



Feidhmeannas Seirbhíse Sláinte
Health Service Executive

Dublin Region Public Analyst's Laboratory



Sir Patrick Duns

Annual Report 2013

*Health Service Executive
Dublin Mid-Leinster*

Dublin Region

Public Analyst's Laboratory

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Annual Report

for the year ended 31st December 2013

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ACKNOWLEDGEMENTS



This Annual Report describes the multitude of analytical services that the laboratory provided in 2013. It reflects the high level of teamwork, commitment and expertise of our staff. I want to thank them all for their dedication during the year.

The number of accredited tests in the laboratory continues to expand. We now have over 130 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 service.

Currently we are dealing with a loss of 9.3 Whole Time Equivalents (WTE) in the laboratory that have not been replaced by the HSE.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 valued attention to, the laboratory during 2013. This supports us in our mission of 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 cooperation between the HSE Environmental Health Service (EHS) and the laboratory. Sampling and analysis is critical 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 results 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.

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 Dublin PAL provides a National service in its wide area of specialised testing, including food chemical testing following the full implementation of the agreed PALs specialisations, microbiological testing of cosmetics and heavy metal analysis of clinical samples.

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 the 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) Local Authority Veterinary Inspectors
- viii) Sea Fisheries Protection Authority
- ix) *safefood*
- x) the general public
- xi) hospitals & GPs
- xii) private food companies
- xiii) other Government Departments (Agriculture, *et al*).
- xiv) Joint Research Centre (JRC), Geel, Belgium

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, Test Item Delivery and Reporting according to Timeframes and Deadlines Policy. This is available at:

http://www.publicanalystdublin.ie/en/Downloads/TestItemDeliveryandSampleReportingTimes/PDF/File_17047_en.pdf

The primary monitor is a LIMS Management Report (MR); an example is shown in Appendix 1. 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, towards 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) protection against food fraud

- xii) supporting the issuing of certificates for the export of food of non-animal origin to non-EU countries
- xiii) nutritional purposes
- xiv) labelling
- xv) quality checks.



In the chemical realm of analysis, the comprehensive analytical categories in 2013 comprised:

- i) contaminants
- ii) materials in contact with food
- iii) allergens (sulphur dioxide)
- iv) additives
- v) compositional
- vi) 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. Revisions to Regulation 882/2004 are under active discussion at EU Council Working Group meetings of Member States including Ireland.

S.I. No. 473 of 2012 European Communities (General Food Law) (Amendment) Regulations 2012 gives further effect to EU Regulation 178/2002.

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) has brought with it major 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 9.3 WTEs in the laboratory comprising retirements, 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, water and cosmetics 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 The Health Services Reform Programme

The Government's health services reform programme progressed considerably in 2013. The Health Service Directorate was established replacing the HSE Board. Five new Service Divisions, with authority and accountability for all aspects of Acute Hospitals, Primary Care, Health and Wellbeing Mental Health and Social Care established. Further governance changes are being implemented as part of the reforms.

Within this major restructuring is the opportunity to implement the Report of the HSE Review of the Public Analyst and Public Health Microbiology Laboratories.

1.5.2 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 was 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 *safefood*, 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 health service.

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 wide 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 was considered, regarding the extent to which it falls within scope, by the HSE Laboratory Services Modernisation Group, which was charged with modernising Medical Laboratory Services, prompted by an external review of existing services.

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 2013. In light of the overall increasingly stringent budgetary situation, value-for-money initiatives are a high priority comprising areas such as:

- i) planned requisitioning and bulk ordering resulting in negotiated discounts from suppliers
- ii) measures have been put in place to reduce supplier delivery charges
- iii) engagement with HSE National Procurement for all maintenance contracts
- 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 (FCM).

During 2013 the laboratory undertook 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 - one each for the mycotoxins and PAHs; and two for the FCMs
- ii) testing two proficiency samples (edible oil and mussels) for benzo[*a*]pyrene (BaP) and the sum of 4 PAHs
- iii) taking part in proficiency tests for patulin in apple juice, aflatoxin B₁ (AfB₁) and deoxynivalenol (DON) in a cereal
- iv) taking part in an interlaboratory method validation for pyrrolizidine alkaloids in honey and plant materials
- v) participating in a proficiency test for the surface area calculations of kitchen utensils
- vi) participating in a proficiency test for the identification of polymers used in food packaging materials
- vii) taking part in a proficiency test for the migration of a range of plasticisers from Tenax
- viii) participating in a workshop on the examination of Declaration of Compliance and supporting documentation associated with FCMs
- ix) supplying twenty food supplement samples to the EURL
- x) considerable associated preparatory and post activity work.



The Cork PAL is the NRL for heavy metals.

1.5.5 Human Biomonitoring

The Public Analyst Service participated in a European project DEMOCOPHES (DEMONstration of a study to COordinate and Perform Human biomonitoring on a European Scale) which ran from September 2010 to November 2012. The aim of the project was to demonstrate the feasibility of a harmonised approach to human biomonitoring surveys (HBM) to obtain comparable results from across Europe on human exposure to certain environmental chemicals by the analysis of biological material such as hair, blood and urine.

The final report of the survey was published in 2013 and is available at <http://www.eu-hbm.info/eureult/media-corner/press-kit>.

1.5.6 Method Research and Development



The discovery of new contaminants in food together with new regulations or lower regulatory limits for existing contaminants and additives means 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.

These methods are not just required for enforcement purposes but for surveys used to assess dietary exposure.

During 2013 method research and development was performed for the following parameters:

- i) nanomaterial
- ii) steviol glycosides in non-alcoholic beverages
- iii) quassin in lemon-flavoured non-alcoholic beverages
- iv) pyrrolizidine alkaloids in honey and plant material
- v) mineral oil in food and packaging
- vi) ergot alkaloids
- vii) perfluorinated alkyl substances (PFAS)
- viii) plasticisers in PVC gaskets
- ix) bisphenol A in food and food simulants
- x) photo initiators
- xi) mycotoxins
- xii) PAHs (EU 15 PAHs & 1 JEFFA PAH)
- xiii) safrole in recipe mixes
- xiv) antioxidants in food supplements
- xv) sulphur dioxide
- xvi) additional improvements to some existing analytical methods.

Nanomaterial

The EU definition of nanomaterials (2011/696/EU) focuses on number size distributions. It defines nanomaterial as a natural, incidental or manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50% or more of the particles in the number size distribution, one or more external dimensions is in the size range of 1-100 nm.



The increasing use of nanotechnology in the food industry, such as silver modified food packing to prevent bacterial growth and titanium dioxide particles for food whitening, underlines the need for standardised protocols to assess nanoparticle toxicity and human exposure.

The laboratory is in the process of setting up a programme for the analysis of nanomaterials and is currently involved in an EU JRC scientific validation study for the quantification and detection of silver nano particles by AF4-ICP-MS.

Steviol Glycosides

Steviol Glycosides are natural sweeteners obtained from the leaves of *Stevia rebaudiana* Bertoni (Asteraceae) and their principal components are stevioside and rebaudioside A. The current applicable legislation in this area is Commission Regulation (EU) No 1131/2011 amending Annex II to Regulation (EC) No 1333/2008 with regard to steviol glycosides.

In 2013 this laboratory developed and validated a gradient HPLC method for the determination of stevioside and rebaudioside A, the component glycosides of principal interest for their sweetening properties in non-alcoholic beverages. Nine samples of these products that declared steviol glycosides as ingredients were tested.

In addition, upon request from the EHS, a sample of chocolate that declared steviol glycosides as ingredients was tested for steviol glycosides content. A method was also developed and validated for the determination of stevioside and rebaudioside A in chocolate.

The laboratory additionally participated in the validation by collaborative study, of a method developed by the Laboratory of the Government Chemist, for the simultaneous determination of seven sweeteners (including stevioside and rebaudioside A). Among the matrices examined were yoghurt, jam, cordial and fruit juice.

Quassine

Quassine is the dried stem wood of *Quassia amara* and *Picrasma excelsa*. Commercial 'quassine' from *Q. amara* is known to contain a mixture of bitter components including quassine. It is used for its bitter flavouring properties, as the extracts are known to be 50 times more bitter than quinine.

Quassine may be not be added as such to food but may be naturally present in flavourings and/or food ingredients with flavouring properties. The current applicable legislation is Commission Regulation (EU) No 1334/2008 on flavourings and certain food ingredients with flavouring properties for use in and on foods.

In 2013 method was developed and validated for the determination of quassine in non-alcoholic beverages. 11 samples of lemon-flavoured beverages were analysed.

Pyrrolizidine Alkaloids in Honey and Plant Material

In 2013 work continued on this group of compounds. Following acceptance in a pre-screening exercise, the laboratory participated in an Internationally organised interlaboratory validation study for 17 pyrrolizidine alkaloids in honey and plant materials. As part of the 2013 Food Sampling Programme (FSP) 17 honey samples were analysed for 7 pyrrolizidine alkaloids (senecionine and its corresponding *N*-oxide, seneciphylline and its *N*-oxide, retrorsine and its *N*-oxide and senkirikine together with the total pyrrolizidine alkaloids).

Mineral oil in food and packaging

Recycled packaging has been found to contain relatively high levels of mineral oil, a printing ink component. The analytical difficulty is that mineral oil is not a single compound but a complex mixture of several thousand chemicals, the pattern of which can differ depending on their source.

In 2013 analytical method development continued, focusing primarily on the coupling of HPLC and GC instrumentation.

Ergot Alkaloids

The laboratory continued analytical development work on ergot alkaloids, namely ergometrine, ergosine, ergotamine, ergocornine, ergocystine, ergocryptine and their corresponding '-inines', and analysed 25 cereal samples as part of the FSP. Further refinements to the method will be made in 2014.

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 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.

Under Commission Recommendation 2010/161/EU Member States monitor the presence of PFAS, prioritising the analysis of PFOS and PFOA in addition to precursors such as perfluorooctane sulphonamide (PFOSA), N-ethyl perfluorooctane sulfonamidoethanol (NEtFOSE) and 8:2 fluoroteleomer alcohol. Also to be included, if possible, in the monitoring programme are compounds similar to PFOS and PFOA but with different chain lengths (C4 – C15) and polyfluoroalkyl phosphate surfactants (PAPs).

In 2013 20 samples of fish were analysed for a range of perfluoroalkyl acids and sulphonates. 8 Samples had levels of PFOS above the limit of quantification (1 µg/kg), ranging from 1.1 to 64 µg/kg, with the highest amount found in a sample of frozen sardines. There is currently no legislation setting maximum PFAS in food. The purpose of this testing is to inform future regulation, with EFSA receiving the data.

Plasticisers in PVC gaskets

Development work continued in this important broad area of analysis.

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. The latter improve the 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, adipates, sebacates 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 continue to extend this analysis to cover plasticisers in food. A change in the legislation has introduced a new category of total plasticisers. This means that in order to test for compliance samples will have to be analysed for a suite of analytes rather than for individual compounds.

In 2013 there were 4 rapid alert notifications arising from high levels of plasticisers in food.

Bisphenol A (BPA) in Food and Food Simulants

In 2013 samples of baby bottles, carboys used for drinking water and canned foods were examined for BPA content under the FSP. The analytical method for the determination of BPA in canned foods continues to require further development as it is a difficult and varied matrix; it will be progressed in 2014, likely by LC-MS/MS.

Further samples of baby bottles were acquired from the market to ensure compliance with Commission Implementing Regulation (EU) No 321/2011 of April 2011 amending Regulation (EU) No 10/2011 as regards the restriction of use of BPA in plastic infant feeding bottles.

Samples of 20 litre carboys used for drinking water were also checked for the specific migration of BPA.

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 legislation in place in the EU for control of PIs in food although some compounds, such as benzophenone, are listed as permitted additives in the Commission Directive 10/2011/EC on plastic materials and articles intended to come into contact with foodstuffs and have specific migration limits. Most however are not mentioned in this legislation.

Development of methodology for the determination of certain PIs in foodstuff and packaging continued in 2013. As part of our National Reference Laboratory responsibilities we successfully participate in proficiency scheme organised by the CRL for Food Contact Materials.

Mycotoxins

This laboratory is the EU NRL for 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 comprise a large number of compounds some of which, like aflatoxins, are highly carcinogenic. Their analysis has been performed 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 and quantitative methods for the analysis of a broader spectrum of mycotoxins by LC-MS/MS continued during 2013, examining particularly trichothecene toxins such as T-2, HT-2, nivalenol (NIV), deoxynivalenol (DON) and its conjugates, zearalenone (ZON) and fumonisins. This involves considerable work but there are substantial efficiency advantages of screening a single sample for a wider range of toxins.

Method development for T-2 and HT-2 in cereals continued during 2013 and it is expected to be the first LC-MS/MS method for mycotoxins put forward for accreditation in 2014.

Other mycotoxin development work in 2013 comprised the following.

Fumonisin B₃

Fumonisin B₃ was added to the analytical method for the determination of fumonisins B₁ and B₂ during 2013. All 48 samples of cereals analysed for fumonisins B₁ and B₂, as part of the FSP, were also tested for fumonisin B₃.

3- and 15-Acetyldeoxynivalenol and Diatoxyscirpenol

The laboratory began development work for the detection of 3- and 15-acetyldeoxynivalenol and diatoxyscirpenol (DAS), so-called conjugates of deoxynivalenol (DON). Development work succeeded for DAS, allowing 31 FSP samples of cereals to be analysed for this parameter. 3- and 15-OAc-DON proved more difficult, with development work continuing.

Citrinin

The mycotoxin citrinin is of interest due to its nephrotoxic properties. It is found in rice and cereals, often co-occurring with ochratoxin A. As it is not currently legislated for data on its prevalence is required. To this end a method has been developed for its detection. 12 Samples of rice were analysed, with none containing citrinin.

Development work will continue to extend the number of matrices that can be analysed with particular focus on red yeast rice and similar products.

Patulin

The analytical method for patulin in apple juices and smoothies was accredited by INAB during 2013. The laboratory continued with method development work on the analysis of patulin in other apple products and these will be put forward for accreditation as time and resources permit. In addition, a confirmatory method for patulin was developed, which will be accredited in 2014.

PAHs (EU 15 PAHs & 1 JEFFA PAH)

This laboratory is the EU NRL for PAHs.

Polycyclic aromatic hydrocarbons (PAH) are a class of compounds with multiple fused aromatic rings that are formed during the incomplete combustion of organic material, many of which are highly carcinogenic. 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. They can also be present as a result of environmental contamination.

Legislation currently in place (Commission Regulation (EC) No 1881/2006 as amended by Commission Regulation (EC) No 835/2011) controls the level of benzo[a]pyrene (BaP) and the sum of PAH4 (sum of benzo[a]pyrene, benz[a]anthracene, benzo[b]fluoranthene and chrysene) in certain foods such as meats and seafood, baby foods and edible oils and fats.

The matrices cocoa and derived products such as chocolate, plus cooked meats were successfully added to the laboratories scope of accreditation in 2013.

High levels of PAHs in food are reported through the EU rapid alert system (RASFF). In 2013 there were 14 such occurrences arising mainly from foodstuffs such as smoked fish products, and edible oils.

Safrole

Safrole (1-Allyl-3,4-methylene dioxy benzene, safrole) is a colorless or slightly yellow oily liquid that occurs naturally in a variety of spices such as cinnamon, nutmeg, black pepper and herbs such as basil. It is a genotoxic and carcinogenic compound and for that reason it is not permitted to be added directly to food. The maximum level of safrole that may be naturally present in flavourings and food ingredients with flavouring properties is regulated under Regulation (EC) No. 1334/2008.

In 2013, a method was developed and validated for the analysis of safrole in recipe/sauce mixes that declared nutmeg and/or black pepper as ingredients, with 10 samples analysed. Further matrices will be validated where it is deemed appropriate.

Antioxidants

Antioxidants are substances which prolong the shelf-life of foodstuffs by protecting them against deterioration caused by oxidation, such as development of fat rancidity and colour changes. The current applicable legislation in this area is Regulation (EC) No. 1333/2008. The legislation lists six antioxidants, namely butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), propyl gallate, octyl gallate, dodecyl (lauryl) gallate and tertiary-butyl hydroquinone (TBHQ). It specifies a range of foodstuffs in which they are permitted for use and the corresponding maximum permitted levels.



Article 32 of the Regulation specifies that all food additives permitted for use before the 20th January 2009 should be subject to a new risk assessment by EFSA. Antioxidants is one of the groups of food additives to be re-evaluated. In preparation for this, information on the permitted antioxidants needs to be collected. EFSA has asked EU Member States to submit information on antioxidants with regard to:

- Analytical methods available for antioxidant determination in food
- Present use and use patterns, comprising which food categories and subcategories, proportion of food within categories/subcategories in which they are used and actual use levels, typical and maximum.

In 2013, this laboratory as the PAL specialising in antioxidant testing, developed and validated a gradient HPLC method for the determination of the six permitted antioxidants listed above in food supplements. 25 Samples of these products were tested as part of the HSE National Chemical Sampling and Analysis Programme for Food Supplements Manufactured in Ireland 2013. The test results will be submitted to EFSA as part of the re-evaluation of permitted antioxidants.

Sulphur Dioxide

In 2013, the existing method for sulphur dioxide testing was validated for testing of cordials and applied to the analysis of 10 samples.

1.5.7 EU Food and Veterinary Office Missions

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

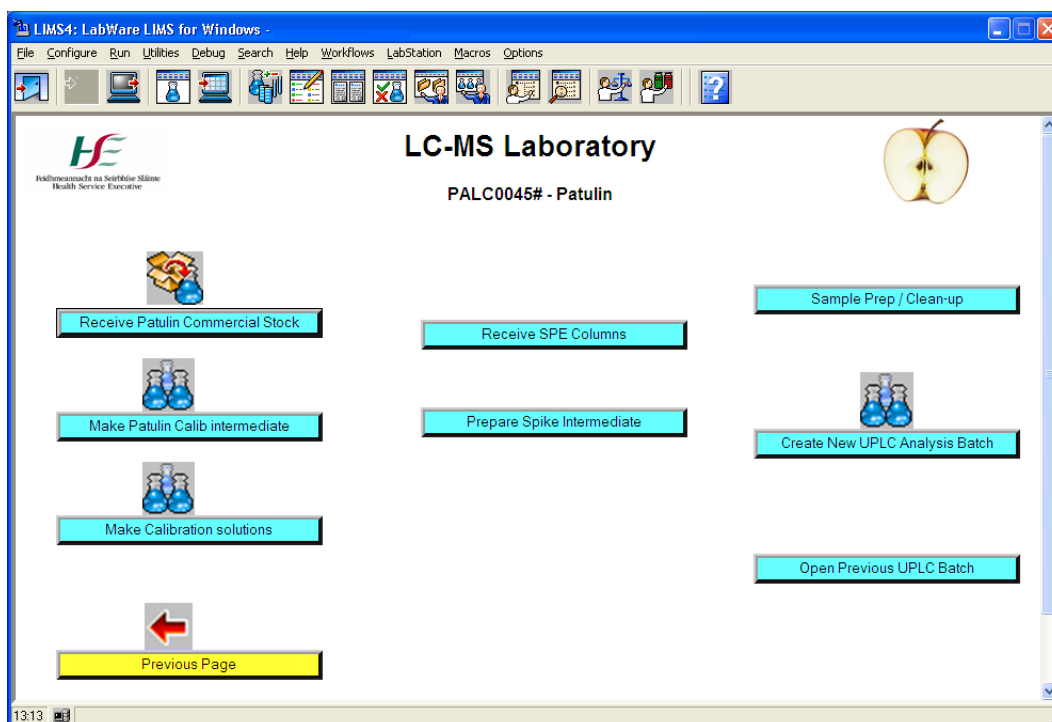
Through its evaluations the mission of the FVO is to:

- 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.

In 2013 no member of staff participated in FVO missions. The missions planned by the FVO were not in any of the areas of expertise of the laboratory staff.

1.5.8 Laboratory Information Management System (LIMS) and IT



In 2013 the extension of the LIMS implementation in the chemistry laboratory sections continued. Instrument records were created and provision for the recording of routine checks of instrument performance and routine maintenance were transferred into LIMS from a paper-based system. This allowed the data contained in these records to be easily accessed through the customised auditing module already in place. Work will continue in 2014 to migrate additional paper-based records to the LIMS.

Analytical data from the laboratory's testing was communicated electronically to the FSAI on a weekly schedule, and water sample results for other customers were summarised and sent electronically at the customer's request.

The LIMS continues to support the laboratory's operations in the chemical and microbiological analysis of food, food contact materials, cosmetics, water, and clinical samples.

1.5.9 Laboratory Web Site <http://www.publicanalystdublin.ie/>

The full content-rich laboratory web site provides for our customers full information on our analytical services, costs thereof as appropriate, downloadable sample request forms & Annual Reports, and more. In autumn 2013 a review and update of the whole website commenced.

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National Reference Laboratory for mycotoxins, PAHs and Food Contact Materials in foodstuffs.

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Fax No: + 353 (0)1 662 8532

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2. LABORATORY WORKLOAD IN 2013

In 2013 the laboratory analysed a total of **11,179** samples, comprising *c.* 75,000 individual tests. The following broad sample types, including both chemical and microbiological testing, were analysed:

Food	3168
Water – Chemical	3449
Water – Microbiological	3298
Clinical	1035
Cosmetics	74
Non Foods	155

Total	11,179

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 2013 comprised:

- i) programmed chemical analysis of food samples under the National Chemical Food Sampling Programme predominantly for the HSE Dublin Mid-Leinster and the HSE Dublin North East with a significant number of samples also received from the HSE South and West.
- 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 2013 National 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.



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 web site -

<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 (NMP) continued in 2013. 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 follow-up sampling.

In 2013 the laboratory tested a wide range of foodstuffs for the following mycotoxins: aflatoxins, ochratoxin A, zearalenone, fumonisins, the trichothecenes DON, T-2 & HT-2, nivalenol, diacetoxynivalenol, citrinin, and patulin.

Legislation for mycotoxins

Legislation for currently regulated mycotoxins has been consolidated into Regulation EC No 1881/2006, as amended. In addition, a Commission Recommendation for T-2 and HT-2 in cereals and cereal products was published in March 2013 (2013/165/EU)

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 2013.

In total 91 samples were analysed for aflatoxins B1, B2, G1 and G2. Many were under the NMP, with these samples mainly taken from shipments entering the State at the designated points of entry.

Samples not counted towards the NMP included 2 complaint samples, a spice sample which was a referral from Galway PAL and a number of cereal samples such as wheat, barley and oats that were analysed for a range of mycotoxins as part of a FSAI survey.

9 Samples of cereal-based baby foods were analysed for aflatoxin B1. These were submitted for multi-parameter testing, with other suites of analysis comprising ochratoxin A and PAH testing.

381 Tests for aflatoxins B1, B2, G1, G2 & Total were carried out on the samples.



Additionally 38 samples were tested for aflatoxin M1. Details are given in Table 1.

<i>Foodstuff</i>	<i>No of samples received</i>	<i>No of samples exceeding limits for Aflatoxin B1</i>
Aflatoxins B1, B2, G1, G2, Total		
<i>Spices</i>	12	One sample of biryani mix and one sample of chilli powder were <i>c.</i> 2 and 3 times respectively above the B1 limit of 5.0 µg/kg.
<i>Whole Nuts</i>	12	
<i>Nut Products</i>	3	1 sample of peanut candy was 1.5 times over the B1 limit of 2.0 µg/kg.
<i>Cereals</i>	53 cereals comprising: 24 Rice 10 Popcorn 6 Wheat 5 Barley 5 Oats 1 Fruit bar 2 Flour	
<i>Dried Fruit</i>	1	
<i>Seeds</i>	1	
<i>Baby foods</i>	9	
Aflatoxin M1		
<i>Milk and milk powder</i>	13	0 2 Samples had no English labelling
<i>Baby foods (Infant formula and follow-on formula)</i>	25 (Samples for DAFM)	0

Table 1 Details of aflatoxin testing in 2013

Ochratoxin A (OTA)

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 2013

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

Foodstuff	No of samples	No of samples exceeding limits
<i>Coffee</i>	13	0
<i>Baby foods</i>	28	0
<i>Beer</i>	12	0
<i>Paprika & Chilli</i>	9	0
<i>Turmeric</i>	5	0
<i>Ginger</i>	5	0
<i>Nutmeg</i>	4	1 - RASFF issued
<i>Black & White Pepper</i>	7	1 - labelling
<i>Cereals</i>	6	0
<i>Rice</i>	12	1 – labelling
<i>Dried vine fruits</i>	5	0
<i>Wine</i>	10	0
<i>Liquorice</i>	5	1
<i>Grape juice</i>	4	0
<i>Chocolate</i>	11	0
<i>Mixed Spices</i>	8	0

Table 2 Ochratoxin A analysis

In addition 5 large scale samples of dried vine fruit were analysed for OTA under the NMP; these were satisfactory.

In 2013 due to the continued implementation of the NMP fewer retail samples of certain matrices were tested for ochratoxin A. Nevertheless the number of samples analysed increased slightly because of additional sampling, including the addition of rice which was a new matrix for 2013.

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

Citrinin

The 12 rice samples analysed for ochratoxin A were also analysed for citrinin. Citrinin was not detected in any of the samples.

Other mycotoxins - Zearalenone, Fumonisin (B1,B2,B3), Trichothecenes T-2, HT-2, Nivalenol, Deoxynivalenol and Diacetoxyscirpenol.

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, except for T-2 and HT-2 which are produced under hot and dry conditions. Zearalenone possesses strong oestrogenic properties. The most important effect of zearalenone is on the reproductive system, particularly of animals.

Fumonisin 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 B₁ 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. As previously mentioned a new Commission Recommendation on levels of T-2 and HT-2 in cereals was published in March 2013 (Commission Recommendation 2013/165/EU) and all samples in 2013 were assessed against this recommendation.

Fumonisin B₃ was added to the *Fusarium* toxins tested in 2013. Nivalenol and diacetoxyscirpenol were also added to the analytes list for all the samples.



Results from the investigations into the trichothecenes and the other *Fusarium* mycotoxins in 2013 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.

<i>Foodstuff</i>	<i>Parameter</i>	<i>No of samples</i>	<i>No of non-compliant results</i>
<i>Cereals</i>	T-2, HT-2	14	0
<i>Cereal based baby foods</i>	T-2, HT-2	19	0
<i>Cereals</i>	DON, Nivalenol, Diacetoxyscirpenol	14	0
<i>Cereal based baby foods</i>	DON, Nivalenol, Diacetoxyscirpenol	19	0

Table 3 T-2, HT-2, DON, Nivalenol, Diacetoxyscirpenol

<i>Mycotoxin</i>	<i>Foodstuff</i>	<i>No of samples</i>	<i>No of samples exceeding limits</i>
<i>Zearalenone</i>	Cereals, cereal products	14	0
<i>Zearalenone</i>	Cereal based baby foods	19	0
<i>Fumonisin B1, B2, B3</i>	Cereals & cereal products (mainly corn)	14	0
<i>Fumonisin B1, B2, B3</i>	Baby foods	19	0

Table 4. Testing for further mycotoxins.

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.

Patulin

In 2013 13 juices and 13 other apple products were tested for patulin content. All were satisfactory. One sample of apple juice taken outside the scheduled FSP was found to be non-compliant and required extensive follow-up as the analytical result was challenged by the FBO. The non-compliant sample resulted in a product withdrawal from the retail market.

Ergot Alkaloids

Testing continued on samples of cereal products for their ergot alkaloid content. Samples were analysed for the six ergot alkaloids, ergometrine, ergosine, ergotamine, ergocornine, α -ergocryptine and ergocristine, and their corresponding 'inines'. The results were gathered over two campaigns. The details are given in Table 5.

<i>Foodstuff</i>	<i>Parameter</i>	<i>No of samples</i>	<i>No of non-compliant results</i>
<i>Cereals (Rye products)</i>	Ergot alkaloids (6) and their 'inines'	25	1 – labelling

Table 5 Ergot Alkaloids

Inorganic contaminants (heavy metals)

In 2013, 8 samples of fish and molluscs were analysed for inorganic arsenic. The inorganic arsenic, which is the toxic form of arsenic, did not exceed 0.20mg/kg. Total arsenic in excess of 1 mg/kg is allowed under S.I. No. 72 of 1992 where arsenic is naturally present

Process contaminants

Polycyclic Aromatic Hydrocarbons

119 Samples were analysed for PAHs. This resulted in a total of 1785 individual tests. The details are presented in Table 6.

In addition to PAH testing, cereal-based baby foods were tested for multi-parameters such as ochratoxin A and aflatoxin B1. Infant formula and follow-on-formula samples were tested for multi-parameters such as taurine, aflatoxin M1 and 5 of these were tested for ESBO and phthalates.



<i>Foodstuff</i>	<i>Number of samples</i>	<i>PAH range µg/kg</i>	<i>BaP range µg/kg</i>	<i>ΣPAH4 range µg/kg</i>
<i>Heat-treated meat</i>	8	<0.5 – 13.3	<0.5 – 13.3 1 burger sample was non-compliant with a BaP level of 13.3µg.kg	0 – 35
<i>Follow-up burger samples</i>	5	<0.5 – 25.6	<0.5 – 4.1 All follow-up samples were satisfactory	0 – 13.6
<i>Herbs/Spices</i>	12	<0.2 – 28.8	<0.7 – 3.6	0 – 54.2
<i>Smoked Fish</i>	8	<0.9 – 5.9	<0.9 – 4.3	0 – >50 1 sample of smoked dried catfish was non-compliant for sum of PAH4, with a level of >50µg/kg
<i>Cocoa beans and derived products</i>	15	<0.5 – 4.0	<0.5 – 1.3	0 – 9.9
<i>Food supplements</i>	25	<0.2 – 14.2	<0.2 – 2.0	0 – 26.4
<i>Edible oils</i>	12	<0.9 – 1.8	<0.9	0 – 2.9
<i>Cereal-based Babyfoods</i>	9	<0.2	<0.2	0
<i>Infant Formula and Follow-on-Formula</i>	25	<0.2	<0.2	0
Totals:	119	- resulting in 1785 individual tests.		

Table 6 Summary of PAH testing results

Two samples were found to exceed the regulatory limits for PAHs in Commission Regulation (EC) No 1881/2006 as amended by Commission Regulation (EC) No 835/2011. These were a burger sample and a smoked fish sample as detailed in the above Table. The legal limits exceeded were 5 and 30µg/kg for benzo[a]pyrene (BaP) and the sum of 4 specific PAHs namely, benzo[a]pyrene, benzo[b]fluoranthene, benzo[a]anthracene and chrysene.

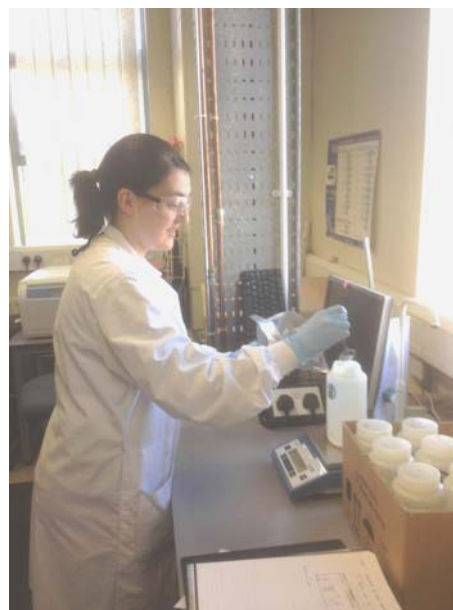
With regard to the herbs and spices no regulatory limit applies. This is also the case for the food supplements analysed, with the exception of 2 oil samples, both of which were satisfactory.

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 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 was extended by Commission Recommendation 2010/307/EU to target foodstuffs that were known to contain high acrylamide levels and/or contribute significantly to the human dietary intake.

Acrylamide levels in some foodstuffs were significantly higher than the levels in comparable products of the same product category. Therefore the Commission considered it appropriate that Member States carry out investigations by examining the production and processing methods used by food business operators. As a result, Commission Recommendation of the 10.1.2011 on investigations into the levels of acrylamide in food set indicative acrylamide values.



The most recent scientific report, published by EFSA in 2012, gives an update of results relating to acrylamide levels in food from the monitoring years 2007 to 2010. It is available at: <http://www.efsa.europa.eu/en/efsajournal/doc/2938.pdf>.

EFSA concluded that there was no consistent trend across food groups towards lower levels of acrylamide and that a decrease in acrylamide levels was shown in only a few food categories while in other categories an increase in the levels was observed.

On the basis of the results of the investigations performed during the years 2011 and 2012 and on the monitoring results obtained pursuant to Recommendations 2007/331/EC and 2010/307/EU, the Commission deemed it appropriate to modify certain indicative values provided for in the Annex to the 2011 Recommendation, resulting in 2013/647/EU.

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 continue to be 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.

For the 2013 sampling, French fries were taken from the same three suppliers in March and November; acrylamide levels were found to have increased for samples provided by two of the suppliers; a decreased level was observed in the sample from the third supplier.

52 Samples were analysed, covering a range of foods. Table 7 presents the range of levels found and additionally an expression of the typical exposure having regard to estimated portion size. 7 Samples had acrylamide levels exceeding their indicative values; 2 were potato crisps and 2 were in the category of biscuits and rusks for infants and young children. The other 3 comprised 1 roast coffee, 1 breakfast cereal and 1 baby food sample.

<i>Foodstuff</i>	<i>Number of samples</i>	<i>Acrylamide range $\mu\text{g}/\text{kg}$</i>	<i>Indicative $\mu\text{g}/\text{kg}$ Values</i>
<i>French fries sold as ready-to-eat</i>	10	50 – 460	600
<i>French fries for home-cooking</i>	4	30 – 70	No indicative value set
<i>Potato crisps</i>	4	440 – 1620	1000
<i>Soft Bread</i>	2	30 – 80	150
<i>Wheat based bread</i>	2	50 – 60	80
<i>Breakfast cereals (excl.muesli and porridge)</i>	4	40 – 450 (1 sample of puffed grain at 450 $\mu\text{g}/\text{kg}$)	400
<i>Biscuits, crackers, wafers, crisp bread and similar, excl. pastry and cake</i>	5	50 – 200	500 Biscuits 1000 Ginger Bread
<i>Roast coffee</i>	4	130 – 510 (1 Sample at 510 $\mu\text{g}/\text{kg}$)	450

<i>Baby foods, other than processed cereal based foods</i>	4	<20 – 60 (1 Sample of meat based baby food at 60 µg/kg)	50
<i>Processed cereal based baby foods</i>	2	<20	50
<i>Biscuits and rusks for infants and young children</i>	3	140 – 270 (2 Rusk samples at 260 and 270 µg/kg)	200
<i>Other (Including savoury-based corn snacks, cakes, pastries and potato-based products)</i>	8	<20 – 210	No indicative value set

Table 7. Acrylamide testing in 2013

Nitrate in various foods.

Table 8 summarises the testing for nitrate in 2013.

Commission Regulation (EU) No. 1258/2011 of December 2011 amending Regulation (EC) No. 1881/2006 sets maximum levels for nitrates in lettuce, spinach and rocket (rucola). The samples detailed in Table 8 were judged on the basis of these maximum levels.

<i>Foodstuff</i>	<i>No of samples</i>	<i>Non compliant samples</i>
<i>Lettuce</i>	10	1
<i>Spinach</i>	2	1
<i>Rocket</i>	4	0

Table 8 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 in food.

EFSA has requested data for dietary intake evaluation and has established a monitoring database. In previous years, particular focus has been on 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.

EFSA has published a scientific report, at <http://www.efsa.europa.eu/en/efsajournal/doc/2347.pdf>, which gives an update of results on the monitoring of furan levels in food. It 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.



EFSA has reported that furan estimates are highest in toddlers and in adults, with jarred baby foods (containing vegetables) and coffee being the major contributors, respectively. Therefore for furan testing in 2013, our focus was on coffee and baby food, with an average of 85% of total furan exposure for adults attributed to brewed coffee. The most recent Scientific Report of EFSA named “Update on furan levels in food from monitoring years 2004-2010 and exposure assessment” reported mean values of 45 µg/kg for brewed coffee, and 3,660 µg/kg for roasted coffee beans. The highest 95th percentile was determined for roasted coffee beans at 6,407 µg/kg.

In 2013 58 samples were analysed as received for furan. 54 were analysed after preparation for consumption.

Tables 9 and 10 present the results.

<i>Foodstuff</i>	<i>Number of samples analysed (as received)</i>	<i>Furan range µg/kg</i>
<i>Babyfood</i>	28	<5 - 85
<i>Coffee</i>	30	74 - 7397

Table 9 Furan - Samples as received

<i>Foodstuff</i>	<i>Number of samples analysed (after preparation)</i>	<i>Furan range µg/kg</i>
<i>Babyfood</i>	24	<5 - 78
<i>Coffee</i>	30	<5 - 204

Table 10 Furan - Samples after preparation

The levels of furan determined in coffees are typically highest in espresso coffees, decreasing for filter coffees, with the lowest levels determined in instant coffees.

Solvent residues

Extraction solvents are solvents which are used in an extraction procedure during the processing of raw materials, foodstuffs, or components or ingredients of these products. The solvent is removed but the unintentional and technically unavoidable presence of residues or derivatives in the foodstuff or food ingredient can occur. The removal of caffeine and some bitter flavours from coffee and tea is sometimes achieved with the use of organic solvents.

Commission Directive 2009/32/EC sets maximum limits for extraction solvents used in the production of food. The following are determined:

- i)** methanol
- ii)** propan-2-ol
- iii)** dichloromethane
- iv)** methyl acetate
- v)** hexane
- vi)** methylethylketone

in foods such as tea, coffee, oils, fats, chocolate and chocolate products.

In 2013 41 samples were analysed for solvent residues, namely 18 samples of decaffeinated coffee and 23 edible oils. This resulted in a total of some 159 individual tests. Results are shown in Table 11.

<i>Foodstuff</i>	<i>Number of samples</i>	<i>Solvent range mg/kg</i>
<i>Decaffeinated Coffees</i>	18	<1.0 – 50.8 12 coffee samples had quite high levels of Methanol present.
<i>Edible oils</i>	23	<0.2 – 1.5

Table 11 Solvent Residues testing in 2013

The decaffeinated coffee samples were submitted for multi-parameter testing, with other suites of analysis including caffeine analysis. The samples of edible oils were also analysed for PAHs and MCPD-esters.

12 samples of decaffeinated coffee (dry matter) were analysed and found to contain methanol levels between 12.5 – 50.8 mg/kg. This would have indicated a problem had methanol been declared as being used for extraction. Further investigation revealed that methanol was present in caffeinated coffees as well.

The other solvents tested for were within the legislative limits.

A number of coffees have been found to contain significant methanol levels in recent years. The FSAI has proposed that, to assess the extent of this observation, a range of regular and decaffeinated coffees are tested in the 2014 FSP.

3-MCPD

3-Monochloropropandiol (3-MCPD) is produced when hydrochloric acid is used during the manufacturing of soy sauce. It is classified by the IARC as a probable carcinogen. A maximum limit for 3-MCPD in soy sauce is 50µg/kg of dry matter as defined in Commission Regulation 1881/2006.

In 2013 14 samples of soy sauce were analysed for 3-MCPD. All samples were found to comply with the legislation. Table 12 presents the results.

<i>Foodstuff</i>	<i>Number of samples</i>	<i>3-MCPD in dry matter Range mg/kg</i>
<i>Soy sauce</i>	14	<10 – 22.2

Table 12 3-MCPD testing in 2013

MCPD esters

The extraction of oil from oil seeds is sometimes achieved with simple crushing to produce virgin or extra virgin oils. However oil is extracted more efficiently, and cheaply, by pre-treating with acid or roasting followed by solvent extraction. The acid treatment can produce 3-monochloropropandiol esters by the action of acid on triglycerides. There is currently no legislative limit for the MCPD esters.

In 2013 23 samples of edible oils were analysed for MCPD esters, with results shown in Table 13.

<i>Foodstuff</i>	<i>Number of samples</i>	<i>MCPD Esters range mg/kg</i>
<i>Edible oils</i>	23	<0.2 – 1.5

Table 13 MCPD Esters testing in 2013

Benzene in fruit flavoured bottled waters and soft drinks

Benzene is a known carcinogen and is thought to be produced by the degradation of benzoic acid in the presence of ascorbic acid and light. Testing for benzene was a component of multi parameter testing which was conducted on 16 samples of soft drinks. There is currently no legislative limit for benzene in soft drinks. 10 Samples had levels less than 0.1µg/L, 5 samples had levels between 0.1 and 0.8µg/L and 1 sample had a level of 1.9µg/L

Flavourings

Samples of compound foods were tested, as appropriate, for coumarin, safrole or quassin and the results were assessed against Regulation (EC) No. 1334/2008 on flavourings and certain food ingredients with flavouring properties for use in and on foods.

Coumarin

26 Samples of cinnamon-containing products including seasonal Easter and Christmas bakery products, bread, bagels, cakes and biscuits were analysed for coumarin content. All the bakery products tested complied with the maximum level of 50 ppm as specified in Regulation (EC) No. 1334/2008.

Safrole

9 Cola drinks/concentrates and 10 recipe mixes and sauces were tested for safrole content. All products tested complied with the maximum level of 1 ppm for non-alcoholic beverages and 25 ppm for recipe mixes and sauces as specified in Regulation (EC) No. 1334/2008.

Quassin

11 Samples of lemon-flavoured non-alcoholic beverages were analysed for quassin content. All products tested complied with the maximum level of 0.5 ppm for non-alcoholic beverages as specified in Regulation (EC) No. 1334/2008.

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. The current applicable legislation in this area is Regulation (EC) No. 1333/2008, as amended. However, Articles 2 and 4 and Annexes I to VI of Directive 95/2/EC continued to apply until the 1st June 2013.

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 2013, the laboratory tested a wide range of foodstuffs for the following additives:

- i) artificial sweeteners – aspartame, acesulfame-k, saccharin and sucralose
- ii) natural sweeteners - stevioside and rebaudioside A
- iii) preservatives – nitrite (as sodium nitrite), nitrate (as sodium nitrate), sulphur dioxide, benzoic acid, sorbic acid.
- iv) caffeine
- v) antioxidants – BHA, BHT, propyl gallate, octyl gallate, lauryl gallate and TBHQ



As a result of a number of RASFF alerts in 2012 regarding suspected inappropriate use of nitrite and nitrate salts in sausages, in 2013 the laboratory tested 12 samples of sausages for these preservatives. Nitrite (as sodium nitrite) and nitrate (as sodium nitrate) were not detected at levels greater than the LOQ of 20 mg/kg for each. This testing was included in a suite of multi-parameter tests performed on the samples.

A further extension to multi-parameter testing introduced in 2013 was the testing of 10 cordial samples for sulphur dioxide, aspartame, acesulfame-K and saccharin.

Table 14 gives the results of testing for additives in 2013. Where labelling is presented as the reason for a sample being not compliant, this was due to either the detection of undeclared ingredients, labelling only in a language other than English or non-designation of an additive into an additive category in an ingredients list.

39 Samples were not compliant, representing 8.7% of the 446 samples tested. This is a high percentage and it illustrates the need for continuing rigorous monitoring and surveillance.

The highest numbers of non-compliant results were observed for the preservatives sodium nitrate & sodium nitrite in cured meats and brines (13.5%) and for sulphur dioxide in a variety of foodstuffs (17.6%).

<i>Additive</i>	<i>Foodstuff</i>	<i>No of samples</i>	<i>No of Tests</i>	<i>No of non-compliant Samples</i>
<i>Artificial sweeteners other than sucralose - Aspartame Acesulfame-K Saccharin</i>	Cordials, yoghurt, sauces, soups and table-top sweeteners	51	153	0
<i>Sucralose</i>	Alcoholic & non-alcoholic beverages, flavoured bottled waters, yoghurt, table-top sweeteners	22	22	0
<i>Steviol Glycosides (Stevioside and Rebaudioside A)</i>	Non-alcoholic beverages, chocolate	10	20	0
<i>Antioxidants</i>	Food Supplements	25	150	0
<i>Sulphur dioxide (SO₂)</i>	Dried fruit, wine, raw crustaceans, vac-packed prepared potatoes & parsnips, sausages and burgers, cordials, mead	91	91	16 Excessive levels of SO ₂ and/or labelling
<i>Nitrite (as Sodium Nitrite) and Nitrate (as Sodium Nitrate) NaNO₂, NaNO₃</i>	Cured meats and brines	111	222	15 Excessive levels of NaNO ₂ and/or NaNO ₃
<i>Benzoic Acid & Sorbic Acid</i>	Non-alcoholic beverages, cakes, marmalades, sauces, spreads, cheeses	77	154	8 Labelling
<i>Taurine</i>	Infant formula and follow-on formula	21 (from DAFM)	21	0
<i>Caffeine</i>	Decaffeinated products	18	18	0
<i>Caffeine</i>	High energy drinks	20	20	0
Totals:		446	871	39

Table 14 Results of additives testing in 2013.

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 2013 the SFPA submitted 6 samples of fish for carbon monoxide testing. These consisted of 3 swordfish and 3 tuna fish. No positives were found.

Compositional / Quality / Labelling analysis

In 2013 the laboratory performed testing to determine the quality of in-use cooking oils. The parameters tested were acid value and peroxide value.

Multi-parameter testing was performed on 25 samples of infant formula and follow-on formula, with all samples being tested for aflatoxin M₁, ESBO and phthalate migration, PAHs, melamine and taurine (21 samples).



17 Samples of honey were tested for sugars, HMF, moisture, diastase number, free acidity, conductivity, insoluble matter and the suite of pyrrolizidine alkaloids. The testing of honey is another excellent example of multi-parameter testing of samples – each sample can be tested for thirteen individual parameters.

Table 15 gives the data for compositional testing in 2013.

<i>Parameter</i>	<i>Foodstuff</i>	<i>No of samples</i>	<i>No of tests</i>	<i>No of non-compliant samples</i>
<i>Acid Value Peroxide Value</i>	In-use cooking oils	7	14	1 Acid value exceeded the guideline limit of 3.0 mg/g
<i>Sugars, HMF, Moisture, Diastase number, free acidity, conductivity, insoluble matter</i>	Honey	17 (incl. 11 from DAFM)	153 (excl. the pyrrolizidine alkaloids)	3 low diastase number, 1 high sucrose, 1 for labelling
Totals:		24	167	6

Table 15 Compositional testing in 2013

Of the 24 samples tested, 6 were non-compliant which is 25%. This is a high percentage and it illustrates the need for rigorous monitoring and surveillance.

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.

Regulation (EU) No. 1169/2011 of October 2011 on the provision of food information to consumers amends Regulations (EC) No 1924/2006 and (EC) No 1925/2006 and repeals a number of Directives.

This new regulation came into effect in December 2011 and will generally apply from mid December 2014, with a couple of exceptions. The regulation will replace the current foodstuffs labelling requirements set out in Directive 2000/13/EC, as amended, and the nutrition labelling requirements set out in Directive 90/496/EEC, as amended.

New requirements of this regulation include the introduction of a minimum font size for mandatory information, allergen labelling for non-packaged foodstuffs, labelling requirements for foodstuffs sold via the internet, country of origin labelling and requirements for mandatory nutrition labelling for many pre-packaged foodstuffs.

Foods placed on the market or labelled prior to 13th December 2014 which are compliant with the existing rules (i.e. Directive 2000/13/EC), but which do not comply with the requirements of the new regulation, may be marketed until stocks are exhausted.

Labelling analysis in 2013

A substantial amount of general labelling analysis was performed.

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.

Sulphur dioxide functions as a preservative in foodstuffs but it is also an allergenic substance and, as such, its presence in a food product must be clearly visible to a consumer, either in the list of ingredients or in a “contains box”. Where present at levels exceeding 10 mg/kg or 10 mg/l expressed as SO₂, sulphur dioxide and sulphites must appear on the product label under their chemical name e.g. sodium metabisulphite. A specification of the additive category and the additive (E) number is not sufficient.



Tables 14 and 15 contains information on the results of labelling analysis in 2013.

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 2073/2005, as amended, on microbiological criteria for foodstuffs specifies similar histamine limits for fish and doubles the respective values for fermented fish products. Regulation (EC) No 2073/2005 has been further amended by Regulation 1019/2013 as regards histamine in fishery products but this amendment post-dated all the analysis carried out in 2013 for histamine.

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 2013 the following biogenic amines were measured in a range of foodstuffs – histamine, tyramine, cadaverine, putrescine, spermidine, spermine, agmatine, phenylethylamine, tryptamine and serotonin.

Table 16 gives the details.

<i>Foodstuff</i>	<i>No of samples</i>	<i>Histamine range Ppm</i>	<i>Tyramine range ppm</i>	<i>No of non-compliant samples</i>
<i>Fish, crustacean, molluscs</i>	36 * (incl. 8 SFPA)	<10–545.1	<10–441.6	3
<i>Sauces</i>	21	<10–69.1	<10–42.3	0

* For 8 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 Regulation 2073/2005.

Table 16 Biogenic Amine analysis in 2013

Food Contact Materials (FCMs)

This laboratory is the specialist testing facility in Ireland and the 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 Commission Regulation (EU) No 10/2011 food contact materials may not release PAAs into food simulant in detectable quantities.

In 2013 the laboratory analysed 21 sets of black nylon kitchen utensils for two common PAAs, aniline and 4,4'-methylenediamine. 5 Samples did not meet the requirements for specific migration and Rapid Alerts were raised with the FSAI for these.

1 Sample was received for analysis under the new emergency legislation introduced during 2012 (Commission Regulation (EU) No 284/2011) and was rejected on the basis of the documents supplied with the consignment.

Photo initiators (PIs)

15 samples were analysed for a range of PIs. These consisted mainly of dry products packaged in paperboard e.g. pasta, rice, porridge oats, muesli, breakfast cereals. 9 PIs were tested for in the food itself, including benzophenone and 4-methyl benzophenone. A total of 135 individual tests were performed.

All samples were determined to have levels of < 0.1 mg/kg, with the exception 2 food products, a muesli and porridge sample. Average levels of benzophenone (BP) at 6.6 and 4.8 mg/kg were found in these, respectively.

The packaging from these samples was tested for the presence of BP to determine its source. The samples had two layers of packaging, a printed outer paperboard and an inner plastic bag. The printed paperboard was determined to be the source of the BP.

Follow-up testing of both sample packaging is expected to be carried out in early 2014 to ensure compliance with Article 3 of Regulation (EC) No. 1935/2004, which states that materials and articles, including active and intelligent materials and articles, shall be manufactured in compliance with good manufacturing practice so that, under normal or foreseeable conditions of use, they do not transfer their constituents to food in quantities which could endanger human health.

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. However ESBO is fat soluble and has the potential to migrate into the foodstuffs during sterilisation and storage, especially into fatty foods.

Commission Regulation (EU) No 10/2011 on plastic materials and articles intended to come into contact with food, limits the content of ESBO that can migrate into the food to 60mg/kg of food. In the case of infant formulae and follow-on formulae or processed cereal-based foods and baby foods for infants and young children this specific migration limit (SML) is lowered to 30 mg/kg.

In future years the use of ESBO in gaskets may decrease due to replacement with other plasticisers such as polyadipates.

In 2013 46 samples in total were analysed for ESBO. The samples comprised 5 infant formulas from the DAFM, 21 baby foods and 19 other jarred foods, 14 of which were sauces. One sample of almond butter at 149mg/kg exceeded the SML. A follow up sample was taken which was found to be satisfactory. The results are presented in Table 17.

<i>Foodstuff</i>	<i>No of samples</i>	<i>ESBO range mg/kg</i>
<i>Infant formula</i>	5	<4
<i>Baby foods</i>	21	< 3– 16
<i>General jarred foods</i>	19	<3 – 149
<i>Follow-up sample</i>	1	<3

Table 17 ESBO results

The samples of infant formula and follow-on-formula were also analysed for taurine, aflatoxin M1, 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)** diethylphthalate (DEP)
- xii)** dimethylphthalate (DMP)

The 45 samples that were analysed for phthalates resulted in 540 individual tests.

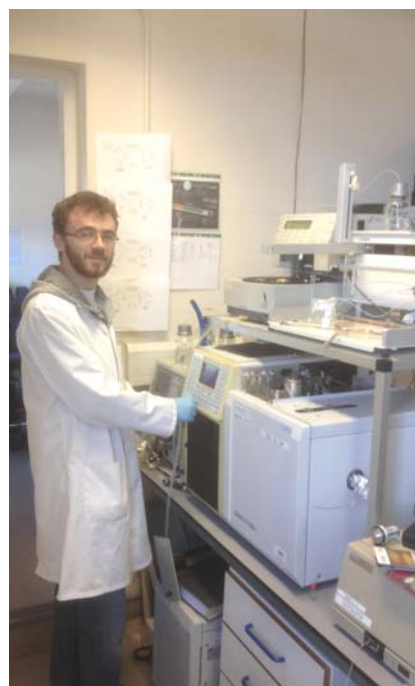
A range of other PVC additives were also monitored including:

- 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.

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.

All samples were satisfactory with the exception of one. Di-iso-nonylphthalate (DiNP) was found to exceed the permitted limit in the gasket of a coconut oil sample. A follow up sample was taken which consisted of three units. Each gasket was analysed individually for the range of phthalates listed above. As the food in contact with the gasket is a fatty food and as the level of DiNP determined, had greatly exceeded the 0.1% limit, then the follow up sample was also deemed as not compliant with the requirements of Regulation (EU) No 10/2011. For supplementary information, the aggregate sample of coconut oil was also analysed for DiNP.



Following on from the joint project with the European Reference Laboratory for food contact materials (EURL FCM) and the Kantonaes Labor Zürich (KLZH) a second round of sampling of glass jars with gaskets was organised by the EURL together with the Kantonaes Labor Zürich (KLZH) and the CVUA, Stuttgart.

On this occasion the emphasis was less on numbers of samples analysed but rather on the ability of FBOs to supply Declarations of Compliance (DoCs) for the gaskets and the materials used in them. To this end the number of samples for each member state was limited to five.

The rationale was that samples with incomplete or no DoCs forthcoming before a deadline would not be chemically analysed but would be considered non-compliant. Only two of the five samples taken by Ireland were fully compliant with respect to the DoCs and the chemical analysis. The project has extended longer than anticipated, into 2014, as Ireland decided to pursue the FBOs of the remaining three samples for the outstanding DoCs after the deadline, to be followed by the chemical analysis of the samples.

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

Melamine in foodstuffs

During 2013 a total of 13 samples were submitted to the laboratory for testing under the import control legislation (Regulation 669/2009, as amended). All were satisfactory.

Melamine and formaldehyde in kitchenware

15 Samples of kitchenware were analysed for specific migration of melamine and residual formaldehyde, comprising 30 analytical tests. One sample was non-compliant for formaldehyde.

In addition, 3 samples were received from the port for formaldehyde testing under the emergency legislation Regulation No 284/2010). All were compliant.

Bisphenol A (BPA) in baby bottles, carboys and canned foods

11 Samples of canned foods were analysed for BPA. All were satisfactory. Five 25 litre carboys used for drinking water were also tested for BPA and were satisfactory. In addition some foil-sealed foods, baby bottles, and polycarbomnate carboys were tested for BPA migration, all being satisfactory.

Migration of lead and cadmium from ware.

37 Samples of ceramic ware were analysed for the specific migration of lead and cadmium. Council Directive No. 84/500/EEC specifies the maximum limit for lead and cadmium allowed to be transferred from ceramic articles. All samples were compliant

Migration of chromium and nickel from kitchenware

14 Samples of metal utensils & cutlery were analysed for the migration of chromium and nickel, giving 28 analytical tests. No sample was found to have high levels of either metal migrating from it. There is no legislation governing these tests, nevertheless, these items are a potential source of heavy metals and therefore a concern for public health.

Research leading to a Ph.D. degree

Since autumn 2008 a postgraduate student conducted 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 has been used in the analysis of these items. It was accredited in 2010 and a 2011 paper was published in the journal 'Food Additives and Contaminants'.

Other topics were pursued, 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. The practical part of the thesis has been completed and the student has left the laboratory, is writing up the thesis and is currently employed in one of the top analytical instrument supplier companies.

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

This analysis is associated with FSAI Guidance Note 25 entitled 'Guidance for enforcement of legislation applicable to: Natural Mineral Waters, Spring Waters and Other Bottled Waters'.

PAHs in Bottled Waters

21 samples were submitted for PAH analysis.

The PAHs 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 within the the parametric values for benzo[*a*]pyrene and sum of the four specific PAHs, 0.01 and 0.10 µg/L respectively.

3.2 A Review of the Results of the Microbiological Food Sampling Programme 2013

Introduction

The food microbiology laboratory examined 1313 food samples submitted by EHOs for Food Control purposes. No hygiene swab samples were submitted.

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 2013, the FSAI performed 1 National Survey (13NS7).



57 Samples were taken at the Port as 'Import' samples. 18 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 non-compliant or suspect results. There were six samples marked as complaint as they were taken as a follow-up to a food poisoning complaint investigation. All 'Import' 'Repeat' 'Complaint' and 'Follow-up' samples are non-programmed, which has a major impact on laboratory time and resources.

Table 18 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 the Table. Unacceptable/potentially hazardous and unsatisfactory samples under the guidelines are combined as 'Non-compliant'. The judgement applied to any sample was determined by the worst result for any of the individual parameters tested. Samples for which a judgement was not considered appropriate were classed as 'No Designation'.

<i>Category</i>	<i>Number</i>	<i>Compliant</i>	<i>Non-compliant</i>	<i>No Designation</i>
<i>Routine</i>	1001	895	90	16
<i>I3NS7</i>	169	167	0	2
<i>Follow-up</i>	18	16	1	1
<i>Repeat</i>	62	28	32	2
<i>Import</i>	57	56	0	1
<i>Complaint</i>	6	4	2	0
Total	1313	1166	125	22

Table 18 Microbiology Food Sampling Programme – General data on food samples for 2013

Results of food testing

In 2013 only 1.7% of food samples did not have a judgement assigned compared with 3.2% in 2012. A judgement is not made on samples 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. A judgement will also be omitted for samples which have results that fall into the non-compliant category but where the temperature on receipt is not available or where the final result was an estimate.

After removing the 'No Designation' category food samples, the compliant samples represented 90.3% of the remaining samples. Food samples judged to be non-compliant represented 9.7% of samples analysed against which there is a judgement. The proportion of non-compliant food samples was 2.2% lower in 2013 than in 2012 (11.9%). Non-compliant samples had been following a consistent downward trend up to 2011, after a slight rise in proportion in 2012, they have decreased slightly again for 2013.

Table 19 summarises the results found for each test parameter for routine food samples in 2013.

	<i>Parameter</i>	<i>Total tests</i>	<i>Non-compliant</i>	<i>% Non-compliant (of samples tested for this parameter)</i>	<i>Non-Compliant</i>	<i>Range cfu/g for N</i>
Indicator Organisms (Enumeration)	Aerobic Colony Count 30°C	417	55	13.2	N/A	N/A
	Enterobacteriaceae	394	9	2.3	$\geq 1.0 \times 10^4$	$2.3 \times 10^4 - >1.5 \times 10^5$
	<i>Escherichia coli</i>	611	5	0.8	$\geq 1.0 \times 10^2$	N/A
Pathogens (Presence or Absence test)	<i>Salmonella</i>	626	2	0.3	Detected	N/A
	<i>Campylobacter</i>	0	0	0	Detected	N/A
Pathogens (Enumeration)	Presumptive <i>Bacillus cereus</i>	542	2	0.4	$\geq 1.0 \times 10^4$	$1.7 \times 10^5 - 7.2 \times 10^5$
	<i>Clostridium perfringens</i>	542	1	0.2	$\geq 1.0 \times 10^2$	$>1.5 \times 10^3$
	Coagulase positive staphylococci	542	4	0.7	$\geq 1.0 \times 10^2$	$1.8 \times 10^2 - 5.9 \times 10^2$
	<i>Listeria monocytogenes</i> Enumeration	702	0	0.2	$\geq 1.0 \times 10^2$	N/A
	<i>Vibrio parahaemolyticus</i> enumeration	0	0	0	$\geq 1.0 \times 10^2$	N/A
	Totals:		4376	82	1.9	N/A

N/A = Not applicable/available.

Table 19 Breakdown of results by parameter (test) for 2013 routine food samples

The majority of routine food samples that are found to be non-compliant fail for indicator organisms and most of these samples fail only for the Aerobic Colony Count (ACC) parameter. We found only 9 routine samples (0.9%) with non-compliant results due to food pathogens. These are listed in Table 20.

The proportion of routine samples tested with non-compliant ACC levels was 13.2% in 2013. After ACC, the parameter that provides more non-compliant results than any other is Enterobacteriaceae. In 2013, 2.3% of samples were non-compliant 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.

Non-compliant *Escherichia coli* results for routine food samples were at 0.8% of samples tested.

Further pathogens

Coagulase positive staphylococci were found in 4 routine samples tested where the level could be deemed as non-compliant. Table 20 shows summary data for all pathogens tested and detected at non-compliant levels.

<i>Food</i>	<i>Analysis Reason</i>	<i>Pathogen</i>	<i>Non-Compliant Pathogen Level cfu/g</i>
<i>Pulled Pork Belly</i>	ROUTINE	<i>Clostridium perfringens</i>	$>1.5 \times 10^3$
<i>Vegetable Soup</i>	ROUTINE	Presumptive <i>Bacillus cereus</i>	1.7×10^5
<i>Coleslaw</i>	ROUTINE	Presumptive <i>Bacillus cereus</i>	7.2×10^5
<i>Egg Mayonnaise</i>	ROUTINE	Coagulase positive staphylococci	5.9×10^2
<i>Chicken Breast</i>	ROUTINE	Coagulase-positive staphylococci	5.8×10^2
<i>Coleslaw</i>	ROUTINE	Coagulase-positive staphylococci	1.8×10^2
<i>Chicken dish</i>	ROUTINE	Coagulase-positive staphylococci	3.2×10^2
<i>Raw Minced Beef (2 Samples from 1 batch of 5 samples)</i>	ROUTINE	<i>Salmonella</i> species	Presence

Table 20 Unsatisfactory routine food samples containing pathogens

The 4 routine samples which tested positive for Coagulase positive staphylococci represented 0.7% of routine food samples tested for this parameter, the same percentage as in 2012. The level of Coagulase positive staphylococci in the non-compliant samples in 2013 ranged from 180cfu/g to 290cfu/g for the 4 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*.

2 Routine samples tested had Presumptive *Bacillus cereus* at non-compliant levels.

One routine sample had *Clostridium perfringens* at the non-compliant level of >1500cfu/g.

No routine samples had *Listeria monocytogenes* at the non-compliant level of >100cfu/g.

The *Vibrio parahaemolyticus* parameter is only applied to fish and fish products. None of our routine samples were items for which it would have been appropriate for the laboratory to add this parameter.

Samples which had pathogens which were on or only slightly above the designated non-compliant level were considered satisfactory after measurement of uncertainty had been taken into account.

2 Samples tested positive for *Salmonella* species. Further serological characteristics of the *Salmonella* isolates were subcontracted to the National *Salmonella* Reference Laboratory (NSRL) at Galway University Hospital. The *Salmonella* serotype was determined to be *Salmonella* Dublin for both samples.

The 2 positive samples were raw minced beef samples and both were taken from the same batch of 5 samples. The batch of raw minced beef was therefore deemed as non-compliant with the microbiological requirements set out in the Food safety criteria of Commission regulation (EC) No 2073/2005, as amended, in relation to *Salmonella*.

Coleslaw samples, at 6.5% of the total routine samples submitted, were again a prominent food type in 2013. However, the proportion of coleslaw samples had been above 10% for the previous 3 years, so this year's percentage shows a decrease. Table 21 shows some food types that are prominent in the database where the sampling reason was stated as "Routine".

<i>Food Name</i>	<i>Number</i>	<i>% of Total submitted</i>
Coleslaw	65	6.5
Cooked ham *	50	5.0
Egg mayonnaise salad	34	3.4
Tuna salad	32	3.2
Potato salad	16	1.6

* Excludes samples that had ham in combination with other ingredients

Table 21 Some prominent food types submitted as "Routine" samples.

National Surveys

There was one National Survey (13NS7) in 2013 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 survey investigated the microbiological safety of ready-to-eat, pre-cut and pre-packaged fresh herbs and salad leaves samples from retail establishments in Ireland. The survey ran from 17th June to 31st October, inclusive.



As the survey was performed at retail level, single samples (n=1) and not batch samples (n=5) were taken. The samples were tested for *Listeria monocytogenes* enumeration and *Salmonella* species detection under the Food safety criteria of Commission regulation (EC) No 2073/2005, as amended. All 169 samples tested were negative for the *Salmonella* parameter.

For 2 of the 169 samples tested the level of *Listeria monocytogenes* was estimated to be 10cfu/g. The level was estimated for statistical reasons. The other 167 samples tested for *Listeria monocytogenes* had a level of <10cfu/g.

The *Listeria monocytogenes* enumeration criteria applies if the shelf-life of the product is less than 5 days. As the production date was unknown for these 2 samples, we were unable to determine whether or not the enumeration criteria applied to these products. Although the *Listeria monocytogenes* result is <100cfu/g, the results could not be designated based on the information provided with the samples.

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 2013.

3.3 Food Complaint samples

A total of 272 consumer complaint samples were submitted by the EHS in 2013. The number includes 70 samples submitted as complaint, control or follow-up samples consequent to food poisoning allegations. In previous years some such of these samples were recorded with routine monitoring work (FLM samples), but recording them as complaint samples is more appropriate.

Excluding such samples, in 2013 there was an increase in food complaint samples submitted of approximately 6% on the previous year.

In addition, 12 samples were received from private customers related to the investigation of consumer complaint. This was 1 less than last year, continuing the downward trend in private samples evident for many years.

Tables 22 & 23 below summarise the breakdown of samples by EU category code and analytical outcome for the EHS complaint samples (Table 22) and those from private customers (Table 23).

The following are details of the food product and the problem encountered for the 45 EHS samples designated as non-compliant.

Food	Problem
Apple tart	Human hair present
Takeaway meal – burger	Contained a piece of metal
Balsamic vinegar	Solid mass present (“mother of vinegar”)
Sesame seeds	Live insect larvae/ insect larval damage
Apple juice	Haze
Apple juice, Tomato juice	Fungal growth/spoilage
Corned beef	Microbial spoilage, odour
Bread	Piece of bakery char
Yoghurt	Fungal growth in product
Ready to eat salad	Wasp present
Chocolate bar	Mechanical damage

Ready to eat salad	Bee present
Milk	Foreign matter present, labelling not compliant with legislation
Carton of infant milk formula	Spoiled by mould growth – pack damaged
Chocolate truffle	Spoiled by fungal growth
Raspberries	Rodent faecal matter present
Cream crackers	Food debris appeared baked in
Potato crisps (2)	Contained a mass of crisp debris
Battered cod	Cysts present
Freeze pops	Spoiled by fungal growth
Pizza	Larva present
Potato chips (2)	Contained a mass of chip debris and char
Sandwich	Piece of fibreglass in bread
Okra	Contained live insects
Takeaway meal – chicken	Discoloured dough
Baby food	Piece of char present
Chicken	Necrotic tissue – Oregon disease
Bread	Extensive mould growth within shelf life
Scotch egg	Paper in sausage meat
Bread	Banded filament baked in
Crisps/corn snacks	Rodent damage
Beans	Insects (Weevils) present
Smoked peppered mackerel	Spoiled by fungal growth
Honey	Sugar content/labelling – not compliant with legislation
Vodka (6)	Alcohol by volume - not compliant with legislation
Tuna	Elevated histamine level
Scombroid fish samples	Test for elevated level of histamine, one substantiated
Sausage roll	Blue flexible material present
Rice cake	Insect larva present

Below are presented some of the problems and the range of products encountered where we were unable to establish the origin of the problem with confidence from our analysis. The range and type of complaint samples received were similar to those received in previous years. Many will have originated at production or in distribution. Some others may have occurred in the domestic environment. Insect and other infestations are now much more likely to be of domestic origin while instances from production or distribution have become rare. Sometimes we are provided with control material that can help resolve a problem.

Problem	Products
Steel nail, steel fragment, metal blade, bolt/screw, metal wire, aluminium	Soup, minced meat, takeaway meal, cough sweets, crisps, bread, infant formula, pineapple, breakfast cereal
Tablet, capsule	Diet cola, orange drink, beef pie, orange juice, iced drink, apple juice
Pieces of plastic	Carrot cake, cheese, sweet, bread, vegetable burger, chicken, ravioli
Insects, insect droppings, fly larva, moth	Fish meal, brie, burger, breaded chicken, battered

larvae	chicken, takeaway meal, insects from stores, nuts, pasta, chocolate
Glass pieces/fragments	Spinach, bread, cheese, cooked porridge
Wood fragments, fruit/vegetable peel, vegetable matter, plant stem material	Canned tomatoes, bread, lasagne, infant formula, chocolate, cheese
Rodent faecal pellet	Pizza box
Fungal & yeast spoilage	Mayonnaise, baby food (lasagne), apple pie, orange juice, apple juice, rice, soft drink
Poor microbial quality	Chicken
Plaster	Takeaway meal
Sliminess/stringy texture	Milk, soft drink
Discoloured meat	Sausage
Tooth crown	Takeaway meal, bread
Stones, concrete	Sandwich, biscuit, dried figs, peanuts
Meat fibres	Vegetable soup
Contained alcohol	Soft drink
Taints	Coffee, frozen peas, butter, burger, porridge oats, brazil nuts, muffin, oxtail soup
Bone	Minced meat, fruit cake, bread, tuna sandwich
Human/animal hair	Bread, pizza
Alleged undercooking	Several instances, not confirmed
Pellets of discoloured dough	Bread, battered chicken
Ceramic fragment	Spinach dish, quiche
Connective tissue	Breakfast cereal

Each year a growing number of samples are submitted that are alleged to contain tablets or capsules at the time of purchase/consumption. When it is suspected that the foreign specimens may be of pharmaceutical origin, the National Medicines Information Centre in St. James's Hospital, which has access to a number of tablet/capsule identification databases, is consulted. However, in many cases definitive identification of the specimens is not possible.

In 2013 assistance was again gratefully received from the Histopathology Department in St. James's Hospital in relation to identification of a specimen that had the appearance of a tooth. The specimen, which was alleged to have been found in a take-away meal, was confirmed to be a human milk tooth.

A number of samples were submitted with allegations of unexpected tastes or taints. It is often not possible to substantiate these allegations as complaint samples are not tasted and detection of the source of the alleged taste via chemical testing can prove difficult.

Occasionally minor problems such as pellets of discoloured dough in bakery products are mistaken for rodent faecal pellets. Similarly an ergot specimen found in bread was mistaken for a rodent faecal pellet. Any allegations of undercooking of meat were unsubstantiated. Instances in which this is confirmed have occurred but they are unusual. On some occasions fungal growth/spoilage could be related to damage to the product packaging although it could not be determined at what point this occurred.

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 be the vector.

	Type	Total samples	Compliant	Not compliant	No designation	% Not compliant
1	Dairy Products	21	8	2	11	9.5
2	Eggs and Egg Products	8	5	1	2	12.5
3	Meat, Game and Poultry	61	44	3	14	4.9
4	Fish, Shellfish and Molluscs	15	12	3	0	20
5	Fats and oils	0	-	-	-	-
6	Soups, Broths and Sauces	7	3	1	3	14.3
7	Cereals and Bakery Products	36	11	5	20	13.8
8	Fruits and Vegetables	14	7	2	5	14.3
9	Herbs and Spices	0	-	-	-	-
10	Non-alcoholic Beverages	15	1	3	11	20
11	Wine	0	-	-	-	-
12	Alcoholic Beverages (other than wine)	8	1	6	1	75
13	Ices and Desserts	12	11	1	0	8.3
14	Cocoa, Coffee, Tea	3	0	0	3	0
15	Confectionery	12	2	4	6	33.3
16	Nuts and Nut Products, Snacks	14	5	3	6	21.4
17	Prepared Dishes	29	8	8	13	27.6
18	Foodstuffs for Particular Nutritional Uses	5	1	1	3	20
19	Additives	0	-	-	-	-
20	Materials in contact with foodstuffs	0	-	-	-	-
21	Others	0	-	-	-	-
171	Foreign body, no food sample submitted	12	1	2	9	16.6
	Totals	272	120	45	107	16.5

Table 22 Complaint samples received from Environmental Health Officers during 2013

Not Compliant: 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 quality demanded, or the sample did not comply with other relevant legislation.

No Designation: Compliance of the food with food law at purchase could not be determined on the basis of the sample provided and the information available.

Type	Total samples	Compliant	Not compliant	No designation	% Not compliant
1 Dairy Products	0	-	-	-	-
2 Eggs and Egg Products	0	-	-	-	-
3 Meat, Game and Poultry	3	3	0	0	0
4 Fish, Shellfish and Molluscs	1	1	0	0	0
5 Fats and oils	0	-	-	-	-
6 Soups, Broths and Sauces	1	1	0	0	0
7 Cereals and Bakery Products	1	0	0	1	0
8 Fruits and Vegetables	1	1	0	0	0
9 Herbs and Spices	0	-	-	-	-
10 Non-alcoholic Beverages	1	0	0	1	0
11 Wine	0	-	-	-	-
12 Alcoholic Beverages (other than wine)	0	-	-	-	-
13 Ices and Desserts	0	-	-	-	-
14 Cocoa, Coffee, Tea	1	0	0	1	0
15 Confectionery	1	0	1	0	100
16 Nuts and Nut Products, Snacks	0	-	-	-	-
17 Prepared Dishes	1	1	0	0	0
18 Foodstuffs for Particular Nutritional Uses	0	-	-	-	-
19 Additives	0	-	-	-	-
20 Materials in contact with foodstuffs	0	-	-	-	-
21 Others	0	-	-	-	-
171 Foreign bodies, no food sample submitted	1	0	0	1	0
Total:	12	7	1	4	8.3

Table 23 Complaint samples / complaint investigation samples received from private clients during 2013

No Compliant: 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 quality demanded, or the sample did not comply with other relevant legislation.

No Designation: Compliance of the food with food law at purchase could not be determined on the basis of the sample provided and the information available.

3.4 Food Export Certification testing

The laboratory provides an analytical service to food business operators particularly regarding analysis of food products for Certificates of Free Sale for exporting foodstuffs outside the EU. In 2013, over 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 (sulphur dioxide, benzoic acid, sorbic acid, sweeteners, antioxidants)
- ii)** alcohol, methanol and congeners
- iii)** labelling analysis
- iv)** microbiological testing.

There is no guidance available to companies to indicate what parameters are required or are appropriate for analysis in specific products. In the laboratory our decisions are risk-based and guided primarily by (i) contaminants and additives legislation where there is a statutory limit specifically for the food type in question, (ii) what analytes similar products have been analysed for previously and (iii) what analytical methods are available in the laboratory.

Costs for analysis are determined on a case by case basis depending on sample type, how many parameters are required for analysis and on the number of samples being submitted.

Some countries importing products from the EU have extra requirements for certificates to be issued. Specific certificates for Brazil, Venezuela and Turkey have been issued.

3.5 Other / Miscellaneous food samples.

Examination was performed on a significant number of food samples from various organisations and private companies.

4. WATER / EFFLUENT / SWIMMING POOL SAMPLES



In the year ended 31st December 2013, 6747 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 shown in Table 24.

<i>Category</i>	<i>Number of Samples</i>
<i>Local Authorities & the HSE – Chemical samples</i>	2271
<i>Local Authorities & the HSE – Microbiological samples</i>	2852
<i>Local Authorities & the HSE – Fluoride samples (Note 1)</i>	800
<i>General Public, companies (Private) – Chemical samples</i>	378
<i>General Public, companies (Private) – Microbiological samples</i>	446
Total :	6747

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 2 Fluoride tables.

Table 24 Water sample categories in 2013

Included in the 6747 samples were the sample/parameter types shown in Table 25.

<i>Type / Parameters</i>	<i>Number of Samples</i>
<i>Trihalomethanes (THMs)</i>	162
<i>Swimming pool (including Spa pool)</i>	43
<i>Effluent - Biochemical Oxygen Demand & other parameters</i>	10
<i>Hospital Renal Dialysis unit samples</i>	17
<i>Environmental Waters (Non-drinking Water Samples)</i>	49
<i>Hydrofluosilicic Acid Samples</i>	29
<i>Bottled/Mineral Water Samples</i>	33
Total :	343

Table 25

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 2013 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 2013, 1294 samples were analysed for nitrate. Of these, 4 had nitrate levels greater than the EU PV of 50mg/l NO₃ and represents 0.31% 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 26 gives the chloroform ranges for the 2013 samples. The Total THM results are presented in Table 27.

<i>Chloroform Range µg/l</i>				
	< 50	51 – 100	101 – 150	> 150
<i>No of samples</i>	91	63	8	0

Table 26 Data for chloroform in 2013 samples

<i>Total THM Range µg/l</i>				
	< 50	51 – 100	101 – 150	> 150
<i>No of samples</i>	69	66	27	0

Table 27 Data for Total THMs in 2013 samples

Of the 162 samples tested for THMs, 27 had a concentration of Total THMs that exceeded the EU PV of 100µg/l.

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 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 2013, 2384 waters were tested for aluminium. Of these 26 had aluminium levels greater than 200µg/l, representing 1.09% 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. The new Parametric Value of 10µg/l came into effect at the end of December 2013.

The 2013 results were compared against the previous PV of 25µg/l. Out of a total of 509 tests performed for lead in water in 2013, 5 had lead levels above the EU PV limit of 25µg/l. This represents 0.98% 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 2013 are given in Appendix 2.

Hydrofluosilicic Acid Analysis

The laboratory continues to perform the independent analysis of HFSA. 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. Representative 'grab samples' of the HFSA distributed nationwide are taken at random and submitted to the laboratory for the 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: 2013, are listed in Table 28.

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

Table 28 HFSA Specification

4.3 The Microbiological Examination of Drinking and Other Water, 2013

In the year ended 31st December 2013 the laboratory analysed 3298 microbiological water samples.

The samples consisted of the water categories shown in Table 29.

<i>Water category</i>	<i>Number of Samples</i>
<i>Drinking Water</i>	3153
<i>Bottled water</i>	32
<i>Ice</i>	13
<i>Swimming / Spa pool</i>	68
<i>Environmental</i>	20
<i>Horticultural water</i>	7
<i>Bathing</i>	5
Total:	3298

Table 29 Categories of waters for microbiological examination

External proficiency testing scheme samples were tested throughout the year.

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 30 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.

<i>Parameter</i>	<i>Limits set by S.I. 278 of 2007</i>	<i>% Samples Conforming with S.I. 278 of 2007</i>	<i>Sample Numbers</i>
Safety Parameters			
<i>Escherichia coli</i>	0 cfu per 100ml	98.07%	2742
Enterococci	0 cfu per 100ml	97.09%	2509
Indicator Parameters			
Coliforms	0 cfu per 100ml	91.94%	2706
<i>Clostridium perfringens</i>	0 cfu per 100ml	98.26%	1663

Table 30

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 residual chlorine.

S.I. No 278 of 2007 states that one of the criteria for a water to be regarded as ‘wholesome and clean’ is that *E. coli* and Enterococci should be absent from 100ml of drinking water sample.

Enterococci and *Clostridium perfringens* are regarded as secondary indicators 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. As a result of this *Clostridium perfringens* testing is useful in determining the effectiveness of the chlorination process. However, both *Clostridium perfringens* and Enterococci may be 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 31 shows the level of compliance of drinking water submitted into the laboratory from private supplies with S.I. No. 278 of 2007.

<i>Parameter</i>	<i>Limits set by S.I. 278 of 2007</i>	<i>% Samples Conforming with S.I. 278 of 2007</i>	<i>Sample Numbers</i>
Safety Parameters			
<i>Escherichia coli</i>	0 cfu per 100ml	90.62%	373
Enterococci	0 cfu per 100ml	87.69%	333
Indicator Parameters			
Coliforms	0 cfu per 100ml	64.54%	361
<i>Clostridium perfringens</i>	0 cfu per 100ml	70.00%	40

Table 31

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 at least have a bacteriological test performed annually to ensure that hygienic quality is maintained.

Bottled Water

The National legislation governing bottled water is set out in S.I. No. 225 of 2007. Bottled waters includes natural mineral waters, spring waters and other waters intended for human consumption supplied in bottles or containers other than waters that are medicinal products.

There were 32 bottled water samples submitted for microbiological analysis in 2013. 96.87% of bottled water samples analysed were compliant with S.I. No. 225 of 2007 for the Coliform and *E.coli* parameters tested, whilst 96.67% were compliant for the Enterococci parameter.



The bottled water samples showed 100% compliance for the *C. perfringens*, sulphite reducing clostridia and *Pseudomonas aeruginosa* parameters.

Table 32 details microbiological parameters examined and percent compliance with S.I. 225 of 2007.

<i>Microbiological Parameter</i>	<i>Limits set by S.I. 225 of 2007</i>	<i>% Samples Conforming with S.I. 225 of 2007</i>	<i>Sample Numbers</i>
Coliforms	0 in 250ml	96.87%	32
<i>Escherichia coli</i>	0 in 250ml	96.87%	32
Enterococci	0 in 250ml	96.67%	30
<i>Pseudomonas aeruginosa</i>	0 in 250ml	100%	29
Sulphite reducing clostridia (Natural mineral and spring water only)	0 in 50ml	100%	29
<i>C. perfringens</i>	0 in 100ml	100%	28

Table 32

Ice for cooling drinks

13 Ice samples were submitted for microbiological analysis in 2013. 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.

8 out of 13 samples complied with S. I 278 of 2007 for the coliform parameter, 11 out of 13 were compliant for the *E.coli* parameter, whilst 9 out of 9 samples were compliant for the Enterococci parameter. 8 out of the 13 samples were compliant for the three parameters.

Table 33 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.

<i>Microbiological Parameter</i>	<i>Limits set by S.I. 278 of 2007</i>	<i>% Samples Conforming with S.I. 278 of 2007</i>	<i>Sample Numbers</i>
Coliforms	0 in 100ml	61.5%	13
<i>Escherichia coli</i>	0 in 100ml	84.6%	13
Enterococci	0 in 100ml	100%	9

Table 33

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 Code of Practice, January 2013 and ‘SWIMMING POOL WATER, Treatment and Quality Standards’, 2009 (a UK publication), as an example of good practice.

68 Swimming / spa pool samples were submitted in 2013 which comprised 53 swimming pools and 15 spa pool waters. The samples were 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 90.20% and 86.67% of all swimming and spa pool samples respectively.

Table 34 shows the percentage compliance of swimming and spa pool samples with PWTAG Code of Practice 2013 and ‘The Swimming Pool Water, Treatment and Quality Standard, 2009’.

<i>Microbiological Parameter</i>	<i>Guide level*</i>	<i>% Conforming Swimming Pool Samples</i>	<i>Swimming Pool Sample Nos</i>	<i>% Conforming Spa Pool Samples</i>	<i>Spa Pool SampleNos</i>
Coliforms	0 in 100ml	81.13%	53	86.67%	15
<i>Escherichia coli</i>	0 in 100ml	96.08%	51	86.67%	15
<i>Pseudomonas aeruginosa</i>	0 in 100ml	88.00%	50	73.33%	15
TVC at 37°C	≤ 10 in ml	68.42%	50	63.64%	15

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

Table 34

Miscellaneous Samples.

In addition to the samples described microbiological testing was carried out on 20 environmental waters and 5 bathing water samples. 7 Horticultural water samples were submitted by private customers and analysed for compliance with the Bord Bia Horticulture Quality Assurance Scheme - Water Analysis Requirements 2009.

5. CLINICAL SAMPLES

In 2013, 963 samples of biological fluids were analysed for metals. The samples consisted of:

Blood:	149
Serum:	761
Urine:	53

The number of metal tests in the different sample types is given in Table 35.

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

<i>Matrix</i>	<i>Aluminium</i>	<i>Copper</i>	<i>Lead</i>	<i>Magnesium</i>	<i>Manganese</i>	<i>Mercury</i>	<i>Selenium</i>	<i>Zinc</i>
<i>Blood</i>			130		18	7		
<i>Serum</i>	230	358					37	167
<i>Urine</i>		45				9		
<i>Totals</i>	230	403	130		18	16	37	167

Total Number of Tests: 1001

Table 35 Metal Tests on Clinical Samples

6. MICROBIOLOGY OF COSMETICS

6.1 Legislation

On 11 July 2013 EC Regulation No. 1223 of 2009 on cosmetic products came into force and S.I. 870 of 2004, which had implemented the old Regulation, was considered to have fallen. From that point it was considered that there was no longer a basis for the taking of samples for cosmetics control. A new S. I., 440 of 2013, published on 20 November 2013 implemented the new Regulation.

Because of the position in relation to legislation, the sampling programme planned to run for 10 months from February to November 2013, terminated in July and the laboratory did not receive the cosmetics samples scheduled for the period August to November.

Some development work related to tattoo inks, which are general products and are not covered by cosmetics regulations, was carried out in the second half of the year.



6.2 The program as implemented

The third annual program of microbiological testing of cosmetics commenced in February 2013. Up to and including July 58 samples were received. Subsequently 9 of these samples were considered to be medical devices and were not reported as cosmetics. It had been planned to look at eye products marketed as cosmetics but intended to enhance the appearance of eyes and which were intended to have a purely cosmetic function. Regardless of the intention, all products intended to be used in the eye rather than around the eye area are considered to be medical devices and are not classed as cosmetics in the EU. These samples are excluded from the discussion below. The sampling program again covered the HSE Dublin North-East and HSE West areas.

6.3 Testing and Compliance

We examined 46 scheduled cosmetics samples. A further 3 samples were examined for follow-up/repeat purposes. Table 36 shows a breakdown according to EU cosmetic category.

<i>EU Cosmetic Category</i>	<i>Number</i>	<i>Compliant</i>	<i>Non-compliant</i>	<i>No Designation</i>
<i>Hair care</i>	1	1	0	0
<i>Make up</i>	5	4	1	0
<i>Mouth wash</i>	11	11	0	0
<i>Skin care</i>	14	14	0	0
<i>Skin cleaning</i>	18	16	2	0
<i>Total</i>	49	46	3	0

Table 36 *Cosmetic samples according to EU cosmetic category*

We reported 43 results for aerobic mesophilic bacteria enumeration, 46 results for yeast and mould enumeration, 32 results for *Pseudomonas aeruginosa* detection and 36 results for *Staphylococcus aureus* detection. We did not report results for a parameter when we were unable to demonstrate satisfactory performance in challenge tests on the product. This can occur when products are highly inhibitory to particular types of microorganism. In these cases of course, it is highly unlikely that the products were contaminated with microorganisms of that type because of their inhibitory nature. In our experience, products are rarely too inhibitory to support the growth of yeast or mould.

2 Scheduled samples out of 46 (4.4%) did not meet the microbiological guidelines contained in the 8th edition of the guidance notes for testing of cosmetic ingredients produced by the EU Scientific Committee on Consumer Safety (SCCS, 2012) and were considered non-compliant with the regulation in force. The products were a skin cleansing product contaminated with aerobic mesophilic bacteria and a make-up (henna) product contaminated with both aerobic mesophilic bacteria and moulds. A follow-up sample for the skin cleansing product was also non-compliant. Other henna products had previously been identified as contaminated or as having borderline results in 2012.

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 37.

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

Laboratory Section	PT Scheme	Studies/Parameters	Distribution
Chemistry			
<i>Food Chemistry Including Method Research and Development</i>	FAPAS	FC: 19 rnds* 21 para** TEL: 2 rnds, 1 para LC-MS: 58 rnds, 120 para, GCMS: 10 rnds, 46 para	April 2014 – March 2015
	CHEK	FC: 1 rnd, 1 para LC-MS: 3 rnds, 6 para, GCMS: 1 rnds, 6 para	
	DAPs	1 parameter Alcohol By Volume	2 rounds (4 samples per year)
	LGC QBS	4 parameters	2 rounds
	SCHEMA	LC-MS 11 parameters TEL: 2 parameters	3 rounds 1 round
	JRC-IRMM (Geel and Ispra)	LC-MS: 1 para GCMS & MR&D: 4 rnds 23 para	LC-MS: 1 rnd
	IISNL	LC-MS 2 parameters	2 rounds
		There may be participation in additional schemes throughout the year.	
<i>Water chemistry</i>	Aquacheck Ltd	Groups 1 – 5 Maximum of 35 parameters per Distribution	5 Distributions per year
	EPA	Groups 1 - 4 Maximum of 26 parameters per Distribution	5 Distributions per year
<i>Clinical Chemistry</i>	TEQAS	8 parameters	12 (2 blood, 2 serum & 2 urines samples per monthly distribution)
Microbiology			
<i>Food Microbiology</i>	HPA Standard Scheme	For Food Microbiology Examinations (Total 16 parameters)	6 per year
	HPA Pathogenic Vibrio	<i>Vibrio</i>	2 per year

	Scheme	<i>parahaemolyticus</i> (2 parameters)	
	Don Whitley Quality Counts Scheme	Spiral Plater counts (1 parameter)	12 per year
<i>Cosmetic Microbiology</i>	LGC Cosmetics (Cosmetics and Toiletries) Scheme	Aerobic mesophilic bacteria (Enumeration), Yeast & mould (Enumeration), <i>P. aeruginosa</i> (Detection), <i>S. aureus</i> (Detection)	2 per year
<i>Water Microbiology</i>	HPA EQA for Drinking Water	For Coliform, <i>E. coli</i> , Enterococci, <i>P. aeruginosa</i> , <i>C. perfringens</i> and TVC at 37 and 22°C.	Total of 6 distributions, (18 samples)
	HPA EQA – Recreational and Surface Water Scheme	For marine (bathing beach): <i>E. coli</i> , Salmonella and Enterococci.	2 Distributions (4 samples)
		For swimming pool waters: Coliforms, <i>E. coli</i> , Enterococci, <i>P. aeruginosa</i> , TVC at 37°C.	2 Distributions (4 samples)
	HPA Bottled and Mineral Water Scheme	For Coliform, <i>E. coli</i> , Enterococci, <i>P. aeruginosa</i> , <i>C. perfringens</i> , SRC and TVC at 37 and 22°C	3 Distributions (2 samples)
	HPA EQA for Food Microbiology (Campylobacter)	For Campylobacter analysis	Total of 4 samples
	LGC standards, QWTAS	For Salmonella analysis 419, (surface waste and bathing water).	Total of 4 samples

* rnds = Rounds. ** para = Parameters.

Table 37 Proficiency Testing Programmes

7.4 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 38 shows the extension to the schedule of accreditation which was assessed by the Irish National Accreditation Board in March 2014.

Test Methods

New methods

SOP PALC 0121# - The Determination of Coumarin in foodstuffs by gradient high performance liquid chromatography

SOP PALC 0135# - The Determination of 2 Steviol Glycosides (Rebaudioside A & Stevioside) in Flavoured Drinks by High Performance Liquid Chromatography

SOP PALC 0138# - The Determination of Taurine in Infant Formula and Follow-On Formula by High Performance Liquid Chromatography with UV Detection

SOP PALC 0074# - The determination of T-2 and HT-2 toxins in cereals, baby food and animal feed - GC-MS method with immunoaffinity clean-up

SOP PALCW 0023# - The determination of mercury in aqueous samples by cold vapour atomic absorption spectrophotometry

SOP PALCW 0024# - The determination of the strength of hexafluorosilicic acid

Extensions to Currently Accredited Methods

SOP PALM 0003(S) - Enumeration of presumptive *Bacillus cereus* - Colony count technique at 30°C

SOP PALCW 0005 - The determination of fluoride and sulphate in water samples by reagent free ion chromatography

SOP PALCW 0006 - The determination of total metals in water samples by inductively coupled plasma/mass spectrometry (ICP-MS)

SOP PALC 0011 - Determination of sulphur dioxide in food and beverages by distillation and titrimetry

SOP PALC 0025 - The determination of caffeine in foodstuffs by HPLC and UV detection

SOP PALC 0026 - Determination of sucralose by HPLC and RI detection

SOP PALC 0005 - The determination of fructose, glucose and sucrose in selected food and drink samples by HPLC (RI detection)

SOP PALC 0018 - Determination of ochratoxin A in foodstuffs by immunoaffinity column extraction and high performance liquid chromatography (HPLC) with fluorescence detection

SOP PALC 0045 - The determination of patulin in apple products, juices and smoothies, by SPE extraction and quantification by UPLC with ultraviolet detection

SOP PALC 0076 - The determination of fumonisin B₁ and B₂ in cereals and cereal products by immunoaffinity column extraction and high performance liquid chromatography (HPLC)

SOP PALC 0115 - The determination of the pH and free acidity of honey by titration to pH 8.30

SOP PALC 0117 - Determination of biogenic amines in fish and fish products by HPLC and fluorescence detection

Table 38 *Extension to Scope of Accreditation*

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

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 2013 staff members attended a diverse variety of training courses and participated in programmes of further education, as detailed in Table 39.

<i>Course/Seminar title</i>	<i>Organiser</i>
<i>Skills Development / Technical Training</i>	
<i>IMSS Annual meeting</i>	Irish Mass Spectroscopy Society
<i>Gas Phase workshop</i>	Thermo Scientific
<i>Analytical workshop</i>	PerkinElmer
<i>Import controls on certain feed and food of non-animal origin</i>	BTSF
<i>NRL PAH workshop</i>	EU-RL PAH
<i>Food Additives and Control of their Proper Use and Marketing</i>	EU Commission - Better Training for Safer Food
<i>Chemistry Separations Seminar Day</i>	Waters Chromatography Ireland
<i>Technologies for Food and Beverage Analysis</i>	Waters Chromatography Ireland
<i>Food Labelling and Allergen Update</i>	FSAI/ Safefood/Teagasc
<i>Food Contact Materials–Administrators Basic Course</i>	Train Safer Food
<i>Mycotoxins Meeting</i>	FSAI
<i>Effectiveness of Official Controls</i>	FSAI
<i>Better Productivity and efficiency through Informatics Seminar</i>	Waters Chromatography Ireland Ltd
<i>Liquid Phase Workshop Agenda</i>	Thermo Scientific
<i>Nanoparticles: Definition, Regulation and Analytical Challenges (webinar)</i>	Agilent Technologies Ltd.
<i>8th Annual Meeting of the NRLs for Mycotoxins</i>	JRC-IRMM
<i>EuroNanoForum 2013</i>	Enterprise Ireland
<i>Meeting with Douglas Gilliland about Nanotechnology AF4 analysis</i>	JRC Ispra
<i>Plenary Meeting of the EU-RL/NRLs for FCMs</i>	JRC Ispra
<i>Analytical Technologies for Food and Agriculture</i>	Thermo Scientific
<i>The European MASStastic Voyage 2013</i>	AB Sciex
<i>Breakthrough Technology: Single Particle ICP-MS for characterizing five attributes of metallic nanomaterials</i>	PerkinElmer (in-house)
<i>Mass, size, composition : field flow fractionation of nano particles plus characterization by ICP-MS</i>	Agilent Technology (in-house)
<i>AF2000 Nano Analysis</i>	Postnova (in-house)
<i>Training Workshop on Declaration of Compliance and supporting documentation</i>	JRC Ispra
<i>Plenary Meeting of the EU-RL/NRLs for FCMs</i>	JRC Ispra
<i>Technologies for Food and Beverage Analysis</i>	Waters Chromatography Ireland Ltd
<i>Induction Training</i>	
<i>General Induction Training</i>	In-house
<i>Induction for students</i>	
<i>Health Safety and Welfare</i>	
<i>Fire Safety Training</i>	H.S.E. Consultant
<i>Safe Handling and use of Industrial Gases</i>	BOC
<i>Inanimate Manual Handling and Back Awareness</i>	Usafety
<i>Display Screen Equipment Program</i>	HSEland
<i>Fire Safety Training</i>	HSE Consultant Sean Waldron

<i>Safety Seminar, Safety in the Workplace</i>	VWR
<i>Occupational First Aid Revalidation</i>	HSE & Heartsafety Solutions
<i>Making Sense of Conflict Workshop</i>	HSE
<i>People Management, The Legal Framework Programme</i>	HSE
<i>Foundation in Financial Management</i>	HSE
<i>HSE Change Model</i>	HSE
<i>Succession Management Programme Review</i>	HSE

Further Education

<i>Specialist Diploma in Quality Management - Lean Healthcare Systems</i>	University of Limerick
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Table 39 Training Courses, Seminars in 2013

9. EXTERNAL MEETINGS

During 2013 laboratory staff participated in numerous committee meetings. These included:

- i)** 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)** Regional Food Sampling meetings
- ix)** Regional Zoonosis meetings
- x)** National Fluoridation Steering Group meetings
- xi)** DSE/Wicklow Quality, Safety and Risk Governance Group

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

Health, Safety and Welfare training was provided for staff in 2013 as detailed in Table 39 above.

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 40.

<i>Waste – 2013</i>	<i>Cost for Disposal € (incl VAT)</i>
General Waste	2391
Solvent/chemical Waste	10921
Clinical Waste including Contaminated Glass	39308
Mercury Waste	-
Paper waste	Included in General Waste contract
Cardboard	Included in General Waste contract
Glass waste	148
Obsolete Equipment	148
Specialised Waste- Plastic	43
Total	52959

Table 40 Waste Management Programme

11. LABORATORY STAFF AS OF 31st DECEMBER 2013

Public Analyst	Dr Michael O'Sullivan
Deputy Public Analysts	Mr Vincent Young (Microbiology) Ms Rosemary Hayden. Quality Manager.
Executive Analytical Chemists	Dr Terence McEvoy 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 Bernadette Bradley (Microbiology) Ms Karen Moore Ms Elaine Eustace (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)
Laboratory Technicians	Ms Geraldine Drew (Microbiology) Ms Maresa Holland Ms Aisling Connolly Ms Siobhan Kelly (Microbiology) Ms Anne O'Boyle Ms Susan Carney 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

Dr. Sarah O'Reilly

Laboratory Assistant

Post vacant

Clerical Officer Grade V (A)
Grade IV (A)
Grade III
Grade III
Grade III

Mr John Gallagher
Ms Sandra Parr
Ms Mary Flannery
Ms Martina Vaughan (Job sharing)
Ms Lee Hwa Young (Job sharing)

Laboratory Aide

Ms Mary Whyte

Appendix 1. Management Report for Monitoring Service delivery to Customers (compiled from the LIMS).

Date of this Report		Time		Samples received since 1st January 2013 - Excludes PT samples							
2013		Number Received	Number Cancelled	Number Reported	Number Not Reported	Number of outstanding samples....			Unreported (within deadline)	Unreported (exceeding deadline)	Memos
						≤ 10 days	11-20 days	21-30 days			
Food Chemistry Section											
FLC		481	2	435	44	25	14	5	44	0	0
FPC		58	0	56	2	1	1	0	2	0	0
FLM		5	5	0	0	0	0	0	0	0	0
CLF		52	0	46	6	5	0	1	5	1	1
CPF		4	1	3	0	0	0	0	0	0	0
CLN		4	0	4	0	0	0	0	0	0	0
CPN		2	0	2	0	0	0	0	0	0	0
<i>Group total</i>		589	8	546	52	31	15	6	51	1	1
GC-MS Section											
FLC		327	2	221	104	11	20	5	104	0	
FPC		34	0	34	0	0	0	0	0	0	
FLM		7	7	0	0	0	0	0	0	0	
CLF		11	0	11	0	0	0	0	0	0	
NLC		2	0	2	0	0	0	0	0	0	
WLC		17	0	5	12	3	0	8	11	1	
NPC		1	0	1	0	0	0	0	0	0	
<i>Group total</i>		399	9	274	116	14	20	13	115	1	
Trace Element Laboratory											
FLC		8	0	8	0	0	0	0	0	0	
CLF		4	0	4	0	0	0	0	0	0	
CLN		1	0	1	0	0	0	0	0	0	
NLC		52	0	38	14	14	0	0	14	0	
HS		877	0	861	16	14	2	0	16	0	
<i>Group total</i>		942	0	912	30	28	2	0	30	0	
LC-MS Section											
FLC		318	0	274	44	9	4	20	44	0	
FPC		5	0	5	0	0	0	0	0	0	
FLM		1	1	0	0	0	0	0	0	0	

2013

	Number Received	Number Cancelled	Number Reported	Number Not Reported	Number of outstanding samples....			Unreported (within deadline)	Unreported (exceeding deadline)	Memos
					≤ 10 days	11-20 days	21-30 days			
CLF	6	0	6	0	0	0	0	0		
NLC	43	1	34	8	8	0	0	8		
NPC	1	0	1	0	0	0	0	0		
<i>Group total</i>	<i>374</i>	<i>2</i>	<i>320</i>	<i>52</i>	<i>17</i>	<i>4</i>	<i>20</i>	<i>52</i>	<i>0</i>	
Chemistry Water										
WL	2011	7	1842	162	106	11	44	161	1	
WP	208	4	193	11	10	0	1	11	0	
WLC	77	1	67	9	3	2	3	9	0	
WPC	124	0	110	14	14	0	0	14	0	
WLF	735	1	708	26	26	0	0	26	0	
WPF	5	2	3	0	0	0	0	0	0	
<i>Group total</i>	<i>3160</i>	<i>15</i>	<i>2923</i>	<i>222</i>	<i>159</i>	<i>13</i>	<i>48</i>	<i>221</i>	<i>1</i>	
Microbiology										
FLC	3	3	0	0	0	0	0	0	0	
FPC	7	1	6	0	0	0	0	0	0	
FLM	1274	47	1175	52	32	20	0	52	0	
FPM	65	0	65	0	0	0	0	0	0	
CLF	156	2	146	8	3	5	0	8	0	
CPF	10	2	8	0	0	0	0	0	0	
CLN	4	0	4	0	0	0	0	0	0	
NLM	1	0	1	0	0	0	0	0	0	
WL	2005	2	1897	106	106	0	0	106	0	
WP	206	2	194	10	10	0	0	10	0	
WLM	604	20	549	35	35	0	0	35	0	
WPM	122	2	111	9	9	0	0	9	0	
KLM	68	0	58	10	10	0	0	10	0	
<i>Group total</i>	<i>4515</i>	<i>81</i>	<i>4214</i>	<i>230</i>	<i>205</i>	<i>25</i>	<i>0</i>	<i>230</i>	<i>0</i>	

Boxed figures indicate number of Memos printed e.g.

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Appendix 2

FLUORIDATION OF WATER SUPPLIES

Tables

FLUORIDATION OF WATER SUPPLIES
Levels of Fluoride in Drinking Waters Tested in 2013. DUBLIN CITY AND COUNTY

RESULTS OF MONTHLY TESTS FOR YEAR ENDING 31st DECEMBER 2013
MILLIGRAMS PER LITRE (PARTS PER MILLION) OF FLUORIDE

WATER SCHEME	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
VARTRY	No Sample Submitted For Fluoride	No Sample Submitted For Fluoride	No Sample Submitted For Fluoride	No Sample Submitted For Fluoride	No Sample Submitted For Fluoride	0.63	0.59	0.60	0.51 & 0.59	0.66	0.64	0.61
BALLYBODEN	No Sample Submitted For Fluoride	0.64	0.73	0.70	No Sample Submitted For Fluoride	0.68	0.67	0.61	0.59	0.64	0.68	0.65
BALLYMORE EUSTACE	0.55	0.58	0.79	0.68	No Sample Submitted For Fluoride	No Sample Submitted For Fluoride	0.63	0.59	0.58	0.66	0.61	0.69
LIFFEY – Leixlip	0.50 & 0.51	0.49 & 0.62	0.61 & 0.65	0.63	0.61	0.64 & 0.61	0.62, 0.62 & 0.61	No Sample Submitted For Fluoride	0.48 & 0.66	0.70, 0.69 & 0.68	0.69 & 0.10	0.58
BALLYEDMONDUFF	0.55	0.56 & 0.68	No Sample Submitted For Fluoride	0.69	0.64	0.67	0.65	0.71	0.65	0.69	0.70	0.68
GLENCULLEN	0.61	0.51 & 0.57	0.62 & 0.63	0.71	0.64	0.73	0.70	0.73	0.66	0.69	0.61	0.63
KILTERNAN	0.66	0.60	0.72	0.80	0.73	0.75	0.76	0.74	0.71	0.74	0.73	0.71
BOG OF THE RING	0.49 & 0.51	0.47 & 0.58	0.61 & 0.63	0.61	0.61	0.57 & 0.62	0.60 & 0.62	No Sample Submitted For Fluoride	0.57	0.65, 0.72 & 0.61	0.66 & 0.53	0.63

FLUORIDATION OF WATER SUPPLIES
Levels of Fluoride in Drinking Waters Tested in 2013.
WICKLOW

RESULTS OF MONTHLY TESTS FOR YEAR ENDING 31st DECEMBER 2013
MILLIGRAMS PER LITRE (PARTS PER MILLION) OF FLUORIDE

WATER SCHEME	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
BLESSINGTON	0.55	0.47	0.63	0.70	0.65	0.71	0.68	0.69	0.61	0.67	0.58	0.57
LARAGH/ ANNAMOE	0.54	0.62	0.65	0.73	0.67	0.73	0.79	0.61	0.31	0.61	0.71	0.63
WICKLOW	0.50	0.51	0.62	0.62	0.61	0.55	0.41	0.49	0.55	0.53	0.64	0.58
ARKLOW	0.55	0.55	0.67	0.71	0.67	0.68	0.67	0.68	0.64	0.65	0.66	0.65
TINAHELY	0.60	No Sample Submitted For Fluoride	0.70	0.74	0.72	0.72	0.75	0.72	0.67	0.69	0.66	0.70

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 2013.
KILDARE

RESULTS OF MONTHLY TESTS FOR YEAR ENDING 31st DECEMBER 2013
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	0.48	0.51	0.62	0.69	0.64	0.66	0.61	0.62	0.51	0.65	0.71	0.58
LEIXLIP	0.50	0.57	0.64	0.65	0.64	0.62	0.63	0.60	0.46	0.66	0.70	0.57
KILCOCK	0.51	0.65	0.64	0.68	0.66	0.71	No Sample Submitted For Fluoride	0.65	0.61	0.62	0.53	No Sample Submitted For Fluoride
STRAFFAN	0.49	0.49	0.64	0.63	0.64	0.63	0.67	0.62	No Sample Submitted For Fluoride	0.65	No Sample Submitted For Fluoride	0.60

POULAPHOUCA REGIONAL SCHEME

LOCATION	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT.	OCT	NOV	DEC
NAAS	0.60	0.71	0.66	0.66	0.60	0.63	0.63	0.65	0.64	0.59	0.54	0.60
KILDARE TOWN	0.59	0.70	0.66	No Sample Submitted For Fluoride	0.64	0.79	0.71	0.62	0.66	0.65	0.62	0.65
NEWBRIDGE	0.54	0.70	0.63	0.66	0.65	No Sample Submitted For Fluoride	0.69	0.70	0.63	0.68	0.71	No Sample Submitted For Fluoride

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 2013

County Supply	Total No. of Samples	% Results <0.8mg/l S.I.278 of 2007 Compliant	Number of Samples Within the Following Ranges (mg/l or ppm)		
			<0.6	0.6-0.8	>0.8
Dublin City & County	214	99.5	64	149	1
Wicklow	137	100.0	45	92	0
Kildare	496	98.4	143	345	8
Meath	411	97.1	122	277	12
Louth	71	97.2	12	56	3
Monaghan	54	90.7	7	43	4
Cavan	77	98.7	21	55	1
Offaly	152	95.4	55	90	7
Westmeath	83	100.0	23	60	0
Longford	50	88.0	21	23	6
Laois	102	84.3	15	71	16
Totals	1847	Average 96.9%	528	1261	58

