in colour and when crushed resulted in a fine powder.

Tartaric acid is a constituent of grapes which may be present in varying amounts. As wine matures, occasionally tartaric acid forms tartrate compounds which then precipitate out as crystals and form a deposit which is often mistaken for fragments of glass. The formation of crystalline deposits in wine is to be expected. The size of the crystals formed can vary greatly and this affects their appearance in the bottle.

When there is question as to whether a foreign object is a pharmaceutical tablet (as was the case with the capsule in bottled water) there is a database to which we have access which can aid the identification process. In order for this to be successful, however, it is necessary for the markings on the capsule to be legible and for any distinguishing criteria i.e. shape/colour of capsule be evident. In this case as no markings were evident identification was not possible.

Another resource at our disposal is assistance from the Histopathology Department in St. James's Hospital, Dublin with regards to the confirmation of tooth specimens. In the laboratory the density of the specimen can be determined to be consistent with that of tooth and it can be analysed to confirm the presence of calcium and phosphate, major constituents of tooth. However, it cannot be determined as to whether the tooth is of human or animal nature. In 2011 a tooth found in pasta sauce was sent to the above Department. The specimen was identified as a segment of human tooth root.

A number of samples were submitted with complaints of a chemical type (low fat super milk) or strong odour (red wine) and chemical type taste (butter). The milk was subjected to a range of testing including for hydrocarbons but it was not possible to identify the source of the slight sweet odour. The wine contained about twice the typical level of ethyl acetate in red wine and a large amount of sediment, both accounting for the consumer complaint. The butter was analysed by GC-MS but no contamination was found.

Other complaint allegations were of a non-descript nature, for example, allegations that the food 'tasted funny' or 'gone off'.

As always, it should be borne in mind that numbers for unsatisfactory samples understates the real figure since, in many cases, the analyst cannot provide sufficient scientific proof and/or opinion to satisfactorily substantiate the alleged cause of an individual complaint. Some complaints which were considered fanciful or frivolous had been received in previous years. No such samples were encountered in 2011.

A number of complaint samples have helped to reveal areas where manufacturers or vendors have exercised insufficient care to prevent contamination. However some more of the complaints submitted could have been more appropriately addressed directly to the vendor.

Over the years certain types of problem such as infestations with insects have very significantly decreased. This reflects improvements in effective controls instigated by Food Business Operators at manufacturing, distribution and retail levels. Two samples of insects from food premises were submitted for identification purposes to support investigations.

In some instances of food infestation we consider it likely that the problems originated at a domestic level. The trends in relation to food complaints and the types of problem encountered by this laboratory support the view that the Irish food industry is generally well run and well organised.

As in the previous year, none of the allegations concerning microbial food poisoning associated with the consumption of complaint samples were substantiated through examination of the food. In many cases of gastrointestinal illness, food may not the vector.

One complaint sample was submitted for biogenic amine testing and was not substantiated.

A number of complaint samples submitted were accompanied by a control sample. In some cases the provision of control samples, i.e. a sealed retail sample of the same product and same batch, is useful in order to provide a reference to which the complaint sample can be compared.

The accompanying Tables indicate the sample types received for microbiological and chemical analysis from the EHS (Table 21) and private customers (Table 22), and the number of complaints received under each heading.

	Type	*Total samples*	*Satisfactory*	*Unsatisfactory*	*Open*	*% Unsat*
	Dairy Products	18	4	5	9	28
2	Eggs and Egg Products	2	1	0	1	0
3	Meat, Game and Poultry	38	21	5	12	13
4	Fish, Shellfish and Molluscs	9	7	1	1	11
5	Fats and oils	0	0	0	0	-
6	Soups, Broths and Sauces	1	1	0	0	0
7	Cereals and Bakery Products	30	9	6	15	20
	Fruits and Vegetables	15	4	6	5	40
9	Herbs and Spices	0	0	0	0	-
10	Non-alcoholic Beverages	13	4	5	4	38
11	Wine		3	1	1	20
12	Alcoholic Beverages (other than wine)	0	0	0	0	-
13	Ices and Desserts	2	1	1	0	50
14	Cocoa, Coffee, Tea	0	0	0	0	-
15	Confectionery	6	1	2	3	33
16	Nuts and Nut Products, Snacks		0	1	0	100
17	Prepared Dishes	19	7	5	7	26
18	Foodstuffs for Particular Nutritional Uses	7	1	1	5	14
19	Additives	0	0	0	0	-
20	Materials in contact with foodstuffs	0	0	0	0	-
21	Others	3	1	1	1	33
171	Foreign bodies, no food sample submitted	1	0	0	1	0
	Totals	**170**	**65**	**40**	**65**	**23**

Table 21 Complaint samples received from Environmental Health Officers during 2011

Unsatisfactory: The complaint was justified and the sample was unsafe because it does not comply with the requirements of Article 14 of Regulation (EC) No 178/2002, **or** the sample was not of the nature, quality or substance demanded.

Open: No comment could be made on the basis of the sample provided and the information available.

	Type	Total samples	Satisfactory	Unsatisfactory	Open	% Uunsat
1	Dairy Products	0	-	-	-	-
2	Eggs and Egg Products	0	-	-	-	-
3	Meat, Game and Poultry	17	13	0	4	0
4	Fish, Shellfish and Molluscs	2	1	0	1	0
5	Fats and oils	0	-	-	-	-
6	Soups, Broths and Sauces	0	-	-	-	-
7	Cereals and Bakery Products	1	1	0	0	0
8	Fruits and Vegetables	0	-	-	-	-
9	Herbs and Spices	0	-	-	-	-
10	Non-alcoholic Beverages	0	-	-	-	-
11	Wine	0	-	-	-	-
12	Alcoholic Beverages (other than wine)	0	-	-	-	-
13	Ices and Desserts	0	-	-	-	-
14	Cocoa, Coffee, Tea	0	-	-	-	-
15	Confectionery	0	-	-	-	-
16	Nuts and Nut Products, Snacks	1	0	0	1	0
17	Prepared Dishes	4	2	1	1	25
18	Foodstuffs for Particular Nutritional Uses	0	-	-	-	-
19	Additives	0	-	-	-	-
20	Materials in contact with foodstuffs	0	-	-	-	-
21	Others	1	0	0	1	0
171	Foreign bodies, no food sample submitted	1	0	0	1	0
	Total:	**27**	**17**	**1**	**9**	**4**

Table 22 Complaint samples / complaint investigation samples received from private clients during 2011

Unsatisfactory: The complaint was justified and the sample was unsafe because it does not comply with the requirements of Article 14 of Regulation (EC) No 178/2002, **or** the sample was not of the nature, quality or substance demanded.

Open: No comment could be made on the basis of the sample provided and the information available.

3.4 Food Export Certification testing

The laboratory provides an analytical service to businesses particularly regarding analysis of food products for Certificates of Free Sale for exporting foodstuffs outside the EU. In 2011 170 samples from numerous different companies were analysed in this category. All were non-programmed which had a major impact on the laboratory resources.

The range of parameters tested for included:

- **i)** additives (colours, preservatives, antioxidants)
- **ii)** metals
- **iii)** alcohol, methanol and congeners
- **iv)** sugars
- **v)** labelling analysis
- **vi)** microbiological testing.

Multiple copies of reports/certificates can be requested by customers, either at the time of analysis or subsequently.

3.5 Other / Miscellaneous food samples.

Examination was performed on 48 food samples from various organisations and private companies.

4. Water / effluent / swimming pool samples

In the year ended 31st December 2011, 7882 samples of water were submitted to the laboratory for chemical and/or microbiological analysis. The majority of the samples were taken from drinking water supplies and were tested for compliance with the European Communities (Drinking Water) Regulations 2007, S.I. No.278 of 2007.

Categories

The water samples were categorised as follows - Table 23.

Category	*Number of Samples*
Local Authorities & the HSE – Chemical samples	2802
Local Authorities & the HSE – Microbiological samples	2993
Local Authorities & the HSE – Fluoride samples (Note 1)	852
General Public, companies (Private) – Chemical samples	391
General Public, companies (Private) – Microbiological samples	844
Total :	**7882**

Note 1*: *Fluoride samples refer to samples submitted for this analysis only and were tested for compliance with the Fluoridation of Water Supplies Regulations, S.I. No.42 of 2007. Fluoride analysis is also performed on other water samples, as shown in the Appendix 3 Fluoride tables.

Table 23 Water sample categories in 2011

Included in the 7882 samples were the sample/parameter types shown in Table 24.

Type / Parameters	*Number of Samples*
Trihalomethanes (THMs)	149
Swimming pool (including Spa pool)	111
Effluent - Biochemical Oxygen Demand & other parameters	10
Hospital Renal Dialysis unit samples	19
Environmental Waters (Non-drinking Water Samples)	11
Hydrofluosilicic Acid Samples	6
Total :	**306**

Table 24

Other water samples

In addition, 5 distributions of water samples for both Aquacheck and EPA Proficiency Test Schemes were analysed throughout the year.

4.1 Discussion of some chemical parameters in the 2011 water samples.

Nitrate: Parametric Value (PV) 50 mg/l NO3

Relatively little of the nitrate found in natural waters is of mineral origin. Most of it comes from organic (such as waste discharges) and inorganic sources (predominantly artificial fertilisers). In addition, bacterial oxidation and fixing of nitrogen by plants can produce nitrate. High nitrate levels in drinking water can make it hazardous to infants as the nitrate can induce 'blue baby' syndrome (methaemoglobinaemia). Infants do not have fully developed digestive systems. Their gastric juices are less acidic than those of adults and 100% of the nitrate is converted into nitrite while only about 10% conversion is expected in adults and children. Nitrite oxidises the haemoglobin in the blood to methaemoglobin, which is not an oxygen carrier to the tissues, with consequent anoxia (methaemoglobinaemia).

In 2011, 1660 samples were analysed for nitrate. Of these, 16 had nitrate levels greater than the EU PV of 50mg/l NO_3 and represents 0.96% of the samples analysed.

Trihalomethanes (THMs): PV 100 µg/l Total THM

Chlorine is the most important chemical used in the disinfection treatment of water in Ireland. Chlorine is a powerful oxidising agent and it breaks down complex organic molecules, predominantly colour compounds, naturally occurring in the water. The breakdown products react with chlorine, and to a lesser extent with bromine which is formed from the oxidation of naturally present bromide, to give THMs. There is a direct correlation, in chlorinated water, between the amount of colour in the water and the levels of THMs formed. THMs do not occur naturally. Those of most concern are chloroform, bromodichloromethane, dibromochloromethane and bromoform. THMs in water may pose a risk to human health because chloroform is a suspected carcinogen. There must be a balance between controlling THM levels and ensuring adequate disinfection of drinking water. Chloroform is the most common THM and Table 25 gives the chloroform ranges for the 2011 samples.

Chloroform Range µg/l				
	< 50	**51 – 100**	**101 – 150**	**> 150**
No of samples	69	72	7	1

Table 25 Data for chloroform in 2011 samples

Of the 149 samples tested for THMs, 8 had a concentration of chloroform that exceeded the EU PV.

Aluminium: ***PV 200 µg/l***

Aluminium is the most abundant metallic element and accounts for approximately 8% of the earth's crust. In the treatment of drinking water aluminium salts are widely used for the removal of colour and colloids. It is through this use that there may be increased concentrations of aluminium in the finished treated water. In their *Guidelines for Drinking Water Quality* the World Health Organisation (WHO) indicates that human exposure to aluminium can arise from a number of sources with drinking water contributing less than 5%. Aluminium intake from foods represents the major route of exposure. The PV of 200µg/l is a maximum level that allows for the beneficial use of aluminium as a coagulant, while minimising the levels in finished treated water.

In 2011, 2626 waters were tested for aluminium. Of these 61 had aluminium levels greater than 200µg/l, representing 2.3% of samples tested.

Lead: ***PV 25 µg/l***

Lead is a poison. Because it accumulates in the body strict limits on levels of lead in drinking water apply. Lead is rarely present in treated drinking water supplies; its presence mainly arises from old household plumbing systems that use lead pipes. The amount of lead brought into solution depends on a number of factors, including pH, temperature and the hardness of the water. A Parametric Value of 10µg/l must be met by 25th December 2013.

Out of a total of 689 tests performed for lead in water in 2011, 16 had lead levels above the EU PV limit of 25µg/l. This represents 2.4% of the total samples analysed.

4.2 Fluoridation of Public Water Supplies.

Water fluoridation is the adjustment of the natural concentration of fluoride in drinking water to the optimal recommended level for the prevention of dental caries. The HSE is ultimately responsible for the fluoridation of water supplies in Ireland.

Article 6 of S.I. No.42 of 2007 (Fluoridation of Water Supplies Regulations) states; "The amount of fluoride which may be added to public water supplies shall be such that the water, after the addition of the fluoride, shall contain not more than 0.8 milligrams of fluoride per litre (mg/l) of water, and not less than 0.6 milligrams of fluoride per litre (mg/l) of water."

The fluoride levels found in water supplies in 2011 are given in Appendix 3.

Hydrofluosilicic Acid Analysis

Hydrofluosilicic acid (HFSA) is a chemical substance containing fluoride that is used for the fluoridation of water intended for human consumption. The HSE has the responsibility for the implementation of S.I. No. 42 of 2007 on a National level and to ensure that the HFSA supplied is independently tested. In 2011, the laboratory undertook the independent analysis of HFSA. Representative 'grab samples' of the HFSA distributed nationwide are taken at random and submitted to the laboratory for independent testing.

The specification for the acid is as follows; 10.9% by weight of HFSA, subject to a tolerance of ±0.3%. The limits for the heavy metals, as specified in European Standard IS.EN 12175:2006, are presented in Table 25A.

Parameter	*Limit mg/kg HFSA (at 100% active ingredient)*
Antimony (Sb)	80
Arsenic (As)	400
Cadmium (Cd)	40
Chromium (Cr)	400
Lead (Pb)	400
Mercury (Hg)	10
Nickel (Ni)	400
Selenium (Se)	80

Table 25A HFSA Specification

4.3 The Microbiological Examination of Drinking and Other Water, 2011

In the year ended 31st December 2011 the laboratory analysed 3837 microbiological water samples.

The samples consisted of the water categories shown in Table 26.

Water category	*Number of Samples*
Drinking Water	3201
Bottled water	11
Ice	6
Endoscopy water	482
Swimming / Spa pool	120
Effluent	4
Horticultural water	3
Tap Swabs	3
Untreated Lake	1
Raw Water	6
Total:	**3837**

Table 26 Categories of waters for microbiological examination

Drinking Water

Drinking water samples were submitted from the HSE, Local Authorities and members of the public and consisted of water originating from both public and private supplies.

The basic standards governing the quality of drinking water intended for human consumption are set out in EU Council Directive 98/83/EC and are implemented by the European Communities (Drinking Water) (No. 2) Regulations 2007, S.I. No. 278 of 2007.

Drinking Water from the HSE / Local Authorities

Table 27 shows the proportion of samples which conformed to the values set out in the European Communities (Drinking Water) (No. 2) Regulations, 2007, S.I. No. 278 of 2007. This data should not be used to assess compliance of Irish drinking water with EU law as our data is aggregated data which includes repeat, pre-treatment and private supply samples which would be expected to have a higher incidence of contamination.

Parameter	*Limits set by S.I. 278 of 2007*	*% Conforming with S.I. 278 of 2007*	*Sample Numbers*
Safety Parameters			
Escherichia coli	0 cfu per 100ml	98.03%	2798
Enterococci	0 cfu per 100ml	97.69%	2424
Indicator Parameters			
Coliforms	0 cfu per 100ml	91.72%	2777
Clostridium perfringens	0 cfu per 100ml	98.32%	1729

Table 27

E. coli is a coliform organism which is an indicator of recent faecal contamination. Coliforms other than *E. coli* may or may not be of faecal origin and may persist and even grow in water. Coliforms are sensitive to chlorine and should always be absent from chlorinated water. Biofilm build-up in domestic taps or pipework can protect the coliform bacteria against chlorine residues.

Enterococci are also indicators of faecal contamination. *Clostridium perfringens* is regarded as a secondary indicator of faecal contamination. The main reason for testing for these organisms is to assess the significance of coliform bacteria in a water sample in the absence of *E. coli*. Enterococci do not multiply in water and are generally more resistant to environmental stresses and chlorination than coliform bacteria. Spores of *Clostridium perfringens* are capable of surviving for significantly longer periods than vegetative bacteria and are also more resistant to chlorination. Thus *Clostridium*

perfringens testing is useful in determining the effectiveness of the chlorination process. However, both *Clostridium perfringens* and Enterococci are present in faeces in much smaller numbers than Coliforms and *E. coli* and are therefore less sensitive indicators of contamination.

Drinking water from Private Supplies

Private supplies are not normally subject to S.I. No. 278 of 2007. Nevertheless the parametric values set out by the regulation provide a useful basis for assessing fitness of a private water sample. Table 28 shows the level of compliance with S.I. No. 278 of 2007 of drinking water submitted to the laboratory from private supplies.

Parameter	*Limits set by S.I. 278 of 2007*	*% Conforming with S.I. 278 of 2007*	*Sample Numbers*
Safety Parameters			
Escherichia coli	0 cfu per 100ml	98.03%	2798
Enterococci	0 cfu per 100ml	97.69%	2424
Indicator Parameters			
Coliforms	0 cfu per 100ml	91.72%	2777
Clostridium perfringens	0 cfu per 100ml	98.32%	1729

Table 28

The type and depth of wells/borings can have a big impact on the bacteriological outcome. It can be very difficult to keep a shallow well, less than 10M, free of bacteriological contamination. It may be possible to improve the bacteriological quality of deeper sources through once off sterilisation and attention to details of well protection. As private wells/borings may be prone to fluctuations in quality, it is important to build a history of quality over time. Owners of private wells/borings are encouraged to have an initial full examination (chemical and microbiological) of their supply carried out and if that is satisfactory, to subsequently have a bacteriological test performed at least annually to ensure that hygienic quality is maintained. Over the last number of years there has been a reduction in the number of samples submitted by private well owners which may be due to the economic recession.

Bottled Water

There were 11 bottled water samples submitted for microbiological analysis in 2011 which consisted of 6 spring waters and 5 other bottled waters. 9 out of the 11 bottle waters were compliant with S.I. No. 225 of 2007 for all microbiological parameters tested. Two spring bottled waters were not compliant; one sample was not compliant for the Coliform parameter and the second sample was not compliant for both the Coliform and Enterococci parameters. The number of bottle water samples analysed was substantially less in 2011 than in 2010 as 119 additional samples were analysed in 2010 as part of the 10NS2 FSAI bottled water survey. In 2010 all bottle water samples, both survey and routine, exhibited 100% compliance for the microbiological parameters examined. As so few bottled water samples were submitted in 2011 we cannot determine whether or not there has been any significant change in the microbiological quality of bottled water samples since the survey.

Table 29 details microbiological parameters examined and percent compliance with S.I. 225 of 2007.

Microbiological Parameter	*Limits set by S.I. 225 of 2007*	*% Conforming with S.I. 225 of 2007*	*Sample Numbers*
Coliforms	0 in 250ml	81.82%	11
Escherichia coli	0 in 250ml	100.00%	11
Enterococci	0 in 250ml	90.91%	11
Pseudomonas aeruginosa	0 in 250ml	100.00%	11
Sulphite reducing clostridia (Natural mineral and spring water only)	0 in 50ml	100.00%	5

Table 29

Ice for cooling drinks

6 ice samples were submitted for microbiological analysis in 2011. There are no specified microbiological criteria in European legislation for ice. Given this, the microbiological criteria specified in drinking water legislation have tended to be applied to ice. This approach is too rigorous as ice undergoes an additional process at the point of distribution. 5 out of 6 ice samples submitted in 2011 complied with S.I. 278 of 2007 for the microbiological parameters tested. One ice sample did not comply with the statutory instrument for the Coliform and Enterococci parameters.

Table 30 lists parameters tested and conformance with S.I. 278 of 2007 for ice. Such conformance is not a requirement and serves only as a reference point.

Microbiological Parameter	*Limits set by S.I. 278 of 2007*	*% Conforming with S.I. 278 of 2007*	*Sample Numbers*
Coliforms	0 in 100ml	83.33%	6
Escherichia coli	0 in 100ml	100.00%	6
Enterococci	0 in 100ml	83.33%	6

Table 30

Swimming and Spa Pool Samples

There are currently no Statutory Irish microbiological standards or guidelines for swimming and spa pool waters. For the purposes of this report the results were compared with the limits set by the Pool Water Treatment Advisory Group (PWTAG), in 'SWIMMING POOL WATER, Treatment and Quality Standards', 2009 (a UK publication) as an example of good practice. The samples are also analysed for Enterococci though there are no guide levels/criteria indicated in the PTWAG guidelines. They are used as secondary indicators of faecal contamination and were not detected from 95% of all swimming / spa pool samples analysed.

Table 31 shows the percentage compliance of swimming and spa pool samples with 'The Swimming Pool Water, Treatment and Quality Standard, 2009'.

Microbiological Parameter	*Guide level**	*% Conforming Swimming/Spa Pool Samples*
Coliforms	0 cfu per 100ml	98.32%
Escherichia coli	0 cfu per 100ml	99.17%
Pseudomonas aeruginosa	0 cfu per 100ml	98.27%
TVC at 37°C	≤ 10 cfu per ml	80.00%
Enterococci	N/A	

* UK Swimming Pool Water, Treatment and Quality Standards, 2009

Table 31

Miscellaneous Samples.

In addition to the samples described, microbiological testing was carried out on 5 tap swabs for presence / absence of Coliforms and *E. coli*. 482 endoscopy water samples were submitted for TVC at 22 / 37°C. The effluent water samples listed in Table 26 were all submitted by private customers. Similarly the horticultural waters were submitted by private customers and analysed, as requested, for compliance with the Bord Bia Horticulture Quality Assurance Scheme - Water Analysis Requirements 2009. 6 raw waters and 1 untreated lake sample were analysed for Coliforms, *E.coli* and Enterococci. In addition to the samples listed in Table 26, 36 samples were analysed as part of external proficiency testing schemes.

5. Clinical samples

In 2011, 1514 samples of biological fluids were analysed for metals. The samples consisted of:

Blood:	208
Serum:	884
Urine:	422

The number of metal tests in the different sample types is given in Table 32.

In addition, samples of biological fluids were analysed under Proficiency Schemes and other Quality Control Programmes.

As part of a survey, at the request of the FSAI, 254 urine samples were analysed for cadmium.

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Matrix	*Aluminium*	*Arsenic*	*Cadmium*	*Calcium*	*Copper*	*Lead*	*Magnesium*	*Manganese*	*Mercury*	*Selenium*	*Thallium*	*Zinc*
Blood		**4**	**4**			**173**		**4**	**23**			
Serum	**221**				**337**			**4**		**50**		**428**
Urine			**377**		**33**	**2**			**10**			**1**
Totals	**221**	**4**	**381**		**370**	**175**		**8**	**33**	**50**		**429**

Total Number of Tests: 1671

Table 32 Metal Tests on Biological Samples

6. Microbiology of Cosmetics

The first annual program of microbiological testing of cosmetics commenced in February 2011 and ran over a planned 10 months. We received 142 cosmetic samples and 3 medicine samples. The cosmetic samples were examined and results assessed against the microbiological guidelines contained in the seventh edition (December 2010) of the guidance notes for testing of cosmetic ingredients produced by the EU Scientific Committee on Consumer Safety (SCCS). The medicine samples were examined and reported without any assessment of the results.

There were 138 informal surveillance samples. One non-compliant sample was found among these and this resulted in the receipt of two further informal samples and 2 formal samples.

Testing commenced with 2 parameters, enumeration of Aerobic Mesophilic Bacteria (AMB) and a test for the presence of *Pseudomonas aeruginosa*. These parameters were chosen as a review of microbiological contamination incidents reported via the EU RAPEX system indicated that these were the parameters most likely to cause a problem. Validation work related to the implementation of additional methods continued in the laboratory in parallel with routine testing. As a result, during the latter part of the year, enumeration of Yeast and Moulds (Y&M) was added to the suite of routine tests. Validation work continues with a view to achieving accreditation for the current suite of tests in 2012 and to extending the range of tests available.

All the methods in use in the laboratory are full implementations of ISO methods. ISO methods for cosmetics allow for considerable flexibility in implementation necessitated by the very variable nature of the products under test. The validation work within the laboratory is intended to demonstrate that the laboratory's implementation of a method will deliver satisfactory results for a range of products. In addition, because of the unique nature of each product, the analytical methods incorporate an internal validation test which demonstrates that the method works with the specific product under test.

Each method requires a specific quantity of sample to allow for testing in accordance with ISO. This quantity includes an amount which is devoted to the specific product validation test. As cosmetic products may be sold in very small quantities and the quantity of product available to the laboratory for testing may be limited, the laboratory may reduce the numbers of parameters for which a product is tested based of the quantity of product available. As cosmetic products frequently include ingredients which are inhibitory, it may be necessary for the laboratory to validate at several dilutions in order to report a satisfactory result. In some cases and for particular products the laboratory may sometimes be able to anticipate the need for higher validation dilutions and the consequential need for greater quantities of test material. When we need to proceed to validate a product test at higher dilutions, we want to do this with a freshly opened sample.

Some test methods are quite general (AMB, Y&M) in their ability to detect contamination while others are very specific, reflecting concerns about particular organisms (*Pseudomonas aeruginosa*). Where test material is limited, the laboratory will apply a general test as long as there is sufficient material. For AMB we require a minimum of 3g to complete a test validated at the initial dilution. For Y&M we require a minimum of 2g. For *Pseudomonas aeruginosa* we require a minimum of 2g. All 3 parameters can be tested together with a 6g quantity of sample. Methods for AMB will likely detect significant contamination caused by a wide variety of bacteria and also by some yeasts and moulds. Methods for Y&M may also detect some bacterial contamination.

Whenever products are sampled as sets, each individual component of the set is logged as a separate sample and is reported separately as long as there is sufficient quantity to test for at least one parameter. This will happen even if the only difference between products is simply colour. This is because each item has experienced a different production environment.

For products supplied in sets, particularly children's products, the quantity of specific components may be very small and the actual quantity may not be declared posing sampling difficulties for EHOs. For the reasons set out above, the laboratory always requests that a minimum of 2 containers of product be submitted and may require more than that. Material from multiple containers from the same batch may be composited for initial testing to provide sufficient sample, or units may be held in reserve against the possible need to return to the sample if testing at the initial dilution is not satisfactory. Any unopened product unused after reporting of results on a sample is applied to the laboratory's ongoing program of validation for additional parameters or accreditation.

We reported results for AMB on 129 samples, for Y&M on 54 samples and for *Ps. aeruginosa* on 129 samples.

The single non-compliant sample found was contaminated with a non pathogenic yeast *Candida pelliculosa*. The contamination was in one component of a binary mouthwash product. All three samples tested from the same batch were found to be contaminated. The second component of the binary product was free from contamination. No adverse reactions were reported.

Occasionally products are so inhibitory to some bacteria that the laboratory is unable to demonstrate compliance at a suitable dilution. In such cases we are usually able to state that it highly unlikely that such products are contaminated

7. Accreditation

7.1 Legislation

The Public Analyst's Laboratory, Dublin was awarded accreditation by the Irish National Accreditation Board (INAB) in September 1998 to the European standard EN 45001, the ISO Guide 25 and the INAB publication P1.

International Standard ISO 17025 "General requirements for the competence of testing and calibration laboratories" Second Edition was published on 15 May 2005. The laboratory successfully achieved transference to the 'Second Edition'.

The purpose of the second edition is to clarify that meeting the requirements of ISO 17025 does not automatically mean that all the ISO 9001 requirements are also met and to align the management requirements of ISO 17025 with the content of ISO 9001:2000.

7.2 Operation of the Laboratory's Quality Management System

7.2.1 Management

7.2.1.1 Organisation

The operation of the Quality Management System is detailed in the following laboratory documentation:

Quality Manual

Administrative Manual
Test Methods - Chemistry
Test Methods - Microbiology

7.2.1.2 Document Control

The laboratory has and maintains procedures to control all documents, internally generated or from external sources, that form part of the quality management system, such as regulations standards, other normative documents, test method, as well as drawings, software, specifications, instructions and manuals. Procedures are established and maintained to control all such documents. All documents are held for a period of at least 5 years in compliance with INAB requirements.

7.2.1.3 Audits

Audits are conducted each year according to a predetermined schedule and procedure. The purpose is to verify that the operations of the laboratory comply with the requirements of the quality management system and International Standard ISO 17025. The internal audit programme addresses all elements of the quality management system.

Three different types of audits are conducted. A horizontal audit is a detailed check of a quality management system element throughout the total range of testing activities covered by the accreditation. Examples are staff training, calibration and maintenance of equipment. A vertical audit is a detailed check that all quality management system elements associated with a test are implemented in a specific assignment. In a vertical audit, a representative performed test is selected at random from work that has recently passed through the laboratory. A Test Witnessing audit is a detailed check that all quality management system elements associated with the performance of a test are implemented. The performance of the test is witnessed by the auditor.

7.3 Technical

7.3.1 Measurement Traceability

Traceability of measurement to SI units of measurements is established in compliance with ISO 17025.

7.3.2 Test Method Validation

A documented procedure is conducted for the validation of laboratory test methods in order to establish the performance characteristics of the method and to identify the influences which may change these characteristics and to what extent.

7.3.3 Estimation of uncertainty of measurement

The uncertainty of a result is a quantitative indication of its quality. A documented procedure is conducted for the estimation of the uncertainty of measurement of laboratory test methods.

7.3.4 Quality Control

In order to ensure the quality of test results, the laboratory operates specified quality control procedures.

7.3.4.1 Internal quality control

Following the validation of the test method a validation report detailing performance criteria calculated, including all raw data and calculations, is prepared. This data provides the basis for the preparation of quality control charts.

The use of statistical quality control (qc) charts is a powerful tool for monitoring the stability of an analytical system. In the performance of a test method, a quality control material is measured regularly and the analytical responses are plotted in time-order on a qc chart; if the chart displays other than random variation around the expected result it suggests that there may be a problem regarding the measurement process. Specified action must then be taken.

7.3.4.2 External Quality Control

The Laboratory participates in both inter-laboratory comparisons and Proficiency Testing Programmes. The current series of Proficiency Testing Programmes are detailed in Table 33.

External Quality Control for both accredited and non-accredited Test Methods

Laboratory Section	PT Scheme	Studies/Parameters	Distribution
		Chemistry	
Food Chemistry Including Method Research and Development	FAPAS	FC: 19 rnds* 24 para** TEL: 4 rnds, 5 para LCMS: 56 rnds, 92 ps GCMS: 9 rnds, at least 26 ps	April 2011 – March 2012
	Chek	FC: 5 rnd, 9 para LCMS: 4 rnds, 8 paras GCMS: 1 rnds, 4 paras	
	DAPs	1 parameter Alcohol By Volume	2 rounds (4 samples per year)
	Quasimeme	4 parameters	2 (2 Samples per 6 monthly distribution)
	JRC-IRMM (Geel and Ispra)	LCMS 9 + to be decided	LCMS 3 + to be decided
Water chemistry	Aquacheck Ltd	Groups 1 – 5 33 parameters per Distribution	5 Distributions per year
	EPA	Groups 1 - 4 26 parameters per Distribution	5 Distributions per year
Clinical Chemistry	TEQAS	8 parameters	12 (2 blood, 2 serum & 2 urines samples per monthly distribution)
		2 parameters	4 (3 urine & 3 blood samples per 3 monthly distribution)
	COPHES –Bio monitoring	1 parameter	3 (2 samples per distribution)
MR&D	DEMOCOPHES	7 monophthalates	4
Food Microbiology	HPA Standard Scheme	For Food Microbiology Examinations (Total 16 parameters)	6 per year
	HPA Pathogenic Vibrio	*Vibrio*	2 per year

	Scheme	*parahaemolyticus* (2 parameters)	
	Don Whitley Quality Counts Scheme	Spiral Plater counts	12 per year
Water Microbiology	HPA EQA for Drinking Water	For Coliform, *E.coli,* Enterococci, *P.aeruginosa*, *C. perfringens* and TVC at 37 and 22'C.	Total of 6 distributions, (18 samples)
	HPA EQA – Recreational and Surface Water Scheme	For marine (bathing beach): *E.coli*, Salmonella and Enterococci.	1 Distribution (2 samples)
		For swimming pool waters: Coliforms, *E.coli*, Enterococci, *P. aeruginosa*, TVC at 37'C.	2 Distributions (4 samples).
	HPA EQA for Food Microbiology (Campylobacter)	For Campylobacter analysis	Total of 4 samples
	LGC standards, QWTAS	For Salmonella analysis under 2 sample types 416 (simulated effluent, sludge) and 419, (surface waste and bathing water).	Total of 8 samples

* rnds = Rounds. ** para = Parameters.

Table 33 Proficiency Testing Programmes

Schedule of Accreditation

The scope of accreditation for the laboratory (Registration No. 099T) covering both chemistry and microbiology has been greatly extended since initial accreditation was awarded in 1998.

Table 34 shows the extension to the schedule of accreditation which was assessed by the Irish National Accreditation Board in February 2012.

Full details of the scope of accreditation are available at
http://www.inab.ie/directoryofaccreditedbodies/laboratoryaccreditationtesting/099T-1.pdf

Extension to the schedule of accreditation, assessed by INAB February 2012
Test Methods ***New methods*** Three new SOPs for cosmetic products: **SOP PALM 3000#** - Enumeration of Aerobic mesophilic bacteria by ISO 21149 **SOP PALM 3001#** - Detection of Pseudomonas aeruginosa by ISO 22717 **SOP PALM 3003#** - Enumeration of Yeast and Mould by ISO 16212 Three new SOPs for clinical analysis: **SOP PALC 99#** - Determination of copper in serum by flame atomic absorption spectrophotometry. **SOP PALC 101#** - Determination of zinc in serum by flame atomic absorption spectrophotometry. **SOP PALC 104#** - Determination of copper in urine by flame atomic absorption spectrophotometry. ***Extensions to Currently Accredited Methods*** Matrix extension to the following SOPs to increase the number of matrices covered in our scope: **SOP PALM 4001#** - Detection of Salmonella spp. using an automated enzyme-linked fluorescent immunoassay system (VIDAS) **SOP PALM 0004#** - Detection of Salmonella spp. in food. Matrix extension to the following SOPs to increase the number of matrices covered in our scope:

Table 34 Extension to Scope of Accreditation

8. Training

The laboratory is committed to providing continual training of staff in a wide range of aspects chemical and microbiological analysis. In accordance with ISO 17025 a policy and procedures are in place for identifying training needs and providing training of personnel. A Training Officer is appointed to manage the laboratory's Training Programme.

A staff file is maintained for each member of staff in which the following information is recorded:

- **i)** name
- **ii)** date commenced in the laboratory
- **iii)** qualifications
- **iv)** relevant work experience
- **v)** record of experience/responsibilities
- **vi)** record of initial in-house training
- **vii)** record of competence re-assessment
- **viii)** record of training received in house by external trainers
- **ix)** record of external training
- **x)** record of current list of competencies for accredited test methods
- **xi)** record of current list of competencies

8.1 In house Training

Technical

Analysts who are required to carry out an unfamiliar analytical procedure must undergo a training programme under the supervision of an experienced analyst. The protocol for the training programme is detailed in a Standard Operating Procedure (SOP). The end result is the demonstration of competence in that method by the trainee analyst. A personal training record is maintained for each member of staff. All approved analysts must demonstrate an on-going ability to achieve the required standard for each Test Method.

8.2 External Training

A wide range of technical training courses are attended by members of staff each year.

During 2011 staff members attended a diverse variety of training courses and participated in programmes of further education as detailed in Table 35.

Course/Seminar title	*Organiser*
Skills Development / Technical Training	
Statistical Tools for Method Validation	Savant Technologies Ltd.
Irish Spectrometry Seminar	Irish Mass Spectrometry Society
6th Workshop of the NRLs for PAHs	DG-IRMM, JRC EURL for PAH
Setup, operation and maintenance of the Onefast sample introduction System	PerkinElmer
Setup, operation and maintenance of the AA240FS & Vapour Generation Accessory VGA 77	JVA
PerkinElmer Workshop	PerkinElmer
Seminar on product shelf-life and microbiological criteria	Food Safety Authority of Ireland/Teagasc
LIP/Fannin/Oxoid Seminar	Oxoid
BioMerieux Food Symposium 2011	BioMerieux
Introductory Training on the Operation of the Shimadzu 2450 UV Spectrophotometer	Mason Technology Ltd.
Food Labels: Do Food Labels Inform, Educate, or Mislead the Consumer?	IFSTI
Meeting of the Task Force on PAAs-FA of the EU-RL-FCM	JRC-Ispra
Initial Familiarisation Training–Waters Acquity H-Class UPLC and Fluorescence Detector	Waters Chromatography Ireland Ltd.
Innovations in Separation Science 2011	Waters Chromatography Ireland Ltd.
6th Annual Meeting of the NRLs for Mycotoxins	JRC-IRMM
Mettler Toledo C30 Coulometer Karl Fisher Titrator, and Mettler Toledo Excellence T50 M Titrator	Mason Technology Ltd.
Additives Training (incl. giving talk on FSP 2011)	Food Safety Authority of Ireland
Acquity UPLC H-Class Applications Training	Waters Chromatography Ireland

	Ltd.
Irish Universities Chemistry Research Colloquium	University College Dublin
Plenary Meeting of the EU-RL/NRLs for FCMs	AGES, Vienna, Austria
Cleaning of Quattro Ultima and Quattro Premier XE Mass Spec. Sample Cones	In-house
DART Accessory for Waters Quattro Premier XE MS/MS spectrometer	KR Analytical Ltd., UK
Annual Labelling Programme–Food Contact Materials	FSAI
Workshop on Sensory Science for Food Contact Materials Safety	JRC, Ispra, Italy
Plenary Meeting of the EU-RL/NRLs for FCMs	JRC, Ispra, Italy
Aquakem 250 – new instrument training	In-house by Serosep
Setup, Operation & Maintenance of the AA240FS & VGA	In-house by JVA
Setup, Operation & Maintenance of the OneFast sample introduction system	In-house by Perkin Elmer
Information day on Guidance note 25. Natural mineral waters.	Food Safety Authority of Ireland
Trace ISQ Operations	Thermo Scientific UK (Travel and subsistence funded by Safefood).
Workshop on 3-MCPD and Glycidyl esters in food products.	ILSI
Induction Training	
General Induction Training	In-house
New staff member	In house
Information Technology Training	
LIMS–Instrument Manager and Standards/Reagents Manager Training	In-house
Configuring, Managing, and Maintaining Windows Server 2008-based Servers–6419B	SureSkills
Accreditation/Auditor Training	
FVO Inspection Mission to Portugal–Food Additives and Food Contact Materials	Food and Veterinary Office
Better Training for Safer Food	D.-G. Health and Consumers
FVO Inspection Mission to Hungary–Food Additives and Food Contact Materials	Food and Veterinary Office
Health Safety and Welfare	
Risk Assessment Workshop	HSE consultant John Taylor
Manual Handling and Back Awareness Training Course	External organiser - Usafety
Occupational First Aid	FETAC

Table 35 Training Courses/Seminars in 2011

9. External meetings

During 2011 laboratory staff participated in numerous committee meetings. These included:

- **i)** Food Safety Authority of Ireland (FSAI) meetings with the Public Analysts
- **ii)** FSAI/PAL/EHS meetings
- **iii)** FSAI meetings with the OFMLs
- **iv)** FSAI/OFML/EHS meetings
- **v)** FSAI Legislation Committee meetings
- **vi)** FSAI Working Groups
- **vii)** FSAI Import Control Group
- **viii)** FSAI-Health Service Executive Contract meetings
- **ix)** Regional Food Sampling meetings
- **x)** Regional Zoonosis meetings
- **xi)** National Fluoridation Steering Group meetings
- **xii)** Laboratory Information Management System meetings

10. Health, Safety & Welfare

In accordance with the Safety, Health and Welfare at Work Act, 2005 and associated legislation, it is the policy of the Public Analyst's Laboratory to ensure, in so far as is reasonably practicable, the safety, health and welfare of all its employees and those who have business on its premises.

A Health Safety and Welfare Officer (HSWO) is appointed from the laboratory staff to manage the laboratory's Health Safety and Welfare programme.

10.1 Risk Assessment

Hazard identification, risk assessment and the subsequent implementation of protective and preventative control measures are key to the successful implementation of our safety management programme thus providing a safe work environment.

The four steps in performing risk assessments are as follows;
Risk Identification
Risk Analysis
Risk Evaluation
Risk Treatment

Risk Assessment tools were imparted at the HSE Risk Assessment Workshops provided to laboratory staff. A risk matrix is used to categorise risks identified i.e. place into the high; medium or low category. This process allows for the prioritisation of the additional actions which have been identified as being required.

10.2 Safety Statement

The laboratory Safety Statement is a written programme detailing the plans to be implemented to ensure the safety health and welfare of employees while at work.

The operation and documentation of the laboratory Health, Safety and Welfare System is integrated with the operation and documentation of the laboratory Quality Management System.

10.3 Training

Risk Assessment Training was provided for staff in January 2011.

The purpose of the Risk Assessment Workshop was as follows;

i) to provide a practical understanding of the hazard identification and risk assessment process
ii) to clarify terms used in the process
iii) to introduce participants to the risk matrix system
iv) to enable participants to undertake a structured approach to risk assessment in the area in which they work.

Two members of staff attended a three day Occupational First Aid Training Programme in September 2011. The aim of programme was to provide the learner with the knowledge, practical skills and understanding required to provide and coordinate first aid in the workplace in compliance with the requirements of the Occupational First Aid Regulations 2007 and the associated Guide to these Regulations.

The programme content included:

i) First aid in the workplace
ii) Patient assessment
iii) Respiratory emergencies
iv) Cardiac first response
v) Wounds and bleeding
vi) Altered levels of consciousness
vii) Musculoskeletal injuries
viii) Burns and scalds, chemicals, electric shock

10.4 Vaccination Programme

All staff members are informed of the possible health hazard posed by contaminated body fluids and water samples. Most infectious hepatitis is caused by viruses; the most common of these are Hepatitis A and B for which a vaccination programme is in operation.

10.5 Waste Management

There is waste management programme in operation which is concerned with the environmental disposal of waste as detailed in Table 36.

Waste – 2011	*Cost for Disposal €*
Solvent Waste	9986
Clinical Waste including Contaminated Glass	38273 - estimated
Mercury Waste	-
Paper waste	494
Cardboard	354
Glass waste	245
Obsolete Equipment	-
General Waste	1138
Specialised Waste	-
Total	50470

Table 36 Waste Management Programme

11. Laboratory Staff as of 31st December 2011

Public Analyst	Dr Michael O'Sullivan
Deputy Public Analysts	Mr Vincent Young (Microbiology) Ms Rosemary Hayden. Quality Manager.
Executive Analytical Chemists	Dr Terence McEvoy (Microbiology). Post vacant. Dr Elizabeth Horne Dr John Keegan Mr Liam Dolan Dr Ian Nesbitt Mr Chris Griffin Mr Ken McCartney Ms Rachel Hewitt (Microbiology) Dr David Browne Ms Juanita O'Melia (Microbiology) Ms Niamh Murphy Mr Patrick English Ms Ruth Buckley Ms Karen Moore (A) Ms Bernadette Bradley (Microbiology) (A)
Chief Laboratory Technician	Post vacant
Senior Laboratory Technicians	Ms Margaret Murphy Ms Alison Brazil Mr Kevin Smith (Microbiology) Ms Annette D'Arcy Mr Barry Hurley Ms Orna McDaniel (Microbiology) (A)
Laboratory Technicians	Ms Geraldine Drew (Microbiology) Ms Maresa Holland Ms Aisling Connolly Ms Siobhan Kelly (Microbiology) Ms Anne O'Boyle Ms Susan Carney Ms Elaine Eustace (Microbiology) Ms Marie Maxwell Ms Alma Keenaghan (Microbiology) Ms Martina Brady Ms Nicola O'Sullivan Ms Denise Fitzgerald Ms Edel Murphy (Microbiology) Ms Claire Prendergast

	Ms Aundre Hunter	
	Ms Susan Fitzpatrick	
	Mr Antoni Llovera (Microbiology)	
	Mr Patrick Duffy	
	Ms Sarah O'Reilly	
Laboratory Assistant	Post vacant	
Clerical Officer Grade V (A)	Mr John Gallagher	
Grade IV (A)	Ms Sandra Parr	
Grade III	Ms Mary Flannery	
Grade III	Ms Martina Vaughan	(Job sharing)
Grade III	Ms Lee Hwa Young	(Job sharing)
Laboratory Aide	Ms Mary Whyte	

Appendix 1.

SOP PALA 0018
SAMPLE REPORTING ACCORDING TO TIMEFRAMES AND DEADLINES POLICY

1 Principle

This SOP details the protocol to be adopted by members of staff for the reporting of samples.

2 Responsibility

It is the responsibility of all members of staff that samples are managed according to this SOP.

3 Procedure

3.1 Analyse samples and issue analytical reports to customers as soon as possible after sample receipt.

3.2 Apply maximum deadlines as detailed in Table 1 below.

Note: Two weeks for the Christmas period and one week for the Easter period can be added.

3.3 In order to facilitate this, at least two analysts should be trained in the analysis of each high priority parameter (with competency maintained). Ideally this competency should be available in the Section where analysis is normally performed as the analysts will be familiar with the working environment and in working with the other team members.

3.4 If the deadlines at Table 1 are not achieved, inform the EHO or other customer, in writing, of the reasons for the overrun and the expected date for issue of report. Issue the memo as early as possible in the sample cycle. Notification at time of receipt, or before, in writing will fulfil this.

3.5 Issue a preliminary report incorporating the above memo information as appropriate.

3.6 Agree any sample reporting timeframes outside of the above in writing with the customer. This may apply to customer led timeframes, such as pertaining to FSAI-provided survey samples.

3.7 For follow-up/repeat samples it was agreed that SOP PALA 0019 Analysis according to Public Health Risk-based Prioritisation will govern the timeframe given for reporting: 4 weeks deadline for contaminants; 6 weeks for other sample types.

Sample Category	Reference Type	New Timeframe. From date of receipt, except for FLCs. Applicable from 15th August 2007
Foods:		
Chemical Food Programme, incorporating prioritisation of parameters	FLC NLC	1 month from end of sampling period. If samples accepted by agreement beyond sampling period, timeframe applies from receipt date.
Repeat Chemical Food Sampling Programme Samples	FLC NLC	4 weeks for contaminants 6 weeks for other sample types
Microbiological: Food Programme. Swabs. Other non-food and non-water.	FLM NLM NPC NPM	4 weeks
Food Complaints	CLF/CPF/ CLN/CPN	3 weeks
Food Export Certification	FPC/FPM	3 weeks
Import Control Samples	FLC/NLC	15 working days from date of sampling
Waters:	W Categories	4 Weeks for final, combined Chemical /Microbiological reports. 10 Days for Fluoride only waters. 3 Weeks for Microbiological Water 6 weeks for in-house Laboratory Effluent Sample.
Clinical Samples:	HS	4 weeks

Table 1

Appendix 2. Management Report for Monitoring Service delivery to Customers (compiled from the LIMS).

Date of this Report 14/12/11 Time 08:59:26

Samples received since 1st January 2011 - *Excludes PT samples*

2011

	Num Rec'd	Num Cancelled	Num Reported	num NotRptd	*Number of outstanding samples....* ≤ 10 days	11-20 days	21-30 days	Unreported Samples within deadline	Unreported Samples exceeding deadline	Memos
Food Chemistry Section										
FLC	458	7	422	29	0	11	15	29	0	
FPC	35	4	29	2	2	0	0	2	0	
CLF	40	0	40	0	0	0	0	0	0	
CPF	3	1	2	0	0	0	0	0	0	
CLN	2	0	2	0	0	0	0	0	0	
CPN	2	0	2	0	0	0	0	0	0	
Group total	*538*	*12*	*497*	*31*	*2*	*11*	*15*	31	0	
GC-MS Section										
FLC	325	0	281	44	2	0	28	44	0	
FPC	71	0	50	21	0	0	21	0	21	
FLM	5	5	0	0	0	0	0	0	0	
CLF	3	0	2	1	0	1	0	1	0	
WPC	13	0	11	2	2	0	0	2	0	
Group total	*412*	*5*	*344*	*68*	*4*	*1*	*49*	47	21	
Trace Element Laboratory										
FLC	65	0	65	0	0	0	0	0	0	*0*
FPC	31	0	29	2	0	0	0	0	0	*0*
CLF	6	0	5	1	0	1	0	1	0	*0*
CLN	2	0	2	0	0	0	0	0	0	*0*
CPN	3	0	3	0	0	0	0	0	0	*0*
NLC	30	0	30	0	0	0	0	0	0	*0*
HS	1663	53	1435	175	46	55	27	170	5	*1*
NPC	1	1	0	0	0	0	0	0	0	*0*
Group total	*1801*	*54*	*1569*	*178*	*46*	*56*	*27*	171	5	*1*
LC-MS Section										
FLC	570	3	514	53	0	0	5	20	13	*8*
FPC	4	0	4	0	0	0	0	0	0	*0*
FLM	1	1	0	0	0	0	0	0	0	*0*

Page 1

2011	Num Rec'd	Num Cancelled	Num Reported	num NotRptd	Number of outstanding samples.... ≤ 10 days	11-20 days	21-30 days	Unreported Samples within deadline	Unreported Samples exceeding deadline	Memos
CLF	1	0	1	0	0	0	0	0	0	0
NLC	64	0	52	12	0	0	0	0	12	11
Group total	*640*	*4*	*571*	*65*	*0*	*0*	*5*	20	25	*19*
Chemistry Water										
WL	2303	18	2121	164	110	48	6	160	4	
WP	250	6	226	18	11	6	1	17	1	
WLC	516	7	486	23	19	4	0	23	0	
WPC	137	1	130	6	4	2	0	6	0	
WLF	844	2	826	16	16	0	0	16	0	
WPF	6	0	6	0	0	0	0	0	0	
Group total	*4053*	*34*	*3795*	*227*	*160*	*60*	*7*	222	5	
Default Group										
FLC	23	1	10	12	0	3	7	10	0	
CLN	1	0	1	0	0	0	0	0	0	
NLC	1	1	0	0	0	0	0	0	0	
NLM	2	0	2	0	0	0	0	0	0	
Group total	*27*	*2*	*13*	*12*	*0*	*3*	*7*	10	0	
Microbiology										
FLC	7	2	5	0	0	0	0	0	0	
FPC	13	4	12	0	0	0	0	0	0	
FLM	1217	95	1092	30	4	25	0	29	1	
FPM	78	2	74	2	2	0	0	2	0	
CLF	107	1	105	1	0	1	0	1	0	
CPF	9	0	9	0	0	0	0	0	0	
CLN	5	0	5	0	0	0	0	0	0	
CPN	1	0	1	0	0	0	0	0	0	
NLM	233	2	224	7	5	2	0	5	0	
WL	2298	20	2172	110	110	0	0	110	0	
WP	245	4	230	11	11	0	0	11	0	
WLM	713	8	679	26	26	0	0	26	0	
WPM	607	11	565	31	31	0	0	31	0	
KLM	170	9	106	55	9	7	7	19	24	
Group total	*5690*	*158*	*5279*	*273*	*198*	*35*	*7*	234	25	
Microbiology - Food Section										
FLM	6	5	1	0	0	0	0	0	0	
CLF	14	0	14	0	0	0	0	0	0	
NPM	5	0	5	0	0	0	0	0	0	
Group total	*25*	*5*	*20*	*0*	*0*	*0*	*0*	0	0	

Appendix 3

FLOURIDATION OF WATER SUPPLIES

Tables

FLUORIDATION OF WATER SUPPLIES
Levels of Fluoride in Drinking Waters Tested in 2011.
DUBLIN CITY AND COUNTY

RESULTS OF MONTHLY TESTS FOR YEAR ENDING 31st DECEMBER 2011
MILLIGRAMS PER LITRE (PARTS PER MILLION) OF FLUORIDE

WATER SCHEME	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
VARTRY	0.6	0.4	0.63	0.64	0.63	0.61	0.66	0.70	0.64	0.63	0.63	0.62
DODDER	0.6	No Sample Submitted	0.60	0.61	0.68	0.66	0.59	No Sample Submitted	0.61	No Sample Submitted	0.57	No Sample Submitted
LIFFEY - Poulaphouca	0.6	0.6	0.66	0.69	0.66	0.52	0.64	0.69	0.65	No Sample Submitted	0.63	0.64
LIFFEY - Leixlip	No Sample Submitted	0.7 & 0.6	0.61	0.58	0.58 & 0.60	0.60 & 0.61	0.65 & 0.56	0.60	0.56 & 0.65	0.66 & 0.64	0.62 & 0.65	0.67 & 0.68
BALLYEDMONDUFF	0.7	0.6	0.62	0.68	0.61	0.63	0.65	0.67	0.70	0.39 & 0.70	0.66	0.67
GLENCULLEN	0.6	0.6	0.65	0.67	0.67	0.64	0.71	0.82 & 0.62	0.57 & 0.83	0.70	0.68	0.54 & 0.79
KILTERNAN	0.7	0.6	0.63	0.69	0.60	0.65	0.67	0.76	0.63	0.69	0.70	0.68
BOG OF THE RING	No Sample Submitted	0.7 & 0.7	0.61	0.63	0.51 & 0.61	0.63	0.63	0.64	0.60 & 0.63	0.63	0.64 & 0.63	0.65

FLUORIDATION OF WATER SUPPLIES
Levels of Fluoride in Drinking Waters Tested in 2011.
WICKLOW

RESULTS OF MONTHLY TESTS FOR YEAR ENDING 31st DECEMBER 2011
MILLIGRAMS PER LITRE (PARTS PER MILLION) OF FLUORIDE

WATER SCHEME	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
BLESSINGTON	0.7	0.6	0.68	0.73	0.67	0.68	No Sample Submitted	No Sample Submitted	0.66	No Sample Submitted	0.67	0.66
LARAGH/ ANNAMOE	0.7	0.6	0.65	0.74	0.76	0.50	No Sample Submitted	No Sample Submitted	0.71	No Sample Submitted	No Sample Submitted	No Sample Submitted
WICKLOW	0.7	0.7	0.69	0.61	0.62	0.63	0.63	0.69	0.64	0.61	0.62	0.68
ARKLOW	0.5	0.7	0.54	No Sample Submitted	0.69	0.50	0.47	0.44	0.48	0.49	0.50	0.61
TINAHELY	0.8	0.8	0.73	0.75	0.73	0.79	0.75	0.64	No Sample Submitted	0.80	No Sample Submitted	0.76

NOTE : Other water samples from Wicklow were submitted for fluoride testing under S.I No.42 of 2007 & S.I. No.278 of 2007.

FLUORIDATION OF WATER SUPPLIES
Levels of Fluoride in Drinking Waters Tested in 2011.
KILDARE

RESULTS OF MONTHLY TESTS FOR YEAR ENDING 31st DECEMBER 2011
MILLIGRAMS PER LITRE (PARTS PER MILLION) OF FLUORIDE

LEIXLIP REGIONAL SCHEME

LOCATION	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT.	OCT	NOV	DEC
MAYNOOTH	0.6	0.7	0.62	0.61	0.62	0.59	0.60	0.64	0.66	0.62	0.65	No Sample Submitted
LEIXLIP	0.6	0.7	0.61	0.57	0.62	0.58	0.55	0.66	0.63	0.66	0.61	0.60
KILCOCK	0.7	0.7	0.63	No Sample Submitted	0.63	0.75	0.68	0.69	No Sample Submitted	0.71	No Sample Submitted	No Sample Submitted
CELBRIDGE NTH	0.5	0.6	0.66	0.59	0.61	0.59	0.64	0.65	0.62	0.65	0.63	0.69

POULAPHOUCA REGIONAL SCHEME

LOCATION	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT.	OCT	NOV	DEC
NAAS	0.7	0.7	0.59	0.80	0.67	0.75	0.68	0.62	0.66	0.69	0.59	0.63
KILDARE TOWN	0.6	0.6	0.72	0.68	No Sample Submitted	0.56	0.64	0.70	No Sample Submitted	0.67	No Sample Submitted	0.64
NEWBRIDGE	0.7	0.6	0.75	0.71	0.75	0.63	0.61	0.70	0.66	No Sample Submitted	0.57	0.62

NOTE : Other water samples from Kildare were submitted from both schemes for fluoride testing under S.I No.42 of 2007 & S.I. No.278 of 2007.

FLUORIDATION OF WATER SUPPLIES
FLUORIDE LEVELS IN PIPED WATER SUPPLIES : JANUARY - DECEMBER 2011

			Following Ranges (mg/l or ppm)		
County Supply	**Total No. of Samples**	**% Results <0.8mg/l**	**<0.6**	**0.6-0.8**	**>0.8**
Dublin City & County	257	98.4	35	218	4
Wicklow	155	97.4	41	110	4
Kildare	411	98.1	94	309	8
Meath	468	97.9	147	311	10
Louth	83	94.0	18	60	5
Monaghan	56	98.2	11	44	1
Cavan	84	96.4	27	54	3
Offaly	268	92.9	90	159	19
Westmeath	99	94.9	28	66	5
Longford	54	88.9	14	34	6
Laois	134	98.5	66	66	2
Totals	**2069**	**Average 96%**	**571**	**1431**	**67**

Note : Some the '<0.6mg/l' results may include Background Fluoride result requests.