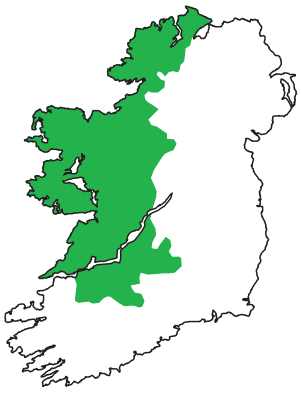
Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Western Region
Public Analyst's Laboratory
Régiún an Iarthair
Saotharlann an Anailisí Phoiblí

Annual Report 2012
Tuarascáil bhliantúil 2012



FOR YEAR ENDED 31ST DECEMBER, 2012

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ACKNOWLEDGEMENTS

I am pleased to present this report which outlines the work undertaken in this laboratory during 2012.

I would like to thank all the staff for their dedication, hard work and goodwill throughout the year and for the high standards maintained in an environment of decreasing resources.

Rory Mannion
Public Analyst

July 2013

This report is also available on the HSE website (www.hse.ie) in both Irish and English.

1. INTRODUCTION

1.1 Scope of the laboratory

This laboratory along with our sister Laboratories in Cork and Dublin form the Public Analyst's Laboratories Service in the Republic of Ireland. The nationally programmed analytical work undertaken by the laboratories in partnership with other official agencies (EHS, FSAI, IMB) plays a key role in the protection of public health. An independent analytical and advisory service is also provided to private industry, the general public and various government agencies.

The laboratory provides this service in the following areas:

- Food
- Water
- Pharmaceuticals and Toxicology
- Air Monitoring
- Cosmetics

Food samples are received primarily from Environmental Health officers (EHOs) as part of agreed surveillance programmes between the Food Safety Authority of Ireland (FSAI), the laboratory and the EHOs.

Samples are also received from the general public, local industry and other government agencies.

The laboratory receives water samples from EHOs on behalf of Local Authorities, directly from Local Authorities, from the general public and from local industry. The majority of the samples are drinking waters which are checked for compliance with the Drinking Water Regulations.

The laboratory's pharmaceutical section is a designated Official Medicines Control Laboratory and receives pharmaceutical samples from The Irish Medicines Board (IMB) in line with a contract between the laboratory and the IMB. A service is also provided to the Pharmaceutical Society of Ireland.

Hospital Pathologists and Physicians as well as Veterinary Surgeons and the general public submit samples for toxicological analysis.

Cosmetic samples are received from EHOs as part of an agreed national surveillance program. Enforcement and complaint samples are also received.

This laboratory, in conjunction with both Cork and Dublin PALs took part in a European Human Biomonitoring study which was completed in 2012. See Section 2 below.

1.2 Finance

The laboratory receives a budget to cover both pay and non pay costs for the year. The budget received for the year 2012 was €2.539 million. The income received was €215,771. The final out-turn for the year was within 1% of the financial allocation.

1.3 Administration

The laboratory is administered by the Primary, Community and Continuing Care (PCCC) Directorate within the Health Service Executive.

2. HUMAN BIO-MONITORING AND DEMOCOPHES STUDY

2.1 Human Bio-Monitoring

Human Bio-Monitoring (HBM) involves the determination of the levels of various parameters in human tissues (urine, blood, hair etc.). Test results are subsequently analysed in the context of exposure assessment and potential human health outcomes.

Occupational Health, Environmental Toxicology and Medical/Clinical testing represent key areas where HBM is used.

HBM for Environmental Contaminants directly measures the levels of exposure and absorption/retention of chemicals from the environment (food, water, air, cosmetics etc.). This estimation removes the large uncertainty associated with the prediction of exposure based on environmental levels and estimated uptake. Some countries, e.g. USA, have generated substantial HBM population data for a range of environmental contaminants.
http://www.cdc.gov/nchs/nhanes/new_nhanes.htm.

Some HBM studies (Heavy Metals etc.) performed previously in Ireland include: Lead (Pb) in the Blood of Mine Workers (various studies in 1980s - HSE/PALG and EPA); Lead (Pb) in the Blood of Crystal Factory Workers (HSE/PALG, 1980); Human Breast Milk Studies (Dioxins 1990s - Cork County Council; Dioxins etc. - FSAI 2010); Lead (Pb) in Blood (2008 HSE - ca. 35 samples, in connection with elevated Pb levels in the water of certain homes in Galway city); Cadmium (Cd) in Urine (2011 - FSAI / PAL, Dublin).

2.2 DEMOCOPHES HBM Study 2011/12

Action 3 of the European Environment and Health Action Plan (2004 – 2010) recommended that HBM be developed in Europe and that a pilot project be initiated. COPHES, an EU Consortium to Perform Human Bio-Monitoring on a European Scale set up a feasibility study called DEMOCOPHES, involving 17 European Member States. The study determined levels of key environmental pollutants in populations across Europe, including members of the Irish population. The DEMOCOPHES study looked at biomarkers for mercury in human hair and for cadmium, phthalates and environmental tobacco smoke (*via* cotinine) in urine. The project set out to collect samples and data from 120 children and their mothers in each of 17 European countries. The project was carried out in late 2011 and 2012.

In Ireland the DEMOCOPHES study was performed by the HSE, http://www.hse.ie/go/democophes/. A National Management Unit was established and a National Focal Point and National Project Contacts (Fieldwork, Laboratory, Toxicology, Medical, Database Management, Statistics, Communication and Finance) were nominated, and notified to the EU DEMOCOPHES team.

Using protocols developed by DEMOCOPHES scientists, all 240 Irish samples were procured by field workers (EHOs) and submitted for analysis to the Public Analysts' Laboratories. The participants included 60 rural mother-child pairs and 60 urban mother-child pairs. Participants were selected from different socio-economic classes.

2.3 EU Administration/Implementation of Project

The EU DEMOCOPHES team co-ordinated the work of the individual National Management Units (NMUs) in each of the 17 countries involved in the project. Teams in Belgium, Cyprus, Czech Republic, Denmark, Germany, Hungary, Ireland, Luxembourg, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom studied exposure to mercury, cadmium, tobacco smoke and some phthalates, and possible relations to lifestyle, using biomarkers and questionnaire data.

The national teams translated the European common protocol, which described in detail how to implement the study. National teams could include some adaptations to suit cultural differences or specific national needs provided they did not compromise the comparability of results.

In total, hair and urine samples from 3,688 volunteers in the 17 participating countries were collected and analysed. Half of the volunteers were from urban areas and half from rural areas. Mothers provided details on their living environment, nutrition, smoking behaviour,

and other information that could help to explain the levels of the biomarkers measured in hair and urine.

Only those laboratories that successfully passed the quality assurance process which included successful completion of external quality assessment schemes (EQUAS) as well as additional Quality Control checks were allowed to analyse the DEMOCOPHES samples. During 2012, 16 laboratories carried out mercury analyses on the hair samples collected while the urine samples were analysed in 14 laboratories for Cadmium, 9 laboratories for Cotinine, 7 laboratories for Phthalate metabolites and 14 laboratories for Creatinine.

Statistical analysis and interpretation of the results was performed in each country as well as at EU level after each participating country transferred its national databases to a European central database.

2.3.1 Publication of the Results:

Details of the study and a summary of the results are available in the so-called "Layman's Report", see http://www.eu-hbm.info/euresult/media-corner/press-kit for access to the Layman's report.

The results and conclusions of COPHES and DEMOCOPHES were presented at the Cyprus Presidency Conference, 'Human Biomonitoring: Linking Environment to Health and Supporting Policy', held in Larnaca on 23rd and 24th October 2012. A press release on this Conference can be found on the Cyprus Presidency website.
http://www.cy2012.eu/index.php/en/news-categories/areas/employment-social-policy/pressrelease-european-projects-measure-chemicals-in-people-across-europe-for-the-first-time

Dissemination to the scientific community: The results of the DEMOCOPHES study were also presented at the 22nd Annual Meeting of the International Society of Exposure Science in Seattle. DEMOCOPHES results on mercury were used for an economic calculation of the cost of the actual exposure of Europeans to this widespread heavy metal. These results were published in the scientific journal: 'Environmental Health' in early 2013. http://www.ehjournal.net/content/12/1/3
The DEMOCOPHES project has successfully coordinated the production of Human Bio-monitoring results which are comparable across Europe.

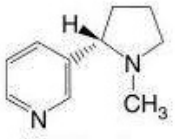
2.4 HBM Analysis/Laboratory Work

The biomonitoring testing of the samples collected in Ireland was assigned to the Public Analysts' Service, with analysis divided as below:

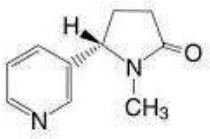
Biomarker	Matrix	Public Analyst's Lab (PAL)
Total Mercury	Hair	PAL Cork
Cadmium	Urine	PAL Dublin
Phthalates (x7)	Urine	PAL Dublin
Cotinine	Urine	PAL Galway
Creatinine	Urine	PAL Galway

2.4.1 Cotinine

Cotinine (a metabolite of nicotine) in urine is an effective biomarker for exposure to tobacco smoke.



(S)-Nicotine



(S)-Cotinine

A new method involving LC-MS/MS was introduced for cotinine in urine. The cotinine results represent the first sensitive survey of urinary cotinine in Ireland.

2.4.2 Creatinine

Creatinine is a normal breakdown product of protein. In general, higher creatinine levels indicate more concentrated urine. The Jaffe colourimetric method was used in the study to determine the urinary Creatinine concentrations in order to normalise the other urinary results (Cadmium, Cotinine and Phthalates) in terms of urine concentration.

2.5 Data Management

The HBM results were summarised in Excel Data sheets. Both the HBM data and also Questionnaire data (data obtained from participants by the field workers) were then quality checked using programmes provided by DEMOCOPHES. The cleaned output files were subjected to SPSS statistical analysis. The generated SPSS Output files were then converted to Report Tables.

2.6 Results for Ireland

HBM Data - Summary of HBM Results

HBM Test Parameter	Geometric Mean (unadjusted)	Mothers		Children	
		Ireland (n = 120)	Europe (n = ca. 1,800)	Ireland (n = 120)	Europe (n = ca. 1,800)
Hg (hair) (µg/g)	GM	0.165	0.225	0.097	0.145
Cd (urine) (µg/L)	GM	0.314	0.219	0.066	0.071
Cotinine (urine) (µg/L)	GM	3.84	2.75	0.712	0.797
DEHP Phthalate metabolites (urine) (µg/L)	GM	34	29	60	50

GM: Geometric mean

Results taken from Human Biomonitoring in children and mothers – European analysis. Cophes Report – Work Package 4, 19-10-2012

For a detailed review of the Irish results see the Irish "National report on the implementation of the project including data analysis and integrated interpretation" (the D17A report) which can be accessed at: http://www.hse.ie/eng/services/news/newsfeatures/democophes/democophes%20ireland%20results.pdf.

In general, the results of this study for the Irish mothers and children examined are reassuringly low, and do not give rise to public health concerns.

DEMOCOPHES set guidance values HBM1 and HBM2 for urinary Cadmium and Phthalates. HBM1 values correspond to the level below which adverse health effects are not expected, while HBM2 values are the level above which there is an increased risk of adverse health effects. None of the levels of biomarkers exceeded or came close to the guideline levels of HBM 2.

For Cadmium, 8 of the Irish Mothers' results are above the HBM1 value of 1µg/L, however when the results are expressed as µg/g of Creatinine (which takes account of the concentration of the urine) only 3 values are just over 1.0µg/g. All values are below the HBM2 level. All of the 120 Irish children had Cadmium values below the HBM1 value of 0.5µg/L for children.

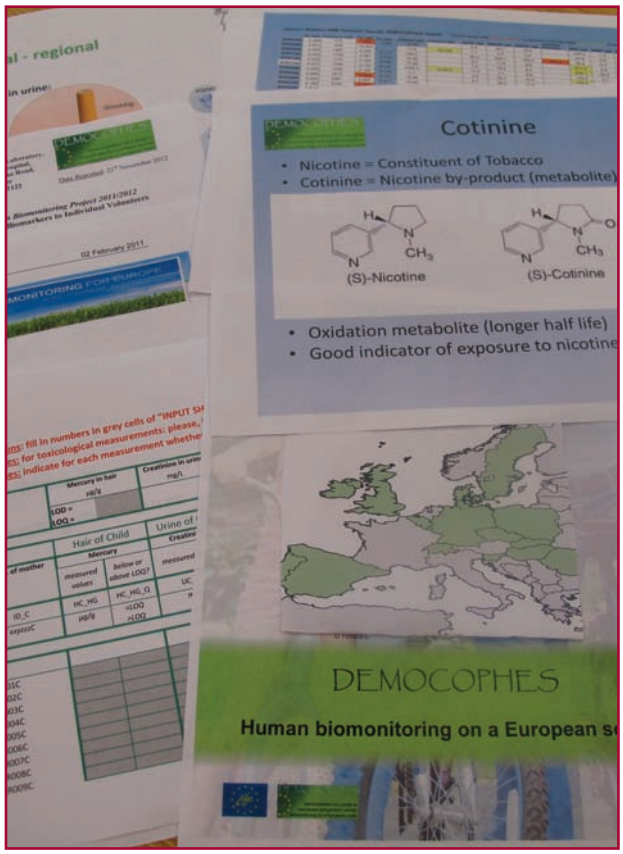
The mean values for the DEHP phthalate metabolites for all mothers and all children are below the HBM1 values set at 300µg/L for mothers and 500µg/L for children.

The values for the Mercury analysis for both mothers and children are all below the health based guidance for neurotoxic effects of 2.3µg/g.

Cotinine levels correlated with reported exposure to tobacco smoke (and educational level).

Regarding smoking, the study showed a much higher incidence of smoking in the lower socio-economic group compared to the higher socio-economic group in the urban area.

Further details of all aspects of the EU DEMOCOPHES Human Bio-Monitoring project can be found on the website http://www.eu-hbm.info/democophes



3. FOOD

3.1 Service Provided

Food in our region (HSE Western Area) is monitored officially for chemical safety*, quality and for legislative compliance. National surveillance is also performed, in line with the developed national specialisations (see 3.3.2 below). The Environmental Health Officers (EHOs) of the HSE, and the Food Safety Authority of Ireland (FSAI, www.fsai.ie) are our main clients, see Table 3.1. The service provided includes programmed surveillance and also ad-hoc testing (food complaints and alerts, 'inspection' samples etc.) as required. Some applied research projects are carried out in conjunction with *safe*food, www.safefood.eu

*see *Reports of the Food Microbiology Laboratory, UHG for a summary of the results of Microbiological testing of foods in HSE West area.*

3.2 Links with Authorised Officers (EHOs etc)

The HSE's food safety role has included monitoring overall food safety systems of food businesses through inspection and audit etc., and monitoring the safety and quality of food through laboratory analysis. The food laboratories interact and support the food inspection services principally through the food surveillance programmes, and also through ad-hoc general support. Food samples are tested for compliance with legislative standards on safety and quality, and results are reported to authorised officers (EHOs) and FSAI. The authorised officers and FSAI, as appropriate, have the responsibility for dealing with the incidents of detected non-compliances referred to in this report.

3.3 HSE Food Safety Laboratory Service – Developments etc.

3.3.1 General

A Food Safety Laboratory Service (FSLS) is provided by the HSE's seven Official Food Microbiology Laboratories (OFMLs) and three Public Analysts' Laboratories (PALs). The OFMLs and PALs groups meet regularly with FSAI and with FSAI-EHOs on food surveillance matters.

In July 2004 a report entitled "A Strategic Developmental Review of Health Board Food Control Laboratories (safefood 2004)" was published;
http://www.safefood.eu/Publications/Research-reports/Strategic-Development-Review-of-Health-Board-Food.aspx.

The Report contains 16 recommendations including, *inter alia*, combining the Laboratories into a unified multi-sited Food Safety Laboratory Service. The recommendations have yet to be officially implemented. A key recent development within HSE food surveillance has been the enhanced national co-ordination of food sampling, with a move to increased sampling from earlier stages (wholesale, import, manufacturing, etc.) in the food chain.

3.3.2 Specialisation of Testing and National Reference Laboratories (NRLs) in the Public Analysts' Laboratory Service

The Public Analysts agreed a specialisation document which includes all food testing performed by PALs, designated as Specialised or Core (tests performed in all three laboratories). The process is ongoing, with updating as required. The document has been passed on to the FSAI and to the Environmental Health Officers so as to help facilitate and develop the nationalisation of food surveillance. Some of the principal national food specialisations agreed to date include:

PAL Dublin: Food Contact Materials (NRL); Mycotoxins (NRL); Food Processing Contaminants, including PAHs (NRL)
PAL Cork: Heavy Metals (NRL); Meat Speciation/Adulteration; GMOs; Pesticides
PAL Galway: Food Allergens; Salt & Folic Acid – National Surveys; Other Natural Toxins

3.3.3 Reporting and Designation of Results of Analysis: Consistency Document

The nationalisation of the Public Analysts' service, in conjunction with new EU/EFSA reporting requirements, has demanded that the 3 Public Analysts' Labs report to clients in a highly consistent manner. The Public Analysts have agreed a National Reporting Consistency guidance document covering all elements of report format, structure and parameter details. A part of the reporting process is that the test results are compared to legislative safety standards/limits and designated with respect to compliance (or non-compliance) with such standards. The reporting consistency document covers the designation process in terms of general policy and approach, whilst recognising that the individual approved examiner must assess each situation on a case-by-case basis.
The guidance document requires consultation with FSAI specialists for an opinion when situations of toxicological assessment are needed.

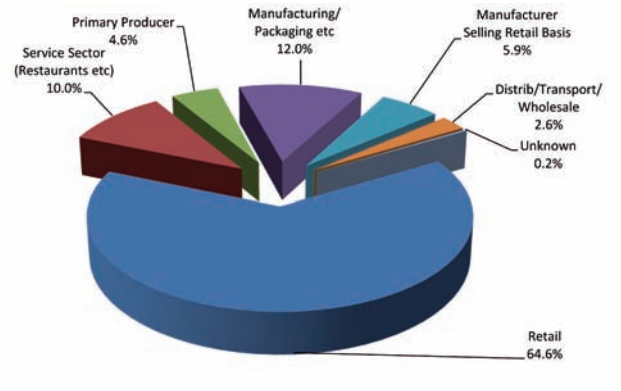
3.4 Food Testing (Chemical) Results for 2012

3.4.1 Regional Chemical Surveillance Programme 2012

Nationally co-ordinated, Regional Food Surveillance (Chemical) Programmes are produced between the HSE (PA Laboratories and Environmental Health Officers (EHOs)) and the FSAI, drawing largely on risk-based priorities and sampling requirements identified by the group. The production of Ireland's Multi-Annual National Control Plan (MANCP) is co-ordinated by FSAI and it includes the Food Surveillance Programmes. HSE West's Chemical Testing Programme for 2012 is outlined in Appendix 1

3.4.2 2012 Samples

A total of 2,499 samples were received in 2012. The Figure below indicates the 'stage' at which EHO samples (excluding complaints) were taken in 2012. There has been a decrease in retail-level sampling over the past number of years and an increase in sampling from further back the food chain.



3.4.3 Statistics for 2012

See Table 3.2 for a breakdown of the 2,499 samples analysed in 2012 per head of population. The samples consisted of 139 complaints (see section 3.7) and 2,373 others. Out of the 2,373 samples "Non-complying" reports (i.e. test results indicating non-compliances with standards in Irish Food Law) were issued on 152 (6.4 %). This figure of 6.4% can be compared to the figures for previous years, see below:

"Non-complying" Reports (as % of samples tested, excluding complaints).

Year	%
2012	6.4
2011	6.5
2010	8.3
2009	6.4
2008	7.4
2007	8.3
2006	5.4
2005	4.7
2004	5.0
2003	4.5
2002	5.1

Of the 152 non-compliances, 105 were due to labelling deficiencies, largely in samples from ethnic, retail premises. The categories of foodstuffs and infringements for complaints and other samples received from HSE West and the General Public are summarised in Appendix 2. Tables 3.1 and 3.2 summarise the work for 2012 according to the sampling source and region.

Table 3.1 Food Sample Sources (2012)

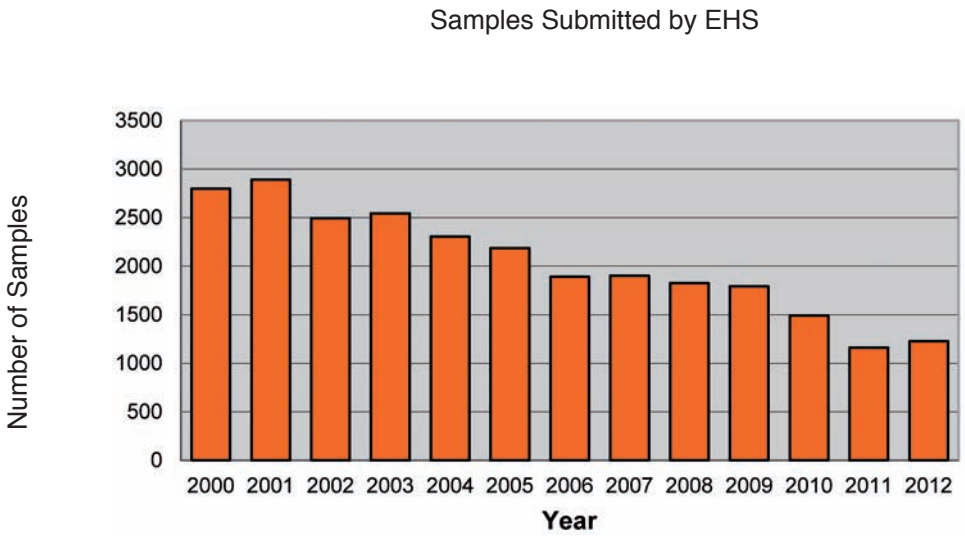
Submitted by / Sample Type	No. of Samples	No. on which Adverse Reports were issued
Environmental Health Officers (all regions)		
Routine Informal (Sampling Programme)	1,226	135
Public (Food Complaints via EHOs)	126	82
Inspection samples (non-programmed)	6	6
Follow-up samples (non-programmed)	78	9
General Public		
Complaints	13	3
Others	318	0
Food Safety Authority of Ireland	432	0
Sea Fisheries Protection Agency & BIP	127	1
DAFM	36	0
Local Authority Veterinary Service	33	1
Cork County Council	3	0
Laboratory QA & Method Development etc.	61	Not applicable
Consumers Association of Ireland	40	0
OVERALL TOTAL	**2,499**	**218**

Table 3.2 HSE Food Sample Sources (2012) EHS

Community Care County Area E.H.O. Service (all sample types)	Number of Samples Submitted (excluding complaints)	Number per 1,000 population*
Galway	201	0.80
Mayo	163	1.25
Roscommon	77	1.20
Clare	146	1.38
Limerick	196	1.16
North Tipperary/East Limerick	137	1.30
Donegal	161	1.00
Sligo/Leitrim/West Cavan	135	1.37
HSE South	65	-
HSE Dublin Mid-Leinster	19	-
HSE Dublin North East	10	-

*Based on 2011 census
There has been a decrease in HSE programmed samples submitted in recent years.

Table 3.3 HSE EHS programmed samples (excluding food complaints) received.



3.4.4 Overall Summary of Data and Food Quality 2012

A wide range of surveillance for allergens, contaminants, additives, labelling and nutritional testing (salt, folic acid, etc.) was carried out in 2012. Results are reported by test parameter in sections 3.5 to 3.7. As in previous years, some instances of non-compliances were found and these were dealt with by the EHOs and FSAI as appropriate. The number of received food complaint samples remains decreased, compared to previous years (see section 3.7). The number of Food Hazard/Contamination Reports (see section 3.8) issued in 2012 was 12.

Once again the results reported here for the year (2012) indicate a high level of legislative compliance and generally a high quality of food with respect to chemical safety. Overall, a particularly low level of non-compliances due to food contamination has been found this year; this finding will guide future surveillance.

Note: *To obtain an overall picture of the safety and hygiene of our food supply, see Annual Reports of FSAI, www.fsai.ie and those of the agencies (Dept. of Agriculture, Food and the Marine; Local Authorities; HSE etc.) involved in the official control and surveillance of food.*

3.5 Food Contaminants, Allergens etc.

3.5.1 General

'Chemical' contaminants, allergens and residues in foods are monitored to ensure their safety and legislative compliance. They include Natural Toxins, Industrial/Environmental contaminants, Food Processing/Packaging contaminants, Allergens, Plant- and Animal-treatment Residues, and Foreign Bodies etc.

Notes:
(i) Other Official Agencies and FSAI (see Appendix 3 and www.fsai.ie) also monitor contaminants & residues in food. The Ashtown Food Research Centre (Teagasc) produces an annual National Food Residue Database for Ireland - (see http://nfrd.teagasc.ie/).

(ii) Data on microbiological contamination of food are to be found in the reports of the Official Food Microbiology Laboratories, in reports of other Departments/Agencies (see Appendix 3) and in FSAI (www.fsai.ie) reports.

3.5.2 Food Allergens and Related Testing

Food Allergens testing is one of our laboratory's national specialisations. This area of surveillance is being developed in conjunction with service users (EHOs and FSAI). Table 3.4 summarises 2012 testing results for Food Allergens.

Table 3.4: Food Allergens and related parameters: Summary of Results for 2012.

Allergen/Parameter	Limit(s) (Legal Source)	Sample Types	Total	Complying With Standard	Non-complying with standard
Gluten (EHO sampling)	20 ppm *	Gluten-free foods	202	194	8
Gluten (private samples)	20 ppm *	Gluten-free foods	252	252	0[1]
Gluten (DAFM)	20 ppm *	Infant Formula	19	19	0
Gluten (DAFM)	20 ppm *	Gluten-free pork products (sausages, pudding)	3	3	0
Peanut protein	Directive 2003/89/EC	Confectionery	113	113	0
Lactose[2] (EHO Sampling)	Directives: 2000/13/EC & 2006/141/EC	Soy desserts, Soy & lactose-free infant formula, confectionery	25	25	0
Galactose / Lactose[3] FSAI / TSCUH	Research project	Various foods	42	N/A	N/A
Egg	Directive 2000/13/EC	Cornsnacks (food complaint)	1	1	0
Casein	Directive 2003/89/EC	Various foods labelled as "milk-free"	27	27	0
Soy	Directive 2003/89/EC	Various foods labelled as "soy-free"	32	31	1
Sulphites	Directive 2003/89/EC	Sausages, burgers, minced meats, dried fruit, fruit/veg, wine/beers….	160	158	2[4]

* *Codex Standard 118 – 1979 was revised and published in late 2008, this standard reduced the previous level of 200ppm for 'rendered gluten-free foods' to 100ppm; on the 20th of January 2009 the EU published Regulation (EC) 41/2009 that sets the same limits as the 2008 Codex standard; the EU Regulation fully applies from the 1st of January 2012. All foods received in 2012 were labelled as 'gluten free' and did not use de-glutenised wheat flour*

1 *Where the level of gluten detected in a private sample exceeds the above limits the sample result is classed as 'non-designated' as the sample was not taken under the official control of foodstuffs regulations and the customer is immediately notified.*

2 *Lactose is not a legally defined food allergen under EU food law (Directive 2003/89/EC) but is rather a dairy sugar to which some people (mainly infants) are intolerant.*

3 *These samples were taken as part of a research project with the FSAI and Temple Street Children's University Hospital to examine the levels of galactose and lactose in a range of foods*

4 *These 2 samples contained undeclared sulphur dioxide – see Table 3.9 for details of samples tested for compliance with sulphite levels in the additives directive (Dir 95/2/EC as amended, 13 of which were non-complying for excessive SO_2)*

Gluten: The Gluten proteins contained in wheat, barley, rye and their cross-bred varieties are toxic to coeliacs. CODEX and EC Commission Regulation No. 41/2009 set gluten limits as follows:

- 100 mg/kg for "very low gluten" foods, having one or more gluten-containing ingredients
- 20 mg/kg for naturally gluten-free foods.

In 2012, a diverse range of gluten-free foods from pharmacies, health food shops, supermarkets and local manufacturers was received. Four of the HSE programmed samples, labelled as gluten-free were non-compliant (with gluten levels > 200 mg/kg) with the legislative limits (all 4 were bakery products produced on a small scale). In addition, four complaint samples received *via* the EHOs from the service sector were also found to be non-compliant. Follow-up action was taken by the authorised officers. The results for mainstream, pre-packaged produce once again indicate an overall high quality (with respect to gluten levels) of gluten-free foods available to the consumer. 252 samples of 17 foods produced/marketed in Ireland were also tested on behalf of private food business operators, in connection with their listing in the Coeliac Society of Ireland Food List.

An ELISA-based analysis for Peanut in foods, based on the use of polyclonal antibodies to the allergenic peanut proteins Ara h1 and Ara h2, is in use in this laboratory. In 2012 we analysed 113 samples of foods (mainly chocolate and other types of confectionery) for the presence of peanut, with an emphasis on products labelled as nut- or peanut-free. The testing indicated no non-compliances. For information regarding allergens and labelling see details of the FSAI survey, -"Food Allergens and Labelling Survey June 2011" (http://www.fsai.ie/resources_publications.html).

All allergen analyses carried out for allergens other than gluten and sulphur dioxide are based on the presence or absence of detectable allergen as Directive 2003/89/EC does not prescribe a permitted level for these allergens in foods.

During 2012, *safe*food launched their knowledge networks, an on-line 'social-network' community on topics of interest in food safety (Cryptosporidium, Salmonella, Biotoxins etc.). The '**Food Allergy and Food Intolerance Network**' (http://safefoodallergy.ning.com/) organises conferences and information days, as well as serving as a valuable resource for networking for those involved in food allergy - support groups, enforcement bodies and producers etc. Some PAL staff are members of these networks and have found the networks to be highly beneficial.

As the national specialist laboratory for food allergens we were invited, in 2011, to participate in a large-scale research project run by the UK Food Standards Agency. This project was co-ordinated by the Institute for Food Research (IFR) and involved the assessment and validation of commercial ELISA kits for the detection of milk and egg residues in foods. For this project we received 16 different ELISA kits (10 for detecting Milk allergenic proteins and 6 for the detection of egg proteins) and 10 different test materials. There were 12 laboratories around the world involved in this study (all with a specialisation in the detection of food allergens). All participating laboratories analysed each test material with each kit – the results were sent to the IFR and will be used in a publication as well as in the validation of methods for the detection of these allergens, this research is being compiled into a peer reviewed journal publication by the co-ordinating group in the IFR.

3.5.3 Food Contaminants – EC Regulation 1881/2006 and Others.

EC Regulation 1881/2006 (& 333/2007, 1126/2007, 629/2008, 420/2011 - amending) sets limits for a range of chemical contaminants in food. Relevant testing performed here in 2012 is summarised in Table 3.5.

Table 3.5 Food Contaminants – EC Regulation 1881/2006 and Others - Principal Testing in 2012

Contaminant	Sample Types	Total	Complying	Non-complying
Lead[1] & Cadmium[1] (Pb & Cd))	Fish/shellfish etc	41	41	0
	Infant Food & Baby Foods,	33	33	0
	Fruit & Vegetables, Herbs,	56	56	0
	Beverages/Waters Meat & Meat Products, Edible Seaweed etc.	6	6	0
	Sub-total (Pb & Cd)	136	136	0
Mercury[1] (Hg)	Fish & Fishery products, Bottled Water etc.	83	83	0
Histamine/ Biogenic Amines[1a]	Scombroid Fish etc (Tuna, Mackerel…)	204	199	5
Arsenic[1] (As)	Infant Formula & Baby Food, Water (Seawater) etc.	42	42	0
Marine Biotoxins[2]				
DSP&AZA Toxins[3,4]	Mussels, Oysters, Scallops	13	13	0
ASP Toxins[5]	As above	15	15	0
PSP Toxins[6]	As above	10	10	0
Anti-bacterial Substances (ABS)[7] (EC Four-Plate test)	Chicken & Pork	20	20	0
	TOTALS	523	518	5

1 *EC Regulation 1881/2006.*

1a *Amines tested for: histamine; tyramine; cadaverine; putrescine. Biogenic amines are sometimes produced by bacteria in fish etc from amino acids Histamine- or Scombroid poisoning is an allergy-like intoxication, rather than a food allergy.*

2 *These toxins may accumulate in shellfish grown in seawater with excessive marine algae. Retail/Catering level (largely) sampling by EHO service. Analysis out-contracted to Marine Institute. Principal official monitoring is at production level by Dept. of CMNR/Marine Institute.*

3 *Diarrhetic Shellfish Poisoning (DSP)* [4] *Azaspiracid (AZA)* [5] *Amnesic Shellfish Poisoning (ASP)* [6] *Paralytic Shellfish Poisoning (PSP)*

7 *The EC Four-plate test is used to screen meats for anti-bacterial (antibiotics etc) residues. Principal official monitoring is at production level (meat plants etc) by the DAFM and LAs.*

Biogenic amines

204 fish samples were tested here in 2012 for Histamine and 3 other biogenic amines, viz. Putrescine, Cadaverine and Tyramine. These included 120 (~ 13 x 9 subsamples) samples submitted by the Sea-Fisheries Protection Authority (SFPA), 9 (1 x 9 subsamples) Border Inspection Post (BIP) samples from The Department of Agriculture, Fisheries and Food (DAFF) and 73 samples from Environmental Health Officers.

5 of the 204 samples had excessive Histamine. 5 Samples contained elevated (>100 mg/kg) Cadaverine. For a general report on Histamine poisoning see http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Seafood/ucm091910.htm

Testing for contaminants has decreased substantially in this laboratory in recent years, in particular as many of the established tests (processing contaminants, mycotoxins etc.) have recently been devolved to the Dublin Public Analyst's Laboratory (as national specialisations). This surveillance will be reviewed in detail for future years. The relatively high level of testing of foods for Lead & Cadmium is performed partly to generate data for dietary intake. Additionally, 158 bottled water samples were screened (by ICP-MS) for metallic contaminants, and none were found to exceed the legislative limits for metals in bottled ground waters.

3.6 Nutrition, Composition, Additives, Labelling etc.

There has been an increase in nutritional/compositional testing in the laboratory in recent years, in particular in the areas of 'Salt'/Sodium, Folic Acid and general nutritional labelling.

3.6.1 Sodium/Salt in Food

A considerable international effort is being made to reduce population dietary intakes of 'Salt'/Sodium, - see e.g. '*Salt and Health: Review of the Scientific Evidence and Recommendations for Public Policy in Ireland*', www.fsai.ie/uploadedFiles/Science_and_Health/salt_report-1.pdf. Data quoted in the report, and applied to Ireland, would yield a calculated reduction of ca. 1,700 deaths in Ireland per year from strokes and ischemic heart disease, if recommended reductions in population intake of salt are achieved. Since 2002, the FSAI has implemented a programme, in association with the food industry, to reduce salt levels in the major, salt-containing, processed foods - refer to http://www.fsai.ie/science_and_health/salt_and_health.html for a progress update. The stated aim was to reduce the average intake of salt to 6 grams per day (from 10 grams per day) by 2010. An ultimate maximum intake of 4 g salt per day is recommended. The 2012 results for the FSAI surveys and other programmed surveillance (EHO sampling) are summarised in Table 3.6.

Table 3.6: Summary of 'Salt' (Sodium & Potassium) Testing Results 2012

Parameter(s)	Food Types etc.		Samples Tested	Average Results[1] (g/100g)	Range of Results (g/100g)
'Salt' (Sodium & Potassium)	Dairy & Non-Dairy Spreads FSAI survey	Sodium	62	0.49	0.26 – 0.76
		Potassium	62	0.04	0.01 – 0.29
	Meat and Meat Products FSAI survey	Sodium	127	0.93	0.52 – 2.23
		Potassium	127	0.23	0.08 – 0.39
	Cheeses FSAI survey	Sodium	56	0.64	0.49 – 0.78
		Potassium	56	0.08	0.06 – 0.09
	Sauces FSAI survey	Sodium	145	0.32	0.14 – 0.94
		Potassium	145	0.18	0.06 – 0.4
	Low Salt/Reduced Salt HSE regional survey	Sodium	32	2.65	0.1 – 13.13
		Potassium	32	0.40	<0.01 – 1.36
	Locally Produced Prepared Dishes and Bakery Products HSE regional survey	Sodium	31	0.22	0.05 – 0.48
		Potassium	31	0.18	0.06 – 0.32
	Miscellaneous Foods[2] HSE samples	Sodium	33	1.00	<0.01 – 14.34
		Potassium	33	0.19	< 0.01 – 1.11
	Cereal Based Infant Foods & Baby Foods HSE samples	Sodium	33	0.06	<0.01 – 0.23
		Potassium	33	0.30	0.08 – 0.75
	Christmas Bakery Products HSE regional samples	Sodium	36	0.20	0.04 – 0.5
		Potassium	36	0.30	0.08 – 0.55
	Bottled Waters[3] HSE regional samples	Sodium	148	39 (mg/L)	2 - 160 (mg/L)

1 *In the calculation of the average result in each category, where present, the value (<0.01g/100g) has been replaced by 0.005g/100g (does not apply to the analysis of bottled water).*

2 *Including sauces, bakery products, rice, pasta, noodles, curry powder & pickled cucumber.*

3 *Samples analysed in the Water Laboratory as part of an extended Audit suite of analysis. Samples include Irish and Foreign brands of still and sparkling Natural Mineral Waters, Spring Waters and 'Other' Waters.*

FSAI Work: The 2012 surveillance work above for FSAI is a continuation of the work dating from 2003. The recent FSAI report "Monitoring of salt in processed foods – 2003 to 2012" can be accessed using the following link http://www.fsai.ie/uploadedFiles/Science_and_Health/Salt_and_Health/Salt-Surveys-2003-2012.pdf .

To date the main food categories contributing to dietary sodium intake have been surveyed (see summary in Table 3.7 below), including follow-up surveys, to monitor the extent of reductions being achieved.

Table 3.7: Summary of Salt Surveillance for FSAI since 2003

Year	Food Categories	No. of Samples	Sodium Results Average (g/100g)	Sodium Results Range (g/100g)
2003	Breads	100	0.60	0.17 – 1.13
	Breakfast Cereals	83	0.33	<0.01 – 0.91
2004	Ready Meals	51	0.29	0.08 – 0.64
	Sauces	52	0.61	0.19 – 4.32
	Processed/Cured Meats	266	1.01	0.07 – 2.50
	Crisps/Snacks	45	0.76	0.23 – 2.38
2005	Babyfoods	82	0.06	<0.01 – 0.37
	Breads	113	0.51	0.23 – 0.99
	Soups	126	2.17	0.19 – 8.61
2006	Breads	64	0.55	0.28 – 0.94
	Processed Meats	206	0.92	0.20 – 1.89
	Crisps/Snacks	96	0.80	0.15 – 2.12
2007	Breakfast Cereals	119	0.28	<0.01 – 0.8
	Dairy & Non Dairy Spreads	75	0.54	<0.01 – 1.15
2008	Processed Meats	26	0.85	0.44 – 1.13
	Breads	6	0.41	0.40 – 0.43
	Breakfast Cereals	24	0.08	<0.01 – 0.30
	Dairy & Non Dairy Spreads	12	0.33	<0.01 – 0.53
	Crisps, Popcorn & Snacks	124	0.60	<0.01 – 1.93
2009	Processed Meats/Meat Products	127	0.81	0.04 – 2.36
	Soups & Sauces	71	0.40	0.06 – 1.44
	Prepared Meals	58	0.23	0.07 – 0.41
	Cheeses	70	0.80	0.19 – 1.61
2010	Bakery Products	132	0.48	0.25 – 0.88
	Soups & Sauces	114	1.25	0.09 – 6.40
2011	Breads	46	0.47	0.33 – 0.88
	Breakfast Cereals	330	0.21	<0.01 – 0.62
	Snacks	235	0.7	0.20 - 1.60
	Dairy & Non-Dairy Spreads	28	0.51	0.24 - 0.75
2012	Dairy & Non-Dairy Spreads	62	0.49	0.26 - 0.76
	Processed Meats	127	0.93	0.52 - 2.23
	Cheeses	56	0.64	0.49 - 0.78
	Sauces	145	0.32	0.14 - 0.94
2003-2012	All foods total to date	3,271	-	-

HSE regional Surveys etc: several HSE surveys, including low-salt foods, locally produced foods, infant foods, Christmas bakery products etc, were carried-out in 2012 (Table 3.6). These HSE surveys monitor foodstuffs to ensure that manufacturers are complying with their labelled salt/sodium levels. In general there is good compliance, however, a sample of Gluten Free biscuits and a bottled water were both found to be non-compliant since their determined Sodium values exceeded their labelled values.

A survey was carried-out for the Consumer Association of Ireland where 40 Breads were tested for Sodium (Mean value: 0.43g/100g) and Potassium (Mean value: 0.16g/100g).

3.6.2 Other Nutritional Testing

Table 3.8 summarises other nutritional testing carried out here in 2012.

Table 3.8: Other Nutritional/Compositional Testing 2012.

Parameter(s)	Food Types etc.	Samples Tested	Range of Results
Folic Acid	Infant Foods (Dry)-HSE survey	17	29-156µg/100g Powder
	Infant and Follow-on Formulae-HSE survey	21	12-42µg/100mls 74-184µg/100g Powder
	Infant and Follow-on Formulae-DAFM survey	19	78-171µg/100g Powder
	Folic Acid Supplements, Multi-vitamins etc.	34	Range of Results (% of Labelled) 37% to 154%
Fat	Milk & Skimmed Milk	4	Results Range (g/100g) 0.9 - 4.2
	Minced Meat/Beef	20	6 - 21.4
	Suasages, Burger Meat etc.	6	1.5 - 24.3
	Cream	1	47.2
Parameter(s)	**Food Types etc.**	**Samples Tested**	**Range of Results (mg/kg)**
Selenium, Chromium, Nickel	Infant Cereal & Baby Foods	34	Cr <0.25 – 0.29
			Ni <0.5 – 0.77
			Se <0.20
	Meat Products	2	Cr <0.25
			Ni <0.5
			Se 0.56 – 0.61
	Water (Sea Water)	6	Cr <0.5µg/L
			Ni <0.5µg/L
			Se 2.87 – 3.38µg/L
	Miscellaneous (Cocunut Milk)	1	Cr <0.25
			Ni <0.5
			Se <0.2
	Food Supplements*	2	Cr <0.25 – 3.9

** Two food supplements non-complying on basis of chromium content vs. labelled content.*

Monitoring of Folic Acid: In 2012, 57 samples of infant foods/formula were tested. The determined folic acid ranged from 92 to 199% of the labelled values; 4 samples within 92-100% of the labelled value, 37 samples 100-150% and 15 samples 150-199%.

34 multivitamins / food supplements were tested for folic acid content (compared to labelled values). 32 Samples were found to be in good agreement with labelled values, with 2 samples considered at variance with the labelled value such that they could "mislead the purchaser to a material degree".

3.6.3 Additives/Labelling/Compositional Quality Results 2012

The choice of additives to be monitored is made by the HSE and FSAI on a year-to-year basis, depending on known usage, risk of exceedance of the acceptable daily intakes (ADIs), and risk/previous results history. The testing is performed to monitor for legislative compliance and also to collect data for the EU on food levels and dietary intakes. The results (see Table 3.9) for 2012 indicate a high level of compliance with the standards. The highest level of exceedances is generally for sulphites and nitrites & nitrates. Non-complying cases are dealt with by the authorised officers.

Table 3.9: Summary of Additives/Labelling/Compositional/Quality Results 2012

Parameter(s)	Food Types	Number of Samples Tested & Results		
		Total	Complying with Standard	Non-Complying with Standard
Additives				
Sulphur Dioxide[1] (Sulphites)	Meat/Meat products (90), Fruit/veg (30), Dried Fruit (23), Beers /Wines (7), Soft drinks (4), Confectionery (5), Prawns (1)	160	147	13
Nitrites & Nitrates[2]	Cured Meats (67) & Brines (19)	86	76 + 3 not designated*	7#
Food Irradiation[3] Photo-stimulated luminescence screening	Herbs/Spices /Seasonings(22), Herbal teas/teas (16), Seeds (6), Noodles (9), Breadcrumbs (1), Sauce (1)	55	55	0
Dairy Testing[4]	Dairy products (Cheese, yogurts, cream etc)	27	25	2$
General Labelling	Miscellaneous Packaged Foods	322	217	105
Alcoholic Strength	Pub-level Spirits	20	20	0
pH	Miscellaneous Food Types	7	7	0
Ref Index/Soluble solids	Jams, chutneys, oils	8	8	0
Starch (indicates use of cereal filler)	Minced Meat	30	30	0

[1] Authorisation and limits set in Statutory Instrument No. 58 of 2004 (Directive 95/2/EC), as amended. EU Directives require member states to monitor their usage and intake of Additives.

[2] Authorisation and limits are set in Statutory Instrument No. 40 of 2008 (Directive 2006/52/EC)

[#] Excessive Sodium Nitrate &/Sodium Nitrite was determined in the following samples: 3 Bacon Ribs, 2 Corned Beef & 2 Cured Tongue samples.

** Also, in the case of 3 brines, the calculated "in-going amounts" of Sodium Nitrite exceeded the legislative limit for Sodium Nitrite in meat (these were not designated as non-complying as no limits apply to the brines).*

[3] S.I. 297 of 2000 authorises irradiation of herbs, spices and vegetable seasonings. Irradiated foods must be labelled as such.

[4] Varying Tests: ALP ('Pasteurisation' efficiency), Inhibitory Substances (Delvo test), FPD/Extraneous water, Fat, Protein, General Labelling etc. Sample numbers exclude dairy products received for other testing (Nutr'l claims, Lead (Pb) etc.).

[$] Two samples had excessively high titratable acidity, i.e. were sour.

General Labelling

Statutory Instrument No. 483 of 2002 consolidates legislation on the labelling of foodstuffs in general. An overview of labelling legislation and enforcement procedures etc. is outlined in a FSAI publication (The Labelling of Food in Ireland – FSAI 2007); http://www.fsai.ie/assets/0/86/204/5dfb809a-7902-4f03-bb6a-6e25a5a09736.pdf.

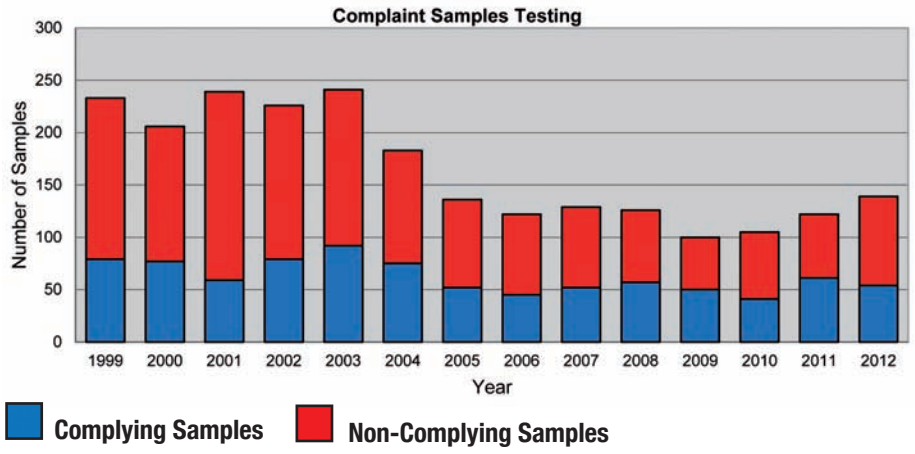
The European Commission carried out a consultation process leading to an overhaul of European food labelling legislation which was completed in October 2011 and led to the publication of Regulation (EC) 1169/2011 on "the provision of food information to consumers". This is a full re-draft of the EU general and nutritional labelling rules and includes the introduction of certain new labelling requirements to cover, for example, compulsory nutritional labelling as well as an extension of country-of-origin labelling to meat other than bovine meat; it also extends the provisions of the 'old' labelling rules to "distance" sales (i.e. internet sales) and to temporary advertising (e.g. chalk boards).

In 2012, 322 samples were examined here for compliance with labelling legislation and 105 were designated as being non-complying. Many of the problems arise from East European and other 'ethnic' processed foods with the absence of labelling in English or Irish, with Quantitative Ingredients Declaration (QUID) labelling deficiencies, and from issues in relation to the labelling of foodstuffs with nutritional and/or health claims that are not permitted under the terms of Regulation (EC) 1924/2006.

3.7 Food Complaints

Complaint samples arise when consumers find contamination or other defects in foods. Complaints are generally made to the EHO service or to the FSAI. Some complaints arise from food poisoning incidents (these samples are tested primarily in the Food Microbiology laboratories, but may also require chemical testing). Complaint samples analysed in this laboratory usually involve the presence of foreign bodies such as insects, metal, unidentified material or abnormal odours/tastes in food. A total of 139 complaint samples, received from EHO services around the country (126) and directly from the public (13), was investigated here in 2012. Of the 139, the number of adverse reports issued was 85 (61.2%).

Appendix 2 gives a breakdown of food complaints received, by food category, from the HSE Environmental Health Service (total 126). The number of food complaints received in this laboratory has decreased from a steady average of ca. 230 per annum (1999-2003) to an average of 129 (2004 – 2012). The reason for this reduction is unclear but it may be related to better handling of complaints by retailers. The number of food complaints received represents a very small fraction of the total number of food items consumed in our region.



3.8 Food Alerts (RASFF) and Food Hazard/Contamination Reports

The EU Rapid Alert System for Food and Feed (RASFF) is activated when a member state reports significant contamination/risk associated with a batch of food or feed. A short summary of the EU RASFF Notifications Report for 2012 (http://ec.europa.eu/food/food/rapidalert/docs/rasff_annual_report_2012_en.pdf) is given by Hazard group below:

Hazard / Risk Group	Number of Notifications 2012
Food: Chemical and Physical Hazards[1]	2400
Food: Microbiological Hazards[2]	745
Food: Other Hazard / Risks[3]	327
Animal Feedstuffs Hazards[4]	41

[1] *Mycotoxins, Heavy Metals, Pesticides and Veterinary Residues, Food Additives & Flavourings, Allergens, Marine biotoxins, GMOs, Foreign Bodies, Radiation, Migration from food contact materials, Composition, Contaminants & Biocontaminants, Adulteration & Fraud, etc.*
[2] *Pathogenic Micro-organisms, TSEs, Parasites, Other Microbiological Contamination.*
[3] *Insufficient controls, Absent Labelling etc., Defective Packaging, Organoleptic defects, others.*
[4] *All Hazards notified for Animal Feedstuffs.*

Food Hazard/Contamination Reports are issued by the laboratory to the EHO service and the FSAI when significant contamination is detected. Upon assessment, a Food Alert notification may be issued (to the EU) depending on their evaluation of the risk. In 2012, 12 Food Hazard/Contamination Reports were issued by the laboratory, relating to: Excessive sulphur dioxide in miscellaneous white vegetables, fruit/fruit products and sausages (7); undeclared sulphur dioxide in sausages (1); Rodent remains in rice (1); Washer and bolt in beans (1); Metal screw in white pudding (1) and Histamine in tuna (1).

There has been a reduction in Hazard Reports issued relating to Contaminants, reflecting the reduced testing in this laboratory for contaminants (due to national specialisations, much of the contaminants testing has been devolved to the Dublin PAL).

Food Hazard/Contamination Reports issued to date from this laboratory are outlined below:

2012	12	2007	24
2011	11	2006	26
2010	11	2005	23
2009	14	2004	16
2008	7	2003	16

4. WATERS / EFFLUENTS

4.1 Introduction

Access to safe drinking water is essential to health, a basic human right and a component of effective policy for health protection.

The European Communities (Drinking Water) No. 2, Regulations, 2007, S.I. 278 of 2007 assign the Environmental Protection Agency (EPA) the role of supervisory authority over public water supplies and provides powers of enforcement to ensure actions are taken where the quality of public drinking water is deficient. In Ireland, the majority of drinking water comes from public supplies (80%), which are monitored under S.I. 278 of 2007. The rest of the water is provided by group water schemes (7%) and private supplies (12%), which are exempt from the legislation. To ensure that the EU and national drinking water standards are met, each water supply must be monitored on a regular basis. The monitoring frequency is legally set out in the regulations, and minimum monitoring frequencies for drinking water depend on the size of the supply in question.

Chemical aspects of water are only one part of the total safety of water. The other aspects are microbial aspects and radiological aspects. Further information on all aspects of drinking water safety can be found on the EPA website at http://www.epa.ie/ . The health concerns associated with chemical constituents in drinking water arise primarily from the ability of chemical constituents to cause adverse health effects after prolonged periods of exposure. There are few chemical constituents of water that can lead to health problems resulting from a single exposure, except through massive accidental contamination of a drinking water supply. Experience has shown that in many, but not all, such incidents, the water becomes undrinkable owing to the unacceptable taste, odour, or appearance.

In 2012, the laboratory received a total of 6,786 water samples. These consisted of drinking waters, bathing waters, pool waters, effluents, haemodialysis samples and miscellaneous samples. More than 100,000 tests were carried out on these samples. Most of the samples analysed are drinking waters, which are tested for compliance with the European Communities (Drinking Water) Regulations 2007, S.I. 278 of 2007.

4.2 Sample Sources 2012

Samples are received from a wide variety of sources, as shown in Table 4.1.

Table 4.1 Source of samples received in 2012

Source	Number
Galway (HSE)	544
Galway County Council	70
Galway City Council	535
Mayo	1,199
Roscommon	246
Donegal	1,604
Sligo / Leitrim	338
North Tipperary	527
Clare	248
Limerick	416
Haemodialysis (Hospitals)	412
Private	632
Miscellaneous	15
TOTAL	**6,786**

4.3 Water Quality

A full appreciation of the overall quality of drinking water can only be obtained by also considering the bacteriological quality along with additional chemical parameters as published by the EPA.

The testing by this laboratory indicates in general a very high level of compliance for those parameters tested in public supplies, with two thirds of all non-compliant drinking water samples originating from private sources. In 2012, a total of 1,917 exceedances were detected. 214 of these exceedances were due to elevated Trihalomethanes (THMs). These exceedances were from 49 different public supplies. As detailed in Table 4.4 and 4.5; 722 non-metal exceedances and 982 metal exceedances were detected in 2012. As some samples were found to be non-compliant for more than one parameter, the 1,704 exceedances (metals and non-metals) were from 929 samples. Over two thirds of these samples were from private sources.

Based on scientific studies, the International agency for research on cancer (IARC) has classified water

contaminants into 5 groups based on their carcinogenicity, as shown in Table 4.2. Results from IARC studies, along with many publications can be viewed on www.iarc.fr.

The World Health Organisation (WHO) takes the IARC classifications into consideration when determining guideline values for drinking water quality. Further information on the work carried out on drinking water quality by the WHO can be viewed on www.who.int.

Table 4.2 Classification of water contaminants from the IARC

Group	Classification
1	Carcinogenic to humans
2A	Probably carcinogenic to humans
2B	Possibly carcinogenic to humans
3	Not classifiable as to its carcinogenicity to humans
4	Probably not carcinogenic to humans

4.4 Fluoridation of Public Water Supplies

Fluoride accounts for about 0.3% of the earth's crust. It's wide range of uses include fluoridation of water supplies, most general anaesthetics, anti-reflective coatings, antibiotics, refrigeration and air-conditioning systems. Fluoride may be an essential element for humans; however, this has not been demonstrated unequivocally.

Public water fluoridation was introduced into Ireland in July 1964, on the grounds of being a low-cost public health measure considered to be safe to human health and of benefit to all sections of society, and not restricted by social boundaries. Dental health surveys in Ireland, conducted by the State in 1963, 1984, 1989, and 1990, have concluded that water fluoridation provides a protective benefit in children at risk of tooth decay. The WHO reports that more than 200 million people in 39 countries benefit from artificially fluoridated drinking water.

In 1984, the WHO issued a guideline value of 1.5 mg/L for fluoride in drinking water. This value was reaffirmed in 1993 and again in 2011.

Currently, two separate pieces of legislation are applicable to the levels of fluoride in drinking water; The Fluoridation of Water Supplies Regulations 2007, S.I. No. 42 of 2007, specifies a concentration range of 0.6mg/L to 0.8mg/L Fluoride and the European Communities (Drinking Water) Regulations 2007, S.I. 278 of 2007 apply a Parametric Value of 0.80mg/L to drinking water supplies. These regulations also require that water supplies to which Fluoride has been added shall be monitored for Fluoride at intervals not exceeding one calendar month. This laboratory carries out the official monthly fluoride testing on all fluoridated supplies in the region. The results can be viewed in Appendix 5. In total, 1,056 drinking water samples were analysed for fluoride in 2012.

4.5 Non-Metals in drinking Water

The results for 2012 are summarised in Tables 4.3 and 4.4.

4.5.1 Volatile Organic Compounds (VOCs)

VOCs are a class of compounds which, in the context of drinking waters include Trihalomethanes (THMs), Benzene, 1,2 Dichloroethane, Trichloroethene and Tetrachloroethene.

THMs (Chloroform, Bromodichloromethane, Dibromochloromethane and Bromoform) are not naturally occurring compounds. They occur as by-products of the disinfection process, as a result of the reaction between the added chlorine and organic matter, which may be present naturally in the water. The rate and degree of formation depends on the chlorine and humic acid concentration, temperature, pH and bromide ion concentration.

Chloroform is the most common THM and the principal disinfection by-product in chlorinated drinking water. In the presence of bromides, brominated THMs are formed preferentially, and chloroform concentrations decrease proportionally. Chloroform and Bromodichloromethane are classified as group 2B agents by the IARC. While bromoform and dibromochloromethane are classified as group 3 agents. The EU has set a health-based parametric value of 100µg/L for THMs (S.I. 278 of 2007). The WHO has issued guideline values of 300 µg/L for chloroform, 100 µg/L for bromoform, 100 µg/L for dibromochloromethane and 60 µg/L for bromodichloromethane. A summary of results for 2012 is shown in the Table 4.3. The high results can be attributed to a limited number of water supplies that were analysed repeatedly.

Table 4.3 Trihalomethane results 2012

Trihalomethane (µg/L).							
Concentration Range	≤ 10	11-50	51-100	101-150	151-200	201-300	> 300
No. of Samples	120	215	220	112	67	27	8

Trichloroethene is used primarily in metal degreasing. It is emitted mainly to the atmosphere, but it may also be introduced into ground water and, to a lesser extent, surface water in industrial effluents. Poor handling and improper disposal of trichloroethene in landfills have been the main causes of ground water contamination.

Tetrachloroethene has been used primarily as a solvent in the dry cleaning industry and to a lesser extent as a degreasing solvent. It is widespread in the environment and is found in trace amounts in water, aquatic organisms, air, foodstuffs and human tissues. In anaerobic ground water tetrachloroethene may degrade to form more toxic compounds, including vinyl chloride.

1,2 Dichloroethane is used mainly as an intermediate in the production of vinyl chloride and other organic chemicals.

Benzene is present in petrol, and vehicular emissions constitute the main source of benzene in the environment. Benzene may be introduced in drinking water by industrial effluents and atmospheric pollution. Benzene is principally used in the production of other organic chemicals. The results for these parameters can be viewed in Table 4.4.

4.5.2 Ammonium

Ammonia in the environment originates from metabolic, agricultural and industrial processes and from disinfection with chloramines. Natural levels in both groundwater and surface water are generally below 0.1 mg/L. The EU has set a parametric value of 0.50 mg/L in drinking water; a stricter limit of 0.30 mg/L is set in Irish Legislation (S.I. 278 of 2007). Ammonia levels greater than the parametric value may be an indicator of possible bacterial, sewage and animal waste pollution. The threshold odour concentration of ammonia at alkaline pH is approximately 1.5 mg/L. The WHO has not issued a health-based guideline value for ammonia in drinking water, as toxicological effects are only observed at exposures above 200 mg/kg body weight. However, ammonia can compromise disinfection efficiency, result in nitrite formation in distribution systems, cause the failure of filters for the removal of manganese and cause taste and odour problems. 97 % of the exceedances in 2012 were private samples.

4.5.3 Chloride

Chloride in drinking water originates from natural sources, sewage and industrial effluents. The main source of human exposure to chloride is the addition of salt to food. The WHO has not issued a guideline value for chloride in drinking water, as the concentrations found are not of health concern; however levels above 250 mg/L may give rise to detectable taste in water. In 2012, 10 exceedances were found. Seven of these exceedances were private samples, while the other 3 were from one public supply.

4.5.4 Chlorine

Chlorine is the most widely used disinfectant for the inactivation of water borne pathogens in drinking water supplies and historically has arguably made the greatest contribution to the public health protection of consumers. Chlorine is not only used as a primary disinfectant in water treatment, but is also added to provide disinfection residual to preserve water in

distribution. There is no statutory limit for the levels of chlorine in drinking water, but the level of residual chlorine present at the consumers tap is constrained between being acceptable to consumers and still providing disinfection. Samples with a chlorine odour are analysed for residual chlorine. While 18 samples contained >1.0mg/L free chlorine and 4 samples contained >1.0mg/L total chlorine, only 1 sample was found to be in breach of the WHO guideline value of 5.0mg/L chlorine.

4.5.5 Colour

Ideally, drinking water should have no visible colour. Colour in drinking water is usually due to the presence of coloured organic matter (primarily humic and fulvic acids) associated with the humus fraction of soil. It is also strongly influenced by the presence of iron and other metals. There is no WHO health-based guideline value for colour, although a level of 20 mg/L Pt-Co, is generally used. In 2012, over half the exceedances were private samples. 10 out of the 204 exceedances contained >100 mg/L Pt-Co.

4.5.6 Conductivity/Total Dissolved Solids (TDS)

Conductivity is the ability of a solution to conduct electric current. It is the reciprocal of electrical resistivity. Therefore, conductivity is a measure of the dissolved solids which have been ionised in the water. Total dissolved solids (TDS) comprise of inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulphates) and small amounts of organic matter that are dissolved in the water. The palatability of water with a TDS of less than 600 mg/L is generally considered to be good. 11 samples were analysed for TDS in 2012 the values ranged from 210 – 415mg/L. Drinking water becomes significantly and increasingly unpalatable at TDS levels greater than 1,000 mg/L. This corresponds to a conductivity of approximately 1250 µS/cm. In 2012, 14 samples had conductivity levels in excess of 1250 µS/cm, with 13 of these samples coming from private sources. 2 samples had conductivity levels in excess of the EU limit of 2500 µS/cm, and both of these were from private sources.

4.5.7 Hardness/Calcium Hardness

Hardness in drinking water is caused by a variety of dissolved polyvalent metallic ions, predominantly calcium and magnesium cations. Hardness is usually indicated by precipitation of soap scum and the need for excess use of soap to achieve cleaning. Public acceptance of the degree of hardness of water may vary considerably from one community to another. Depending on the interaction of other factors, such as pH and alkalinity, water with hardness above approximately 200 mg/L may cause scale deposition in the treatment works, distribution system and tanks within buildings. 745 out of the 1671 samples tested here in 2012 contained >200mg/L CaCO3.

On the other hand, soft water (but not necessarily cation exchanged softened water) with a hardness of less than 100 mg/L may have a low buffering capacity and thus be more corrosive for water pipes. 585 out of the 1671 samples tested here in 2012 contained <100mg/L CaCO3. Calcium hardness is a term for the level of calcium carbonate in water. It is used in the calculation of the Langelier Index. This is an index used to determine if a water sample has a tendency to dissolve or deposit calcium carbonate. Strictly speaking, it is not a corrosion predictor. There is no corrosion prediction index that applies to all materials, and in fact indices related to calcium carbonate saturation, have given mixed results. In particular, it should be noted that the Langelier Index is not considered a good corrosion prediction model for copper systems.

4.5.8 Nitrate and Nitrite

Nitrate and nitrite are naturally occurring ions that are part of the nitrogen cycle. The nitrate concentration in both groundwater and surface water is normally low, but can reach high levels as a result of leaching or run-off from agricultural land or contamination from human or animal wastes as a consequence of the oxidation of ammonia. Nitrite is the intermediate in the oxidation of ammonia to nitrate, and so any water containing appreciable levels of nitrite is of questionable quality.

In general, the most important source of human exposure to nitrate and nitrite is through vegetables (nitrate and nitrite) and through meat in the diet (nitrite is used as a preservative in many cured meats). In the case of bottle fed infants, drinking water can be the major external source of exposure to both nitrate and nitrite. In 2012, private samples accounted for 95% of all exceedances.

4.5.9 Odour

To a large extent, consumers have no means of judging the safety of their drinking water themselves, but their attitude towards their water will be affected to a large extent by the aspects of water quality that they are able to perceive with their own sense (taste, odour and appearance). The provision of drinking water that is not only safe, but also acceptable in appearance, taste and odour is of high priority. Water that is aesthetically unacceptable will undermine the confidence of consumers, will lead to complaints and more importantly, could lead to the use of water from sources that are less safe. In most cases, aesthetic problems can be prevented by optimizing conventional treatment processes such as coagulation, sedimentation and chlorination.

The taste and odour thresholds of hydrogen sulphide in water are estimated to be between 0.05 and 0.1 mg/L. The "rotten eggs" odour of hydrogen sulphide is a result of oxygen depletion and the subsequent reduction of sulphate by bacterial activity. Hydrogen sulphide in drinking water can be removed by techniques like aeration, granular activated carbon, filtration and oxidation. As it is unlikely that a person could consume a harmful dose of hydrogen sulphide from drinking water, the WHO has not issued a health-based guideline value for hydrogen sulphide in drinking water. In 2012, 104 samples were found to exude an odour other than chlorine. The odours were categorised as follows: Objectionable (52), Hydrogen sulphide (9), Sulphur (11), Musty (16), Stale (8), Sweet (4) and Phenol (4). 89 of these odours were from private water sources.

4.5.10 pH

Although pH usually has no direct impact on consumers, it is one of the most important operational water quality parameters. Careful attention to pH control is necessary at all stages of water treatment to ensure satisfactory water clarification and disinfection. For effective disinfection with chlorine, the pH should preferably be less than 8.0, although waters with a pH less than 7.0 are more likely to be corrosive. 77 out of the 82 exceedances were samples with a pH < 6.5, with 77% of these samples being from private sources. All 5 samples with pH values >9.5 were private samples.

4.5.11 Phosphate

Phosphates are sometimes used as water treatment chemicals to solve specific water quality problems. Orthophosphate and polyphosphate are the two general types used in water treatment. They inhibit corrosion of water mains/plumbing (iron, steel, galvanized, asbestos/cement, lead, copper) and sequester nuisance metals in the water supply (iron, manganese, calcium, magnesium). They can also improve the quality of water in the distribution system by removing scale deposits & tuberculation; discourage microbial film formation/ re-growth, and stabilizing free chlorine disinfectant residuals. Rarely is a single treatment process or chemical additive a cure-all. Any chemical used in water treatment may have particular advantages or disadvantages. Water quality and treatment methods vary greatly. However, application of phosphates has been considered one of the most cost effective means of controlling a multitude of problems. 5 drinking water samples were analysed in 2012. 4 of the samples contained <0.5mg/L phosphate and the one remaining sample contained 0.6mg/L phosphate as PO_4.

4.5.12 Sulphate

Sulphates occur naturally in numerous minerals and are used in the chemical industry. They are discharged into water in industrial wastes and through atmospheric deposition; however, the highest levels usually occur in ground water and are from natural sources.

The presence of elevated sulphate levels in drinking water can cause noticeable taste, and very high levels can cause a laxative effect in unaccustomed consumers. The taste threshold for sulphate in drinking water ranges from approximately 250mg/L for sodium sulphate to 1,000mg/L for calcium sulphate.

The WHO has not issued a health-based guideline value for sulphate in drinking water, as the levels found in drinking water are not of health concern. However, due to gastro-intestinal effects resulting from ingestion of high sulphate containing water, the WHO recommend that health authorities be notified of sources of drinking water containing more than 500mg/L sulphate. A small number (9) of samples were analysed in 2012, with the results ranging from 15 to 65 mg/L.

4.5.13 Total Alkalinity

Alkalinity is a measure of the capacity of water or any solution to neutralize or "buffer" acids. This measure of acid-neutralizing capacity is important in determining how "buffered" the water is against sudden changes in pH.

Alkalinity should not be confused with pH. pH is a measure of the hydrogen ion (H^+) concentration, and the pH scale shows the intensity of the acidic or basic character of a solution at a given temperature. The reason alkalinity is sometime confused with pH is because the term alkaline is used to describe pH conditions greater than 7.

The most important compounds in water that determine alkalinity include the carbonate and bicarbonate ions. Carbonate ions are able to react with and neutralize 2 hydrogen ions and the bicarbonate ions are able to neutralize H^+ or hydroxide ions present in water. The ability to resist changes in pH by neutralizing acids or bases is called buffering. Alkalinity is especially important in areas where acid rain is a problem. 1660 samples were analysed in 2012. The results ranged from <10 – 611 mg CaCO3/L.

4.5.14 Turbidity

Turbidity in water is caused by suspended particles or colloidal matter that obstructs light transmission through the water. Turbidity can seriously interfere with the efficiency of disinfection by providing protection for organisms, and much of water treatment is directed at removal of particulate matter before disinfection. Turbidity is measured in nephelometric turbidity units (NTU) and can generally be noticed by the naked eye above 4 NTU. However, to ensure the effectiveness of disinfection, turbidity should be no more than 1 NTU and preferably much lower. Of particular importance is the fact that this will be a good indicator that chlorine-resistant pathogens such as Cryptosporidium are being removed. 82 % of the exceedances in 2012 were private samples.

Table 4.4 Summary of Non-Metals in drinking water results for 2012

Parameter	IARC Rating	Parametric Value (S.I. 278 of 2007)	WHO Guideline Value	No. of Samples	No. of Exceedance (%)
Benzene	Group 1	1.0 µg/L	10 µg/L	769	0
Trichloroethene	Group 2A	10 µg/L	20 µg/L		
Tetrachloroethene			40 µg/L	769	0
1,2 Dichloroethane	Group 2B	3.0 µg/L	30 µg/L	769	0
Odour		Acceptable to consumers and no abnormal change	Acceptable to consumers	3894	[1]104 (2.7%)
Colour	n/a			3889	[2]204 (5.2%)
Turbidity	n/a			3894	[2]210 (5.4%)
pH	n/a	6.5 – 9.5	-[4]	3931	82 (2.1%)
Conductivity	n/a	2,500 µS/cm		3926	2 (0.1%)
Nitrate	n/a	50 mg/L	50 mg/L	3888	7 (0.2%)
Nitrite	n/a	0.50 mg/L	3.0 mg/L	3888	14 (0.4%)
Ammonium	n/a	0.30 mg/L	-[4]	3888	88 (2.3%)
Free Chlorine	Group 3[3]	-	5.0 mg/L	773	[5]1 (0.1%)
Chloride	n/a	250 mg/L	-[4]	83	10 (12%)
Total Chlorine	Group 3[3]	-	5.0 mg/L	76	0
Total Dissolved Solids	n/a	-	-[4]	11	[6]0
Total Hardness	n/a	-	-[4]	1671	n/a
Calcium Hardness		-		30	n/a
Total Alkalinity	n/a	-	-[4]	1660	n/a
Phosphate				5	n/a
Sulphate	n/a	250mg/L	-[4]	9	0

[1] The number of samples not having chlorine or none detected as their odour.
[2] Although there are no health-based guideline values for colour or turbidity, levels of 20 mg/L Pt-Co and 4.0 NTU respectively are generally used as guideline values.
[3] This classification refers to hypochlorite (one of the breakdown products of chlorine)
[4] Guideline value not established as the levels found in drinking water are not of health concern.
[5] The number of samples having in excess of 5mg/L free chlorine.
[6] The number of samples having in excess of 600mg/L TDS.

4.6 Metals in Drinking Water

The results for 2012 are summarised in Table 4.5.

4.6.1 Aluminium

Aluminium is the most abundant metallic element and constitutes about 8% of the earth's crust. Aluminium salts are widely used in water treatment plants as coagulants to reduce organic matter, colour, turbidity, and microorganism levels. The Aluminium is subsequently removed, but traces may persist in the treated water. The parametric value of 200 µg/L in treated water is not a health based value, but prevents the deterioration of water quality (turbidity and colour) in the distribution network due to the deposition of aluminium hydroxides. The contribution of drinking water to the total oral exposure to aluminium is usually less than 5% of the total intake. Currently, there are uncertainties as to the extent of aluminium absorption from drinking water, which depends on a number of parameters, such as the aluminium salt administered, pH (for aluminium speciation and solubility), bioavailability and dietary factors.

4.6.2 Antimony

Elemental antimony forms very hard alloys with copper, lead and tin and is often used in solders as a replacement for lead. Total exposure from environmental sources, food and drinking water is very low compared with occupational exposure. While 6 of the 1093 samples analysed for antimony contained >5.0µg/L, none of them were found to contain >20µg/L (the WHO guideline value). 5 out of the 6 exceedances in 2012 were from private sources.

4.6.3 Arsenic

Arsenic and inorganic arsenic compounds are principally used as alloying agents in the manufacture of transistors, lasers and semi-conductors. Arsenic is usually present in natural waters at concentrations of less than 1 – 2 µg/L. However, in waters, particularly ground waters, where there are sulphide mineral deposits and sedimentary deposits deriving from volcanic rocks, the concentrations can be significantly elevated. To date, arsenic has not been shown to be essential in humans and its' acute toxicity is predominantly a function of the rate of removal from the body.

The results for the year 2012 are summarised in Table 4.5. It should be pointed out that 95 % of the exceedances were from private samples.

4.6.4 Boron

Boron compounds are used in the manufacture of glass, soaps and detergents and flame retardants. Naturally occurring boron is present in groundwater, primarily as a result of leaching from rocks and soils containing borates and borosilicates. The borate content of surface water is frequently a consequence of the discharge of treated sewage effluent, arising from its use in some detergents.

In 2012, 6 samples exceeded the EU Parametric Value (Table 4.5). All 6 were from private sources. In 2011, the WHO revised the Boron Guideline Value from 1.0 mg/L to 2.4 mg/L in drinking water. 1 of the 6 samples with a boron exceedance also exceeded the WHO guideline value.

4.6.5 Cadmium and cadmium compounds

Cadmium metal is used in the steel industry and in plastics. Cadmium compounds are widely used in batteries. Cadmium is released to the environment in wastewater, and diffuse pollution is caused by contamination from fertilizers and local air pollution.

Contamination in drinking water may also be caused by impurities in the zinc of galvanized pipes and solders and some metal fittings. In 2012, no exceedances of either the EU Parametric value or the WHO guideline Value were found.

4.6.6 Chromium

Chromium is widely distributed in the earth's crust. It has found a wide range of applications, mainly due to its hardness and resistance to corrosion. It is also known for its remarkable magnetic property. It is mainly used in the manufacture of stainless steel, as it prevents corrosion and discoloration of steel. Chromium (III) or trivalent chromium is required in the human body, but in very small amounts. It is mainly required for carrying out lipid and sugar metabolism.
In 2012, only one private sample was found to exceed the Parametric Value.

Table 4.5 Summary of Metals in drinking water results for 2012

Parameter	IARC Rating	Parametric Value (S.I. 278-2007)	WHO Guideline Value	No. of Samples	No. of Exceedance (%)
Aluminium	n/a	200 µg/L	-[4]	3,925	82 (2.1%)
Antimony	Group 2B[3]	5.0 µg/L	20 µg/L	1,093	6 (0.5%)
Arsenic	Group 1	10 µg/L	10 µg/L	1,095	46 (4.2%)
Boron	n/a	1.0 mg/L	2.4 mg/L	1,073	6 (0.6%)
Cadmium	Group 2A	5.0 µg/L	3.0 µg/L	1,083	0
Chromium	Group 1[1]	50 µg/L	50 µg/L	1,083	1 (0.1%)
Copper	n/a	2.0 mg/L	2.0 mg/L	1,193	24 (2.0%)
Iron	n/a	200 µg/L	-[4]	3,910	369 (9.4%)
Lead	Group 2A	25 µg/L	10 µg/L	1,433	12 (0.8%)
Manganese	n/a	50 µg/L	-[4]	3,909	291 (7.4%)
Nickel	Group 2B	20 µg/L	70 µg/L	1,113	41 (3.7%)
Potassium	n/a	-	-[4]	4	n/a
Selenium	Group 3	10 µg/L	40 µg/L	1,077	0
Sodium	n/a	200 mg/L	-[4]	447	99 (22.1%)
Zinc	n/a	-	-[4]	1,084	4[2] (0.4%)

[1] Classification refers to hexavalent Chromium

[2] The number of zinc samples which gave results >3.0mg/L. (There is no health-based guideline value for zinc although a level of >3mg/L may not be acceptable to consumers.)

[3] Classification refers to antimony as antimony trioxide.

[4] Guideline value not established as the levels found in drinking water are not of health concern.

4.6.7 Copper

Copper is an essential human nutrient. It is also used to make pipes, valves and fittings and is present in alloys and coatings. Copper concentrations in drinking water vary widely, with the primary source most often being the corrosion of interior copper plumbing. This corrosion is greater when the water is acidic or very soft. Copper can stain laundry and sanitary ware at concentrations above 1 mg/L. Although copper can give rise to a taste in water, it should be acceptable at the WHO health-based guideline value of 2.0 mg/L. In total, 24 exceedances were detected in 2012, of which 8 were from public supplies. The other 16 exceedances were from private samples, with copper levels ranging from 2.24 – 6.05 mg/L copper.

4.6.8 Iron

Iron is the second most abundant metal in the earth's crust, and is an essential element in human nutrition. Elemental iron is rarely found in nature, as the iron ions Fe2+ (ferrous) and Fe3+ (ferric) readily combine with oxygen- and sulphur-containing compounds to form oxides, hydroxides, carbonates, and sulphides. In drinking water supplies, ferrous salts are unstable and are precipitated as insoluble ferric hydroxide, which settles out as a rust-coloured silt. Anaerobic groundwater's may contain ferrous iron at concentrations of up to several milligrams per litre without discoloration or turbidity in the water when directly pumped from a well. Staining of laundry and plumbing fixtures may occur at concentrations above 0.3 mg/L. Iron also promotes the growth of "iron bacteria", which derive their energy from the oxidation of ferrous iron to ferric iron and in the process deposit a slimy coating on the piping. Iron (particularly ferrous iron) is an essential element in human nutrition. 369 samples were found to be non-compliant with regard to iron levels. 123 of these samples contained >1,000 mg/L, and indeed 14 samples contained > 10,000mg/L iron. 77% of the exceedances were from private sources.

4.6.9 Lead

Lead is used primarily in the production of lead-acid batteries, solders and alloys. Lead affects the developing nervous systems and intellectual and behavioural

developments. Consequently, foetuses and children under six years of age are most at risk. Owing to the decreasing use of lead-containing additives in petrol worldwide and of lead-containing solder in the food processing industry, concentrations of lead in the air and food are declining, and intake from drinking water constitutes a greater proportion of total intake. Lead is rarely present in water as a result of dissolution from natural sources. Its presence is primarily due to household plumbing systems containing lead in pipes, solder, fittings or the service connection to homes. The amount of lead dissolved from the plumbing system depends on several factors, including pH, temperature, water hardness and the standing time of water in the pipes. The present parametric value of 25 µg/L (S.I. 278 of 2007) will be reduced to 10µg/L Lead in 2013. Based on this new Parametric Value, 54 (3.8%) of the samples analysed in 2012 would be non-compliant.

4.6.10 Manganese

Manganese is one of the most abundant metals in the earth's crust, usually occurring with iron. It is an essential element for humans and other animals. Its major uses include steel production, and as an oxidant for cleaning, bleaching and disinfection (as potassium permanganate). It can also be used as an additive in unleaded petrol, to increase the octane rating and reduce engine knocking. Manganese occurs naturally in many food sources, and the greatest exposure to manganese is usually from food. At levels above 0.1 mg/L, manganese in water supplies causes an undesirable taste in beverages and stains sanitary ware and laundry.

Although the WHO have not issued a guideline value for manganese, as the levels found in drinking water are generally not of health concern, a health-based guideline value of 400 µg/L has been derived. Over 82% of the samples which exceeded the EU parametric value of 50 µg/L in 2012 were from private sources.

4.6.11 Nickel

Nickel is used mainly in the production of stainless steel and nickel alloys. Food is the dominant source of nickel exposure in the non-smoking, non-occupationally exposed population. Nickel is an essential metal for human development, although its metabolism is not fully clear. Allergic contact dermatitis is the most prevalent effect of nickel in the general population. Of the 1113 samples analysed in 2012, 41 exceeded the EU parametric value of 20µg/L. 8 of these samples also exceeded the WHO guideline value of 70µg/L.

4.6.12 Potassium

Potassium is an essential element in humans. It is seldom, if ever found in drinking waters at levels that could be a concern for healthy humans, thus the WHO has not issued a health-based guideline value for potassium in drinking water. The recommended daily requirement of potassium is about 3g. Potassium occurs widely in the environment, including all natural waters, and can occur in drinking water as a result of the use of potassium permanganate as an oxidant in water treatment.

4.6.13 Selenium and selenium compounds

Selenium is an essential element for humans, and foodstuffs such as cereals, meat and fish are the principal source of selenium for the general population. Selenium plays a crucial role in controlling the effects of thyroid hormone on fat metabolism. There are indications that selenium status may be marginal in many parts of the world, including Western Europe.

Selenium and selenium compounds are used principally in glass making and as pigments (coloring agents) for paints, plastics, ceramics and glazes.

4.6.14 Sodium

Sodium salts (e.g. sodium chloride) are found in virtually all foods and drinking water. Foods are the main source of exposure. The WHO has not issued a guideline value, as the contribution from drinking water to daily intake is small. Although the taste threshold concentration of sodium in drinking water depends on the associated anion and the temperature of the solution, the average threshold is 200 mg/L at room temperature.

4.6.15 Zinc

Zinc is an essential trace element found in virtually all food and drinking water in the form of salts or organic complexes. It is vital for many biological functions such as disease resistance, wound healing, digestion and reproduction. The major uses of zinc include anti-

corrosion coatings on steel (galvanizing), construction materials, brass, pharmaceuticals and cosmetics.

Zinc imparts an undesirable astringent taste to water at the taste threshold of 3mg/L (as zinc sulphate). Water containing zinc at levels above this threshold may appear opalescent and develop a greasy film on boiling. Although levels of zinc in drinking water normally do not exceed 0.1mg/L, concentrations in tap water can be much higher, due to dissolution of zinc from household plumbing. In 2012, 78 samples contained >0.10mg/L zinc, although only 4 of these were found to contain >3.0mg/L.

4.7 Haemodialysis Water

Haemodialysis units operate water treatment systems to produce purified water for use in Dialysis machines. The laboratory performed analyses on 412 samples submitted in 2012. The parameters analysed include pH, conductivity, sodium, potassium, total hardness and a range of metals.

4.8 Private Samples

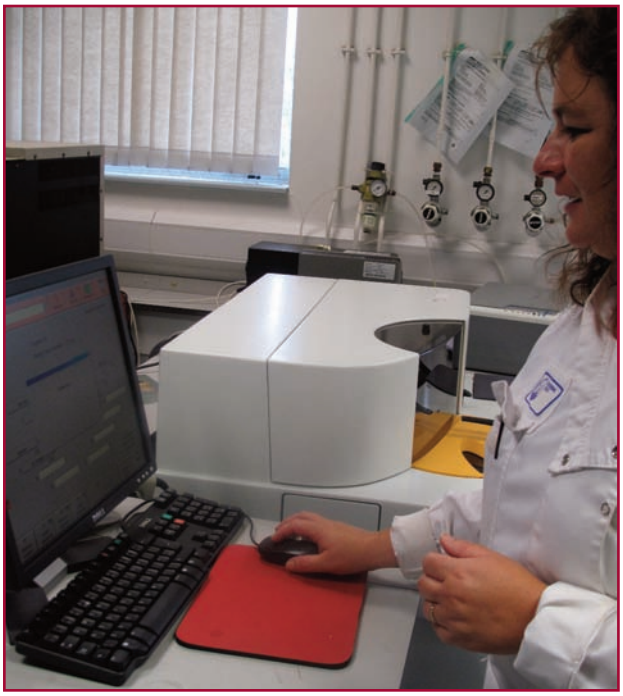
The laboratory provides a service to the general public to investigate concerns or complaints about water quality.

The number of samples tested for private individuals in 2012 was 632.

4.9 Bathing Waters

Bathing waters and inlet streams to bathing areas were tested for compliance with the Quality of Bathing Water Regulations 1992, (S.I. No. 155 of 1992) and Bathing Water Quality Regulations 2008 (S.I. No. 79 of 2008) for the 2012 bathing water season.

In 2012, 93 samples were analysed. The parameters analysed include dissolved oxygen (where the % oxygen saturation ranged from 87 to 120), pH (results ranged from 7.4 to 8.6), colour (results ranged from 2.4 to 105mg/L Pt-Co), along with presence/absence tests like mineral oils, surface active substances and tarry residues. The vast majority of samples analysed were in full compliance with the legislation. For further details of current bathing water quality, see http://splash.epa.ie/#



4.10 Pool Waters

The laboratory analyzes chlorine/bromine levels, along with total dissolved solids and alkalinity of swimming pools, jacuzzis, hot tubs and spa pools. In 2012, 261 samples were analysed. At present there is no legislation for the control of these parameters. 11 of the samples were found to contain > 5 mg/L free chlorine. 6 of these 11 were also found to contain > 10mg/L free chlorine. In the case of the total chlorine levels, 26 of the samples were found to contain > 5 mg/L total chlorine, while 7 contained > 10mg/L total chlorine. The total dissolved solids varied from 107 to 25,677mg/L, with 3 samples found to contain more than 10, 000 mg/L. The alkalinity levels varied from <10 to 599mg/L. The total Bromine levels obtained for 5 different samples ranged from <1 – 5 mg/L Br.

4.11 Effluents

The laboratory carries out a wide range of analyses on effluent samples. These samples include samples for discharge licences and suspected pollution samples. In 2012, 26 samples were analysed. The parameters tested include Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), suspended solids, fats, oils and greases (FOGs), dissolved oxygen, phosphate (both soluble and total), nitrate, nitrite, ammonia and a range of metals.

5. AIR POLLUTION MONITORING

5.1 European Legislation

Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive 2008/50/EC

This directive sets out how Air Quality should be monitored, assessed and managed, and sets limits for the following parameters:

- Sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead.
- Benzene, carbon monoxide and ozone.

Directive 2004/107/EC sets target limits for the following parameters:

- Arsenic, cadmium, mercury, nickel
- Polycyclic aromatic hydrocarbons.

5.2 National Legislation

Directive 2004/107/EC was transposed into Irish Legislation in 2009 by S.I. No. 58 of 2009. The CAFE Directive was transposed into Irish Legislation by the Air Quality Standards Regulations 2011 S.I. No. 180 of 2011 in May 2011. The country is divided into four zones for the purpose of assessment and management of air quality. Galway City is in zone C along with Limerick City, Waterford City and 18 other towns and urban areas around the country. The number of monitoring stations within each zone is also stipulated.

5.3 Laboratory Results

This laboratory operates air monitoring stations at two locations in the city, near the Bodkin roundabout (adjacent to Currys) and at Terryland Waterworks. This work is performed on behalf of Galway City Council. The parameters monitored are Sulphur Dioxide, Black Smoke and PM_{10}. Data recorded by the laboratory is reported to and published by the EPA. The EPA has made available an "Air Quality Index for Health" on their website at http://www.epa.ie/air/quality/.

5.3.1 Sulphur Dioxide

Sulphur Dioxide may enter the air from the natural environment or from the combustion of fuels which contain Sulphur. High levels of SO_2 can cause respiratory problems and lead to damage to the ecosystem. It is a major precursor to acid rain.

The regulations stipulate one SO_2 monitor in zone C. The EPA operates a mobile monitoring station in this zone. The laboratory continues to monitor for SO_2 at both stations in the city. The results for 2012 are shown in Appendix 6.

The daily limit value set for the protection of public health of 125 $\mu g/m^3$ was not exceeded at any time during the year.

5.3.2 Black Smoke

Black smoke measurement was the traditional method for determining the amount of particulate matter in the air. Legislative guidelines date back to 1980. Since Jan 2005, there is no legislative requirement to measure this parameter; however the laboratory continues to perform this measurement at both monitoring stations. Given the data that has been collected over many years, it is considered useful to continue this measurement to facilitate the observation of long term trends.

5.3.3 PM_{10}

PM_{10} is the term used to describe particulate matter which is 10µm or less in diameter. These particles may consist of a complex mixture of soot, organic, and inorganic matter. There are many sources of PM_{10}s, which include the combustion of diesel and solid fuels and dust from road traffic.

Concern about PM_{10} levels relate to the respiratory problems caused by their inhalation.

The Air Quality Regulations require monitoring at two locations in Zone C. The EPA operates one such monitoring unit in a mobile facility. The other monitoring unit is operated by the laboratory at the Bodkin roundabout monitoring station.
The Regulations set a 24 hour average limit of 50 $\mu g/m^3$ which, is not to be exceeded more than 35 times a calendar year, and a yearly average limit of 40 $\mu g/m^3$ for PM_{10}.

The 24 hour average limit was exceeded twice during the year. The highest value recorded was 62 $\mu g/m^3$. The daily average for the year was 16 $\mu g/m^3$.

The results for the year 2012 are shown in Appendix 6.

6. PHARMACEUTICALS & TOXICOLOGY

6.1 Pharmaceutical Laboratory

Since 1976, the laboratory has provided an analytical service to the Irish Medicines Board (IMB, formerly the National Drugs Advisory Board), to test drug products and medicines, as well as providing technical advice and support related to the testing of medicines.

The Pharmaceutical Section of the Public Analyst's Laboratory, Galway has been appointed an Official Medicines Control Laboratory (OMCL) under the framework of the European Directorate for the Quality of Medicines and Healthcare (EDQM) and the Council of Europe.

Role as an Official Medicines Control Laboratory (OMCL)

The function of the IMB is to protect and enhance public and animal health through the regulation of human and veterinary medicines and medical devices available for sale or manufactured in Ireland and to participate in systems designed to do the same throughout the EU.

At a **National** level, the laboratory contributes to the protection of public health and the regulatory function of the IMB by providing independent analytical data and technical advice on medicinal products that enable the IMB to make informed decisions on the quality and the compliance status of medicines.

At a **European** level, the laboratory actively participates in activities of the General European OMCL Network (collaboration between regulatory medicine testing laboratories designed to improve communication, enhance cooperation and to harmonise methods of work across the EU and other states). These activities include the testing of Centrally Authorised Medicinal Products (CAP), testing of Mutually Recognised/Decentralised Products (MRP/DCP), Market Surveillance Studies (MSS) and participation in EDQM organised Proficiency Testing Studies (PTS).

(For more information see http://www.edqm.eu/en/General-european-OMCL-network-46.html)

Analysis

Testing of Pharmaceuticals in the laboratory is carried out according to the monographs of the European Pharmacopoeia, the British Pharmacopoeia, the United States Pharmacopoeia and/or company methods.

A wide variety of tests are carried out on each sample. Tests carried out during 2012 included Appearance Testing, Packaging Check, Extractable Volume, Uniformity of Mass, pH, Identification and Assay by HPLC, Identification and Assay by UV-Vis, Uniformity of Content by HPLC, Uniformity of Dosage by UV, Dissolution (HPLC and UV), Disintegration, Water Determination by Karl Fischer, Loss on Drying, Identification by IR, Related Substances by TLC, Melting Point, Specific Gravity, Related Substances by HPLC, Preservative Content by HPLC, Enantiomeric Purity by HPLC, Ethanol by GC, Identification of Sodium, Magnesium, Calcium, Chloride ions etc.

Sample Numbers

The number of samples submitted to the laboratory in 2012 was 79. A total of 66 reports were issued, a lower number than previous years due to a reduction in staffing. Details of analytical findings may be found in the IMB 2012 Annual Report (see www.imb.ie).

Quality System
To ensure quality and comparability of results within the Network, OMCLs must operate to a quality system based on ISO/IEC 17025. The laboratory has been accredited for the analysis of Pharmaceuticals since 1991 (EN45001) and, from 2006, to the current standard, ISO/IEC 17025:2005. At the request of INAB (the Irish National Accreditation Service), a "Flexible Scope" approach has been applied to a number of tests in the laboratory.

As an OMCL, the laboratory is also required to operate to Quality Management Guidelines issued by the EDQM-OMCL Network and accepted by the EA (European Accreditation Cooperation). (See http://www.edqm.eu/en/EDQM-Publications-Quality-Management-Guidelines-86.html for more information).

Mutual Joint Audits (MJA) of OMCLs are carried out by experts from the Network, trained in Quality Management to ensure that the quality management systems of the OMCLs comply with the requirements of ISO/IEC 17025 and the OMCL Network Quality Management Guidelines. One member of staff has been trained as a MJA auditor.

The OMCL is also audited periodically by the Irish Medicines Board.

Proficiency Testing Schemes
The laboratory regularly takes part in Proficiency Testing Schemes (PTS), such as those organised by EDQM and Pharmassure.

The methods covered by PTS during 2012 included FT-IR, TLC, Assay by HPLC, Loss on Drying, pH, Melting Point, Density, Karl Fischer, Ethanol by GC, Assay by UV.

Attendances
A member of staff attended the Annual Meeting of the EDQM European Network of OMCLs held in Copenhagen in June 2012 and the Annual CAP and MRP/DCP meetings held in Sofia in November.

One staff member participated as an auditor of the French OMCL (Montpellier) under the Mutual Joint Audit Scheme of the OMCL Network in May 2012.

Attendances were funded by the Irish Medicines Board and the Council of Europe.

6.2 Toxicology Laboratory

A basic toxicology service is offered to Consultant Pathologists and Physicians, Veterinary Surgeons and members of the public, mainly for alcohol testing.

In previous years, samples have been tested for Paraquat and Strychnine. No such samples were submitted in 2012.

Ethanol Testing
The majority of samples submitted for alcohol testing are submitted by Consultant Pathologists in HSE West. Blood and urine "B-samples", taken under the Road Traffic Act, are also independently analysed for alcohol. Since October 2011, the ethanol limits for drink driving offences are 67 mg/100 ml in urine and 50 mg/100 ml in blood for experienced drivers, with lower limits for new or learner drivers and drivers of buses, lorries, trailers, work vehicles, taxis and other public service vehicles.

Twenty samples taken under the Road Traffic Act were tested during 2012, of which 16 (i.e. 80%) were above the legal limit at the time of testing.

The total number of samples tested during 2012 was 173, made up as follows;

Ethanol in Biological Fluids (Post Mortem)	103
Ethanol in Biological Fluids (Road Traffic Act)	20
Ethanol in Biological Fluids (Other)	5
Proficiency Tests	25
Ethanol (Herbal, Medicines etc.)	7
Ethanol (Foodstuffs, Misc.)	13

Quality System
The laboratory takes part in a Proficiency Testing Scheme coordinated by the LGC, where samples of blood and urine are each received on a monthly basis and analysed for ethanol. One PTS for the quantification of Ethanol in a Pharmaceutical product was also carried out.

7. COSMETICS

7.1 Cosmetics Legislation

In Ireland, the European Communities (Cosmetic Products) Regulations – S.I. No. 870/2004 gives effect to EU "Cosmetics Directive", Council Directive 76/768/EEC and amendments. The European legislation has been "recast" into a new Regulation (EC No. 1223/2009) which comes into effect from 11th July 2013. The "Tooth Whitening Directive", 2011/84/EU (transposed by S.I. 396 of 2012) was introduced in October 2012. The Directives & Regulations set out standards which must be met by the Cosmetics Industry.

7.2 Official Control and Enforcement of Cosmetics Legislation in Ireland

Official control of cosmetics in Ireland is conducted by The Irish Medicines Board (IMB) as the national Competent Authority for enforcement of cosmetics legislation, along with HSE's Environmental Health Officers and Public Analysts' Laboratories, as authorised officers and official laboratories respectively. A Cosmetics Surveillance Committee, with membership from the IMB, EHS and PALs has been established to facilitate the planning and coordination of control activities. A HSE Cosmetics Control Group co-ordinates some of HSE's activities (RAPEX* responses, sampling SOPs, training etc.) International collaboration is facilitated by the OCCL, of which we are a member. This is a network of Official Cosmetics Control Laboratories formed within the European Directorate for the Quality of Medicines and HealthCare (EDQM).

**RAPEX is the EU rapid-alert system for notifying hazards/risks associated with cosmetics and other consumer products:*
http://ec.europa.eu/consumers/safety/rapex/docs/2012_rapex_report_en.pdf
In Ireland the National Consumer Agency (NCA) administers RAPEX. www.consumerconnect.ie

7.3 Results for 2012

Table 7.1 below summarises testing of cosmetics performed in this laboratory in 2012 (see Appendix 7 for outline of the Surveillance Programme for 2012). The service is provided to authorised officers (EHOs) from three regions, HSE West, Dublin Mid-Leinster and Dublin North-East.

Cosmetics samples are submitted by the HSE authorised officers (Environmental Health Officers) to monitor compliance with the cosmetics regulations. Non-complying samples are dealt-with by the EHOs, in conjunction with the IMB as appropriate.

Table 7.1 Summary of Cosmetics Testing Results 2012

Parameter	Cosmetic Types	Samples Tested	Complying	Non-complying
Formaldehyde	Hair- Straightening products, tanning products & Personal Hygiene Cosmetics	67	63	4
XRF screen Lead & Cadmium (Pb, Cd)	Face paints, Childrens' & General make up etc.	161 (635 subsamples)[1]	161	0
ICP-MS Lead, Cadmium Arsenic (As), Chromium (Cr), Nickel (Ni)	Face paints, Childrens' & General make up etc.	50 (131 subsamples)[1]	46	4[2]
Mercury (Hg)	Creams, Soaps etc. (Whitening)	44	44	0
Antimony (Sb)	Eye-liner	1	1	0
Diethylene Glycol	Toothpaste	45	45	0
Hydrogen Peroxide	Tooth-whitening products, toothpaste	75	60	15
p-Phenylenediamine	Hair Dyes	30	27	3
Hydroquinone	Creams, Soaps etc. (Whitening)	47	43	4
General Labelling Examination	Make up, face paints, soaps, shower gels, creams etc	181	111	70
Salicylic Acid, Sorbic acid Benzoic acid 4-hydroxybenzoic acid	Children's bubble bath, baby lotion, sun lotion etc	28	28	0

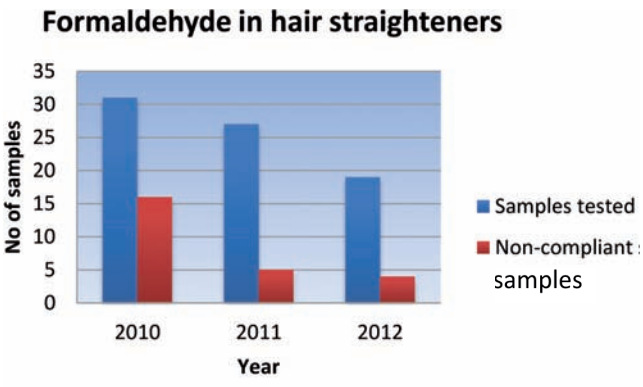
[1] *161 samples (635 sub-samples) were screened by XRF for lead & cadmium. Of the 161 samples, 50 were further tested by ICP-MS for: Lead & Cadmium (131 components), Arsenic (107 components), Chromium and Nickel (129 components).*
[2] *4 samples contained excessive Nickel.*

7.3.1 Formaldehyde in Hair-straighteners, etc

General: Formaldehyde, formalin, and methylene glycol solutions are forms of formaldehyde and they can be treated as one in terms of safety and toxicity. These solutions can release formaldehyde gas under certain conditions. Formaldehyde has high inhalation toxicity and is also a known skin 'sensitiser'. EU cosmetics legislation (see Section 7.1) regulates formaldehyde strictly, setting a maximum limit of 0.2% for formaldehyde in general cosmetics products. All finished cosmetics products containing formaldehyde (or other preservatives which release formaldehyde) must be labelled with the warning *"contains formaldehyde"* where the concentration of the formaldehyde exceeds 0.05%. In 2010, due to the discovery of excessive formaldehyde in a hair-straightening salon product, the laboratory introduced testing for formaldehyde - see 2011 annual report: http://www.hse.ie/eng/services/Publications/corporate/Western%20Region%20PA%20Lab%20annual%20report%202011.pdf

7.3.1.1 Results in 2012:

67 cosmetic samples consisting of hair-straighteners/smoothing products (19), tanning cosmetics (15), personal hygiene products (21) and moisturisers/make up (12) were tested in 2012. Formaldehyde results ranged between < 0.04% and 9.2 %, with 4 samples (3%, 3%, 2.7%, 9.2 %) exceeding the statutory limit of 0.2%. The offending products were 3 samples of a hair straightener and one crème defrizzant product. The laboratory issued four Cosmetics Hazard/Contamination Reports to the EHOs and IMB. The problem of usage of excessive formaldehyde in hair-straighteners appears to have decreased somewhat from 2010 levels (non-compliances 2010: 52% (16/31), 2011:19% (5/27), 2012: 21% (4*/19) * *this includes 3 samples of the one product*).



7.3.2 Heavy Metals

Lead and Cadmium: 161 samples (childrens' face paints, childrens' general cosmetics, adult products) were tested here in 2012. Many of these samples were multi-component cosmetics sets consisting of different sub-sample types and colours. 635 sub-samples in total were tested.

A Lead (Pb) limit of 20mg/kg and a Cadmium (Cd) limit of 5mg/kg (limits developed by BfR/Germany) have been adopted in HSE as an interim 'limit'. In 2012, for the first time, none of the tested sample components exceeded either the Pb or Cd limit. **These results represent a great improvement in the situation compared to previous years.**

Non-complying results for Lead and Cadmium in Cosmetics.

Year	No of Samples Tested	No of sub components	No. of Non-complying components
2008	162	798	96
2009	226	946	34
2010	260	1,020	4
2011	181	680	12
2012	161	635	0

50 samples were also tested for Arsenic, Chromium and Nickel. Arsenic results ranged from < 0.5 to 34 mg/kg (highest level found in a seaweed product). Chromium levels ranged from < 0.5 to 47 mg/kg. Excessive Nickel was found in 4 samples, with results ranging from 59 to 116 mg/kg.

The Table below summarises the range of Nickel levels found in 2012.

Nickels (Ni)	
Results Range (mg/kg)	Number of Components
<1.2	61
1.2 - 5.0	46
5.1 - 20	16
20-50	2
>50	4
TOTAL	**129**

Whereas there are no specific limits for Nickel in cosmetics, cosmetics products must (a): be safe and (b): must not contain prohibited substances unless "… technically unavoidable in good manufacturing practice". To minimise the risk of sensitisation (to Nickel) in sensitive

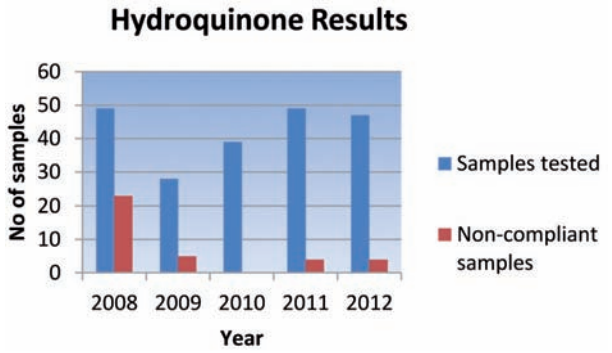
persons Nickel levels in cosmetics should be kept low. Some studies report 5 mg/kg as a 'threshold' for leave-on cosmetics. It is of note that the vast majority (107/129) of components contain Nickel at levels below 5 mg/kg, indicating that manufacturers can, and do, achieve such levels. The significance of the 18 intermediate, elevated results (above 5 mg/kg) requires an assessment. The results have been reported and also notified to the IMB.

7.3.3 Hydroquinone and Mercury in Creams, etc.

Hydroquinone products are popular for their skin-lightening properties in Asian and African cosmetics markets and Hydroquinone is sometimes found in cosmetic products sold in "ethnic" shops. These products are generally topical in nature (e.g. creams, oils, lotions) and are applied to lighten areas of darkened skin. RAPEX reports involving hydroquinone are relatively common (on a European level).

Hydroquinone (at any level) is prohibited for use as a skin-lightening agent. Mercury (as various mercury compounds) is also occasionally used in skin-whitening products, even though such use is prohibited.

During 2012, 4 of the 47 (8.5%) 'whitening/lightening' samples tested here were found to contain hydroquinone. These results compare to 47% (23/49), 18% (5/28), 0% (0/39) and 8.0% (4/49) for 2008, 2009, 2010 and 2011 respectively, highlighting an ongoing, albeit improving, issue.



44 of the samples were also tested for mercury, and all were compliant. Non-complying mercury results for skin whitening products have been sporadic with 0% (0/9), 4.5% (1/22), 0% (0/43) and 8.3% (4/48) for 2008, 2009, 2010 and 2011 respectively.

7.3.4 para-Phenylenediamine in Hair Dyes

In 2012, 30 samples of hair dyes were tested for para-phenylenediamine (PPD), a permitted hair colourant with allergic properties and an upper limit of 2%. Three of the samples exceeded the new limit of 2% para-phenylenediamine which came into effect on July 15th 2010 (Directive 2009/130/EC).

7.3.5 Diethylene Glycol in Toothpastes

Testing of 45 toothpastes in 2012 yielded no exceedances of the legislative limit of 0.1%, European Communities (Cosmetic Products, Amendment) Regulations 2009, (S.I. 191 of 2009).

7.3.6 Hydrogen Peroxide

"Tooth-whitening" products, toothpastes, gels, etc., and related products are currently in widespread use by the public. Hydrogen peroxide is permitted in "oral hygiene products" up to a maximum limit of 0.1% (see SI 270 of 2004, Schedule 3, Part 1 (12)). A programmed HSE survey of 75 commercially available products (toothpastes, gels, dental stain removers, etc.) was carried out in 2012. 15 of the 75 products tested in 2012 exceeded the hydrogen peroxide limit of 0.1%. The range of peroxide results found was 0.13 to 15.4%. October 31st 2012 is the date at which newly set limits (0.1% peroxide, "Oral products…" available generally to public) for tooth-whitening products came into force (see Directive 2011/84/EU, transposed by S.I. 396 of 2012). Under the new legislation the 15 products above must not be sold to the public, some may only be sold to dental practitioners and any with a peroxide level of >6.0% would be completely prohibited (9 samples were >6.0%).

7.3.7 General Labelling of Cosmetics

181 samples were examined in 2012 for compliance with the labelling requirements in the Cosmetics Regulations (S.I. No.870 of 2004). 70 (39%) samples were found to be non-compliant; these non-compliances related to the omission of some or all of the following labelling information: Responsible Persons (RP) address, 'Period after opening' (PAO) symbol, date of minimum durability, batch number and list of ingredients.

7.3.8 Other Cosmetics Testing

7.3.8.1 Salicylic, Sorbic, Benzoic and 4-Hydroxybenzoic Acid

These compounds are permitted preservatives in Cosmetics as per Commission Directive 76/768/EEC (as amended by Comm. Directive 2007/17/EC), at varying levels depending on the product type and intended use. There are possible allergenic risks with the use of such preservatives with susceptible persons, who would often purchase cosmetics labelled as "preservative / allergen free". 28 samples, primarily children's bath/shower products, suncare products as well as other "sensitive" products, were tested; no legislative exceedances were found.

7.3.8.2 Ionising radiation

In 2012, 13 samples of children's cosmetics (consisting of 113 separate components) taken from the 2008 to 2011 routine surveys were screened for ionising radiation*. All the samples were considered satisfactory. Many of the samples tested had previously been shown to contain excessive Lead levels (1100 to 8200 mg/kg).

*This work was carried out in the physics department of NUIG by Dr. Elaine Connolly & Prof. Will Van der Puten. The number of gamma rays emitted from the samples was counted using a sodium iodide detector; the counts did not exceed background levels.

7.4 Summary of Cosmetics Hazard/Contamination Reports issued in 2012

Cosmetics samples are tested to ensure their safety and compliance with specific or general safety standards. Cosmetics Hazard/Contamination Reports are issued by the laboratory when the results of analysis indicate a particular hazard. Such reports require risk analysis to assess if the hazard represents a significant risk to consumers. In 2012, the laboratory issued 6 Cosmetics Hazard/Contamination reports concerning: formaldehyde (4) and hydroquinone (2).

7.5 Overall Summary

The recent surveillance results indicate several improvements in the quality of cosmetics on the Irish market. In particular the levels of Lead and Cadmium appear to have decreased substantially from 2008. A likely factor in this reduction is the targeted HSE surveillance of the cheaper, imported cosmetics (often Asian produce from low-cost outlets) produced for children, and the enforcement actions, etc., of the Environmental Health Officers (EHOs). Non-compliances in the areas of mercury, hydroquinone, formaldehyde and diethylene glycol are also down overall. There continues to be some incidences of non-compliances which are dealt with by the EHOs in conjunction with IMB as appropriate. The 2012 results will inform future surveillance programmes.

8. MISCELLANEOUS TESTING

Thirteen 'miscellaneous' samples were received in 2012. These included:

- 5 samples of insects for identification
- 1 sample of a deposit from a boiler
- 1 sample of material from inside a coolant pipe
- 2 private samples for metals analysis (water & fish oil capsules)
- 1 sample of rodent droppings from a restaurant
- 1 suspected sample of rodent droppings
- 1 musical instrument lacquer sample for lead analysis
- 1 sample of blood for mercury analysis

9. QUALITY ASSURANCE

The accuracy and quality of results issued to customers of the Public Analysts' Laboratory is ensured by having an internationally recognised quality assurance system in place which covers all aspects of the laboratory's work. This laboratory is accredited to the international standard ISO 17025:2005.

9.1 Accreditation

Accreditation is a formal recognition of a laboratory's competence to carry out specific tests or types of tests. Accreditation gives customers of a laboratory confidence, through ensuring consistently high standards in the quality of the service.

The current relevant standard for this laboratory is ISO/IEC 17025 'General requirements for the competence of testing and calibration laboratories'. The standard contains detailed requirements for both the management of laboratory operations and technical aspects such as method validation, measurement traceability and measurement uncertainty. Gaining

accreditation to ISO 17025 means that this laboratory can demonstrate to its customers that it has been successful in meeting the requirements of an international accreditation standard. Member states of the EU have established a network of national accreditation bodies which seeks to ensure that the competence of all EU laboratories are assessed to the same principles. In Ireland, the Irish National Accreditation Board (INAB) is the body with responsibility for awarding accreditation, in accordance with the relevant ISO 17000 series of standards and guides.

This laboratory has continuously added to its list of accredited tests, and now is accredited for a wide range of analytes, using a variety of testing procedures in Food, Water, Cosmetic and Pharmaceutical products. A full list of our accredited tests is available on the INAB website http://www.inab.ie/directoryofaccreditedbodies/laboratoryaccreditationtesting/009T.pdf

INAB Surveillance Visit

The laboratory receives regular surveillance and re-assessment audits from INAB. Their purpose is to determine whether a laboratory is continuing to comply with the ISO 17025 and INAB Regulations. Our annual INAB surveillance audit took place in November 2012. This year we extended our scope by achieving flexible scope accreditation for trace elements in foods by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). Flexible scope will allow us to increase the range of elements tested in food, as required, following suitable internal validation.

9.2 Proficiency Testing

As part of our external quality control, the laboratory participates in a range of international proficiency testing schemes. These schemes involve receiving and analysing test samples with unknown concentrations of analyte. The results are submitted to the scheme organisers who then inform the laboratory how they have performed in the scheme. Participation in the testing schemes enables the laboratory to monitor the quality of its measurements and can demonstrate our competency to customers and accreditation bodies.

In 2012 we participated in a large number of proficiency testing rounds, covering a wide range of parameters and analytical procedures (see table on following page). The proficiency testing schemes in which we participate include schemes organised by:

- FAPAS: The Food and Environment Research Agency, http://www.fapas.com
- CHEK: Food and Consumer Product Safety Authority, The Netherlands.
- Quasimeme: Quality Assurance of Information for Marine Environmental Monitoring in Europe"
- QDCS: Quality in Dairy Chemistry, Laboratory of the Government Chemist (LGC), U.K.
- AQUACHECK: Proficiency testing scheme for water testing, LGC, U.K.

http://www.lgcpt.com/productviewnarrow.aspx?SchemeID=77

- Pharmassure: Proficiency testing for Pharmaceuticals, LGC, U.K.
- EDQM: European Directorate for the Quality of Medicines and Health Care.
- LGC-Tox: for ethanol in biological fluids.

10. STAFF TRAINING

The need for staff training and on-going professional development is emphasised in both the Service Contract with FSAI and various specific legislation relating to food control. Both internal and external training is offered to staff in the use of Analytical Methods and Instrumentation, Health & Safety (including Manual Handling), Information and Communication Technology and training organised by HSE (including Managing Attendance). Staff attended seminars on Food Allergens, Food Labelling, and Human Bio-monitoring (organised in conjunction with the DEMOCOPHES project – see Section 7) as well as meetings with other official laboratories. In-house induction and HSE induction training is provided for all new staff. General management training has also been undertaken. Due to budgetary constraints staff training has continued to be significantly reduced this year. Most of the staff training received was on a budget neutral basis. Unfortunately, it was not possible to attend other important training courses, which could lead to further improvements and developments in the service, due to the significant expense involved.

Proficiency Testing Schemes (Food Testing) 2012

Scheme	Analyte	Matrix Tested
QDSC	Alkaline Phosphatase (Pasteurisation)	Milk
QDSC	Antibiotic Residue (Delvo Test)	Milk
FAPAS	Apparent Alcoholic Strength	Whiskey
FAPAS	Ash	Prepared Meals, Canned Meat
Quasimeme	Domoic & EpiDomoic Acids (shellfish toxins)	Shellfish
FAPAS Butterfat	Fat (Gerber) and Fat (Rose Gottlieb)	Milk
FAPAS	Fat (Werner-Schmid)	Prepared Meals, Canned Meat
National Measurement Institute (NMI) Australia	Folic Acid	Bread, Flour
QDCS	Freezing Point Depression	Milk
FAPAS	Gluten	Infant Formula, Cake Mix, Snack Food
FAPAS	Histamine	Fish and Fish Products
FOBS	Microscopy/ Identification	Complaint Samples
FAPAS	Moisture	Prepared Meals, Canned Meat
FAPAS	Nitrate/ Nitrite	Meat
FAPAS	Nitrogen (Protein)	Canned Meat
FAPAS	Peanut	Chocolate
FAPAS	pH (Acidity)	Tomato Sauce
FAPAS	Potassium	Energy Drink
FAPAS	Refractive Index (Soluble solids as Sucrose)	Tomato Sauce
FAPAS	Sodium	Prepared Meal, Tomato Sauce, Canned Meat
QDSC	Titratable Acidity	Milk
QDSC	Total Solids	Milk
FAPAS	Trace Metals (Arsenic, Lead, Chromium, Cadmium, Selenium)	Chilli Powder, Infant Formula
CHEK	Sorbic Acid	Wine
CHEK	Sulphur Dioxide (Preservative)	Wine
FAPAS	Sulphur Dioxide (Preservative)	Meat, Fruit

Proficiency Testing Schemes (Pharmaceutical Testing) 2012

Scheme	Analyte	Matrix Tested
Pharmassure	Density	Orange Oil, Cottonseed Oil, Glycerol, Caster Oil
Pharmassure	FT-IR Identification	Pharmaceuticals
Pharmassure	GC -Assay	Ethanol Solution
Pharmassure	HPLC – Assay & Identification	Pharmaceuticals
Pharmassure	Karl Fischer Titration	Pharmaceuticals
Pharmassure	Loss on Drying	Pharmaceuticals
EDQM	Loss on Drying	Pharmaceuticals
Pharmassure	Melting Point	Saccharin, Nitrotoluene, Acetanilide.
Pharmassure	pH Testing	Buffered Solutions
Pharmassure	Thin Layer Chromatography (Related Substances)	Pharmaceuticals
Pharmassure	UV absorbance	Phenolphthalein
EDQM	UV Assay and Identification	Pharmaceutical Products
Pharmassure	Volumetric Titration	Test Solution

Proficiency Testing Schemes (Water Testing) 2012

Scheme	Analyte	Matrix Tested
AQUACHECK	Alkalinity, Hardness, Colour, Turbidity, Conductivity, pH, Fluoride, Chlorine	Water
AQUACHECK	Nitrate, Nitrite, TON, Ammonia	Water
AQUACHECK	Trace Metals (Antimony, Aluminium, Arsenic, Boron, Cadmium, Chromium, Iron, Manganese, Copper, Lead, Nickel, Selenium, Zinc)	Water
AQUACHECK	Volatile Organic Compounds	Water

Proficiency Testing Schemes (Cosmetic and Miscellaneous Testing) 2012

Scheme	Analyte	Matrix Tested
LGC Cosmetic Testing	Metals (Arsenic, Cadmium, Chromium, Lead, Nickel)	Lipstick, Cosmetic Powder
DemoCophes EQUAS	Cotinine and Creatinine	Urine
LGC Toxicology Scheme	Alcohol	Blood, Urine

11. MEETINGS/COMMITTEES etc.

FSAI:
- Liaison Meetings with Public Analysts' Group
- Service Contract Meetings with Western Area HSE
- Allergen Labelling & Analysis Working Group
- EHO-PAL Liaison Group
- FSAI-EHO-PAL National Group on Sampling Programmes
- Molluscan Shellfish Safety Committee
- Legislation Committee (FSAI-Dept. of Health & Children…) & Sub-Committees
- Bottled Water Guidance Note Drafting Committee
- Scientific Sub-committee [Additives, Contaminants..]

***safefood*/HSE:** IT system for Laboratory Service
Cosmetics Control Group HSE and Cosmetics Safety Steering Group (IMB, HSE…)
OCCL: Organisation of Cosmetics Control Laboratories (EU EDQM)
Zoonoses Committee [Western Region]
I.A.P.A.L.: The Irish Association of Public Analysts' Laboratories
Fluoridation Committee [HSE West]
HSE/County Council Water Group Meetings
HSE Water Group Meetings
Chemistry Network of Accredited Laboratories: Forum for Quality Managers from INAB Accredited Chemistry Laboratories
Irish Medicines Board: Liaison Meetings
EDQM European Network of Official Medicines Control Laboratories: Annual Meeting, CAP meeting
NSAI: Working group on the revision of Irish Standard 432 (I.S. 432:2009) on bottled ground water
Community Services Management Meetings

12. INFORMATION AND COMMUNICATION TECHNOLOGY

The LabWare laboratory information management system (LIMS), funded nationally by Safefood has been 'live' since 01 January 2007. Further development of the LIMS was planned in 2010 - 2011 (connection to the EPA Environmental Data Exchange Network (EDEN)) but this project was paused while a new national information technology system for the Environmental Health Services in the HSE is procured. Once this is in place, it is anticipated that the HSE Public Analysts Laboratories and Public Health Microbiology laboratories will be connected to both the EHS and EDEN systems via the LabWare LIMS.

As the LIMS has been in constant use for more than 6 years it is now becoming necessary to update both the 'core' LIMS software and the ancillary Database system upon which the LIMS 'sits'. The current version of Microsoft SQL Server (SQL Server 2000) that contains the laboratories data; and that is hosted on the server in the laboratory; is no longer supported by Microsoft. There is a need therefore to upgrade both the LIMS and database software to the current or at least more up to date versions. It has also been proposed that the databases for the PAL and OFML services would be hosted in a HSE central server farm. These updates and changes have been presented to the HSE management and are under consideration.

Appendix 1. Outline Summary of HSE West Food Sampling-Analysis (Chemical) Programme for 2012

Jan 10 – 15		**Herbs, Spices, Seasonings** 30 Food Irradiation screening, Pb/Cd)		
Jan 16 – 31	**Sausages** 40 Local Processors & Other Irish Processors & Imports (SO_2)		**Low- or Reduced-Salt Foods** 40 (Na/K)	**Folic Acid Method Development**
Feb. 1 – 14	2x9 **Various Port-level Fish** (Biogenic Amines)	**'Peanut-free' Foods** 35 (Peanut Protein)		
Feb. 15 – 29		25 **Scrombroid fish** (Biogenic amines)	25 **Lactose- free Foods** (Lactose)	**FSAI Salt Reduction Programme** 75 Cheese/Cheese Products (Na/K)
Mar. 1 – 15	**Breads** 40 (Na/K) (FSAI- requested consumer survey)		**Various Sulphited Foods** 35 Local Processors (SO_2)	**FSAI** 50-100 **Folic Acid**
Mar. 16- 31		**Imported Dairy products etc** 20 (ALP, Inhi'y subs, Adulteration….)		**FSAI Salt Reduction Programme** 100 **Processed Meats** (Na/K)
Apr. 1- 15	**Brine solutions from DAFM approved plants** ~6 (Nitrate & Nitrite)	**Local/Regional Produce with labelled Salt/Sodium values** 30 (Na/K, labelling, Gen.Exam.etc)		
Apr. 16 – 30		**Locally Manufactured produce** 36 **Gluten-free Foods** (Gluten, Labelling etc)	**Cured Meats** 40 **HSE-controlled Premises** (Nitrite/Nitrate)	**FSAI Salt Reduction Programme Ready Meals** 75 (Na/K)
May 1 – 15		35 **General "Soya-free" Foods** (Soya Protein)	**Imported Seafood** 30 (Pb/Cd, Labelling…)	**Imported Shellfish** 10 (DSP/AZA, ASP, Pb/Cd)
May 16 – 31	35 **Meat Products** Mainly Local Processors (SO_2)	**Foods Labelled as "Milk-free"** 35 (Milk Protein/Casein etc)	**Pub-level Spirits** 20 (Alcoholic strength)	
June 1 – 15	1x9 **Various Port-level Fish** (Biogenic Amines)		~40 **Infant Formula, Follow-on Formula, Premature Infant Formula. Allergen/Nutritional…. Survey** (Allergens (G,PP,L…), Folic Acid, Labelling…..)	
June 16 – 30		**Scrombroid fish etc** 25 (Biogenic amines)		**FSAI Salt Reduction Programme** 75 **Cooking Sauces** (Na/K)

Appendix 1. Outline Summary of HSE West Food Sampling-Analysis (Chemical) Programme for 2012 (continued)

July 1 – 15	2x9 **Various Port-level Fish** (Biogenic Amines)	35 **Gluten-free Foods** (Gluten)		
July 16 – 31		35 **'Peanut-free' Foods** (Peanut Protein)		
Aug. 1 – 15	3x9 **Various Port-level Fish** (Biogenic Amines)	**Various Sulphited Foods** 25 (SO_2, Pb/Cd)		
Aug. 16 – 31	**Brine solutions from DAFM approved plants** ~6 (Nitrate & Nitrite)	25 **Scombroid Fish** (Biogenic Amines)	30 **Food Supplements Survey** (Folic Acid, Minerals etc.)	
Sept. 1 – 15	3x9 **Various Port-level Fish** (Biogenic Amines)		**HSE-controlled Manufacturing Premises Survey** ~25 Survey provisional - subject to developments in HSE (EHS OFMLs) and FSAI	**Shellfish – imports etc** 10 (AZA, DSP, ASP)
Sept. 16 - 30		25 **Minced Meats/Beefs** (Fat Content, Adulteration)	~20 **Infant Formula** DFAM Samples (Folic Acid.....)	**FSAI Salt Reduction Programme Breakfast Cereals** 150 (Na/K)
Oct. 1 - 15	**Brine solutions from DAFM approved plants** ~6 (Nitrate & Nitrite)	**Herbal Teas, Seeds, Noodles** 30 (Irradiation, Labelling/Gen. Exam)	35 **'Peanut-free' Foods** (Peanut Protein)	50-100 **FSAI** (Folic Acid)
Oct. 16 – 31		**Ethnic Foods** (General Exam. & labelling....) 25	35 **Gluten-free produce** (Gluten)	
Nov. 1 – 15	1x9 **Various Port-level Fish** (Biogenic Amines)		**Weaning Foods** 35 (Folic Acid, Na/K, Other Nutritional, General/ Nutritional labelling, etc.)	
Nov. 16 – 30		25 **Raw, unprocessed meats** (ABS)		
Dec. 1 – 15	2x9 **Various Port-level Fish** (Biogenic Amines)		**Christmas Bakery Products** 25 (Na/K, General Examination & Labelling….)	
Dec. 16 – 31	**Food Complaints, Food 'Alerts' etc., 'suspect' samples, Follow-up samples etc**			
Jan - Dec	**-Bottled waters from manufacturing premises – CHECK or AUDIT suite – approx 104 samples – HSE west production -Food Complaints, Food 'Alerts' etc., 'suspect' samples and tap waters from food premises (where relevant) -'Inspection Support' samples from Manufacturing/ Processing etc. premises when required, and in consultation with lab.**			

Appendix 2: Routine Official samples received from H.S.E., for the period from 01/01/2012 to 31/12/2012
Appendix 2: Food Complaint samples (from H.S.E. & the Public) from 01/01/2012 to 31/12/2012

Food Category	No. of Samples with Infringements		Chemical / Physical Contamination		Compositional		Labelling (1) & Presentation		Other		No. of Samples Received		% with infringements	
	Routine	Complaint	Routine	Complaint	Routine	Complaint	Routine	Complaint	Routine	Complaint	Routine	Complaint	Routine	Complaint
1. Dairy Products	7	8	0	5	0	2	7	1	0	0	41	11	17.07	72.73
2. Egg and Egg Products	0	0	0	0	0	0	0	0	0	0	3	2	0.00	0.00
3. Meat and Meat Products, Game and Poultry	21	6	0	5	10	0	11	1	0	0	180	12	11.67	50.00
4. Fish, Shellfish and Molluscs	12	9	3	9	0	0	9	0	0	0	127	12	9.45	75.00
5. Fats and Oils	0	0	0	0	0	0	0	0	0	0	1	0	0.00	0.00
6. Soups, Broths and Sauces	3	2	0	1	0	1	3	0	0	0	49	2	6.12	100.00
7. Cereals and Bakery Products	29	10	1	7	0	3	28	0	0	0	139	16	20.86	62.50
8. Fruit and Vegetables	11	5	1	4	6	1	4	0	0	0	66	8	16.67	62.50
9. Herbs and Spices	7	0	0	0	0	0	7	0	0	0	28	1	25.00	0.00
10. Non-Alcoholic Beverages	11	13	0	5	4	8	7	0	0	0	162	25	6.79	52.00
11. Wine	0	0	0	0	0	0	0	0	0	0	2	1	0.00	0.00
12. Alcoholic Beverages (Other than Wine)	0	1	0	1	0	0	0	0	0	0	26	2	0.00	50.00
13. Ices and Desserts	0	1	0	0	0	1	0	0	0	0	5	1	0.00	100.00
14. Cocoa and Cocoa Preparations, Coffee & Tea	5	0	0	0	0	0	5	0	0	0	16	0	31.25	0.00
15. Confectionery	4	4	0	4	0	0	4	0	0	0	64	4	6.25	100.00
16. Nuts and Nut Products, Snacks	0	4	0	4	0	0	0	0	0	0	10	6	0.00	66.67
17. Prepared Dishes	11	12	0	10	1	2	10	0	0	0	35	17	31.43	70.59
18. Foodstuffs Intended For Special Nutritional Uses	7	2	0	1	4	1	3	0	0	0	226	7	3.10	28.57
19. Additives	0	0	0	0	0	0	0	0	0	0	1	0	0.00	0.00
20. Materials & Articles Intended to come into contact with Foodstuffs	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
21. Others	7	8	0	5	2	1	5	2	0	0	45	12	15.56	66.67
Totals	**135**	**85**	**5**	**61**	**27**	**20**	**103**	**4**	**0**	**0**	**1226**	**139**	**11.01**	**61.15**

Note 1: Refers to labelling infringements under the Dept. of Health enacted legislation only.

Appendix 3: Outline of Principal Official Surveillance of Foodstuffs in Ireland (ROI).

Department/Agency Authority	Principal Food Categories	Principal Sampling Stage(s)	Principal Sampling Officers	Principal Official Laboratories[1]	Test Parameters and Groups
Department of Agriculture Food & the Marine (DAFM)	Foods of Animal Origin (Meats, etc.) Fruit/Vegetables, etc. Milk/Dairy, etc. Fish, Shellfish, etc.	'Production' etc. Meat Plants, Farms, etc. Dairy Plants, etc. Fishing Boats, Processing plants, Fish Farms, etc.	DAFM Veterinary Officers & Agricultural Officers, etc. Sea Fishery Officers etc. (Sea Fisheries Protection Authority (SFPA))	Veterinary Public Health Regulatory Laboratory Ashtown Food Research Centre Labs State Laboratory Pesticides Laboratory Dairy Science Labs Marine Institute (also BIM Lab)	Microbiology & Veterinary Residues, Contaminants, etc. Pesticides etc., Microbiology, Residues etc., Microbiology (incl. virology), Marine Biotoxins, Residues & Contaminants etc.
Health Service Executive (HSE)	All foodstuffs (Food, Drink, Food-contact Materials)	All stages Manufacturing, wholesale, Retail, Catering, Import etc.	HSE Environmental Health Officers	HSE Food Microbiology Labs & **HSE Public Analysts' Labs[2]**	Microbiology Contaminants, Complaints, Compositional & Additives, Nutritional, Labelling, etc.
Local Authorities	Meat, Brines, Dairy…	'Production' plants, etc.	Veterinary Officers, etc.	Local Authority Labs, Dept. of Agriculture Labs, etc.	Microbiology, Residues, etc.
Radiological Protection Institute of Ireland (RPII)	Marine products, Meats, Others	Any stage	Various	Radiological Protection Institute of Ireland	Ionising Radiation
FSAI (surveys)	Any Foodstuff	Any stage	FSAI, etc.	Dependent on Testing Parameter(s) and laboratory capacity	'New' Parameters of concern. Any Other Parameter.

[1] The Irish Equine Centre performs official testing on behalf of DAFM. Some testing is also performed by the Veterinary Laboratory Service, including the Central Veterinary Research Laboratory, and by the Interim Salmonella Reference Laboratory, UCHG, Galway.
- see Directory of Food Safety Laboratory Services, Safefood, for more details on food testing labs in Ireland.

[2] The Public Analysts' Laboratory Service operates as a single, co-ordinated service, with a system of national Specialisations and Core Testing in place (and ongoing).
***Core Testing:** Microscopy/Complaints; General Examination/labelling etc.*
*Examples of **Specialisations** include:*

- ***Dublin PAL:*** *Mycotoxins (Aflatoxins etc); Food Contact Materials (Furan, Aromatic amines, ESBO, ITX etc.); Food Processing Contaminants (Acrylamide, Melamine, PAHs, Benzene…) etc*
- ***Cork PAL:*** *Vitamins (A,B,C.D,E..) and Other Compositional/Nutritional testing; GMO Testing; Pesticides (Infant Formulae..); Congeners (spirits etc.); Oil Profiles (Saturated/Unsat'd etc.); Food Irradiation screening; Food Adulteration etc*
- ***Galway PAL:*** *Food Allergens (Gluten, Peanut protein etc); Folic Acid; 'Salt' (Na/K) national surveys; Other Compositional/Nutritional testing; VOCs in Drinking & Bottled Waters; Marine Biotoxins; Food Irradiation etc.*

A Service is also provided to Agencies other than HSE.

Appendix 4: Annual Results Food Contaminants etc. PAL Galway (results for all foods tested)

	Non-complying or "Excessive" Samples/Total Samples tested										
Parameter	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Aflatoxins	3/133 2.3%	4/250 1.6%	8/231 3.5%	6/233 2.6%	13/220 5.9%	8/220 3.6%	1/149 0.7%	3/115 2.6%	0/49 0%	1/26 3.8%	N/T
Fumonisins	1/72 1.4%	1/86 1.2%	1/44 2.3%	0/52 0%	0/51 0%	0/24 0%	1/10 10.0%	3/40 7.5%	0/21 0%	N/T	N/T
Ochratoxin A	3/88 3.4%	0/83 0%	2/109 1.8%	1/109 0.9%	N/T	N/T	N/T	N/T	N/T	N/T	N/T
Patulin	0/27 0%	0/4 0%	N/T	0/52 0%	N/T	N/T	N/T	N/T	N/T	N/T	N/T
Lead (Pb)	3/249 1.2%	0/170 0%	0/330 0%	1/248 0.4%	1/143 0.7%	2/479 0.4%	2/512 0.4%	4/422 0.9%	0/390 0%	0/207 0%	0/128 0%
Cadmium (Cd)	0/249 0%	0/120 0%	0/273 0%	0/205 0%	0/130 0%	2/403 0.5%	0/512 0%	1/415 0.2%	4/381 1.0%	0/204 0%	0/129 0%
Mercury (Hg)	2/47 4.3%	0/96 0%	2/140 1.4%	0/176 0%	0/74 0%	0/54 0%	0/20 0%	4/169 2.4%	2/233 0.9%	0/38% 0%	0/80 0%
Arsenic (As)	1/99 1.0%	0/188 0%	0/154 0%	0/42 0%	0/47 0%	0/163 0%	0/238 0%	0/51 0%	0/67 0%	0/7 0%	0/34 0%
Benzo-[a]-pyrene	9/152 5.9%	4/282 1.4%	2/84 2.4%	2/75 2.7%	2/98 2.0%	19/102 18.6%	0/115 0%	0/65 0%	0/57 0%	N/T	N/T
3-MCPD	1/94 1.1%	0/90 0%	0/62 0%	0/35 0%	2/73 2.7%	0/96 0%	0/30 0%	N/T	0/18 0%	0/33 0%	N/T
Nitrates	N/T	N/T	N/T	0/42 0%	0/39 0%	0/35 0%	0/3 0%	N/T	N/T	N/T	N/T
Marine Biotoxins: **DSPs**	0/133 0%	0/103 0%	0/99 0%	1/52 1.9%	0/21 0%	0/11 0%	0/20 0%	1/22 4.5%	0/14 0%	0/15 0%	0/13 0%
AZAs	0/143 0%	0/108 0%	0/108 0%	0/47 0%	0/20 0%	0/29 0%	0/20 0%	1/23 4.3%	0/14 0%	0/8 0%	0/13 0%
ASPs	0/140 0%	0/108 0%	0/65 0%	0/41 0%	0/23 0%	0/39 0%	0/36 0%	0/30 0%	0/30 0%	0/18 0%	0/15 0%
Gluten **Gluten Free (GF) Foods**	8/278 2.9%	22/240 9.2%	11/252 4.4%	15/134 11%	4/144 2.8%	1/175 0.6%	2/102 2.0%	17/394 4.3%	4/333 1.2%	6/270 2.2%	8/476 1.7%
Benzene	5/50 10.0%	N/T	N/T	N/T	3/90 3.3%	0/64 0%	0/29 0%	0/58 0%	N/T	N/T	N/T
Anti-bacterial Substances (ABS) EC 4-Plate Test	0/95 0%	0/119 0%	0/69 0%	0/73 0%	0/38 0%	0/37 0%	0/38 0%	0/51 0%	0/32 0%	0/24 0%	0/20 0%
AV/DPTGs(Oils)	15/82 18.3%	14/74 18.9%	4/62 6.5%	6/37 16.2%	2/17 11.8%	9/32 28.1%	5/27* (18.5%)	N/T	N/T	N/T	N/T
Histamine/ **Biogenic Amines**	1/97 1.0%	1/297 0.3%	1/114 0.9%	6/129 4.7%	4/139 2.9%	16/131 12.2%	2/128 1.6%	15/320 4.7%	5/289 1.7%	1/218 0.5%	5/204 2.5%
Sorbates/ Benzoates	6/105 5.7%	2/63 3.2%	18/163 11.0%	3/46 6.5%	2/36 5.6%	2/59 3.4%	6/72 8.3%	0/47 0%	0/34 0%	N/T	N/T
Sulphites	1/195 0.5%	1/120 0.8%	6/444 1.4%	7/135 5.2%	6/198 3.0%	1/166 0.6%	8/190 4.2%	8/206 3.9%	9/213 4.2%	6/176 3.4%	15/160 9.4%
Nitrites / Nitrates	17/209 8.1%	7/172 4.1%	4/282 1.4%	10/158 6.3%	13/85 15.3%	11/94 11.7%	2/64 3.1%	0/8 0%	4/32 12.5%	25/79 31.6%	7/86 8.1%
Artificial Sweeteners (i.e. Acesu-lfame K, Aspartame & Saccharin)	0/35 0%	0/8 0%	1/2 50.0%	4/208 1.9%	0/38 0%	N/T	0/41 0%	0/3 0%	N/T	N/T	N/T
Food Irradiation	0/57 0%	0/115 0%	3/248 1.2%	19/246 7.7%	3/291 1.0%	2/335 0.6%	0/253 0%	2/136 1.5%	0/56 0%	0/88 0%	0/55 0%
Food Complaints	147/226 65.0%	149/241 61.8%	108/183 59.0%	84/136 61.8%	77/122 63.1%	77/129 59.7%	69/126 54.8%	50/100 50%	64/105 61.0%	62/122 50.8%	85/139 61.2%
Lactose	New testing introduced in 2012										0/67 0%
Casein	New testing introduced in 2012										0/27 0%
Soya	New testing introduced in 2012										1/32 3.1%
Peanut	Testing introduced in 2010								0/169 0%	0/34 0%	0/113 0%

N/T = Not tested. ** Results exceed Dutch DPTGs limit of 15% or Acid value of 4.0 (results not designated as non-complying)*

Appendix 5: Fluoridation of Water Supplies – HSE West for 2012

FLUORIDATION OF WATER SUPPLIES :- GALWAY

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Ballinasloe	12	0.61 – 0.73	0.63
Carna	2	<0.10 - 0.55	0.28
Clifden	1	<0.10	<0.10
Dunmore/Glenamaddy	12	0.63 – 0.70	0.68
Galway City	107	0.65 – 0.74	0.69
Kinvara	6	0.62 – 0.72	0.69
Luimnagh Waterworks	8	0.66 – 0.71	0.69
Mid-Galway Regional	12	0.55 – 0.97	0.70
Mountbellew	12	0.66 – 0.71	0.68
Oughterard	11	0.58 – 0.85	0.68
Portumna	14	0.52 – 0.62	0.60
Spiddal	11	<0.10 - 0.79	0.42
Tuam R.W.S.	23	0.62 - 0.71	0.67

FLUORIDATION OF WATER SUPPLIES :- MAYO

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Achill	12	0.55 - 0.77	0.68
Ballina	24	0.59 - 1.00	0.68
Erris	12	0.55 - 0.68	0.64
Kiltimagh	12	0.70 - 0.80	0.74
Lough Mask Regional	11	0.69 - 0.74	0.73
Shrule	12	0.62 - 0.71	0.68
Swinford	12	0.52 - 0.81	0.75
Westport	13	0.40 - 0.71	0.54

FLUORIDATION OF WATER SUPPLIES :- ROSCOMMON

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Ballinlough Loughglynn	12	0.60 - 0.68	0.66
Boyle/Ardcarne	13	0.20 - 0.73	0.55
Castlerea Regional	11	0.57 - 0.61	0.60
Castlerea Urban	13	0.57 - 0.95	0.77
Cortober	1	0.35	0.35
Mount Talbot	12	0.37 - 0.65	0.58
North East Regional	12	0.65 - 0.86	0.80
North Roscommon Regional	12	0.65 - 0.70	0.68
Roscommon Town (Central)	12	0.48 - 0.68	0.59
South Roscommon Regional	12	0.17 - 0.76	0.59

Appendix 5: Fluoridation of Water Supplies HSE West for 2012

FLUORIDATION OF WATER SUPPLIES :- DONEGAL

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Buncrana	16	0.58 - 0.78	0.70
Bundoran	16	0.63 - 0.72	0.70
Cardonagh Mixed	18	0.61 - 0.74	0.67
Cranford	14	<0.10 - 0.70	0.62
Creeslough/Dunfanaghy	17	0.59 - 0.70	0.66
Donegal/Eske	17	0.56 - 0.70	0.63
Falcarragh/Gortahork	16	< 0.10	<0.10
Frosses/Inver	13	<0.10 - 0.68	0.63
Glenties/Ardara	14	<0.10	<0.10
Inishowen East	17	0.66 - 0.75	0.69
Letterkenny	30	0.64 - 0.75	0.70
Lettermacward	14	0.63 - 0.74	0.69
Lough Mourne	22	0.31 - 0.80	0.73
Milford	12	0.54 - 0.59	0.58
Rosses Regional	33	<0.10	<0.10

FLUORIDATION OF WATER SUPPLIES :- SLIGO/LEITRIM

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Kinsellagh	12	0.59 - 0.70	0.69
Lough Gill/ Cairnes	12	0.64 - 0.67	0.66
Lough Easkey	12	0.63 - 0.77	0.70
Lough Talt	12	0.65 - 0.76	0.69
North Leitrim Regional	11	<0.10 - 0.70	0.59
South Leitrim Regional	12	0.17 - 0.81	0.67
Sligo North Regional Supply	13	<0.10 - 0.80	0.66
Sligo South Regional	12	0.63 - 0.71	0.67
Killaraght	12	0.18 - 0.90	0.56
Lough Gill/ Foxes Den	12	0.63 - 0.69	0.65
Kinlough Tullaghan	12	0.59 - 0.81	0.69

FLUORIDATION OF WATER SUPPLIES :- LIMERICK

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Limerick City	21	0.58 - 0.68	0.65
Ballyneety	1	0.66	0.66

Appendix 5: Fluoridation of Water Supplies – HSE West for 2012

FLUORIDATION OF WATER SUPPLIES :- CLARE

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Ballyvaughan	1	0.60	0.60
Ennis	12	0.64 - 0.77	0.74
Ennistymon	5	0.64 - 0.72	0.70
Kildysart	10	0.54 - 0.81	0.69
Lisdoonvarna	5	0.58 - 0.72	0.67
Milltown Malbay	12	0.55 - 0.73	0.65
North Clare	1	0.67	0.67
Shannon	12	0.58 - 0.74	0.68
West Clare New Doolough	12	0.54 - 0.68	0.64
West Clare Old Doolough	12	0.54 - 0.71	0.64

FLUORIDATION OF WATER SUPPLIES :- NORTH TIPPERARY

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Borrisokane	12	0.62 - 0.72	0.67
Clareville	11	0.58 - 0.69	0.65
Murroe	11	<0.10 - 0.90	<0.10
Nenagh	12	0.43 - 0.73	0.67
Roscrea	11	0.63 - 0.72	0.67
Thurles	26	0.65 - 0.73	0.69
Templemore	14	0.13 - 0.64	0.36

Appendix 6:

Concentration of Smoke & Sulphur Dioxide in the atmosphere during 2012 at the Galway Waterworks site.

	Micrograms Per Cubic Metre					
	Smoke			Sulphur Dioxide		
	Average Reading	Lowest Reading	Highest Reading	Average Reading	Lowest Reading	Highest Reading
January	1	1	6	24	8	56
February	2	1	8	14	5	27
March	1	1	4	20	5	42
April	1	1	2	34	15	53
May	1	1	4	37	11	58
June	1	1	1	27	10	45
July	1	1	2	18	4	29
August	1	1	3	24	5	58
September	1	1	1	27	8	42
October	2	1	4	23	8	44
November	4	1	10	23	5	36
December	2	1	6	20	14	29
Average	2	1	4	24	8	43

Appendix 6:

Concentration of Smoke & Sulphur Dioxide in the atmosphere during 2012 at the Bodkin Roundabout site.

	Micrograms Per Cubic Metre					
	Smoke			Sulphur Dioxide		
	Average Reading	Lowest Reading	Highest Reading	Average Reading	Lowest Reading	Highest Reading
January	5	1	19	14	1	41
February	4	1	23	8	3	18
March	6	1	18	18	5	41
April	6	1	18	24	11	36
May	6	1	29	25	7	43
June	4	1	11	21	4	37
July	4	1	16	18	6	30
August	4	1	14	17	3	37
September	3	1	24	19	7	33
October	1	1	1	16	3	24
November	-	-	-	-	-	-
December	10	1	34	18	8	27
Average	5	1	19	18	5	33

Appendix 6:

R + P PARTISOL PLUS MODEL 2025 SEQUENTIAL AIR SAMPLER for 2012
PM_{10} RESULTS MASS CONCENTRATION (M.C) µg/m³

Station: Bodkin Roundabout YEAR 2012 - Galway City Council - 24 Hour M.C. µg/m³

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
01	17.1	59.7	-	14.5	16.3	10.4	12.6	11.5	13.4	12.3	10.3	-
02	132	50.0	-	17.3	22.4	23.5	5.0	19.6	8.4	11.3	11.7	-
03	18.1	20.9	-	8.6	23.7	10.3	6.9	15.6	<5	9.3	10.7	-
04	16.2	18.4	6.7	14.2	20.5	13.4	18.0	16.5	8.3	14.5	8.0	9.8
05	26.0	23.8	13.3	18.5	22.9	9.3	15.1	8.1	16.1	15.1	15.1	30.9
06	14.6	11.8	<5	11.0	21.4	12.7	14.8	<5	18.0	30.5	19.7	10.2
07	19.9	17.0	15.8	8.1	11.9	8.2	13.0	9.5	<5	14.2	12.9	15.3
08	11.5	14.8	31.7	9.7	9.8	8.8	9.4	8.8	10.6	17.6	9.0	14.7
09	14.3	16.8	21.4	5.5	17.4	11.1	8.2	6.6	13.2	24.7	14.5	16.3
10	7.2	20.8	5.2	-	7.3	9.3	16.5	12.2	8.1	26.5	12.7	32.7
11	5.4	29.8	<5	13.3	10.1	10.5	6.3	-	7.2	11.5	10.9	23.5
12	39.4	21.1	19.8	8.3	15.6	10.7	12.0	-	8.6	15.0	8.7	28.0
13	19.4	10.3	22.3	15.5	17.3	15.8	24.1	-	13.1	14.0	9.8	24.6
14	23.5	21.0	25.8	11.1	16.2	14.5	6.6	14.0	13.8	-	11.9	13.5
15	29.0	12.4	22.1	10.5	16.6	-	7.5	13.1	13.2	-	17.4	<5
16	28.1	13.6	8.7	13.4	16.4	-	7.0	17.0	10.0	7.6	13.3	-
17	9.7	-	16.7	13.4	18.3	-	6.3	9.2	12.0	14.6	11.0	-
18	19.4	-	6.8	6.3	18.1	-	11.0	-	9.6	19.3	13.3	-
19	12.7	-	24.4	8.5	18.4	-	12.7	-	13.7	15.5	7.6	27.0
20	16.3	-	29.1	8.7	18.0	-	62.0	-	10.8	27.6	12.9	25.5
21	21.4	-	15.3	11.5	14.7	-	29.4	5.6	13.8	25.3	12.7	13.3
22	24.3	-	42.9	13.8	15.6	-	11.0	14.3	19.2	20.2	10.2	14.4
23	12.2	-	22.4	13.8	21.7	-	<5	12.3	19.2	17.8	14.3	20.2
24	5.4	-	35.0	12.9	17.6	-	9.6	11.3	10.2	20.9	32.9	11.9
25	11.7	-	47.3	16.0	33.6	-	10.7	11.3	13.1	12.5	22.8	10.3
26	8.8	-	35.0	13.6	37.6	5.9	8.3	7.8	18.8	-	7.8	18.2
27	16.1	-	31.2	14.7	24.1	9.0	11.7	-	11.2	10.0	10.4	12.5
28	23.3	-	45.4	14.2	18.6	10.2	7.3	-	12.7	7.6	19.8	21.0
29	10.9	-	26.8	13.2	15.9	9.7	15.6	10.2	22.9	-	35.5	20.7
30	13.8		33.4	16.3	15.1	11.7	6.7	16.5	16.7	-	19.3	21.7
31	29.5		16.4		5.7		7.8	16.6		14.6		14.0
Monthly Mean	**17**	**23**	**24**	**12**	**18**	**11**	**13**	**12**	**13**	**17**	**14**	**19**
No. of Days exceeding 50µg/m³	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**

No. of Days exceeding 50µg/m³ YEAR 2012: 2 ANNUAL MEAN = 16

Appendix 7:

Cosmetics Surveillance Programme (Chemical) 2012 (HSE West, Dublin Nth East & Mid-Leinster)

Period	Survey/Samples	Suggested Ranked Sample Types	Suggested Ranked Premises/Stage	HSE West, DNE & DML Total
February	**Miscellaneous Children's Low-cost Cosmetics** (Heavy Metals)	Lipsticks; Multi-packs containing mascara, eye shadow, lipsticks, etc. or individual products; Cheap Cosmetics for children; 'Follow-up' samples	Wholesalers/Distributors, 'Pound'/ Low-cost Outlets, Toy Shops, Children's Magazines, Hardware Shops etc., Other retail etc.	40
	"Fake/Instant Tan" Products (Dihydroxyacetone)[1]			5
March	**Children's Cosmetics labelled as 'Preservative-free' or 'Allergen-free'** (Allergens/Preservatives)	Children's Cosmetics products marketed as 'preservative-free' or 'allergen-free' or with similar descriptions. 'Preservative-free' and Hypoallergenic sun blocks for Kids and Other Products	Multiple Supermarkets, Low-cost Outlets, Other Sources	25
April	**Hair-straightening Products (Salons etc.) And Instant Tan products** (Formaldehyde)	Emphasis on: previously untested Salon Straighteners, 'Home-use' straightening kits & previously non-complying produce, Instant tan products	Salons, Retailers, Wholesalers, Importers etc.	30
	Nail Varnishes and 'Cheap' Perfumes (Phthalates)[1]	Chinese Imports, US Imports (as different 'limits' apply in US)	Salons, Retailers, Wholesalers, Importers etc.	10
May	**Skin Creams/Lotions** (Resorcinol, Salicylic Acid & Phenol)[1]		Ethnic Shops Wholesale Outlets	5
	Miscellaneous Lips' Cosmetics etc. and Ethnic Eye Cosmetics (Kohl, Eye Liners etc.) (Heavy Metals: (Pb, Cd, Cr, Ni, As))	Lipsticks, Lip Gloss, Balms etc Children's 'Low-cost' Products 'Low-cost' General Products General Children's Products Black Eye-liners etc.	Wholesale/Retail etc. including Large Multiples, Discount Stores, Toy Shops etc. Ethnic (Asian/Middle East…..) Premises	35
June	**Hair Dyes etc. & Black Henna Tattoos & Black Henna Hair Products** (p-Phenylenediamine, Oxidation Colourants (Pb, Cd, Cr, Ni, As))	Cheap Brand hair dyes (whether or not labelled as containing Phenylenediamine) Henna Tattoos	Wholesale, Salons, Festivals, Tattoo Parlours	30
	Sun Creams/Lotions UV Blockers (OMC, PABA…) Preservatives[1]	Cheaper Brands		5
	False Nail Products & False Eye Lashes (Acrylic Acid/Acrylates)[1]		Ethnic Shops Wholesale Outlets	5
July	**Miscellaneous Irish-manufactured Cosmetics** (Heavy Metals, Formaldehyde, Labelling etc.)	Irish-manufactured Cosmetics: skin creams etc.; personal hygiene produce – shampoos, liquid soaps, gels etc; make-up powders etc.; Home-made cosmetics	Retail/Wholesale etc. Specialist cosmetics outlets, Markets etc.	35
	Depilatory Products & Hair Waving Solutions (Thioglycolic Acid)[1]			5
August	**Low-cost Toothpastes & Cheap Cosmetics (Skin Creams….)** (Diethylene glycol (DEG) & Fluoride[1] (Toothpastes))	'Cheap' Children's Toothpastes Cheap Skin Creams…..	Discount Stores etc., Ethnic Shops Other retail/wholesale	35
September	**Halloween Cosmetics** Heavy Metals (Pb, Cd, Cr, Ni, As)	Children's Halloween cosmetics	Discount Stores etc and Wholesale/Retail including Toy Shops, Large Multiples	35
October	**Tooth-whitening products Hydrogen peroxide**	Tooth-bleaching products	Distributors, Pharmacies, Trading Stalls in shopping centres etc. Salons…	25
November	**Mouthwashes** Fluoride[1]	Imported or unusual brands		5
	Skin-lightening Creams & Soaps Hydroquinone & Hg	General skin-lightening face and skin creams etc., Soaps…	Ethnic Premises etc. 'Pound'/ Low-cost Outlets	30
January - December	**General: Non-routine samples (Complaints, RAPEX etc.); Some Method development work etc. ongoing. Hydroquinone & Hg in Skin-Lightening Creams: testing ongoing; available by prior consultation with Laboratory. General and Labelling examination ongoing.**			

Note: [1] These samples were taken in the HSE West, DNE and DML regions and the analysis was carried out in PAL Cork

Appendix 8:

Public Analyst:	Mr. Rory Mannion
Deputy Public Analyst:	Vacant (Since Nov 2009)
Deputy Public Analyst:	Dr. Padraig Burke
Quality Manager:	Dr. Helena McGrath
Executive Analytical Chemists:	Ms. Sharon Crowe Dr. Michelle Cuffe Dr. Caroline Lardner Dr. Brenda Lennon Dr. Christopher Laffey Dr. Andrew Flanagan Dr. Leonie Wallace Dr. Declan Costello Dr. Katie Coyle Dr. Gayle Kealy
Chief Technician:	Vacant (Since Aug 2007)
Senior Laboratory Technicians:	Mr. John Creaven Mr. Martin Patten Ms. Mary Finan Ms. Patricia Thornton Ms. Eithne Clasby Ms. Elaine Goldrick Ms. Suzanne Davoren
Laboratory Technicians:	Ms. Cecily Gilmore Mr. Martin Gilligan Ms. Noelle Brennan Mr. Tom Fogarty Mr. Eric Costello Ms. Caitriona Greaney Ms. Sylvia O'Flynn Ms. Nora Madden Ms. Amanda McCarron Ms. Deirdre Muldoon Ms. Aileen Maughan Mr. Tommy Heneghan Ms. Mary Rabbitte Ms. Caroline Lupton Ms. Louise Mannion Ms. Hilary Hardy

Asst. Staff Officer:	Vacant (Since 2010)
Clerical Officers:	Ms. Eileen Mannion Mrs. Attracta Ginnerty Ms. Aine Mahoney Vacant position (Since Oct 2007)
Housekeeper:	Ms. Theola Busch

Glossary of Abbreviations

AAS	Atomic Absorption Spectroscopy
ADI	Acceptable Daily Intake
BfR	German Risk Assessment Authority
BIP	Border Inspection Posts
BOD	Biochemical Oxygen Demand
CAP	Centrally Authorised Products
COD	Chemical Oxygen Demand
CODEX	Codex Alimentarius Commission
COPHES	Consortium to Perform Human Bio-Monitoring on a European Scale
DAFM	Department of Agriculture, Food and the Marine
DOH	Department of Health
EA	European co-operation for Accreditation
EDEN	Environmental Data Exchange Network
EDQM	European Directorate for the Quality of Medicines and HealthCare
EHO	Environmental Health Officer
EHS	Environmental Health Service
ELISA	Enzyme-linked immunosorbent assay
EPA	Environmental Protection Agency
EQUAS	External Quality Assurance Scheme
FSAI	Food Safety Authority of Ireland
FSLS	Food Safety Laboratory Service
HACCP	Hazard Analysis and Critical Control Point
HBM	Human Bio-Monitoring
HPLC	High Performance Liquid Chromatography
HSE	Health Service Executive
HVP	Hydrolysed Vegetable Protein
IARC	International Agency for Research on Cancer
ICIs	Inter-laboratory Comparison Investigations
ICP-MS	Inductively coupled plasma mass spectrometry
IMB	Irish Medicines Board
INAB	Irish National Accreditation Board
IR	Infra-Red
LIMS	Laboratory Information Management System
MJA	Mutual Joint Audit
MRP/DCP	Mutually Recognised Products/Decentralised Products
NCA	National Consumer Agency
NMR	Nuclear Magnetic Resonance
NRL	National Reference Laboratory
NSAI	National Standards Authority of Ireland
NTU	Nephelometric Turbidity Units
OCCL	Official Cosmetic Control Laboratories
OMCL	Official Medicines Control Laboratories
PAL	Public Analyst's Laboratory
PAH	Polyaromatic Hydrocarbon
PCCC	Primary Continuing and Community Care
PEMSAC	Platform of European Market Surveillance Authorities for Cosmetics
PTS	Proficiency Testing Schemes
QA	Quality Assurance
RAPEX	EU Rapid Alert System for Non-Food Products
RASFF	EU Rapid Alert System for Food and Feed
*safe*food	*safe*food, The Food Safety Promotions Board
S.I.	Statutory Instrument
SOPs	Standard Operating Procedures
THMs	Trihalomethanes
UV	Ultra-violet
VOCs	Volatile Organic Compounds
VWA	Food and Consumer Product Safety Authority of The Netherlands
WHO	World Health Organisation
XRF	X-Ray Fluorescence

Notes: