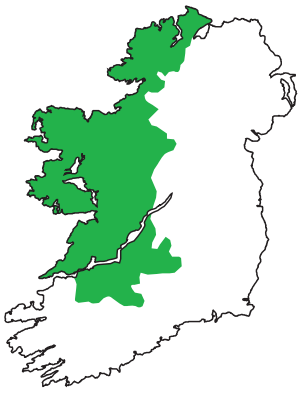
Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

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

Annual Report 2011
Tuarascáil bhliantúil 2011



FOR YEAR ENDED 31ST DECEMBER, 2011

CONTENTS ..... PAGE

ACKNOWLEDGEMENTS

This report details the activity of the laboratory for the year 2011. I would like to compliment the hard work and dedication demonstrated by the staff throughout the year. I would also like to acknowledge the cooperation and forbearance demonstrated in implementing all the cost saving measures which necessarily had to be undertaken throughout the year.

Rory Mannion
Public Analyst

July 2012

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

FIFTY YEARS OF SERVICE

The year 2011 marks the 50th anniversary of the establishment of the Public Analyst's Laboratory in Galway.

Dr. P. P. Donovan took up duty as the Public Analyst on the 1st of October 1960 and oversaw preparatory work in setting up the laboratory which commenced operation on the 1st of April 1961. This work involved the conversion of a morgue to a suitable laboratory facility. This building was extended in 1966 and again in the early eighties and was vacated in 1997, with the establishment of our current purpose-built laboratory building.

The original building has been extended and refurbished since then and is now occupied by the Pain, Hepatology and Coeliac Clinics.

The laboratory was initially administered by the County Council and the Public Analyst reported to the County Manager.

Most of the work conducted by the laboratory in the early years was in the examination of food samples. Some waters and miscellaneous samples were also analysed. The range and diversity of food types were quite limited at that time and the samples received by the laboratory were basic in nature.

Not surprisingly, milk samples made up a significant proportion of the overall samples received. Milk adulteration was a significant problem and approximately 7% of the samples analysed in 1961were found to be adulterated.

The number and range of sample types analysed by the laboratory gradually increased to include food, water and effluent, air monitoring, drug and toxicology samples, fertilisers and feeding-stuffs. Analysis of water for Fluoride also commenced, on foot of the requirement of the Health Fluoridation Act.

A Flame Photometer was acquired in 1966, followed by an Atomic Absorption Spectrometer in 1967. A Gas Chromatograph along with Ultra-Violet (UV) and Infrared (IR) Spectrophotometers were acquired the following year. These were state of the art instruments at the time and this was a major leap forward for the laboratory. This investment, along with a doubling of staff from four in 1961 to eight in 1969 significantly enhanced analytical capabilities.

Apart from what was now established routine work, the laboratory responded to specific health issues of the time. One of these concerns related to Lead contamination in the Tynagh mine area in Co. Galway, which led to a monitoring scheme being put in place in 1967. Samples of herbage, milk, vegetables, water, animal blood and dust were analysed for Lead. The deaths of a number of animals were attributed to Lead poisoning.

Blood samples from workers in the mines were also analysed for Lead in what is now termed a Human Bio-Monitoring (HBM) study. Workers with blood Lead values approaching a threshold level were moved to duties involving lower exposure. Over 100 samples per month were being analysed in 1968.

Similar monitoring measures were put in place for the Mogul mining area in Tipperary.

The administrative arrangement of the laboratory changed in 1971 with the establishment of the Health Boards. The Public Analyst was now obliged to report to the CEO of the Western Health Board rather than the County Manager. The internal administration of the laboratory remained unchanged.

A significant development took place in 1976 when an agreement was drawn up between the WHB and the National Drugs Advisory Board (NDAB) whereby the laboratory would provide a drugs testing service to the latter. This service is still being provided today to the Irish Medicines Board.

That year also saw the commencement of environmental monitoring of Killala Bay for the presence of industrial discharges including acrylonitrile and methylacrylate. Both of these chemicals were being used by a recently constructed synthetic fibre factory (Asahi) in Killala, Co. Mayo.

Further HBM work took place in 1976 and 1977 for the monitoring of blood Lead levels in three cohorts of people, namely pregnant women, dock workers and army recruits. Subsequently mothers and their children from Navan Town, along with randomly selected individuals were selected for the project.

This survey which was carried out on behalf of the European Commission was designed to test the applicability of guidelines to deal with the monitoring of populations for exposure to Lead in the context of an EEC Directive on Biological Standards for Lead.

Further studies took place in 1978 on children living in the Tynagh mines area and children from Galway City.

In 1982 and 1983, over 20 years after milk quality issues were identified by the laboratory, further problems were revealed.

Results of laboratory tests showed that some samples of milk which were provided to school children on a subsidised basis were adulterated with up to 35% water. The problem came to light because the level of adulteration was so high some children refused to drink the milk.

At the same time a survey conducted by the laboratory showed that 50% of milk samples analysed in the first half of 1983 contained detectable levels of antibiotics. After the release of this data the incidence of residues dropped to 10% for samples taken in the latter half of the year.

This work on antibiotic residues (or more correctly inhibitory substances, as the test conducted did not distinguish from naturally occurring inhibitory substances and artificial inhibitors) was extended to meat products in the subsequent years.

The proportion of samples with positive results was initially very high, eventually declining to very low levels.

The 1980s were a very difficult period in the economic life of this country and this was reflected in the budgetary allocations generally, and specifically that of this laboratory. The development which had taken place in the 1970s had ceased and by the end of the 1980s the capacity of the laboratory to deliver an up-to-date service had been seriously hampered due to lack of investment in modern equipment and instrumentation. The building had also become very outdated and overcrowded and was no longer fit for purpose. The requirements of the impending (Official Control of Food) Regulations 1991 brought this deficit into sharp focus.

This position was recognised by the Department of Health and in 1993 sanction was received for seven additional staff. Funding was also provided for the purchase of new instrumentation and approval was given for a new laboratory on a green field site.

The additional investment greatly improved the food testing service, bringing it from a basic to an advanced level and the range and complexity of tests performed increased greatly. By 1994 there was a compliment of 28 staff in total.

In 1999 the laboratory acquired a PM_{10} analyser for the measurement of particulate matter in air. This complimented the monitoring for smoke and SO_2 which has been performed continuously since 1961.

By this time the process of accreditation had become established in the laboratory. The first test accredited was Fluoride in drinking water in 1989. Since then, accreditation has placed an ever increasing demand on the resources of the laboratory. A full time Quality Manager was appointed in the year 2000.

The most significant development over the last 50 years of the laboratory was the movement to the current building. The building was handed over to the then Western Health Board on the 16th October 1997 and the new facility was operational from the first week in November. The Department of Health also provided a once off grant of £325,000 for new equipment all of which was installed before the end of 1997. The net budget for the year was £1,005,020.

The new laboratory coupled with successive adequate budgets and additional staff transformed the capabilities of the laboratory from a very low base to that of similar facilities in Europe. The budget for 2008 was €3.1million and the total number of staff part time and whole time was 45. This was reflected in the increased range and complexity of the tests provided. This was particularly the case in the area of food testing as well as the whole laboratory in general.

In 2006, the laboratory acquired its first ICP/MS instrument for the analysis of trace metals in drinking water. This replaced both a flame and a furnace Atomic Absorption Spectrophotometer and was a major advance in analytical capabilities. This complimented previous investments in an Ion Chromatograph for the analysis of Fluoride and a discrete colorimetric analyser for nutrients.

Two years after the purchase of the ICP/MS, results from the analysis of water samples from the Galway City supply revealed very high levels of Lead. It transpired that some parts of the Mervue area of the city were still serviced by a Lead mains supply, unlike the rest of the city where these pipes had been replaced. This discovery led to restrictions being placed on drinking the affected water, particularly for young children and expectant mothers.

As well as operating at a national level, the laboratory operates at a European level, in the analysis of pharmaceuticals and is an active member of the General Network of Official Medicines Control Laboratories, under the auspices of the EDQM and the Council of Europe. In 2007, the Pharmaceutical section of the laboratory received formal recognition as an "Official Medicines Control Laboratory".

The range of analytical services was extended in the same year to include cosmetic testing. Initial testing of some of the cheaper brands of cosmetics revealed instances of extremely high levels of lead. Some hair straightening products were found to contain very high levels of Formaldehyde.

In tandem with national finances the resources made available to the laboratory in terms of staff and budget have been decreasing since 2008. The budget allocation for the year 2011 is €0.5million less than that allocated in 2008/2009. Staff numbers have decreased by 10%. This decrease in resources mirrors that in the 1980s. If this lack of investment continues long term, the inevitable consequence will also mirror that of the 1980s.

The challenge for this laboratory at the present time is to maintain the best service possible with the resources that are available. In this respect all areas of expenditure are closely managed in order to achieve best value for money.

The very good relationship which exists with our sister laboratories in Cork and Dublin is helpful in this regard.

This cooperation was best exemplified in the recent DEMOCOPHES HBM project (see Section 7) where the analytical work required was divided between the three Laboratories on the basis of existing capabilities within each laboratory, facilitating a response to the requirements of a European project, while ensuring the most cost effective provision of service.

Considerable progress has also been made in developing the three Public Analysts' Laboratories from their original design of separate regional facilities to a more unified national service. This is particularly the case in the area of Food analysis with the development of specialisations in each laboratory. This continuing cooperation will play a significant role in increasing efficiencies in the service as available resources continue to decline in the medium term. It will also support the laboratories in fulfilling their key role in the protection of public health, a role as relevant today as it was fifty years ago.

1. INTRODUCTION

1.1 Role of the Laboratory

The primary role of the Public Analyst's Laboratory is one of public health protection. This is achieved by providing an independent, objective, analytical and advisory service to our customers in the areas of food, water, pharmaceuticals, toxicology, air monitoring and cosmetics.

1.2 Sample Sources

Food samples are received from Environmental Health Officers as part of a contractual agreement between the HSE and the FSAI. The laboratory also provides a service directly to the FSAI, to the general public, to other government agencies and the food industry.

Water samples are received from Environmental Health Officers on behalf of Local Authorities as part of regulatory monitoring programmes. Samples are also received directly from Local Authorities, from private individuals and from local industry and hospitals.

The Irish Medicines Board submits pharmaceuticals to the laboratory for analysis for both surveillance and enforcement purposes. A service is also provided to the Pharmaceutical Society of Ireland.

Cosmetic samples are received from the EHOs as part of a scheduled program of analysis agreed between the EHOs, the IMB and the laboratory. Enforcement and complaint samples are also received.

Samples for toxicological analysis are received from Hospital Pathologists and Physicians as well as Veterinary Surgeons and the general public.

Air pollution monitoring is conducted by the laboratory on behalf of Galway City Council.

Miscellaneous testing is also responded to on request.

1.3 Administration

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

1.4 Finance

The budget received for the year to cover both pay and non pay elements was €2.614 million. This represented a decrease of €0.491 million over a period of two years. While some of this was offset by a reduction in staff numbers, it presented a very difficult challenge in maintaining our level of service to our customers. The final out-turn for the year was within 1% of our budgetary allocation.

The income generated by the laboratory was €193,219 for the year.

1.5 Workload

The number of samples received during the year is as follows.

Foods	2,547
Waters	7,426
Pharmaceuticals	78
Toxicology	132
Cosmetics	496
Air-Monitoring	1,592
Human Bio-Monitoring	152
Miscellaneous	24
Total	**12,447**

2. FOOD

2.1 Service Provided

Food in our region (HSE Western Area) is monitored officially for chemical safety*, quality and for legislative compliance. Some national surveillance is also performed. 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 2.1. Testing is performed for contaminants, allergens, nutrients, additives, composition and labelling etc. The service provided includes programmed surveillance and also ad-hoc testing (food complaints and alerts, 'inspection' samples etc.) as required.

Some private samples, including food complaints and food export certification samples, are tested for the public and for industry. Applied research projects are carried out in conjunction with safefood, www.safefood.eu.

The authorised officers (EHOs), and FSAI as appropriate, have the responsibility for dealing with the incidents of detected non-compliances in samples.

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

2.2 Inspection and Surveillance of Food

The principal legislative responsibility for ensuring food safety lies directly with the food industry (manufacturers, importers, wholesalers, caterers and retailers). The HSE's main activity in food safety has been in legislative enforcement, including:

- **Monitoring the overall food safety systems and operations (HACCP, Hygiene etc.) in place in the food industry.** This is performed through inspection and audit etc. in particular, monitoring of food hygiene.

- **Monitoring the safety and quality of food through laboratory analysis.** Foods are monitored for compliance with specific legislative standards of safety (microbiological, chemical and physical) and also with general safety standards and quality/compositional criteria.

2.3 HSE Food Safety Laboratory Service – Developments etc.

2.3.1 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). One effect of the location of the FSLS and the Environmental Health Officers in the Department of Health/Health Service Executive, is that the service has traditionally had a broad public health protection remit, alongside the role of food surveillance, to ensure legislative compliance. 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/Global/Publications/Research%20reports/StrategicDevelopmentReviewOfHealthBoardFoodControlLaboratories.pdf?epslanguage=en

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.

2.3.2 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. 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
Core Testing: includes microscopy/food complaints, basic compositional (moisture, pH, general examination (organoleptic, labelling…)) etc.
A consequence of specialisation is that samples are more likely to come from any part of the country, or indeed from different agencies. As a result, the laboratories need to ensure a more consistent approach to their operations, e.g. reporting consistency.

2.3.3 Reporting and Designation of Results of Analysis

Programmed samples are generally received for testing for specified contaminants, but a general examination may also be required.

Specified Contaminants where legislative limits are in place (e.g. Aflatoxins): Sample results are reported quantitatively. Traditionally, the results of analysis have also been compared directly to the specific numerical limit for that contaminant, and an overall sample designation ("compliant" or "non-compliant") given, taking into consideration the measurement uncertainty associated with the result(s). EFSA, the European Food Safety Authority, now requires that each individual result of analysis is designated with respect to compliance.

General Qualitative Legislative Standards in place:
- e.g. food should be "..of the nature, substance, quality demanded by the purchaser…" (Sale of Food and Drugs Acts 1875 - 1936). This historic requirement is still in place and is used in the context of food adulteration, food fraud etc.
- Foods should not be "unsafe", "injurious to health" or "unfit for human consumption" (Regulation (EC) No. 178/2002).

Public Analysts have traditionally invoked the above wordings and legislation when designating laboratory results, e.g. the presence of a rodent part in an article of food would render it unfit for human consumption (contamination by extraneous matter…).

In both of the above situations the designations are sometimes difficult and an element of opinion comes into play. Department of Health food legislation authorises the Approved Examiners to include such opinions, - see European Communities (Official Control of Foodstuffs) Regulations 2010, Schedule 1 *("(6): Here the Approved Examiner may insert his or her opinion … ..whether the article is injurious to health…..").*

Two particular situations arise where the designation of results is difficult:
(1): where a determined result for a nutrient, e.g. Folic Acid, appears significantly different (e.g. 40% lower) to a labelled value. This difficulty arises as there are no tolerances for labelled nutritional values in Irish or EU legislation.
(2): where a determined result for a parameter, e.g. some allergens such as peanut protein, appears close to the threshold level which may result in an adverse reaction.

The laboratory generally looks to FSAI for toxicological guidance in such situations. Work is currently on-going in FSAI in both areas, i.e. establishing nutritional labelling tolerances and threshold 'limits' for allergens, and this should benefit the laboratories. Currently, when these situations arise, results may be issued as "Not designated" where appropriate.

2.4 Food Testing (Chemical) Results for 2011

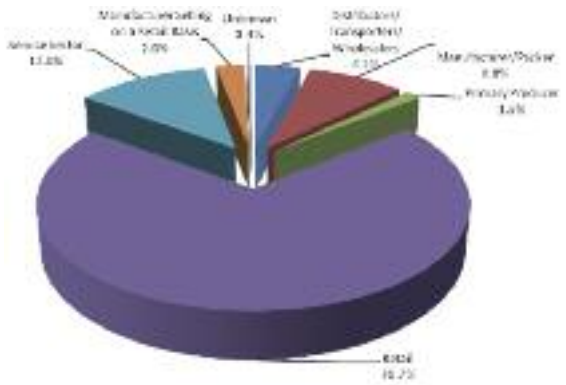
2.4.1 Regional Chemical Surveillance Programme 2011

Nationally co-ordinated, Regional Food Surveillance (Chemical) Programmes are produced between the HSE (PA Laboratories and EHOs) and the FSAI, drawing largely on risk-based priorities and sampling requirements identified by the group. An increased national co-ordination of the sampling process has resulted in a more consistent approach to sampling nationally. 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 2011 is outlined in Appendix 1. The programme contains largely surveys of food groups which have known, and regulated contaminants, e.g. histamine in tuna. Also programmed are surveys of food groups which may not have been traditionally sampled; in 2011 such surveys included Minced Meats, Beers & Ciders, Teas and Soy Milks.

2.4.2 Results for 2011

All of the programmed surveys for 2011 were carried out. A total of 2,547 samples was received. The Figure below indicates the 'stage' at which Western Region EHO samples (excluding complaints) were taken in 2011. There has been a welcome decrease in retail-level sampling over the past number of years and an increase in sampling from further back the food chain.



2.4.3 Statistics for 2011

The total number of food samples tested in 2011 was 2,547. For a breakdown of samples analysed per head of population see Table 2.2. The samples consisted of 122 complaints (see section 2.7) and 2,425 others. Out of the 2,425 samples analysed "Non-complying" reports (i.e. test results indicating non-compliances with standards in Irish Food Law) were issued on 158 (6.5 %). This figure of 6.5% can be compared to the figures for previous years, see below:

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

Year	%
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
2001	4.2
2000	5.1

Of the 158 non-compliances, 125 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 2.1 and 2.2 summarise the work for 2011 according to the sampling source and region.

Table 2.1: Food Sample Sources (2011)

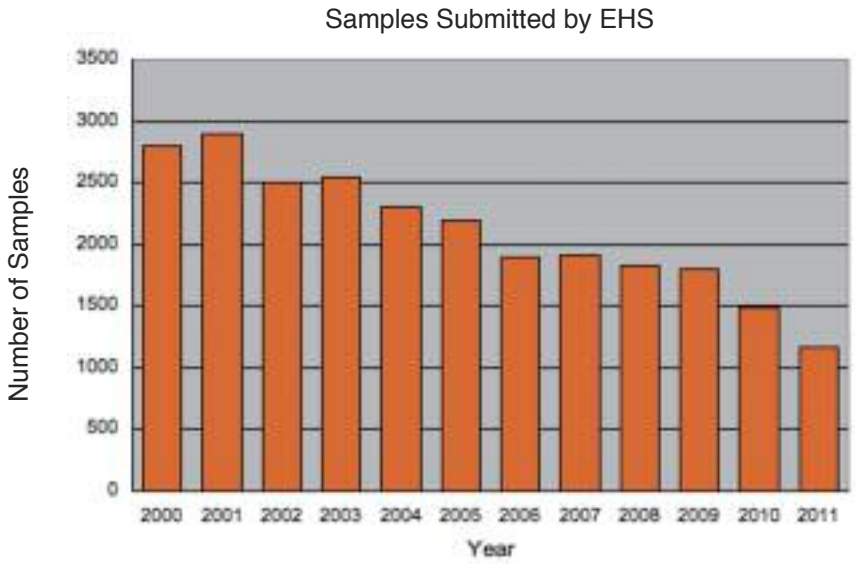
Submitted by / Sample Type	No. of Samples	No. on which Adverse Reports were issued
Environmental Health Officers (HSE West)		
Informal Routine (Sampling Programme)	1,160	121
Public (Food Complaints via EHOs)	104	53
Inspection samples (non-programmed)	48	11
Follow-up samples (non-programmed)	79	13
Survey samples	20	0
General Public		
Complaints	15	7
Others	146	2
Food Safety Authority of Ireland	653	0
Sea Fisheries Protection Agency & BIP	147	0
DAFM & Local Authority Veterinary Service	71	11
Laboratory QA & Method Development etc.	88	Not applicable
Export Certification	16	0
OVERALL TOTAL	**2,547**	**218**

Table 2.2: HSE West Food Sample Sources (2011)

Community Care County Area E.H.O. Service	Total Number of Samples Submitted (excluding complaints)	Number per 1,000 population*
Galway	249	0.99
Mayo	159	1.22
Roscommon	89	1.39
Clare	144	1.40
Limerick	219	1.30
North Tipperary/East Limerick	128	1.21
Donegal	179	1.11
Sligo/Leitrim/West Cavan	140	1.42

* Based on 2011 census and HSE Community Care data.

Table 2.3 HSE EHS programmed samples (excluding food complaints) received



There has been a decrease in HSE programmed samples submitted in recent years.

2.4.4 Overall Summary of Data and Food Quality 2011

A wide range of surveillance for contaminants, additives, labelling etc. and nutritional testing (salt, folic acid, etc.) was carried out in 2011. Results are reported by test parameter in sections 2.5 to 2.7. As in previous years, some instances of food contamination 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 2.7). The number of Food Hazard/Contamination Reports (see Section 2.8) issued was 11.

Once again the results reported here for the year (2011) indicate a high level of legislative compliance and a generally high chemical quality of food in our region.

Overall, a particularly low level of non-compliances (contamination etc.) has been found this year; this finding will be factored into 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 of food.*

2.5 Food Contaminants, Allergens etc.

2.5.1 General

'Chemical' contaminants, allergens and residues in foods are monitored to help ensure food 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.

Surveillance of contaminants and residues in Ireland is nationally co-ordinated. The testing described in this report reflects the contaminant priorities identified by HSE West and FSAI.

Notes:
(i) Other Official Agencies and FSAI (see Appendix 3 and www.fsai.ie) also produce reports on 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.

2.5.2 Food Contaminants – EC Regulation 1881/2006 (& 1126/2007, - amending)

EC Regulation 1881/2006 sets limits for a range of chemical contaminants in food. Relevant testing performed here in 2011 is summarised in Table 2.4.

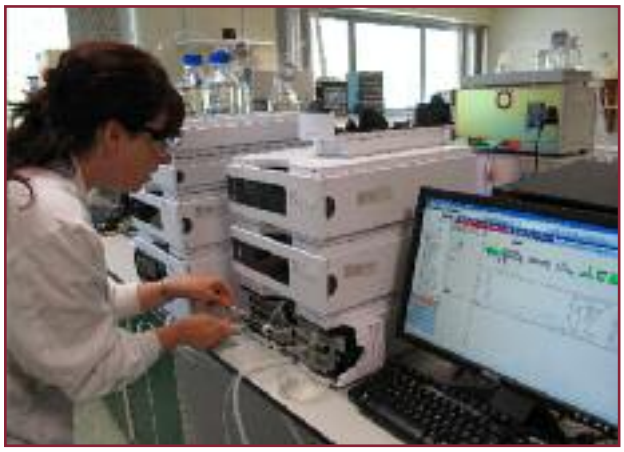


Table 2.4: Food Contaminants – EC Regulation 1881/2006 (as amended) - Principal Testing in 2011

Contaminant	Limits	Sample Types	Total	Complying	Non-complying
Aflatoxins[1] (B_1,B_2,G_1,G_2)	2.0µg/kg (B_1) 4.0µg/kg (Total)	Maize, Peanut Butters, Cereals etc.	26	25	1
Lead[2] (Pb)	0.3 to 1.5mg/kg	Fish/shellfish & Fishery products	76	76	0
	10.0µg/L	Water	3	3	0
	0.1 to 0.3mg/kg	Vegetables	19	19	0
	10mg/kg/20mg/kg	Herbs/Spices	22	22	0
	-	Herbal teas/tea	2	2	0
	-	Beer/Cider/alcoholic beverages	45	45	0
	-	Soya Products	23	23	0
	-	Seaweed	7	7	0
	-	Miscellaneous	10	10	0
		Sub-total Lead (Pb)	207	207	0
Cadmium[2] (Cd)	0.05 to 1.0mg/kg	Fish/shellfish & Fishery products	74	74	0
	5.0µg/L	Water	3	3	0
	0.05 to 0.2mg/kg	Vegetables	19	19	0
	-	Herbs/spices	21	21	0
	-	Herbal teas/tea	2	2	0
	-	Beer/Cider/alcoholic beverages	45	45	0
	-	Soya products	23	23	0
	-	Seaweed	7	7	0
		Miscellaneous	10	10	0
		Sub-total Cadmium (Cd)	204	204	0
Mercury[2] (Hg)	0.50 to 1.0mg/kg	Fish, Seaweeds, Fishery products etc.	38	38	0
3-MCPD[3]	0.02mg/kg	Soy Sauces	33	33	0

1 *Aflatoxins are fungal toxins which may contaminate certain foods (nuts, dried fruit etc), particularly from the tropics/sub-tropics. Testing now transferred to PAL Dublin.*

2 *For data on EU exposure to Heavy Metals (As, Cd, Pb & Hg) see EU SCOOP Report http://europa.eu.int/comm/food/food/chemicalsafety/contaminants/scoop_3-2 11_heavy_metals_report_en.pdf*

3 *3-MCPD, 3-monochloropropanediol contamination may occur where foodstuffs undergo acid hydrolysis e.g. acid hydrolysis of vegetable protein to produce soy sauce. This testing will be transferred to PAL Dublin in 2012.*

Aflatoxins in imported foods constitute one of the most common sources of EU Rapid Alert Notifications. In 2011, just 1 of the 26 samples tested here, a maize meal, had excessive Aflatoxin B_1 (3.6µg/kg). Surveillance of mycotoxins in bulk imported food is carried out by the Public Analyst's Laboratory in Dublin, the specialist laboratory and NRL.

Testing for the other contaminants above indicate full compliance. The relatively high level of testing of foods for Lead/Cadmium is performed partly to generate data for dietary intake. A small survey (36 samples) was carried out on the levels of leachable aluminium in both loose tea and teabags. The data is intended to provide baseline data for potential further studies in this area. Additionally, 91 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.

2.5.3 Food Allergens and Related Testing

The laboratory has acquired Food Allergens as a new national specialisation. It is intended to develop this area of surveillance in conjunction with service users (EHOs and FSAI). Table 2.5 summarises 2011 testing results for Food Allergens.

Table 2.5: Food Allergens and related parameters: Summary of Results for 2011

Allergen/Parameter	Limit(s) (Legal Source)	Sample Types	Total	Complying With Standard	Non-complying with standard
Gluten (EHO sampling)	20 ppm[1]	Gluten-free foods	144	140	4
Gluten (private samples)	20 ppm[1]	Gluten-free foods	121	119	2
Gluten (LAVS samples)	20 ppm[1]	Gluten-free pork products (sausages, pudding)	5	5	0
Peanut protein	Directive 2003/89/EC	Confectionery	34	34	0
Lactose[2]	Directive 2000/13/EC	Soy desserts, Soy & lactose-free infant formula, confectionery	17	17	0
Casein	Directive 2003/89/EC	Various foods labelled as "milk-free"	41	41	0
Sulphites[3]	Directive 2003/89/EC	Sausages, burgers, Fruit/Veg, Beers/ Ciders, Fish, Shellfish, soft drinks…	176	174	2
Histamine/Biogenic Amines[4]	200mg/kg (EC Reg. 2073/2005...)	Scombroid Fish etc (Tuna, Mackerel…)	218	217	1

1 *Codex Standard 118 – 1979 (2008 revision) and EU Regulation (EC) 41/2009 set standards of 100ppm (for 'rendered gluten-free foods') and 20ppm (naturally gluten-free food). All foods received in 2011 were labelled as 'gluten free' and did not use de-glutenised wheat flour.*

2 *Lactose is not a legally defined food allergen under EU food law (Directive 2003/89/EC) - rather it is a dairy sugar to which some people have an intolerance.*

3 *These samples contained undeclared sulphur dioxide - See Table 2.10 for details of samples tested for compliance with sulphite levels in the additives directive. (Dir 95/2/EC, as amended)*

4 *Amines tested for include: 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.*

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 new 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 2011, a diverse range of gluten-free foods from pharmacies, health food shops, supermarkets and local manufacturers was received. Four of the 144 (3 from one premises) HSE programmed samples were non-compliant (gluten levels 400, 800, 1,000 and >1,350 mg/kg) with the legislative limits. Follow-up action was taken by the authorised officer. 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. 121 samples of food produced in Ireland were also tested on behalf of food business operators, in connection with their listing in the Coeliac Society of Ireland Food List.

An ELISA-based analysis for **Peanut** in foods was introduced here in 2010; this technique is based on the use of polyclonal antibodies to the allergenic peanut proteins Ara h1 and Ara h2. In 2011 we analysed 34 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, the only samples found to contain peanut were labelled with "may-contain peanut" type labels. The majority of samples labelled in this manner were found not to contain any peanut residues. This may indicate an over-reliance on the type of labelling used by the food industries involved. This information is included as part of a broader FSAI survey entitled "Food Allergens and Labelling Survey June 2011"
http://www.fsai.ie/resources_publications.html

The Peanut ELISA test was accredited by INAB in 2011 and we also received 'flexible-scope' accreditation for the detection of allergens in food using the ELISA technique. This accreditation was awarded based on the Peanut ELISA validation that had been carried out as well as our lengthy experience with the Gluten ELISA.

During 2011 *safe*food launched their knowledge networks, an on-line 'social-network' type community on topics of interest in food safety (Cryptosporidium, Salmonella, biotoxins etc.). There is also a **'Food Allergy and Food Intolerance Network**' (http://safefoodallergy.ning.com/) that organises conferences and information days as well as serving as a valuable resource for networking for those involved in food allergy -from support groups for those with food allergies to enforcement bodies and producers etc. A number of PAL staff are members of these networks and we 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.

Biogenic amines: 218 fish samples were tested here in 2011 for **Histamine** and 3 other biogenic amines, viz. Putrescine, Cadaverine and Tyramine. These included 118 (~ 13 x 9 subsamples) samples submitted by the Sea-Fisheries Protection Authority (SFPA), 27 (3 x 9 subsamples) Border Inspection Post (BIP) samples from The Department of Agriculture, Food and the Marine (DAFM) and 73 samples from HSE Environmental Health Officers.

Just one of the 218 samples had excessive Histamine (618mg/kg), a tuna fillet sample submitted by an EHO.

12 Samples contained elevated (>100 mg/kg) Cadaverine. For a general report on Histamine poisoning see
http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/Seafood/FishandFisheriesProductsHazardsandControlsGuide/ucm091910.htm.

2.5.4 Other Contaminants, etc

Table 2.6 below summarises testing results for other contaminants/residues in 2011

Table 2.6: Other Food Contaminants/Residues: Summary of Results for 2011

Contaminant	Limit(s) (Legal Source)	Sample Types	Total	Complying	Non-complying
Marine Biotoxins[1]	EU Decisions 2002/225/EC & 2002/226/EC				
DSP Toxins[2]	160 µg/kg	Imported Mussels, Oysters, Cockles	15	15	0
AZA Toxins[3]	160 µg/kg	Imported Mussels, Oysters, Scallops	8	8	0
ASP Toxins[4]	20 mg/kg	As above	18	18	0
Arsenic (As)	0.5 mg/kg (SI 44 of 1972)	Rice/Maize/Cereals	2	2	0
	0.5 mg/kg (SI 44 of 1972)	Water (Bottled)	3	3	0
	0.5 mg/kg (SI 44 of 1972)	Miscellaneous	2	2	0
Anti-bacterial Substances(ABS)[5] (EC Four-Plate test)	2 mm 'Zone' of Inhibition	Chicken (16) Pork (8)	24	24	0

[1] *These toxins may accumulate in shellfish grown in seawater with excessive marine algae. Sampling focus on Imported Shellfish. Principal official monitoring is at production level by DAFM/Marine Institute.*

[2] *Diarrhetic Shellfish Poisoning (DSP).* [3] *Azaspiracid (AZA).* [4] *Amnesic Shellfish Poisoning (ASP).*

[5] *Sampling focus on Imported produce. Principal official monitoring is at production level (meat plants etc.) by the Dept. of Agriculture, Food and the Marine, and by the Local Authorities.*

2.6 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.

2.6.1 Sodium/Salt in Food

There is considerable international effort 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, suggests a calculated reduction of ca. 1,700 deaths in Ireland per year from strokes and ischaemic heart disease, if recommended reductions in population intake of salt are achieved. Since 2002, the FSAI has implemented a programme, in conjunction 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 2011 results for the FSAI surveys and other programmed surveillance (EHO sampling) are summarised in Table 2.7.

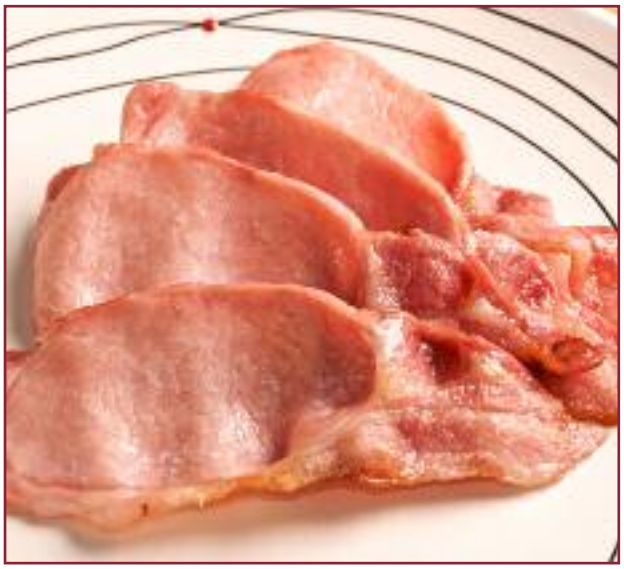


Table 2.7: Summary of 'Salt' (Sodium & Potassium) Testing Results 2011

Food Types etc.		Samples Tested	Average Results[1] (g/100g)	Range of Results (g/100g)
Bread FSAI survey	Sodium	46	0.47	0.33 – 0.88
	Potassium	46	0.19	0.11 – 0.27
Breakfast Cereals FSAI survey	Sodium	330	0.21	<0.01 – 0.62
	Potassium	330	0.31	0.06 – 0.87
Snacks FSAI survey	Sodium	235	0.7	0.20 – 1.60
	Potassium	235	0.75	0.10 – 1.91
Dairy & Non-Dairy Spreads FSAI survey	Sodium	28	0.51	0.24 – 0.75
	Potassium	28	0.04	<0.01 – 0.15
	Sub Total	639		
Babyfood HSE regional survey	Sodium	26	0.06	<0.01 – 0.26
	Potassium	26	0.21	0.04 – 0.51
Prepared Meals HSE regional survey	Sodium	54	0.26	0.01 – 0.62
	Potassium	54	0.22	0.01 – 0.46
Cereals and Bakery Products HSE regional survey	Sodium	16	0.33	<0.01 – 0.93
	Potassium	16	0.22	0.1 – 0.45
Christmas Bakery Products HSE regional survey	Sodium	28	0.2	0.04 – 0.97
	Potassium	28	0.24	0.08 – 0.63
Soups & Sauces HSE regional survey	Sodium	20	2.01	0.01 – 10.57
	Potassium	20	1.14	0.01 – 17.32
Reduced Salt/Low Salt Survey[2] HSE regional samples	Sodium	21	1.32	<0.01 – 10.57
	Potassium	22	4.35	0.01 – 50.2
	Sub Total	166		
Bottled Water HSE regional samples	Sodium	84	(mg/L) 39	(mg/L) 4 - 1030

1 *In the calculation of the average result in each category of food types, where present, the value (<0.01g/100g) has been replaced by 0.005g/100g.*

2 *Samples include stock cubes/granules, sauces, babyfood, cereals and bakery products, vegetables and 'low salt' table salt.*

FSAI Work: the 2011 surveillance work above for FSAI is a continuation of the work dating from 2003. The 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, including follow-up surveys, to monitor the extent of reductions being achieved. Table 2.8 summarises the main surveys undertaken by this laboratory for FSAI since 2003.

Table 2.8

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	0.002 – 0.91
2004	Ready Meals	51	0.29	0.08 – 0.64
	Sauces	52	0.65	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/Infant Formula	136	0.01	<0.005 – 0.37
	Snack Foods/Fried Foods	87	0.57	0.006 – 1.67
	Ready-made Foods	73	0.49	0.06 – 1.58
	Breads	113	0.51	0.23 – 0.99
	Soups	126	2.17	0.19 – 8.61
2006	Breads	71	0.54	0.28 – 0.92
	Meat Products	223	0.90	0.20 – 1.89
	Crisps	98	0.80	0.29 – 2.12
2007	Breakfast Cereals	119	0.28	<0.01 – 0.8
	Spreads/Butters	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	0.13	<0.01 – 0.30
	Spreads/Butters	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	Processed Meats	17	1.50	0.24 – 6.00
	Bakery Products	198	0.42	0.01 – 0.88
	Soups & Sauces	131	1.58	0.07 – 11.77
	Crisps, Popcorn & Snacks	7	0.38	0.02 - 0.60
	Babyfood/Weaning Food	43	0.06	<0.01 – 0.18
	Prepared Meals	54	0.25	0.02 – 0.55
	Confectionery	24	0.15	0.01 – 0.42

HSE Surveys etc: several HSE surveys were included in 2011 (Table 2.7). These surveys monitor foodstuffs to ensure that manufacturers are labelling their salt/sodium levels accurately.

A further 42 samples (9 meats, 11 vegetables, 8 breads (private survey), 9 follow-on milks/cereal-based infant foods, 5 miscellaneous) were tested and results compared to the labelled values.

Prepared Meals: the average sodium value of 0.26g/100g for the Prepared Meals (Cooked/Prepared on premises) corresponds to 0.66 g 'salt' (sodium chloride) per 100g, and to 2.64 g of salt per 'meal' (for a meal weight of 400g). This means that the prepared meal contains ca. 66% of the ultimate targeted daily intake of salt (4 grams).

Note: Ashtown Food Research Centre is performing research into reducing salt in ready meals (see article in TResearch Volume 5, Number 2, Summer 2010).

2.6.2 Other Nutritional Testing

Table 2.9 summarises other nutritional testing carried out here in 2011.

Table 2.9 Other Nutritional/Compositional Testing 2011

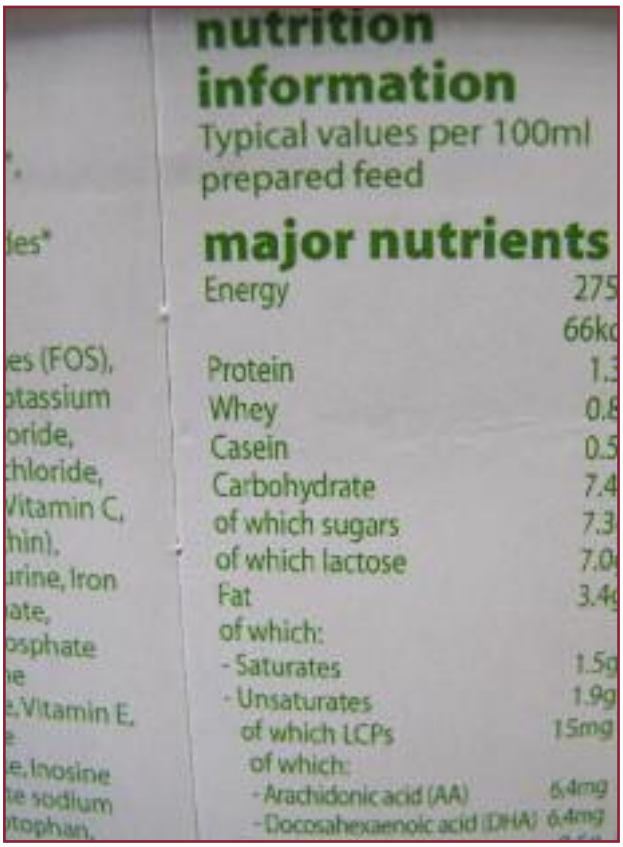
Parameter	Food Types etc.	Samples Tested	Range of Results
Folic Acid	Bread (including white, brown, wholemeal, wholegrain, soda & granary) – FSAI survey	51	54-140µg/100g
	Breakfast Cereals (including oat-, bran-, rice- & wheat-based) – FSAI survey	182	80-742µg/100g
	Cereal-based Infant Foods (Dry) – HSE survey	11	26-167µg/100g Powder
	Infant and Follow-on Formulae – HSE survey	23	10 to 40µg/100mls 91-199µg/100g Powder
	Infant and Follow-on Formulae – DAFM survey	20	66 – 172 µg/100g Powder
	Folic Acid Supplements, Multi-vitamins etc.* HSE survey	13	Range of Results (% of Labelled)
			69% to 141%

Parameters	Food Types etc.	Samples Tested	Range of Results (g/100g)
Fat	Minced meats	30	2.5 – 23.6
	Prepared dishes	20	0.7 – 18.7
	Brown Bread	1	6.9
Starch	Mince Meat	30	Starch detected in one sample.**

**Method: USP 2009, Volume 1, p. 1093*

***The presence of starch (added cereal....) is indicated by the positive starch result.*

Folic Acid testing was introduced in this laboratory in 2006, as an analytical resource for FSAI in support of the potential introduction of mandatory fortification of breads with folic acid. The report of the Implementation Group on Folic Acid Fortification (www.fsai.ie/assets/0/86/204/cc3c2261-7dc8-4225-bf79-9a47fbc2287b.pdf) did not recommend mandatory fortification but recommended monitoring of the (voluntary) fortification of foods on the market. In 2011, two large surveys, of breads and breakfast cereals, were carried out and the results were reported to FSAI. Other, smaller surveys (infant formulae/foods and folic acid supplements/multivitamins) were also performed as part of programmed surveillance. Results were generally within, or close to, the expected range.



2.6.3 Additives/Labelling/Compositional Quality Results 2011

Table 2.10 Summary of Additives/Labelling/Compositional Quality Results 2011

Parameter(s)	Food Types	Number of Samples Tested & Results		
		Total	Complying with Standard	Non-Complying with Standard
Additives				
Sulphur Dioxide[1] (Sulphites)	Meats (44),Beers /alcoholic beverages (45), Fish/shellfish (26), Fruit/veg (45), Soft drinks (9), Others (7)	176	170	6
Nitrites & Nitrates[2]	Cured Meats (62), Brines (10) & Meat Products (7)	79	54	25[2]
Food Irradiation[3] 1. Photo-stimulated luminescence screening 2. Confirmatory Thermoluminescence testing (SUERC, Scotland)	Herbs/Spices /Seasonings(23), Herbal teas/teas (48), Seeds (8), Noodles (7), Pasta (2) Spices (1)	88 1	88 1	0 0
Dairy Testing[4]	Dairy products (Cheese, yogurts, cream etc)	18	18	0
General Labelling	Miscellaneous Packaged Foods	430	315	115
Alcoholic Strength	Pub-level Spirits	16	16	0
pH	Miscellaneous Food Types	13	13	0
Moisture	Tea/Teabags	36	36	0

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

[2] Limits for cured meats set in directive 2006/52/EC given effect by S.I. No 58 of 2004 (as amended). Excessive Sodium Nitrate &/Sodium Nitrite was determined in the following samples: 15 Bacon Ribs, 5 Bacons, 1 Ham, 2 Corned Beef & 2 Air Dried Beef samples.

[3] S.I. No. 297 of 2000 authorises irradiation of herbs, spices and vegetable seasonings. Irradiated foods must be labelled clearly as such.

[4] Varying Tests: ALP ('Pasteurisation'), Inhibitory Substances (Delvo test), FPD/Extraneous water, Fat, Protein, General Labelling etc. Sample numbers exclude dairy products received for other testing (Nutritional claims, Lead (Pb) etc.). An emphasis was placed on the sampling & analysis of milk and dairy products on retail sale in Ireland that would have been outside the control of the Department of Agriculture; i.e. imported milk and dairy products (e.g. liquid milk from Northern Ireland).

The choice of **additives** monitored is made by the FSAI and the HSE on a year-to-year basis. Factors include 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 levels and intakes. The results (see Table 2.10) for 2011 indicate a high level of compliance with the standards. Non-complying cases are dealt with by the authorised officers.

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 has begun a consultation process on an overhaul of European food labelling legislation which is to continue during 2011. This process will result in a full re-draft of the EU general and nutritional labelling requirements and 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.

In 2011, 430 samples were examined here for compliance with labelling legislation and 115 were designated as being non-complying with the standards in the legislation. 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.

2.7 Complaint Samples.

Complaint samples arise when consumers find contamination, infestation, spoilage, extraneous matter, odours 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, hairs/fibres, plant 'debris', plastic, glass, metal, general dirt/unidentified material or abnormal odours/tastes in food.

A total of 122 complaint samples, received from EHO services around the country (107) and directly from the public (15), were investigated here in 2011. Of the 122, the number of adverse reports issued was 62 (50.8%). Appendix 2 gives a breakdown of food complaints received, by food category, from the HSE West area only (total 119). 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 127 (2004 – 2011). The reason for this reduction is unclear but it may be related to better handling of complaints by retailers.

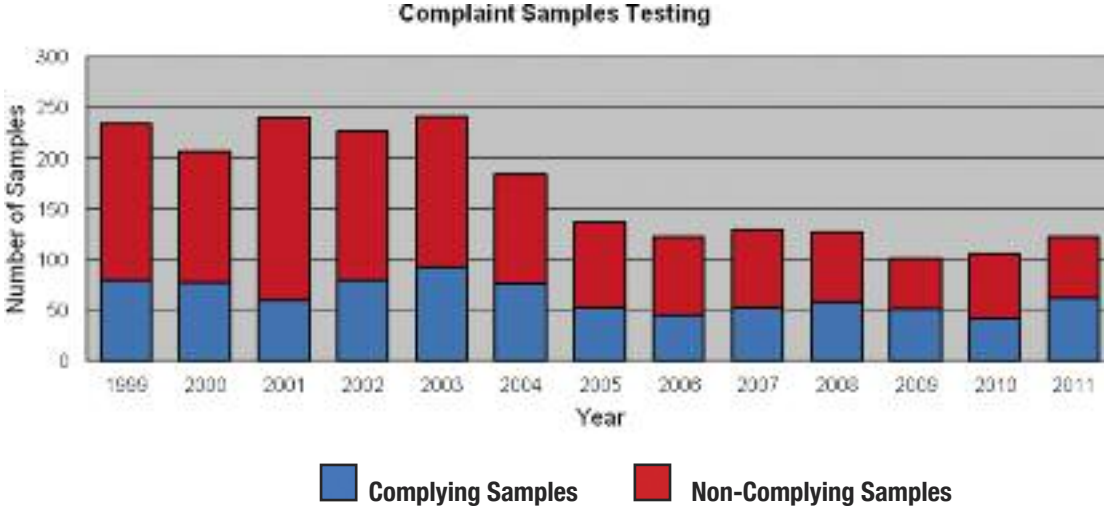
The number of food complaints received represents a very small fraction of the total number of food items consumed in our region.

2.8 Food Alerts (RASFF) and 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 2011 (http://ec.europa.eu/food/food/rapidalert/docs/RASFF_annual_report_2011_en.pdf) is given by Hazard group below:

Hazard / Risk Group	Number of Notifications 2011
Food: Chemical and Physical Hazards[1]	2719
Food: Microbiological Hazards[2]	835
Food: Other Hazard / Risks[3]	418
Animal Feedstuffs Hazards[4]	4

See notes overleaf



1 *Mycotoxins, Heavy Metals, Pesticides and Veterinary Residues, Additives, Allergens, Marine biotoxins, GMOs, Foreign Bodies, Irradiation, Migration from food contact materials, Composition, Contaminants, Adulteration, Flavourings, etc.*
2 *Pathogenic Bacteria (Salmonella, Listeria etc.) and Viruses, Other Microbiological Contamination, TSEs. Parasites*
3 *Insufficient controls, Absent Labelling etc., Defective Packaging, Organoleptic defects, Parasites, 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 consideration by the FSAI, a Food Alert notification may be issued (to the EU) depending on their evaluation of the risk. In 2011, 11 Food Hazard/Contamination Reports were issued by the laboratory, relating to:

- Undeclared sulphur dioxide in peeled potatoes, lamb kebabs & sausages
- Mould in fromage frais and in malt vinegar
- Beetles baked into biscuits
- Bone shard in soup
- Sharp material in babyfood (12-36 months)
- Salt crystals found in sugar
- Rice weevils in risotto rice
- Excessive sodium nitrite in bacon ribs

A summary of the total number of Food Hazard/Contamination Reports issued to date from this laboratory is outlined below:

2011	11	2005	23
2010	11	2004	16
2009	14	2003	16
2008	7	2002	19
2007	24	2001	43
2006	26	2000	31

3. WATERS / EFFLUENTS

3.1 Introduction

The European Communities (Drinking Water) Regulations 2007, S.I. No. 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 (85%) with the remainder provided by group water schemes and private supplies. 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 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 and appearance.

In 2011, the laboratory received a total of 7,426 water samples. These consisted of drinking waters, bathing waters, pool waters, effluents, haemodialysis samples and miscellaneous samples. More than 80,000 tests were carried out on these samples. Most of the samples analysed were drinking waters, which were tested for compliance with the European Communities (Drinking Water) Regulations 2007, S.I. No. 278 of 2007.

3.2 Sample Sources 2011

Samples were received from a wide variety of sources, as shown in Table 3.1.

Table 3.1 Sources of samples received in 2011

Source	Number
Galway (HSE)	639
Galway County Council	83
Galway City Council	535
Mayo	1,281
Roscommon	247
Donegal	1,643
Sligo / Leitrim	250
North Tipperary	552
Clare	334
Limerick	571
Haemodialysis (Hospitals)	389
Private	887
Miscellaneous	15
TOTAL	**7,426**

3.3 Water Quality

The testing by this laboratory indicates in general a high level of compliance for those parameters tested. In 2011, private drinking water samples accounted for over half of all exceedances recorded. A full appreciation of the overall quality can only be obtained by also considering the bacteriological quality along with additional chemical parameters as published by the EPA. 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 3.2. The World Health Organisation (WHO) takes the IARC classifications into consideration when determining guideline values for drinking water quality.

The parametric values set in the Drinking Water legislation (S.I. No. 278 of 2007) are generally lower that the WHO guideline values. The WHO values are purely health based whereas S.I. No. 278 of 2007 also takes into account the general over-all quality of the water.

Table 3.2 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

3.4 Fluoridation of Public Water Supplies

Fluoride accounts for about 0.3% of the earth's crust. Its wide range of uses include fluoridation of water supplies, most general anaesthetics, anti-reflective coatings, antibiotics, refrigeration and air-conditioning systems. The WHO has issued a guideline value of 1.5 mg/L for fluoride in drinking water.

Fluoride has been added to Public Water Supplies in Ireland since the 1960s as a means of improving dental health. 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. The 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, 1180 samples were analysed for fluoride in 2011.

3.5 Non-Metals in Drinking Water

The results for 2011 are summarised in Tables 3.3 and 3.4.

3.5.1 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.

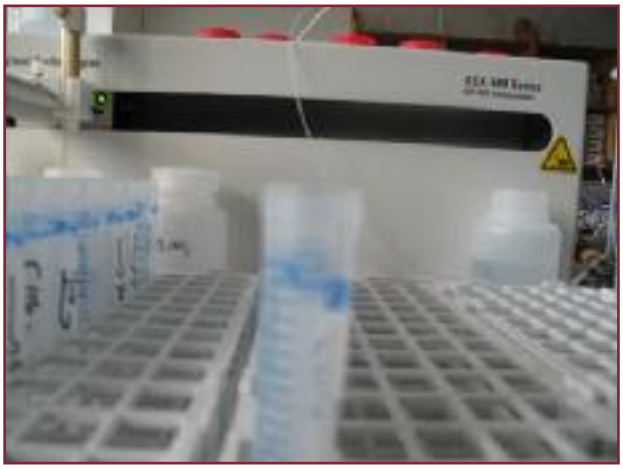
THMs (Chloroform, Bromodichloromethane, Dibromochloromethane and Bromoform) are not naturally occurring compounds. They occur as by-products of the disinfection process, as a result of the reaction between the added chlorine and organic matter, which may be present naturally in the water. The rate and 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. No. 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 2011 is shown in Table 3.3. The high results can be attributed to a limited number of water supplies that were analysed repeatedly.

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 3.4.

3.5.2 Ammonium

Ammonium 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 0.3 mg/L in drinking water (S.I. No. 278 of 2007). Ammonium levels greater than the parametric value may be an indicator of possible bacterial, sewage and animal waste pollution. The threshold odour concentration of ammonium at alkaline pH is approximately 1.5 mg/L. The WHO has not issued a health-based guideline value for ammonium in drinking water, as toxicological effects are only observed at exposures above 200 mg/kg body weight. However, ammonium 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. 94 % of the exceedances in 2011 were private samples (Table 3.4).

Table 3.3 Trihalomethane results 2011

Trihalomethane (µg/L).							
Concentration Range	≤ 10	11-50	51-100	101-150	151-200	201-300	> 300
No. of Samples	139	222	253	147	99	27	4

3.5.3 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.

3.5.4 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 a 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. In 2011, 954 samples were analysed. 97% of these samples contained <1.0 mg/L residual chlorine.

3.5.5 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 2011, over half the exceedances related to private samples.

3.5.6 Conductivity

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. 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 2011, 20 samples had conductivity levels in excess of 1250 µS/cm. Only 6 private samples had conductivity levels in excess of the EU limit of 2500 µS/cm.

3.5.7 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. 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.

3.5.8 Hydrogen Sulphide

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.

3.5.9 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 waste as a consequence of the oxidation of ammonium. Nitrite is the intermediate in the oxidation of ammonium 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 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 2011, private samples accounted for 83% of the exceedances.

3.5.10 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. 75% of the 2011 exceedances were from private samples.

3.5.11 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. 84 % of the exceedances in 2011 were private samples (Table 3.4).

Table 3.4 Summary of Non-Metals in drinking water results for 2011

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	883	0
Trichloroethene	Group 2A	10 µg/L	20 µg/L		
Tetrachloroethene			40 µg/L	884	0
1,2 Dichloroethane	Group 2B	3.0 µg/L	30 µg/L	881	2 (0.2%)
Colour	n/a	Acceptable to consumers and no abnormal change		4056	[1]219 (5.4%)
Turbidity	n/a			4058	[1]234 (5.8%)
pH	n/a	6.5 – 9.5	-[3]	4049	99 (2.4%)
Conductivity	n/a	2,500 µS/cm		4088	6 (0.1%)
Nitrate	n/a	50 mg/L	50 mg/L	4096	5 (0.1%)
Nitrite	n/a	0.5 mg/L	3.0 mg/L	4107	7 (0.2%)
Ammonium	n/a	0.3 mg/L	-[3]	4107	102 (2.5%)
Free Chlorine	Group 3[2]	-	5.0 mg/L	954	[4] 3 (0.3%)
Chloride	n/a	250 mg/L	-[3]	90	16 (17.8%)
Total Dissolved Solids	n/a	-	-[3]	15	n/a
Hardness	n/a	-	-[3]	1721	n/a
Alkalinity	n/a	-	-[3]	2214	n/a

[1] 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.

[2] This classification refers to hypochlorite (one of the breakdown products of chlorine)

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

[4] The number of samples having in excess of 5mg/L free chlorine.

3.6 Metals in Water

3.6.1 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 mg/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.

3.6.2 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.

3.6.3 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 2011 are summarised in Table 3.5. It should be pointed out that 96% of the exceedances were from private samples.

3.6.4 Boron

Boron compounds are used in the manufacture of glass, soaps, 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.

The WHO has revised the Boron Guideline Value from 1.0 mg/L to 2.4 mg/L in Guidelines for Drinking Water Quality, 4th Edition, published in 2011. Both exceedances in 2011 were from private samples (Table 3.5).

3.6.5 Cadmium and Cadmium Compounds

Cadmium 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, solders and some metal fittings.

3.6.6 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.

3.6.7 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 mg/L.

3.6.8 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 Fe^{2+} (ferrous) and Fe^{3+} (ferric) readily combine with oxygen- and sulfur-containing compounds to form oxides, hydroxides, carbonates and sulfides. In drinking water supplies, ferrous salts are unstable and are precipitated as insoluble ferric hydroxide, which settles out as a rust-coloured silt. Anaerobic groundwaters 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/Litre. 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.

3.6.9 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 for Lead of 25µg/L (S.I. No. 278 of 2007) will be reduced to 10µg/L in 2013.

3.6.10 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 managanese, 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.

3.6.11 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.

3.6.12 Selenium and Selenium Compounds

Selenium is an essential element for humans, and foodstuffs such as cereals, meat and fish are the principal sources 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 (colouring agents) for paints, plastics, ceramics and glazes.

3.6.13 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 have 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.

Table 3.5 Summary of Metals in drinking water results for 2011

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]	4,132	85 (2.1%)
Antimony	Group 2B[3]	5.0 µg/L	20 µg/L	729	1 (0.1%)
Arsenic	Group 1	10 µg/L	10 µg/L	1,204	52 (4.3%)
Boron	n/a	1.0 mg/L	2.4 mg/L	1,168	2 (0.2%)
Cadmium	Group 2A	5.0 µg/L	3.0 µg/L	1,182	0
Chromium	Group 1[1]	50 µg/L	50 µg/L	1,181	5 (0.4%)
Copper	n/a	2.0 mg/L	2.0 mg/L	1,246	33 (2.6%)
Iron	n/a	200 µg/L	-[4]	4,091	452 (11.0%)
Lead	Group 2A	25 µg/L	10 µg/L	1,638	42 (2.6%)
Manganese	n/a	50 µg/L	-[4]	4,075	336 (8.2%)
Nickel	Group 2B	20 µg/L	70 µg/L	1,205	36 (3.0%)
Selenium	Group 3	10 µg/L	40 µg/L	1,185	5 (0.4%)
Sodium	n/a	200 mg/L	-[4]	453	87 (19.2%)
Zinc	n/a	-	-[4]	1,204	5[2] (0.4%)

[1] Classification refers to hexavalent Chromium

[2] The number of zinc samples which gave results >3mg/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.

3.6.14 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.

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.

3.7 Haemodialysis Water

Haemodialysis units operate water treatment systems to produce purified water for use in Dialysis machines. The laboratory performed analysis on 389 samples submitted in 2011. The parameters analysed include pH, conductivity, sodium, potassium, hardness and a range of metals.

3.8 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 2011 was 887.

3.9 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 2011 bathing water season.

In 2011, 95 samples were analysed. The parameters analysed include dissolved oxygen, pH, colour and ammonium, 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.

3.10 Pool Waters

The laboratory analyses chlorine/bromine levels, along with total dissolved solids and alkalinity of swimming pools, jacuzzis, hot tubs and spa pools. In 2011, 513 samples were analysed. At present there is no legislation for the control of these parameters. 32 of the samples were found to contain > 5 mg/L free chlorine. 11 of these 32 were also found to contain > 10mg/L free chlorine.

In the case of the total chlorine levels, 86 of the samples were found to contain > 5 mg/L total chlorine, while 26 contained > 10mg/L total chlorine. The total dissolved solids varied from < 10 to 7614mg/L, while the alkalinity levels varied from <10 to 785mg/L.

3.11 Effluents

The laboratory carries out a wide range of analysis on effluent samples. These include samples for discharge licences and suspected pollution samples. In 2011, 56 samples were analysed. The parameters tested include Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), fats, oils and greases (FOGs), suspended solids, dissolved oxygen, phosphate (both soluble and total), nitrate, nitrite, ammonium and a range of metals.

4. AIR POLLUTION MONITORING

4.1 European Legislation

The current European legislative instruments governing air quality are the **Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive 2008/50/EC and Directive 2004/107/EC** (4th daughter directive from previous Framework directive). The CAFE directive has replaced five existing legislative instruments, and Directive 2004/107/EC will also be merged into the CAFE directive in the future. This will result in greater clarity and simplicity whereby a single directive replaces six separate acts.

The CAFE 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 and polycyclic aromatic hydrocarbons.

4.2 National Legislation

The CAFE Directive was transposed into Irish Legislation by the Air Quality Standards Regulations 2011, S.I. No. 180 of 2011 in May 2011.

Directive 2004/107/EC was transposed into Irish Legislation in 2009 by S.I. No. 58 of 2009.

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.

4.3 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.

4.3.1 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 2011 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.

4.3.2 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.

4.3.3 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}, 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 µg/m^3 which is not to be exceeded more than 35 times a calendar year, and a yearly average limit of 40 µg/m^3 for PM_{10}s.

The 24 hour average limit was exceeded four times during the year. The highest value recorded was 64.6 µg/m^3. The daily average for the year was 17.6 µg/m^3.

The results for the year 2011 are shown in Appendix 6.

5. PHARMACEUTICALS & TOXICOLOGY

5.1 Pharmaceutical Laboratory

Service to the Irish Medicines Board (www.imb.ie). 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. Since 1976 this 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.

In this regard, 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)

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 (a 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), the testing of Mutually Recognised/Decentralised Products (MRP/DCPs), and participation in Proficiency Testing Schemes (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 2011 included Appearance Testing, Uniformity of Mass, pH, Identification and Assay by HPLC, Identification and Assay by UV-Vis, Uniformity of Content, Uniformity of Dosage, Dissolution, Disintegration, Assay by Titrimetry, Water Determination by Karl Fischer, Loss on Drying, Identification by IR, Identification by TLC, Specific Optical Rotation, Melting Point, Specific Gravity, Related Substances by HPLC, Preservative Content etc.

During 2011, Certificates of Analysis were issued for 90 samples, including both finished medicinal products and active pharmaceutical ingredients. Details of analytical findings may be found in the IMB 2011 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 (initial accreditation was to the EN45001 standard). In 2002 the laboratory successfully made the transition to ISO/IEC 17025 and in 2006 to the current standard, ISO/IEC 17025:2005. At the request of INAB (Irish National Accreditation Board), 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 co-operation for Accreditation) (see http://www.edqm.eu/en/EDQM-Publications-Quality-Management-Guidelines-86.html for more information).

Mutual Joint Audits (MJAs) 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. During September 2011, the first Irish MJA was carried out on the laboratory by auditors from the EDQM, as well as colleagues from the French and German OMCLs.

The Pharmaceutical laboratory was also audited by the Irish Medicines Board in May 2011 and by INAB in October 2011.

Proficiency Testing Schemes

The laboratory regularly takes part in Proficiency Testing Schemes (PTS), such as those organised by EDQM and Pharmassure. In 2011, at the request of the Irish National Accreditation Board (INAB), the laboratory successfully took part in a PTS organised by Asia Pacific Laboratory Accreditation Cooperation (APLAC). The methods covered by PTS during 2011 included Optical Rotation, IR, TLC, UV, Volumetric Titration, Assay by HPLC, Loss on Drying, pH, Melting Point and Density.

Attendances

A member of staff attended the Annual Meeting of the EDQM European Network of OMCLs held in Dusseldorf in May and the Annual CAP and MRP/DCP meetings held in Lisbon in November. A staff member also attended a symposium on Counterfeit Medicines and a training course for auditors of the MJA/MJV Quality Assessment Scheme of the OMCL Network, both of which were held in the EDQM headquarters in Strasbourg.

Attendances were funded by the Irish Medicines Board and the EDQM.

5.2 Toxicology Laboratory

A basic toxicology service is offered, mainly to the Consultant Pathologists and Physicians in HSE West as well as to Veterinary Surgeons and members of the public. Blood and urine samples, "B-samples" taken under the

Road Traffic Act are also independently analysed for alcohol. From 28 October 2011 (through the Road Traffic Act 2010) the limits for drink driving offences were lowered from an ethanol content of 107 mg/100ml to 67 mg/100ml in urine and from 80 mg/100 ml to 50 mg/100 ml in blood for experienced drivers. Even lower limits apply to new or learner drivers and to drivers of buses, lorries, trailers, work vehicles, taxis and other public service vehicles.

Nine samples taken under the Road Traffic Act were tested during 2011, of which 6 were above the legal limit at the time of testing.

The total number of samples tested during 2011 was 136, see Table 5.1 below;

Table 5.1

Ethanol (Post Mortem)	88
Ethanol (Road Traffic Act)	9
Proficiency Tests	25
Strychnine	3
Ethanol (Foodstuffs, Misc.)	11

Quality System

The laboratory takes part in an External Quality Assessment Scheme (UKNEQAS) organized by Cardiff Bioanalytical Services Ltd. Samples of blood and urine are received on a monthly basis and analysed for ethanol.

EDQM-OMCL Network audit team accompanied by Kevin O'Donnell of the IMB.

6. COSMETICS

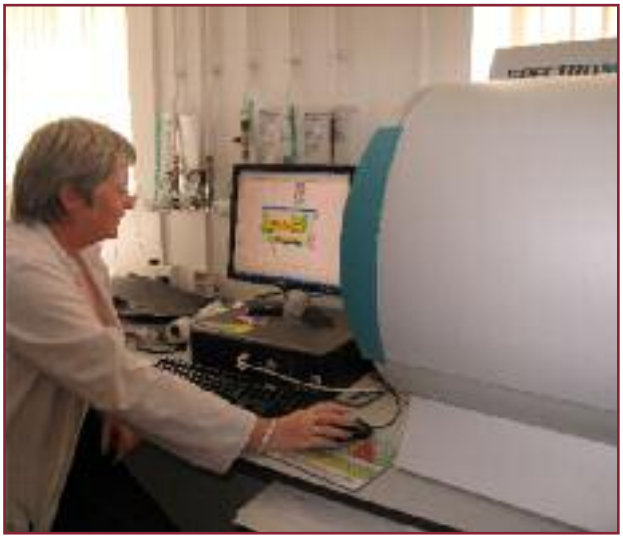
6.1 Cosmetics Legislation

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 Directive & Regulations set out standards which must be met by the Cosmetics Industry.

6.2 Official Control and Enforcement of Cosmetics Legislation in Ireland

The Irish Medicines Board, IMB, is the national Competent Authority for enforcement of cosmetics legislation. HSE's Environmental Health Officers and Public Analysts' Laboratories are authorised officers and official laboratories respectively for cosmetics control. The IMB now co-ordinates cosmetics control and surveillance, e.g. joint IMB-HSE production of national Cosmetics Surveillance Plans has begun. A Cosmetics Surveillance Committee is in place, with membership from the IMB and HSE. On a national basis, the Cosmetics Control Group co-ordinates the HSE's activities (RAPEX responses, sampling SOPs, training etc.). The National Standards Authority of Ireland (NSAI) has a working group on cosmetics standards (Cosmetics Standards Advisory Group), both the HSE and IMB are represented on this group. The OCCL, of which we are a member, is a network of Official Cosmetics Control Laboratories formed within the European Directorate for the Quality of Medicines and HealthCare (EDQM). Plans are currently in place for the OCCL to strengthen links with the European Commission Cosmetics group, PEMSAC to prevent overlaps of function, sampling etc.

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/2011_rapex_report_en.pdf
In Ireland the National Consumer Agency (NCA) administers RAPEX.
www.consumerconnect.ie



6.3 Results for 2011

Table 6.1 below summarises testing of cosmetics performed in this laboratory in 2011 (see Appendix 7 for outline of the Surveillance Programme for 2011). The service is provided to authorised officers (EHOs) from three regions, HSE West, Dublin Mid-Leinster and Dublin North-East.

Table 6.1 Summary of Cosmetics Testing Results 2011

Parameter	Cosmetic Types	Samples Tested	Complying	Non-complying
Formaldehyde	Hair Straightening Products	27	22	5
	Personal Hygiene Cosmetics	106	105	1
Lead[1]	Face paints, Children's & General make up	680	671	9
Cadmium[1]	Face paints, Children's & General make up	680	679	1
Mercury	Creams, Soaps (Whitening)	48	44	4
Antimony	Hair Care Oil	1	1	0
Nickel	Various Cosmetics	2	2	0
Diethylene Glycol	Toothpaste	26	26	0
Hydrogen Peroxide	Tooth whitening products, Toothpaste	57	57	0
p-Phenylenediamine	Hair Dyes	29	29	0
Hydroquinone	Creams, Soaps (Lightening)	49	45	4
General Labelling Examination	Make up, Face Paints, Toothpaste, Hair Dyes, Creams etc.	227	137	90
Salicylic, Sorbic, Benzoic acid 4-hydroxybenzoic acid	"Preservative/ Allergen- free" Children's Cosmetics	19	19	0
pH	Handwash, Hair product, Toothpaste	3	3	0
Iodopropynyl-butylcarbamate[2]	Creams/Lotions (Brightening)	3	3	0

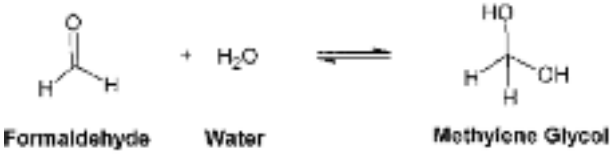
[1] *181 samples (largely multi-component cosmetics sets) consisting of 680 sub-samples were screened for lead & cadmium*

[2] *Samples tested outside this laboratory*

Note: *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.*

6.3.1 Formaldehyde in Hair-straighteners etc.

General: Formaldehyde is a highly active chemical with many uses, including functioning as a permitted preservative in cosmetics. Anhydrous formaldehyde is a gas under normal conditions, but it is generally used by industry as a solution in water (formalin). Formaldehyde reacts with water to form hydrated formaldehyde, known also as methylene glycol.



Formaldehyde Water Methylene Glycol

The reaction is reversible, i.e. the methylene glycol can release formaldehyde under certain conditions. Thus, although of a different chemical form to formaldehyde gas, formalin (or methylene glycol) solutions and formaldehyde can be treated as one in terms of safety and toxicity. Formaldehyde has high inhalation toxicity and is a known skin 'sensitiser'.

EU cosmetics legislation (see Section 6.1) regulates formaldehyde strictly, setting a maximum limit of 0.2% for formaldehyde[1] in general cosmetics products. Due to its high inhalation toxicity, formaldehyde is prohibited for use in aerosol dispenser sprays. 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%.

[1] "formaldehyde and paraformaldehyde: (a) Products other than for oral hygiene – 0.2% (expressed as free formaldehyde);"

In 2010, due to the discovery of excessive formaldehyde in a hair straightening salon product, the laboratory:
• introduced new, official EU testing methodologies (UV and HPLC) for formaldehyde
• organised an inter-lab validation study with NLVWA, Netherlands (Dutch Official Cosmetics Control Lab)
• performed ^{13}C NMR* non-destructive testing to directly detect the formaldehyde (as methylene glycol)
• performed testing of 'equivalent' products (to the initially contaminated product) on the market, in association with DoH, EHOs and IMB
- see 2010 Annual Report, p. 25, for a summary of 2010 work in this area.
http://www.hse.ie/eng/services/Publications/corporate/westernlabannualrpt%202010.pdf
Follow-up surveillance (of hair straighteners etc.) took place in 2011, and surveillance of some personal hygiene produce was also introduced.

** ^{13}C NMR testing was performed in the chemistry department NUI Galway.*

6.3.1.1 Results in 2011

A: Hair Straighteners etc: a total of 27 samples of hair straighteners/smoothing products was tested in 2011, with emphasis on samples labelled as containing formaldehyde or as "formaldehyde-free". Formaldehyde results ranged between < 0.04% and 6.7%, with 3 samples (1.4, 1.5 & 6.7%) exceeding the statutory limit

of 0.2%. Two other samples, whilst complying with the formaldehyde limit, were deficient for labelling ("contains formaldehyde" is a mandatory labelling requirement where formaldehyde exceeds 0.05%). The laboratory issued one Cosmetics Hazard/Contamination Report (concerning 2 samples) to the EHOs and IMB. The problem of usage of excessive formaldehyde in hair straighteners appears to have abated somewhat from 2010 levels (16 exceedances out of 31 samples tested in 2010).

B: Personal Hygiene Cosmetics: as information on formaldehyde usage/levels in retail-level cosmetic products etc. in Ireland was unavailable, it was decided, in conjunction with the EHOs and IMB, to perform some surveillance in this area. 106 samples of personal care products (shampoos, conditioners, bubble baths etc.) were received from the EHS. Products tested included children's and general cosmetics, low-cost and mainstream items etc. Formaldehyde results ranged from <0.04% to 0.08%. One sample was non-complying as it did not contain the required warning "contains formaldehyde". Reassuringly, the detected levels are low, with no sample exceeding the legislative limit of 0.2%. 15 of the samples were non-complying with respect to general labelling.

6.3.2 Heavy Metals

181 samples (make-up sets, lipsticks, lipgloss, face paints, eye shadows, etc.) were analysed here for Lead (Pb) and Cadmium (Cd) in 2011. Many of these samples were multi-component cosmetic sets consisting of different cosmetic types and colours. Overall, 680 sub-samples or components were tested. The samples were screened initially by X-ray fluorescence (XRF) and, if required, lead and cadmium levels were quantified by atomic absorption spectroscopy (AAS). The results for the quantified samples are shown in the Tables 6.2 and 6.3 for Lead and Cadmium respectively.

Table 6.2: Lead Results for Cosmetics 2011 (AAS Results)

Lead (Pb)	
Results Range (mg/kg)	Number of Subsamples
<5.0	205
5.0 - 10.0	26
10.1 - 20.0	8
20.1 - 100	3
101 - 1,000	2
>1,000	6
TOTAL	**250**

Table 6.3: Cadmium Results for Cosmetics 2011 (AAS Results)

Cadmium (Cd)	
Results Range (mg/kg)	Number of Subsamples
<0.5	205
0.5 - 1.0	1
1.1 - 5.0	0
>5.0	1
TOTAL	**207**

There are no specific limits set for Heavy Metals in the Cosmetics Directive or Regulations. A Lead (Pb) limit of 20mg/kg and a Cadmium (Cd) limit of 5mg/kg (limits developed by BfR/Germany) have been adopted as an interim measure for official control purposes. In 2011, 11 components exceeded the Pb limit of 20 mg/kg, and one sample exceeded the Cd limit of 5mg/kg.

3 RAPEX Alerts resulted from:
- a pencil component of a children's make-up set (Pb: 822mg/kg)
- an eyeliner (Pb: 11922mg/kg, i.e. 1.2%, Cd: 49mg/kg)
- a yellow face-paint component of a children's face-paint set (Pb:16900mg/kg, i.e. 1.7%)

Four samples of Kohl eye make-up were submitted in 2011 as a follow-up to a RAPEX alert issued by the French authority. The levels of lead found in these samples were extraordinarily high and ranged from 35% to 62%. The Irish distributor agreed to a voluntary withdrawal of all these products and provided the EHOs with a list of customers. Most of the products were voluntarily surrendered at retail level, and a small number were seized and detained by authorised officers.

Of a total of 48 samples submitted for mercury analysis, 4 were found to be non-compliant. These samples were all from the same manufacturer, two "freckle" creams and two "skin bleaching" creams. Mercury (as various mercury compounds) is sometimes used in skin whitening products as an active ingredient, even though its use is prohibited. The results all exceeded levels of 2.5% mercury in the products. There had been previous RAPEX reports on similar products from this manufacturer, indicating the difficulty in control of products often imported in small numbers for sale in "ethnic" premises.

Full INAB accreditation was achieved in 2011 for Heavy Metals analysis of cosmetics by ICPMS. Metals now analysed include arsenic, cadmium, chromium, lead and nickel in all cosmetic matrices.

6.3.3 Hydroquinone 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 and localised blemishes such as freckles, chloasma (also known as melasma), age spots and acne scars. RAPEX reports involving hydroquinone are relatively common (on a European level) and annually include many of the same products, indicating both the popularity of the products and the difficulty in controlling the manufacture and distribution of same. Hydroquinone (at any level) is prohibited for use as a skin-lightening agent. During 2011, 4 of the 49 (8%) samples tested here were found to contain hydroquinone. These results compare to 47% (23/49), 18% (5/28) and 0% (0/39) for 2008, 2009 and 2010 respectively.

6.3.4 para-Phenylenediamine in Hair Dyes

In 2011, 29 samples of hair dyes were tested for para-phenylenediamine (PPD), a permitted hair colourant with allergic properties and an upper limit of 2%. None of the samples exceeded the new limit of 2% para-phenylenediamine which came into effect on July 15th 2010 (Directive 2009/130/EC).

6.3.5 Diethylene Glycol in Toothpastes

Following surveillance in 2009/2010, a small survey of 26 toothpaste samples was carried out in 2011. Whilst the intention had been to sample "low cost" products these proved difficult to obtain so the survey included many mainstream products to ensure legislative adherence. No sample exceeded the legislative limit of 0.1%, European Communities (Cosmetic Products, Amendment) Regulations 2009. (S.I. 191 of 2009).

6.3.6 Hydrogen Peroxide

The current popularity of "whitening" toothpastes and related products prompted a small market study to ascertain if the products contained hydrogen peroxide as an ingredient. Hydrogen peroxide is permitted in oral care products up to a maximum limit of 0.1%. A broad spectrum of sample types (57 in total) were analysed and all were found to conform to legislative requirements.

6.3.7 General Labelling of cosmetics

227 samples were examined in 2011 for compliance with the labelling requirements in the Cosmetics Regulations (S.I. No.870 of 2004). 90 (40%) 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.

6.3.8 Other Cosmetics Testing

6.3.8.1 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". A small sample set (19), primarily children's suncare products as well as other "sensitive" products was investigated. All were found to conform to legislative limits.

6.3.8.2 Iodopropynyl butylcarbamate

Three samples were investigated for the presence of iodopropynyl butylcarbamate, a permitted preservative at low levels as per Council Directive 76/768/EEC. One was a sample similar to that involved in a previous RAPEX report on elevated iodopropynyl butylcarbamate, one listed the material as an ingredient and the third sample was of a similar type so analysis was carried out for investigative purposes. All samples were within legislative limits. The analysis was carried out in the CVUA in Karlsruhe, Germany (fellow OCCL member).

6.4 Summary of Cosmetics Hazard/Contamination Reports issued in 2011

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 2011, the laboratory issued 11 Cosmetics Hazard/Contamination reports concerning: Mercury in Freckle creams (2), Formaldehyde in hair straightener (1), Lead/Cadmium in make-up products (4) and Hydroquinone in creams (4).

6.5 Resources

Laboratory resources for Cosmetics testing are minimal and thus the service provided in this area is restricted. The position is helped to some extent by the close co-operation and partnership approach adopted within the Public Analyst's Laboratory (PAL) service. The Dublin PAL is specialising in the microbiological testing of cosmetics, whilst the Cork and Galway laboratories each specialise in different chemical testing areas.

7. HUMAN BIO-MONITORING

Human Bio-Monitoring (HBM) involves the determination of the levels of various chemical parameters in human tissues (urine, blood, hair etc) and subsequent analysis/interpretation of the results in the context of exposure assessment.

HBM may have varying contexts and settings:
• Occupational Health (Health and Safety authorities etc.),
• Environmental Toxicology (Toxicology and Public Health Laboratories)
• Medical/Clinical testing (Laboratory Medicine…)

HBM for Environmental Contaminants is a direct measure of the levels of exposure and absorption/retention of such chemicals from the environment (food, water, air, cosmetics etc.). The estimation of exposure using HBM results removes the (often large) uncertainty associated with the prediction of actual exposure based on environmental levels and estimated uptake. There is some debate among scientists and public health clinicians on the relative values of HBM (for Environmental Contaminants) vs. Environmental Monitoring. Due to the lack of additional resourcing for HBM, our involvement in HBM necessarily means a reduction in other surveillance areas.

Some HBM (Heavy Metals etc.) studies performed 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).

7.1 DEMOCOPHES Human Bio-Monitoring Study

In September 2010, a Consortium to Perform Human Bio-Monitoring on a European Scale (**COPHES**) set up a feasibility study called DEMOCOPHES. This is an international study involving 16 European Member States. The purpose of the study is to determine levels of key environmental pollutants in populations across Europe, including members of the Irish population. The DEMOCOPHES pilot study will look at biomarkers for mercury in human hair and for cadmium, phthalates as well as environmental tobacco smoke in urine. The project will collect samples and data from 120 children and their mothers in each participating country.

In Ireland the DEMOCOPHES study is being performed by the HSE. A National Management Unit has been established and a National Focal Point and National Project Experts (Fieldwork, Laboratory, Toxicology, Medical, Database Management, Statistics, Communication and Finance) have been notified to the EU project team.

7.2 HBM Analysis/Laboratory Work

In 2011, the preparatory work for testing the samples began in the Public Analysts' Laboratories in Ireland. To ensure the quality of the results, the project required laboratories to participate in European Inter-laboratory Comparison Investigations (ICIs) and External Quality Assessment Schemes (EQUAS).

The aim of the ICIs was to assist the laboratories and get comparable results before the testing of samples started. Test samples were sent to all the laboratories involved in the project. The results obtained were compared with the average results for all the laboratories and web-conferences were held to discuss the findings.

The EQUAS studies focused on the accuracy of results. The test samples sent to the laboratory for the EQUAS study had assigned values and tolerance ranges and had been analysed by internationally recognised reference laboratories.

In Ireland the three Public Analysts' Laboratories were involved in the project with each laboratory investigating different analytes.

This Laboratory was involved in the analyses of Cotinine and Creatinine in urine samples. The Cork Public Analyst's Laboratory was involved in the analysis of Mercury in hair samples and the Dublin Public Analyst's Laboratory in the analysis of Cadmium and Phthalates (7 parameters) in urine.

During 2011, a considerable amount of time was spent investigating the method supplied by the DEMOCOPHES group for cotinine analysis. The method provided involved gas chromatography with mass spectrometry detection. This method was found, by this laboratory, not to be suitable for the quantification of low levels of Cotinine. A new method involving Liquid Chromatography and Mass Spectrometry detection (LC-MS/MS) has now been developed and used for the analysis of the test samples. Following completion of the ICI and EQUAS studies a number of laboratories were selected from each country as qualifying to test the samples from the DEMOCOPHES Study. In Ireland, the three Public Analyst's Laboratories (PALs) qualified for their chosen analytes.

At the time of writing, all 240 Irish samples had been procured (by EHO service) and each tested for 11 parameters in Public Analysts' Laboratories.

Further details of the DEMOCOPHES Human Bio-Monitoring project can be found on the website http://www.eu-hbm.info/democophes
A summary of the Irish involvement with the project can be accessed at
http://www.hse.ie/eng/services/News/democophes/

8. MISCELLANEOUS

Twenty four 'miscellaneous' samples were received in 2011. These included:

- 12 private samples from industry for metals analysis
- 1 blood serum for manganese analysis
- 1 ash sample, which was received as part of an investigation into excessively caustic ceremonial ash.
- 1 rodent for identification & 1 sample of rodent droppings from a premises
- 1 wire scrubber for comparison with a food complaint sample
- 2 samples regarding mould growth in a house
- 3 samples of deposits taken from a water tank & a water cooler system
- 2 samples of suspected insects

9. QUALITY ASSURANCE

The quality of the analysis carried out in the laboratory, and the reliability of the results supplied to our customers is ensured by having a quality assurance system in place which covers all aspects of the laboratory's work.

This laboratory complies with an International standard for testing laboratories i.e. 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.

In Ireland, the Irish National Accreditation Board (INAB) is the body with responsibility for awarding accreditation to the ISO 17025 international standard.

9.1 Accreditation

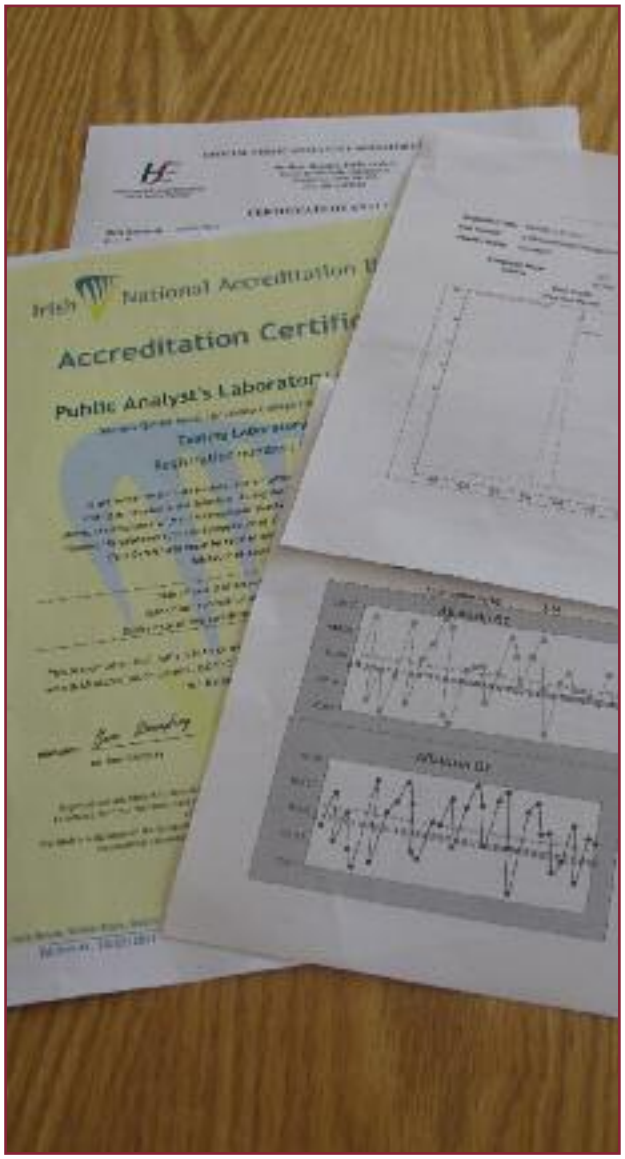
Accreditation is a formal recognition of a laboratory's competence to carry out specific tests or types of tests. Accreditation gives customers of a laboratory confidence, through ensuring consistently high standards in the quality of the service.

Over the past 22 years, 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 Water, Food and Pharmaceuticals products. In 2011, the laboratory extended its scope to include for the first time, the testing of Cosmetic products.

Other areas expanded in 2011 include the testing of Allergens in Foods using the ELISA technique and Sodium, Potassium and Folic acid in foods. This work was done in addition to maintaining our accreditation status for all others tests in food, water and pharmaceuticals.

A full list of our accredited tests is available on the INAB website,
http://www.inab.ie/schemes/lab/testing/directory.html



9.2 External Audits 2011

During 2011, the laboratory was audited by three separate external organisations. In May 2011, the Pharmaceutical section of the laboratory was audited by the Irish Medicines Board. This audit was also in preparation for our first Mutual Joint Audit (MJA) by the European Directorate for the Quality of Medicines and HealthCare (EDQM) and the Official Medicines Control Laboratories (OMCL) Network.

The MJA took place from 20th-22nd of September 2011. The audit team consisted of auditors from the French and German OMCLs and 2 auditors from the EDQM. They assessed the Pharmaceutical section for compliance with the ISO 17025 standard as well as EDQM-OMCL Network guidelines.

In October 2011, the Laboratory's annual audit from the Irish National Accreditation Board took place. This audit team also consisted of 3 auditors and took place from the 18th -20th of October. The audit dealt with all sections of the laboratory and following the audit our scope of accreditation was expanded to include accredited tests for Sodium, Potassium and Folic Acid in a range of foods. The Laboratory also expanded its flexible scope of accreditation to include the detection of allergens in food using the ELISA technique and as mentioned previously, the laboratory expanded its accredited testing into the Cosmetics area.

9.3 Proficiency Testing

The reliability of results is ensured by a variety of ways including using validated methods of analysis, analysis of certified reference materials and participation in proficiency testing programmes. 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.

In 2011, we participated in a large number of proficiency testing rounds, covering a wide range of parameters and analytical procedures (see Table 9.1), including many new analytes. The results are monitored internally and also externally, by the Irish National Accreditation Board.

Table 9.1 Proficiency Testing Schemes – 2011

Scheme	Parameters Tested
FAPAS	Nutritional components - Nitrogen, Moisture, Ash, Fat
FAPAS	Sodium – Bread, Meat Meal, Cheese and Pasta Meal, Snack Foods
FAPAS	Aflatoxins – B_1, B_2, G_1, G_2, Total Aflatoxins
FAPAS	Trace Elements in food (Lead, Cadmium, Mercury)
FAPAS	Nitrate & Nitrite in Meat
FAPAS	3-MCPD in Soy Sauce
FAPAS	Allergens Histamine, Gluten, Sulphites, **New in 2011** - Peanut
FAPAS	Fruit Juice – pH, Brix, Sodium, Potassium
FAPAS	Food Additives – Sulphur Dioxide (Fruit slurry, Meat)
FAPAS	Alcoholic Strength
FAPAS	Butterfat
National Measurement Institute (NMI) Australia	**New in 2011 -** Folic Acid in Flour
CHEK	Sorbic Acid and Sulphite (Wine), Histamine (Fish)
Quasimeme	Shellfish - Domoic and Epi-domoic Acid, Okadaic Acid, DTX-2 and AZA toxins
QDCS	Dairy Products: Acid Titration, Freezing Point Depression, Phosphatase, Antibiotics, Total Solids
FOBS	Foreign Body Identification (Foods)
AQUACHECK	Water –Alkalinity, Hardness, Colour, Turbidity, Conductivity, pH, Fluoride, Free Chlorine, Food – pH, Pharmaceuticals – pH
AQUACHECK	Water – Nitrate, Nitrite, TON, Ammonium
AQUACHECK	Water - Volatile Organic Compounds.
AQUACHECK	Water – Aluminium, Arsenic, Boron, Cadmium, Chromium, Iron, Manganese, Copper, Lead, Nickel, Selenium, Zinc. **New In 2011** - Antimony
AQUACHECK	Water – **New in 2011:** Total Hardness, Alkalinity, Sodium, Potassium, Total Solids, BOD, COD, Suspended Solids, Chloride, Combined Chlorine.
EDQM	Pharmaceutical Analysis – Dissolution Testing, Advanced Titration
LGC /Pharmassure	Pharmaceutical Analysis- HPLC Assay, UV spectroscopy, Density, Melting Point, pH, Loss on Drying.
Asia Pacific Laboratory Accreditation Cooperation (APLAC)	HPLC Assay in Pharmaceutical Products (carried out at the request of INAB)
LGC Cosmetics & Toiletries PT scheme	**New in 2011** Cadmium, Chromium, Lead and Nickel in Cosmetic Products.
EDQM Cosmetic Proficiency Testing Scheme	**New in 2011** Hydroquinone, Formaldehyde in Cosmetic Products.
DemoCophes Inter-Laboratory Comparisons and EQUAS	**New in 2011** Creatinine and Cotinine in Urine.
LGC Heath Control	Blood and Urine Alcohol
LGC Quartz	Blood Alcohol

10. STAFF TRAINING

The need for staff training and on-going professional development are 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, Information and Communication Technology and Dignity at Work. Staff attended seminars on Marine Biotoxins and on Good Weighing Practice as well as meetings on Human Bio-Monitoring (organised in conjunction with the DEMOCOPHES project – see Section 7).

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. Important training was not availed of, which could lead to further improvements and developments in the service, due to the significant expense involved.

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
- Inter-Agency Meetings on Food Control
- Legislation Committee (FSAI-Dept. of Health & Children…) & Sub-Committees
- Bottled Water Guidance Note Drafting Committee
- Cross Agency Labelling Enforcement Working Group
- Scientific Sub-committee [Additives, Contaminants..]

***safe*food/HSE:** IT system for Laboratory Service
HSE Regional Food Committee [HSE West]
HSE Food Sampling Review Group
Cosmetics Control Group HSE
Cosmetics Safety Steering Group (IMB, HSE,...)
OCCL: Organisation of Cosmetics Control Laboratories (EU led)
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
DEMOCOPHES-COPHES Working Meeting: Concerning the DEMOCOPHES HBM study, February 2011, (see Section 7)

12. INFORMATION AND COMMUNICATION TECHNOLOGY

The LabWare laboratory information management system (LIMS), funded nationally by *Safe*food has been 'live' since 01 January 2007. The LIMS is in continuous use in the laboratory and is undergoing expansion and development as a result of funding provided by the Department of Finance and also as a result of user and administrator training courses funded by *Safe*food. This development has included the integration of various instruments, involved in water and pharmaceutical analysis, into the LIMS enabling paperless transfer of results. In 2008 an electronic reporting link was set-up between this laboratory and the FSAI, using the government VPN (Virtual Private Network), whereby summaries of all relevant sample details and results are automatically created and sent to the FSAI for inclusion in a national database of food testing. Further development of the LIMS was planned in 2010 - 2011 (connection to the EPA Environmental Data Exchange Network (EDEN)) but this project was paused until at least the second half of 2012 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.

Appendix 1. Outline Summary of HSE West Food Sampling-Analysis (Chemical) Programme for 2011

Jan 10 – 14		**Herbs, Spices, Seasonings** 30 Food Irradiation screening, Pb/Cd)		*Method Development Allergens*
Jan 17 – 31	**Peeled Potatoes, peeled parsnips, raw chipped potatoes etc** 30 (SO_2, Pb/Cd.)		**Low- or Reduced-Salt Foods** 40 (Na/K)	**FSAI Survey** 50 **Bread & Bread Products** (Na/K/Folic acid etc.)
Feb. 1 – 11	2x9 **Various Port Fish** (Biogenic Amines)	**Meat Products** 40 (SO_2)	**'Peanut-free' Foods** 35 (Peanut Protein)	
Feb. 14 – 28		35 **Naturally gluten-free foods from CSI book** (Gluten, Labelling..)	40 **Various Sulphited Foods** (SO_2)	**FSAI Survey** ~130 **Breakfast cereals** (Na/K/Folic acid etc.)
Mar. 1 – 11		50 **Bottled Waters** (DW Testing suite)		
Mar. 14- 31	**Peanut butters, Maize Meals, Ground Corn..** 30 (Aflatoxins)	**Lactose- free foods** 35 **LF Milks, Confectionery…** (Lactose)		
Apr. 1- 15	**Imported Dairy products etc.** 25 (ALP, Inhibitory substances, Adulteration)	**Prepared Meals Survey** 40 **Salt Content etc.** (Na/K ,Proximates)		*Method Development Allergens*
Apr. 18 – 29		30 **Minced Meats/Beefs** (Fat Content, Adulteration…)		
May 2 – 13		36 **Locally Manufactured produce Gluten-free Foods** (Gluten, Na/K, Labelling etc.)	**Imported Seafood** 40 (Pb/Cd, Labelling…)	**Imported Shellfish** 10 (DSP/AZA, ASP, Pb/Cd)
May 16 – 31	25 **Scombroid fish etc** (Biogenic amines)	**Beers and Ciders** 30 (SO_2, Pb/Cd, Labelling…)		
June 1 – 17	1x9 **Various Port Fish** (Biogenic Amines)	**Soy Sauces** 40 (3-MCPD)	40 **Infant Formula, Follow-on Formula, Premature Infant Formula Allergen/Nutritional Survey** (Allergens, Folic Acid, Labelling…..)	
June 20 – 30		30 **Herbal Teas, Seeds, Noodles** (Irradiation, Labelling/Gen. Exam)	**Local/Regional Produce with labelled Salt/Sodium values** 40 (Na/K, labelling, General Examination, etc.)	

Appendix 1. Outline Summary of HSE West Food Sampling-Analysis (Chemical) Programme for 2011 (continued)

July 1 – 15	2x9 **Various Port Fish** (Biogenic Amines)		30 **Cured Meats** (Nitrite/Nitrate)	
July 18 – 29	25 **Scombroid Fish** (Biogenic Amines)			**FSAI survey** 150 **Snack products** (Na/K etc.)
Aug. 1 – 12	3x9 **Various Port-level Fish** (Biogenic Amines)	**Local fresh or frozen prawns, shrimps, crabs…** 30 (SO_2, Pb/Cd)	**Foods Labelled as milk-free** 35 (Milk Protein/Casein etc.)	
Aug. 15 – 31		**Tea (Leaves and Bags)** 30 (Pb/Cd, Moisture, Ash, Irradiation, Labelling, Al)	**Food Supplements National Survey** 30 (Folic Acid, Minerals etc.)	
Sept. 1 – 16	3x9 **Various Port-level Fish** (Biogenic Amines)	**Scombroid fish** 25 (Biogenic Amines)	**Gluten Free Foods** 35 (Gluten)	**Shellfish – imports etc** 10 (AZA, DSP, ASP)
Sept. 19 - 30	35 **General "Soya-free" Foods** (Soya Protein)		**Ethnic Foods** 25 (General Exam. & labelling……)	**Infant Formula** 20 (Folic Acid)
Oct. 3 - 14	20 **Pub-level Spirits** (Alcoholic strength)		**Soy Milks and Soy Beans** 30 (Pb/Cd, Casein, Labelling etc.)	**FSAI survey** 100 **Spreadable fats** (Na/K etc.)
Oct. 17 – 31		**Catering-level Gluten-free Meals Restaurants serving GF options** 36 (Gluten)		
Nov. 1 – 11	1x9 **Various Port-level Fish** (Biogenic Amines)		**Weaning Foods** 35 (Folic Acid, Na/K, Other Nutritional, General/ Nutritional labelling, etc.)	**FSAI Survey** 100 **Cheese products/ Processed meats** (Na/K etc.)
Nov. 14 – 30			**Raw, unprocessed meats** 30 (ABS)	
Dec. 1 – 16	2x9 **Various Port-level Fish** (Biogenic Amines)		**Christmas Bakery Products** 30 (Na/K, General Examination & Labelling….)	
Dec. 19 – 30				
Jan - Dec	**- 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. West, for the period from 01/01/2011 to 31/12/2011
Appendix 2: Food Complaint samples (from H.S.E. West & the Public) from 01/01/2011 to 31/12/2011

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	4	5	0	2	0	3	4	0	0	0	51	11	7.84	45.45
2. Egg and Egg Products	0	0	0	0	0	0	0	0	0	0	0	1	0.00	0.00
3. Meat and Meat Products, Game and Poultry	18	3	0	3	11	0	7	0	0	0	134	12	13.43	25.00
4. Fish, Shellfish and Molluscs	7	3	1	2	0	0	6	1	0	0	150	10	4.67	30.00
5. Fats and Oils	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
6. Soups, Broths and Sauces	4	4	0	4	1	0	3	0	0	0	89	6	4.49	66.67
7. Cereals and Bakery Products	37	14	1	10	1	4	35	0	0	0	142	20	26.06	70.00
8. Fruit and Vegetables	8	3	0	3	3	0	5	0	0	0	72	6	11.11	50.00
9. Herbs and Spices	1	0	0	0	0	0	1	0	0	0	35	0	2.86	0.00
10. Non-Alcoholic Beverages	10	8	0	4	0	4	10	0	0	0	122	18	8.20	44.44
11. Wine	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
12. Alcoholic Beverages (Other than Wine)	3	0	0	0	0	0	3	0	0	0	62	0	4.84	0.00
13. Ices and Desserts	0	0	0	0	0	0	0	0	0	0	7	1	0.00	0.00
14. Cocoa and Cocoa Preparations, Coffee & Tea	2	0	0	0	0	0	2	0	0	0	35	0	5.71	0.00
15. Confectionery	5	4	0	3	0	0	5	1	0	0	49	7	10.20	57.14
16. Nuts and Nut Products, Snacks	1	2	0	2	0	0	1	0	0	0	16	3	6.25	66.67
17. Prepared Dishes	9	9	0	7	1	1	8	1	0	0	71	11	12.68	81.81
18. Foodstuffs Intended For Special Nutritional Uses	10	2	0	1	0	1	10	0	0	0	105	4	9.52	50.00
19. Additives	0	0	0	0	0	0	0	0	0	0	0	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	2	3	0	1	0	1	2	1	0	0	20	9	10.00	33.33
Totals	**121**	**60**	**2**	**42**	**17**	**14**	**102**	**4**	**0**	**0**	**1160**	**119**	**10.52**	**50.42**

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)	Animal Origin Foods (Meats, etc.) Brines 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 Retail, Wholesale, Manufacturing, 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', 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 lab. 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.
***Core Testing:** Microscopy/Complaints; General Examination/labelling etc.*
*Examples of **Specialisations** include:*

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

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	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Aflatoxins	11/179 6.1%	12/254 4.7%	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%
Fumonisins	2/21 9.5%	0/121 0%	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
Ochratoxin A	0/152 0%	1/174 0.6%	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
Patulin	0/52 0%	0/75 0%	0/27 0%	0/4 0%	N/T	0/52 0%	N/T	N/T	N/T	N/T	N/T	N/T
Lead (Pb)	1/184 0.5%	0/173 0%	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%
Cadmium (Cd)	0/184 0%	0/172 0%	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%
Mercury (Hg)	0/16 0%	0/36 0%	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%
Arsenic (As)	N/T	1/134 0.7%	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%
Benzo-[a]-pyrene	0/1 0%	28/99 28.3%	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
3-MCPD	15/60 25%	9/163 5.5%	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%
Nitrates	0/58 0%	N/T	N/T	N/T	N/T	0/42 0%	0/39 0%	0/35 0%	0/3 0%	N/T	N/T	N/T
Marine Biotoxins: DSPs	0/173 0%	1/211 0.5%	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%
AZAs	N/T	0/211 0%	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%
ASPs	N/T	0/211 0%	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%
Gluten Gluten Free (GF) Foods	2/94 2.1%	13/236 5.5%	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%
Benzene	7/111 6.3%	1/53 1.9%	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
Anti-bacterial Substances (ABS) EC 4-Plate Test	0/209 0%	0/48 0%	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%
AV/DPTGs(Oils)	26/108 24.1%	17/70 24.3%	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
Histamine/ Biogenic Amines	1/125 0.8%	3/214 1.4%	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%
Sorbates/ Benzoates	15/172 8.7%	0/54 0%	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
Sulphites	9/195 4.6%	8/179 4.5%	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%
Nitrites / Nitrates	18/172 10.5%	27/170 15.9%	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%
Artificial Sweeteners (i.e. Acesulfame K, Aspartame & Saccharin)	8/45 17.8%	N/T	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
Food Irradiation	0/35 0%	0/191 0%	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%
Food Complaints	129/206 62.6%	180/239 75.3%	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%
Peanut	N/T	N/T	N/T	N/T	N/T	N/T	N/T	N/T	N/T	N/T	0/169 0%	0/34 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 2011

FLUORIDATION OF WATER SUPPLIES :- GALWAY

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Ballinasloe	12	0.63 – 0.74	0.70
Clifden	9	<0.10	<0.10
Dunmore/Glenamaddy	12	0.51 – 0.72	0.64
Galway City	107	0.63 – 0.74	0.68
Luimnagh Waterworks	13	0.63 – 0.71	0.67
Mid-Galway Regional	12	0.41 – 0.73	0.56
Mountbellew	12	0.58 – 0.75	0.69
Oughterard	12	0.61 – 0.76	0.69
Portumna	12	0.51 – 0.66	0.55
Spiddal	13	<0.10 – 0.74	0.60
Tuam R.W.S.	24	0.39 – 0.74	0.67

FLUORIDATION OF WATER SUPPLIES :- MAYO

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Achill	12	0.54 – 1.00	0.60
Ballina	24	0.50 – 0.87	0.70
Erris	12	0.55 – 0.69	0.63
Kiltimagh	12	0.58 – 0.77	0.72
Lough Mask Regional	13	0.72 – 0.76	0.73
Shrule	12	0.62 – 0.73	0.67
Swinford	12	0.59 – 1.00	0.71
Westport	12	0.52 – 0.73	0.60

FLUORIDATION OF WATER SUPPLIES :- ROSCOMMON

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Ballinlough Loughglynn	10	0.16 – 0.72	0.70
Boyle/Ardcarne	13	0.16 – 1.13	0.59
Castlerea Regional	11	0.49 – 0.70	0.63
Castlerea Urban	13	0.54 – 0.88	0.82
Mount Talbot	12	0.42 – 0.49	0.45
North East Regional	14	<0.10 – 0.87	0.84
North Roscommon Regional	12	<0.10 – 0.81	0.57
Roscommon Town (Central)	12	0.49 – 0.68	0.65
South Roscommon Regional	12	<0.10 – 0.70	0.43

Appendix 5: Fluoridation of Water Supplies HSE West for 2011

FLUORIDATION OF WATER SUPPLIES :- DONEGAL

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Buncrana	14	0.52 – 0.73	0.67
Bundoran	15	0.17 – 0.73	0.71
Cardonagh Mixed	15	0.64 – 0.71	0.67
Cranford	12	0.47 – 0.69	0.66
Creeslough/Dunfanaghy	15	<0.10 – 0.68	<0.10
Donegal/Eske	16	0.58 – 0.71	0.67
Falcarragh/Gortahork	12	<0.10	<0.10
Frosses/Inver	14	<0.10 – 0.81	0.50
Glenties/Ardara	12	<0.10	<0.10
Inishowen East	14	0.70 – 0.77	0.72
Letterkenny	35	0.60 – 0.76	0.73
Lettermacward	12	0.61 – 0.70	0.69
Lough Mourne	20	<0.10 – 0.86	0.63
Milford	13	<0.10 – 0.83	0.68
Pollan Dam	22	<0.10 – 0.75	<0.10
Rosses Regional	34	<0.10 – 0.68	<0.10

FLUORIDATION OF WATER SUPPLIES :- SLIGO/LEITRIM

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Kinsellagh Farnaghcardy	13	0.57 – 1.00	0.64
Lough Gill/ Cairnes	14	0.20 – 0.68	0.65
Lough Easkey	12	<0.10 – 0.75	0.68
Lough Talt	12	0.59 – 0.77	0.66
North Leitrim Regional	11	<0.10	<0.10
South Leitrim Regional	13	<0.10 – 0.77	0.62
Sligo North Regional Supply	12	<0.10 – 0.66	0.61
Sligo South Regional	11	0.22 – 0.60	0.56
Killaraght	12	0.19 – 0.73	0.65
Lough Gill/ Foxes Den	14	0.59 – 1.09	0.67
Kinlough Tullaghan	2	0.62 – 0.72	0.67

FLUORIDATION OF WATER SUPPLIES :- LIMERICK

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Kilmallock	1	<0.10	<0.10
Limerick City	24	0.59 – 0.66	0.62
Ballyneety	8	0.60 – 0.66	0.63
Castleconnell	8	0.60 – 0.66	0.63

Appendix 5: Fluoridation of Water Supplies – HSE West for 2011

FLUORIDATION OF WATER SUPPLIES :- CLARE

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Kilkee	12	0.64 – 0.69	0.66
Clarecastle	12	0.64 – 0.75	0.67
Ennis	16	0.63 – 0.77	0.69
Ennistymon	14	<0.10 – 0.73	0.67
Kildysart	16	0.41 – 0.96	0.66
Kilfenora	1	0.70	0.70
Lisdoonvarna	10	0.64 – 0.72	0.69
Milltown Malbay	12	0.60 – 0.85	0.74
Shannon	12	0.60 – 0.76	0.66
West Clare New Doolough	12	0.62 – 0.70	0.65
West Clare Old Doolough	13	0.40 – 0.86	0.68
Limerick	12	0.59 – 0.70	0.63

FLUORIDATION OF WATER SUPPLIES :- NORTH TIPPERARY

Location	Number of Samples	Range (mg/L)	Median (mg/L)
Borrisokane	10	0.52 – 0.73	0.71
Clareville	12	0.57 – 0.64	0.62
Murroe	11	<0.10 – 0.63	<0.10
Nenagh	14	0.16 – 0.70	0.60
Roscrea	16	0.61 – 0.72	0.67
Thurles	25	0.46 – 1.07	0.62
Templemore	12	0.54 – 0.66	0.64

Appendix 6:

Concentration of Smoke & Sulphur Dioxide in the atmosphere during 2011 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	3	1	7	22	5	40
February	1	1	4	23	5	47
March	2	1	7	15	3	38
April	1	1	2	23	6	38
May	1	1	2	22	8	37
June	1	1	2	28	8	60
July	1	1	2	36	9	60
August	1	1	1	33	9	62
September	1	1	1	30	6	60
October	1	1	2	31	9	59
November	2	1	11	29	6	57
December	1	1	7	27	7	51
Average	1	1	4	27	7	51

Appendix 6:

Concentration of Smoke & Sulphur Dioxide in the atmosphere during 2011 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	15	1	42	11	3	28
February	7	1	18	15	3	30
March	11	1	28	11	2	40
April	6	1	31	17	4	30
May	4	2	6	16	9	21
June	3	1	8	19	6	47
July	10	1	3	23	4	48
August	2	1	5	22	4	45
September	3	1	6	19	6	39
October	3	1	11	21	6	40
November	4	1	18	19	3	41
December	5	1	22	17	6	30
Average	6	1	17	18	5	37

Appendix 6:

R + P PARTISOL PLUS MODEL 2025 SEQUENTIAL AIR SAMPLER for 2011
PM_{10} RESULTS MASS CONCENTRATION (M.C) µg/m³ 2011

Station: Bodkin Roundabout YEAR 2011 - Galway City Council - 24 Hour M.C. µg/m³

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
01	-	-	33.4	14.1	30.4	13.5	10.3	8.1	21.2	14.5	13.6	18.8
02	-	-	-	12.0	43.7	12.4	10.2	<5	30.5	6.6	12.0	9.3
03	-	-	58.3	11.7	34.7	10.5	9.0	10.4	-	15.3	15.9	17.9
04	-	-	63.3	14.2	22.1	11.1	17.3	7.4	25.7	19.1	16.9	7.1
05	-	-	56.9	9.0	20.4	9.0	10.8	7.8	9.5	15.3	35.4	7.6
06	-	-	41.5	18.1	64.6	-	12.2	<5	19.4	13.7	25.5	9.0
07	-	-	35.1	15.3	18.5	-	8.7	6.0	10.3	14.9	25.3	15.8
08	-	-	18.7	20.4	16.0	7.8	6.7	8.2	10.0	10.0	25.1	18.5
09	-	-	21.6	22.7	16.2	9.8	14.0	7.2	13.7	12.3	13.3	14.0
10	-	-	17.9	21.6	22.2	7.1	11.0	9.0	15.2	30.3	21.2	8.6
11	-	-	12.9	12.0	17.6	9.8	13.3	<5	19.3	13.5	17.3	12.3
12	-	-	14.3	12.0	11.5	8.2	13.5	6.8	33.9	5.6	23.1	15.2
13	-	-	16.0	6.3	8.4	7.9	12.9	8.4	20.6	11.7	22.6	22.3
14	-	28.2	33.7	12.9	13.4	12.5	9.0	10.2	13.3	9.8	32.8	15.1
15	-	13.8	35.5	18.4	17.5	20.5	8.7	10.7	16.4	9.1	30.4	22.9
16	-	36.0	36.1	8.5	22.3	16.1	5.4	6.8	11.3	13.1	23.5	9.9
17	-	45.2	25.7	16.9	5.4	10.0	<5	11.9	8.8	15.0	9.1	12.5
18	-	19.1	-	33.0	18.0	8.3	7.0	9.0	12.3	8.8	10.0	17.9
19	-	28.2	-	44.0	26.5	8.0	9.1	11.9	6.3	12.0	37.5	11.2
20	-	18.0	-	41.6	17.9	16.0	8.9	19.5	15.3	11.2	21.1	11.3
21	-	20.7	12.4	38.8	14.9	9.0	7.6	9.5	32.3	11.4	13.9	20.7
22	-	8.3	32.3	36.3	15.6	8.9	9.2	11.3	28.3	7.8	22.5	19.5
23	-	22.6	45.3	11.1	20.7	10.2	7.5	11.0	21.0	11.8	21.5	11.1
24	-	27.3	43.9	16.9	23.0	11.5	-	8.8	21.5	7.3	16.2	20.1
25	-	26.0	35.8	21.3	13.6	7.5	-	13.9	15.5	14.6	14.8	23.1
26	-	14.2	40.3	32.4	12.9	9.4	<5	8.1	12.9	10.0	24.0	27.2
27	-	18.0	36.8	19.5	10.8	11.7	8.7	9.0	9.6	11.4	17.2	9.8
28	-	47.8	40.2	23.4	13.9	8.7	10.0	7.4	10.3	10.9	13.3	17.3
29	-		45.0	35.5	21.3	7.8	13.2	10.0	8.8	20.5	9.5	18.2
30	-		26.8	35.3	10.4	8.2	15.5	10.5	12.8	13.7	11.0	8.7
31	-		30.0		17.3		5.5	16.7		11.5		10.6
Monthly Mean	-	25	34	21	20	10	10	9	17	13	20	15
No. of Days exceeding 50µg/m³	0	0	3	0	1	0	0	0	0	0	0	0

No. of Days exceeding 50µg/m³ YEAR 2011: 4 ANNUAL MEAN = 17.6

Appendix 7:

Cosmetics Chemical Surveillance Programme 2011 (HSE West, Dublin Nth East & Mid Leinster)

	Survey	Suggested Ranked Sample Types	Suggested Ranked Premises/Stage	HSE West, DNE &DML Total
February	**Cosmetics for Personal Hygiene** (Formaldehyde)	Shampoos, Bubble Bath, Shower Gels, etc. Children's, Toddlers' and Infants' products, Other products	'Pound'/ Low-cost Outlets, Usual Retail, Wholesale, Any other source	60
March	**Miscellaneous Children's Low-cost Cosmetics** (Heavy Metals, Pb/Cd)	Lipsticks, Multi-packs containing mascara, eye shadow, lipsticks, blusher etc or individual products; Cheap Children's Cosmetics	Wholesalers/Distributors, 'Pound'/ Low-cost Outlets, Children's Magazines, Other (retail etc.)	30
April	**Hair-straightening Products** (Formaldehyde)	Follow-up survey/Untested Salon Products etc (Timing: On –going)	Salons, Wholesalers, Importers etc.	
May	**Preservative/Allergen-free Children's Cosmetics** (Allergens/Preservatives)	Hypoallergenic sun blocks for Kids and Other Products	Multiple Supermarkets, Others	30
June	**Miscellaneous Cosmetics** (Heavy Metals , Labelling etc)	General Talcs, Mineral Talcs, Face Powders, Blushers, Eye liners, Mascara, Lipsticks… Including any Irish-manufactured Cosmetics; Organic Produce; Home-made cosmetics.	Retail/Wholesale etc. Specialist outlets	40
July	**Skin-lightening Creams & Soaps** (Hydroquinone & Hg)	General face and skin creams etc., Soaps	Ethnic Premises etc 'Pound'/ Low-cost Outlets,	30
	Hair Dyes etc. (p-Phenylenediamine)	Hair dyes labelled as containing Phenylenediamine….	Retail/Wholesale & Salons	30
August	**Miscellaneous Lip Cosmetics etc** (Heavy Metals: Pb,Cd)	Lipsticks, Lip Gloss, Lip Balms etc., Cheap Children's Products, Cheap General Products	Wholesale/Retail including large multiples, Discount Stores etc., Toy Shops etc.	50
September	**Halloween Cosmetics** (Pb,Cd)	Halloween Children's cosmetics	Discount Stores etc. and Wholesale /Retail (including Toy Shops, Large Multiples)	40
October	**Tooth-whitening Products** (Hydrogen Peroxide)	Tooth bleaching products…		30
November	**Personal Hygiene Cosmetics** (Formaldehyde)	General Shampoos (especially with Anti-frizz, Smoothing, Relaxing etc descriptions); Conditioners, Shower Gels, Bubble Bath, Liquid Soaps etc. Cheaper Brands and Mainstream Produce	'Pound'/Low-cost Outlets, Salons, Wholesalers/Distributors General Retail, Ethnic shops etc.	40
November	**Toothpastes** (Diethylene glycol (DEG))	Cheap/General Children's Toothpastes Cheap/General Toothpastes (especially if containing Polyethylene Glycol)	Discount Stores etc., Ethnic Shops, Other (retail/wholesale)	40
Jan - Dec	**General : Non-routine samples (Complaints, RAPEX etc) ; Some Method development work etc ongoing. Hydroquinone & Hg in Skin-Lightening Creams: testing ongoing. General and Labelling examination ongoing.**			

Appendix 8:

Public Analyst:	Mr. Rory Mannion
Deputy Public Analyst:	Vacant (Since November 2009 due to embargo)
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 due to embargo)
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 Feb 2010 due to embargo)
Clerical Officers:	Ms. Eileen Mannion Ms. Attracta Lohan Ms. Aine Mahoney Vacant position (Since Oct 2007 due to embargo)
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 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: