Environmental Protection Agency

Dioxin Levels in the Irish Environment: Tenth Assessment (Summer 2012)

Based on levels in Cows milk

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Environmental Protection Agency

The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. We regulate and police activities that might otherwise cause pollution. We ensure there is solid information on environmental trends so that necessary actions are taken. Our priorities are protecting the Irish environment and ensuring that development is sustainable.

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- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet several times a year to discuss issues of concern and offer advice to the Board.

Dioxin Levels in the Irish Environment

Tenth Assessment

(Summer 2012)

Based on Levels in Cows' Milk

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January 2014

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Tenth Assessment

(Summer 2012)

Based on Levels in Cows' Milk

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EXECUTIVE SUMMARY

Background

Dioxins have, in recent years, continued to generate environmental concerns that capture public attention. In order to maintain surveillance of dioxins, furans and other related pollutants, the Environmental Protection Agency has carried out a number of almost identical surveys based on levels found in cows' milk. Examination of the time series trends from these studies provides much valuable information. This report describes the study carried out in Summer 2012 and is a follow-up survey to nine earlier studies carried out between 1995 and 2011. These studies have shown that concentrations of dioxins and the other pollutants remain at a consistently low level in the Irish Environment.

"Dioxins" is a collective term for the category of 75 polychlorinated dibenzo-para-dioxin compounds (PCDDs) and 135 polychlorinated dibenzofuran compounds (PCDFs). Seventeen PCDD and PCDF compounds are considered to be of toxicological significance. The most toxic of these is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The toxic responses include skin effects, immunotoxicity and carcinogenicity, as well as reproductive and developmental toxicity. These compounds, or congeners, arise mainly as unintentional by-products of incomplete or poorly controlled combustion and from certain chemical processes.

Given that the primary mechanism for dioxins entering the food chain is through atmospheric deposition, cows' milk is considered to be a particularly suitable matrix for assessing their presence in the environment, since cows tend to graze over relatively large areas and these compounds will, if present, concentrate in the fat content of the milk.

Since some Polychlorinated biphenyls (PCBs) have dioxin-like properties, testing for dioxin-like PCBs was included for each sample, in accordance with international practice. For the first time non-dioxin PCBs were included in the survey.

Five samples, representative of different regions, were analysed for brominated flame retardants (BFRs) and brominated dioxins

Sources of Dioxins

Although PCDDs and PCDFs are not produced intentionally except for research and analysis purposes, their formation is often a by-product of many anthropogenic and natural activities. According to a study in the context of the Stockholm Convention http://ec.europa.eu/environment/dioxin/sources.htm, the main sources for emissions of dioxins to air in EU-25 are

- Residential combustion
- Open burning of waste (backyard burning, bonfires)
- Wood preservation (~15%)
- Iron and steel industry
- Power production, non-ferrous metals, chemical industry
- Traffic

The dominant sources of dioxin emissions in Ireland are from non-industrial activities.

Dioxin Sampling and Results

Two types of sampling stations were chosen:

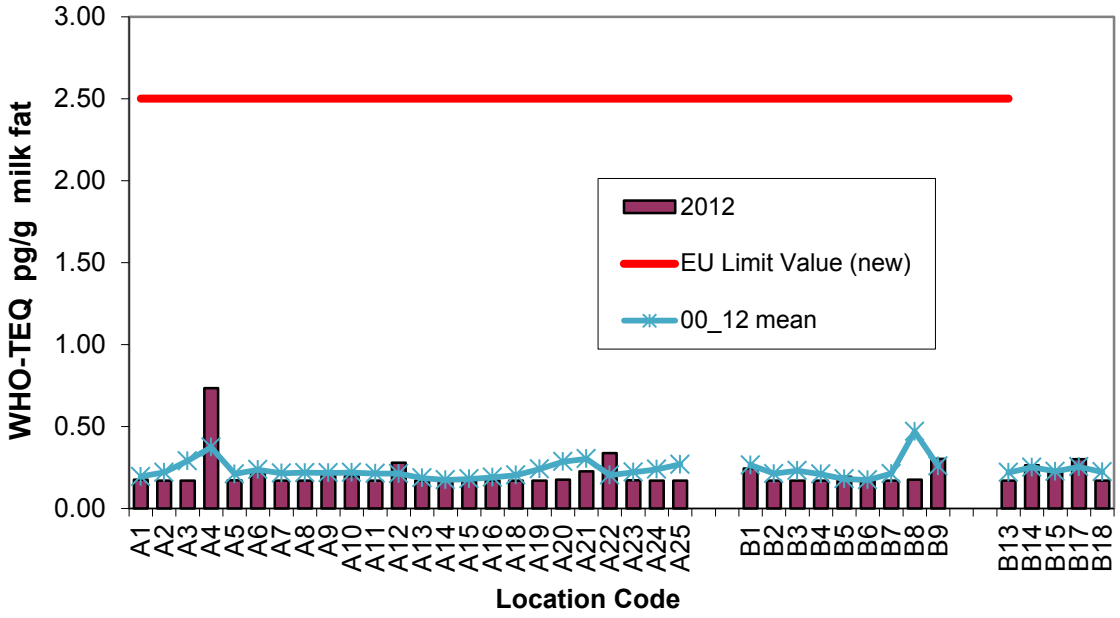
Type A	background stations covering the entire country (24 samples)
Type B	potential impact stations in areas of perceived potential risk (14 samples)

The reported ranges for dioxins in milk fat (38 samples) were 0.158 to 0.593 pg with an overall mean value of 0.196 pg WHO-TEQ/g. It can be seen from Figure 1 that these results, in line with the historical data from earlier surveys, are well below the EU limit of 2.5 pg WHO-TEQ/g.

For dioxin-like PCBs, the mean value was 0.132 pg WHO-TEQ/g with a range of 0.070 to 0.220 pg WHO-TEQ/g.

The range for the sum of Dioxins & PCBs is 0.240 to 0.760 pg WHO-TEQ/g with a mean of 0.328 pg WHO-TEQ/g. The EU limit for this parameter is 5.5 pg WHO-TEQ/g.

Figure 1 Dioxins/Furans
2012 Data Compared with 2000-2012 Averages



Brominated Flame Retardants

Brominated Flame Retardants (BFRs) replaced PCB as the major chemical flame retardant in the late 1970s and are commonly used in furniture, fabrics and electronic products as a means of reducing the flammability of combustible organic materials. The use of PBDEs have been restricted for some time and certain PBDEs are listed as persistent organic pollutants (POPs) which are subject to international control under the Stockholm Convention on POPs. There are many types of BFRs but only Polybrominated diphenyl ethers (PBDEs) were found in any measurable quantities in the survey samples. The range for Σ−PBDEs (N=5) was 34.3 to 277 ng/kg fat with a mean of 87.5 ng/kg fat. These levels are low by international norms.

PCBs

For the first time non-dioxin-like PCBs were included in the survey. These have a different toxicological profile to the dioxin like-PCBs. The limit for PCBs in milk fat is 40,000 pg/g. The data ranged from 327 to 680 with a mean of 447 expressed as pg/g, significantly below the above limit.

Conclusions

1. The levels of dioxins found in the 2012 surveys are well below the EU limit in milk and milk products of 2.5 pg WHO-TEQ/g for dioxins only (Figure 1), and 5.5 pg WHO-TEQ/g for dioxins and PCBs combined. The results are also in line with earlier similar EPA surveys[1] .

2. All dioxin levels recorded in this survey compare favourably with those taken from a random selection of similar studies in EU and other countries.

3. Non-dioxin PCB data which are included for the first time, are very low compared with EU limits.

4. The results of this survey are in line with the dioxin results from the latest report from the Cork County Council animal health surveillance programme (published in December 2013) which has been operating in the Cork Harbour Region since 1991.

5. The study encompassed sampling for a range of micropollutants including Dioxins, PCBs and Brominated Flame Retardants. The levels found were low by international standards and norms.

1. INTRODUCTION

Background

"Dioxins" is a collective term for the category of 75 polychlorinated dibenzo-para-dioxin compounds (PCDDs) and 135 polychlorinated dibenzofuran compounds (PCDFs). These compounds or congeners are not formed for specific purposes but arise mainly as unintentional by-products of incomplete or poorly controlled combustion and from certain chemical processes.

They can be formed when any substances containing carbon compounds are burned in the presence of chlorine at temperatures of at least 300°C.

Dioxins, furans, and polychlorinated biphenyls (PCBs) are classified as persistent organic pollutants (POPs) under the Stockholm Convention on POPs which has as its objective the protection of human health and the environment from POPs. Such POPs are also controlled under legislation such as the EU POPs Regulation (EU 2004) and national POPs regulations (DECLG 2010).

In line with the Environmental Protection Agency's intention to maintain surveillance of dioxins, furans (collectively known as PCDD/F) and other micro pollutants, the Agency carried out a follow-up survey to the 1995, 2000, 2004, 2006, 2007, 2008, 2009, 2010 and 2011 surveys of dioxin in cows' milk (EPA 1996, EPA 2001, EPA 2005, EPA 2008 (1) and (2), EPA 2009, EPA 2010, EPA 2011 and EPA 2012 in Summer 2012. 38 samples were taken and the sample locations were nominally the same as for the earlier surveys. Sometimes, for various technical and logistical reasons (EPA 2005) it was not always possible to sample in exactly the same location as previously, so that direct comparison of individual sampling points should be made with caution. As in earlier surveys, testing for dioxin-like PCBs was also included in this programme. In line with a new EU regulation (EU 2012) some "marker" non-dioxin-like PCBs were also included in 2012.

Dioxin levels in milk samples taken during the grazing season can be used as indicators for the actual average local dioxin exposure by atmospheric deposition. This is described more fully in earlier reports (EPA 2010)

As in previous years sampling for brominated flame retardants (BFRs) and brominated dioxins and furans (PBDD/F), was undertaken at the same time as the dioxin survey. Five pooled samples, representative of different regions, were analysed.

Samples were taken between June and early August 2012 when the cows could be expected to be grazing outdoors. Analytical results are given in Tables 4 and 5 in Appendix 1.

Toxicity of Dioxins

The toxicity of individual dioxin and dibenzofuran compounds (or congeners) varies considerably. The PCDD and PCDF congeners which are likely to be of toxicological significance are those 17 congeners with chlorine atoms at the 2,3,7 and 8 positions. The most toxic dioxin is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). There are also 12 PCB congeners with dioxin like properties, known as dioxin-like PCBs.

A system of Toxic Equivalency Factors (TEFs) or weighting factors is used for assessing relative toxicities of mixtures of Dioxins and Dioxin-like compounds.

Further discussion of the toxicity of dioxins, furans and dioxin-like PCBs is contained in earlier reports (EPA 2012).

A new Regulation, EU 1259/2011 revising maximum levels for dioxins, dioxin-like PCBs and non dioxin-like PCBs in foodstuffs including milk, came into force in December 2011. This has the effect of reducing the dioxin limits from 3.0 pg WHO-TEQ/g to 2.5 pg WHO-TEQ/g and the dioxin+ PCB limits from 6.0 pg WHO-TEQ/g to 5.5 pg WHO-TEQ/g. The TEF values have been modified for some congeners, both upwards and downwards, in accordance with latest scientific information. Limits have also been set for the first time for non dioxin-like PCBs. As the sampling was undertaken in 2012 these changes are reflected in this report.

Appendix 2 lists the old and new TEF values.

Sources of Dioxins

PCDDs and PCDFs are not produced intentionally except for research and analysis purposes, but their formation is often a by-product of many anthropogenic activities.

The main sources for emissions of dioxins to air in EU-25 are from non-industrial sources, with approximately 30 % of emissions across the EU-25 being as a result of residential combustion, with 15 % from backyard burning. http://ec.europa.eu/environment/dioxin/sources.htm. Industrial emissions of dioxins and furans are highly controlled and it is estimated that industrial emissions of dioxins and furans in Europe has reduced by approximately 80 % over the last two decades as a result of more stringent legislative requirements.

Across the EU-25 countries the main sources of dioxin emissions are reported as:

- Residential combustion (~ 30%)
- Open burning of waste (backyard burning) (~15%)
- Wood preservation (~15%)
- Iron and steel industry (~ 8%)
- Power production, non-ferrous metals, chemical industry (~ 5% each)

It should be noted that there is no longer any iron and steel manufacturing in Ireland, with the vast majority of dioxin emissions to atmosphere estimated to be from uncontrolled combustion activities and power and heat generation (including residential).

Measures to Reduce Dioxins in the Environment

Considerable efforts have been made in recent times to minimise illegal waste and backyard burning. These include the Department of Environment's Race against Waste campaign, the EPA media campaigns on backyard burning and illegal waste collection, the "Dump the Dumpers" phone hotline and the "See it, Say it" iPhone app.

More recently these initiatives were enhanced by the Waste Management Regulations which make more explicit the offence of disposal of waste by uncontrolled or unregulated burning, including backyard burning of household waste (DOEHLG 2009).

Measures to improve energy efficiency put in place through the National Climate Change Strategy 2007-2012, with an increased focus on wasteful fuel consumption and waste management and consequent emphasis on non-combustion energy alternatives, should also have a positive impact on dioxin levels in the future. The Air Quality Regulations 2011 (DOEHLG 2011) giving effect to the EU CAFE Directive (2008/50/EC), is another example of a synergistic effect on dioxin emissions from a related piece of legislation. The CAFE Directive requires that Ireland must reduce its average PM2.5 background concentration by 10% by 2018. Bringing about reductions in particulate levels from combustion should result in reductions in dioxin levels. The National Energy Efficiency Action Plan 2009 – 2020 which aims to achieve by 2020 a 20% reduction in energy demand across the economy, should also have a similar impact (DCENR, 2011).

Sources of PCBs

Unlike dioxins, PCBs have found widespread use in a number of commercial open and closed applications, due to their physical and chemical properties, such as non-flammability, chemical inertness, high boiling points and high dielectric constants. Typical open applications have been their use in pigments, sealants, rubber products and carbonless copy paper. Closed applications have included use of PCBs in hydraulic and heat transfer systems, transformers and capacitors. The production and use of PCBs has been discontinued for some years but because of their persistent qualities they remain in electrical equipment, buildings and the environment. Dioxins and furans are often found in appreciable quantities as contaminants in PCBs. In Ireland, the Waste Management (Hazardous Waste) Regulations 1998 were brought into force to implement provisions of the PCB Directive which set out the requirements in terms of the disposal of PCBs and registering holdings of PCBs.

Persistent Organic Pollutants (POPs) & the Stockholm Convention

Dioxins, PCBs and PBDEs (See Chapter 5) are among the substances listed as POPs in the Stockholm Convention. In keeping with its obligations under the Convention, the Environmental Protection Agency as competent authority under the national POPs regulations, has prepared a National Implementation Plan on POPs which details the measures put in place to protect human health and the environment from the POPs that are listed under the Convention, including dioxins, PCBs and PBDEs.

http://www.epa.ie/pubs/reports/waste/haz/POP%20Report_web.pdf

The plan sets out further priority actions to support the control of POPs showing how it plans to limit and control POPs.

2. NATIONAL DIOXIN SURVEY

Background

This survey was planned as a follow-up to the earlier national surveys mentioned in the introduction. As far as possible, the same approach was adopted in terms of time of year and location of samples.

Samples were taken June and early August 2012 when the cows could be expected to be grazing outdoors. Details are given in Tables 4 and 5, Appendix 1.

Sampling Strategy

Two types of sampling stations were chosen:

Type A background stations covering the entire country (24 samples)

Type B potential impact stations in areas of perceived potential risk (14 samples)

Type A samples were normally taken from full milk silos (30,000 to 50,000 gallons) in regional dairies. However there were a number of instances where sampling from silos was not possible and the samples were taken instead from road tankers representative of the area to be covered. Type B samples were taken from road tankers representing the "potential impact" areas.

Sampling Procedure

Samples were taken in thick-walled pyrex glass bottles of one litre capacity, which had been washed with detergent and acetone. The sample volume was 800 ml. Duplicate samples were taken with the intention of submitting one sample for analysis and retaining the other sample in the EPA regional laboratories in the event of a sample being lost in transport or a repeat analysis being required.

The samples were taken by EPA personnel while the milk was still in its raw state. Shipment of samples was by overnight courier in ice boxes to the laboratory (see below).

Analysis

The laboratory used for the dioxin analyses was the State Laboratory in Backweston, Co Kildare. The agency continued to use Gesellschaft für Arbeitsplatz und Umweltanalytik (GfA) laboratory in Münster, Germany for the BFR analysis.

Analyses were carried out following pre-treatment and extraction from the milk fat, using high resolution gas chromatography and high resolution mass spectrometry with ^{13}C-labelled isomers as internal standards.

Results and Tables

The data showing WHO-TEQs for milk fat are shown in Tables 4 and 5 (see Appendix 1) with a statistical summary in Table 1.

For comparison purposes it is generally more useful to use the milk fat rather than whole milk data due to the varying composition of fat in milk. Using the fat data also facilitates comparisons with other dairy products such as butter and cheese and also with human milk. Regulatory limits are also generally expressed in terms of dioxin content in fat.

The detailed analytical results showing the levels for the individual congeners are provided in the Annex.

The fat content was measured separately and TEQs were determined in fat and then back-calculated to give corresponding levels in the original whole milk sample.

Table 1: Summary of Milk Fat Data in pg TEQ/g fat

	"A" Samples			"B" Samples			"A and "B" Samples combined		
Sample	**Dioxins** WHO-TEQ incl. LOQ [a]	**PCBs** WHO-TEQ incl. LOQ [a]	**Dioxins and PCBs** Total WHO-TEQ incl. LOQ [a]	**Dioxins** WHO-TEQ incl. LOQ [a]	**PCBs** WHO-TEQ incl. LOQ [a]	**Dioxins and PCBs** Total WHO-TEQ incl. LOQ [a]	**Dioxins** WHO-TEQ incl. LOQ [a]	**PCBs** WHO-TEQ incl. LOQ [a]	**Dioxins and PCBs** Total WHO-TEQ incl. LOQ [a]
EU Limit	2.5		5.5	2.5		5.5	2.5		5.5
EU Action level	1.75	2.0		1.75	2.0		1.75	2.0	
Minimum	0.158	0.080	0.242	0.158	0.070	0.250	0.158	0.070	0.242
Maximum	0.593	0.170	0.760	0.239	0.220	0.430	0.593	0.220	0.760
Mean	0.205	0.129	0.332	0.182	0.138	0.321	0.196	0.132	0.328
Median	0.166	0.130	0.299	0.162	0.130	0.290	0.165	0.130	0.298

Discussion

Summary

A summary of the milk fat data showing a breakdown of the background (type A), and the potential impact (type B) samples along with the combined data set is presented in Table 1.

Dioxins

Considering the entire set of samples (Tables 4 and 5), the reported WHO-TEQ ranges for dioxins in milk fat are 0.158 to 0.593 pg with overall mean values of 0.196 pg WHO-TEQ/g. The highest value was the A4 sample from North Co. Wexford but was still within EU limits and action values.

Dioxin-like PCBs

The highest dioxin-like PCB level was again the North Co. Dublin B8 sample at 0.220 pg WHO-TEQ/g, around 10% of the EU action level. This sample would tend to be subject to the greatest anthropogenic influences of all the areas sampled. The levels found are typical of those found internationally in a semi – urban environment. The mean value was 0.132 pg WHO-TEQ/g with a range of 0.070 to 0.220 pg WHO-TEQ/g. There is no separate EU limit value for dioxin-like PCBs.

Dioxins & PCBs

The range for the sum of Dioxins & PCBs is 0.240 to 0.760 pg WHO-TEQ/g with a mean of 0.328 pg WHO-TEQ/g. The highest value was the A4 sample because of the dioxin content of this sample as mentioned above.

Figure 1 Dioxins/Furans
2012 Data Compared with 2000-2012 Averages

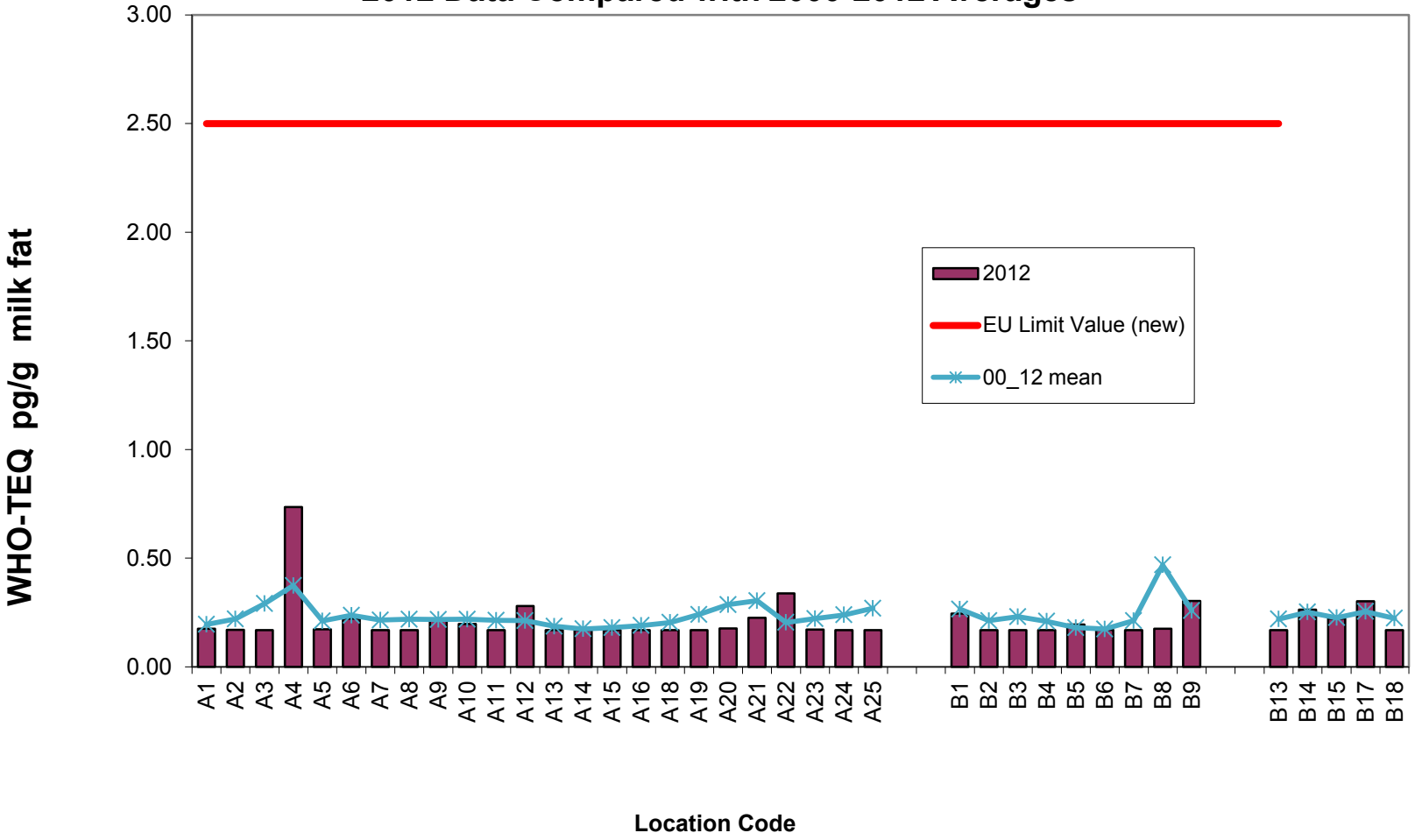


Figure 2 PCBs
2012 Data Compared with 2000-2012 Averages

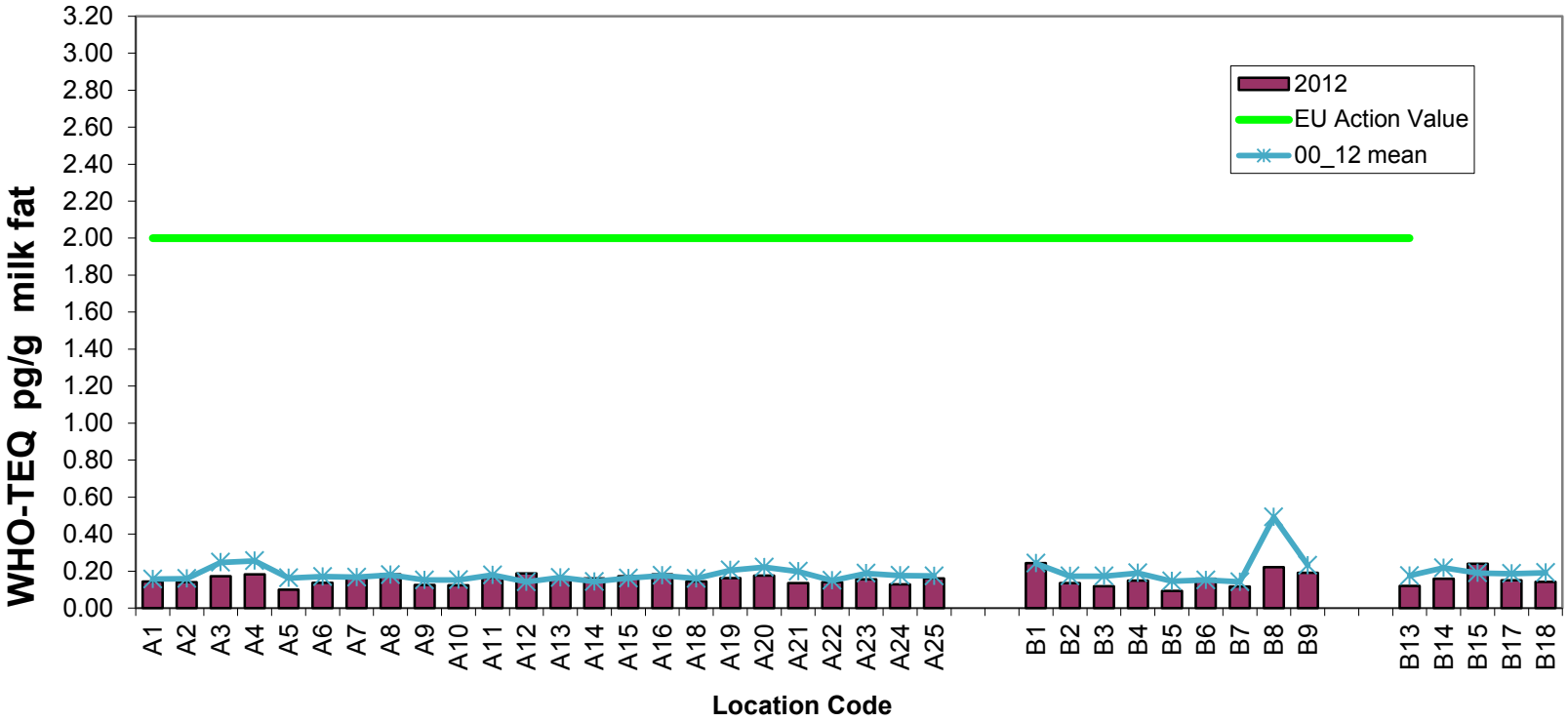
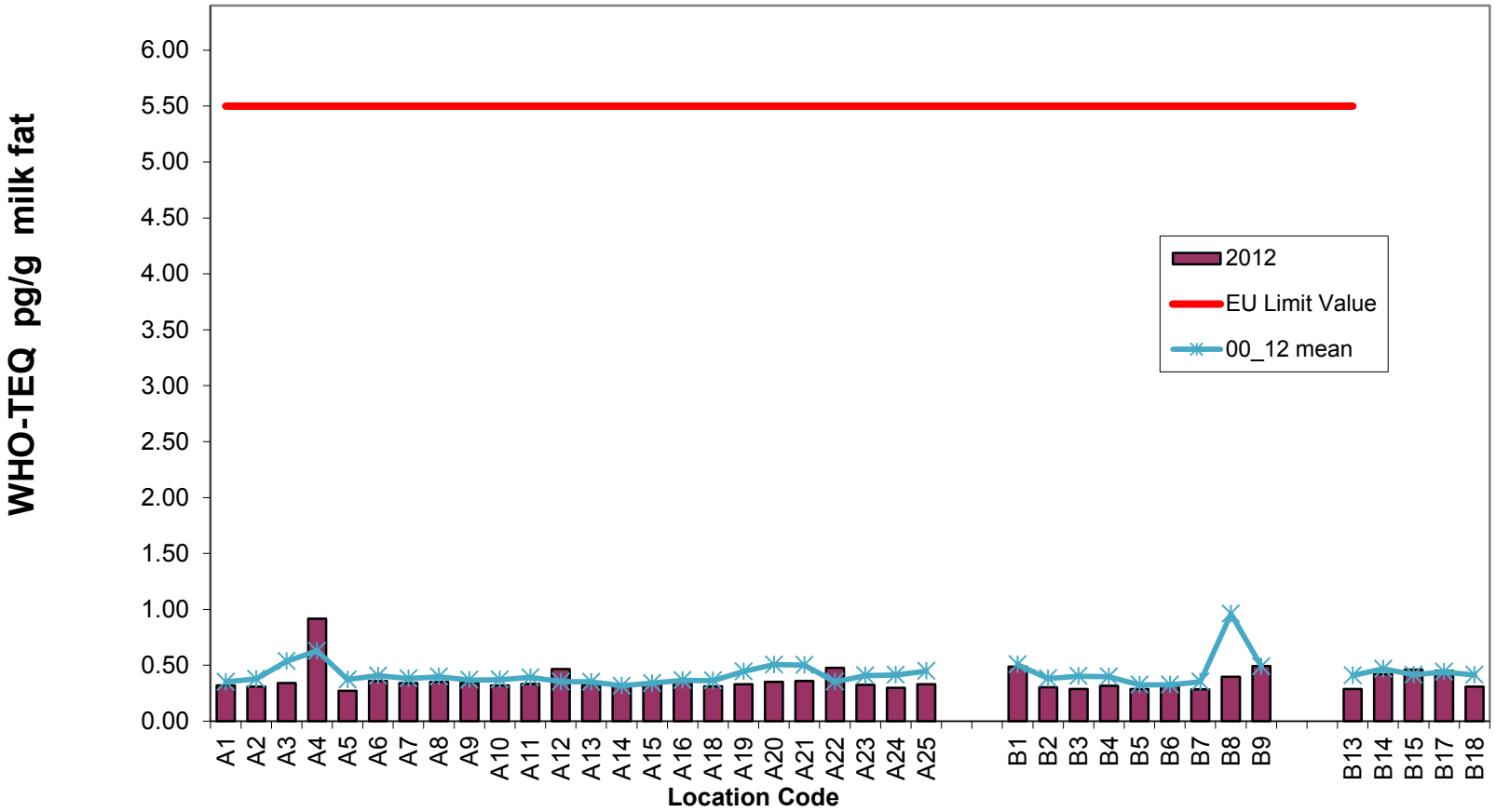


Figure 3 Dioxins/Furans + PCBs
2012 Data Compared with 2000-2012 Averages



3. COMPARISON WITH EARLIER DIOXIN SURVEYS

Figures 1, 2 and 3 show the 2012 data in terms of the averages for the period 2000 to 2012 for dioxins, PCBs and dioxins + PCBs, respectively. It also shows the degree of compliance with regulatory limits.

As previously mentioned, comparisons of low-level data over time should be made with a certain amount of caution. For example, analytical sensitivity has improved and the treatment of amounts reported below the limits of detection has changed (EPA 2005). An additional factor of potential uncertainty is the adoption of the new TEF values as discussed earlier (Appendix 2). For the purpose of comparison, the 2012 data were normalised using the old TEF values in the above Figures 1-3.

In addition, the amalgamation and re-organisation of certain dairies following the rationalisation of the dairy industry can make historical comparisons of individual sample points somewhat problematic. These issues are discussed more fully in earlier reports (EPA 2005).

The mean value for dioxins in milk fat in the 2012 survey was 0.196 pg WHO-TEQ/8 compared to an overall mean for the period 2000 to 2012 of 0.234 pg WHO-TEQ/g.

In the case of PCBs the 2012 mean value was 0.132 pg WHO-TEQ/g, in line with the overall mean for the same period 0.188 pg WHO-TEQ/g.

It can be seen that the 2012 results for dioxins and PCBs are broadly in line with the earlier similar EPA surveys.

Figure 1, read in conjunction with Tables 4 and 5, indicates that locations having average dioxin concentrations of less than 0.2 pg WHO-TEQ/g were typically in west Munster and Connaught, whereas those with concentrations greater than 0.3 pg WHO-TEQ/g were typically along the east coast. A similar pattern may be observed with respect to PCB concentrations. This is likely to reflect the broad pattern of an increase in anthropogenic influences from west to east.

4. OTHER STUDIES IN MILK AND DAIRY PRODUCTS

The latest report from the Cork County Council animal health surveillance programme which has been operating in the Cork Harbour Region since 1991 was published in December 2013 (Cork Co Council 2013). It showed a range of 0.23 to 0.42 pg WHO-TEQ/g fat with a mean of 0.32 pg WHO-TEQ/g fat for dioxins (n=4) for samples taken in 2008-2009.

The number of recent international studies on dioxin levels in Cows' milk is relatively limited.

A number of similar dioxin international studies were referenced in earlier reports (EPA 2012).

In addition to those studies referenced in earlier reports (EPA 2012) a 2011 Russian milk study from the Bashkiria and Chechnya regions showed mean dioxin levels of 1.3 and 2.4 pg WHO-TEQ/g fat respectively (n=6 for both) . The higher levels from Chechnya was attributed to the prevalence of polychlorinated dibenzofurans connected to the effects of large-scale fires at oilfields and pipelines (Amirova and Shahtamirov, 2011). These comparisons are summarised in Table 2.

It is clear, therefore, that the levels of dioxins in the Irish studies are low by international comparisons.

There is now an increasing tendency internationally to measure dioxins and other micro pollutants in human milk as a good means of monitoring human exposure and body burdens of these substances. A Irish project on dioxins in human milk undertaken by FSAI was described in an earlier report (EPA 2012). The study described sampling from 109 mothers in different parts of Ireland in 2010 and concluded that the concentrations of dioxins and PCBs were among the lowest in Europe.

Dioxin Limits in Milk

The EU limit for dioxins and furans for milk and milk products is set at 2.5 pg WHO-TEQ/g fat. When PCBs are included it is 5.5 pg WHO-TEQ/g fat (EU 2011).

The EU action level for dioxins and furans is 1.75 pg WHO-TEQ/g fat. The action level for dioxin-like PCBs is also set at 2.0 pg WHO-TEQ/g fat. There is no separate limit for dioxin-like PCBs (EC 2006 (2)).

It is clear that the overall mean levels found in all of the Irish surveys are at least an order of magnitude below the above limits.

Table 2: Comparison of dioxin and PCB WHO-TEQ values from Irish cows' milk samples with data from international monitoring programs

Country	**Period of sampling**	**Number and specification of samples**	**Dioxins/Furans Mean values pg WHO-TEQ/g fat**	**PCBs Mean values pg WHO-TEQ/g fat**	**Dioxin/Furans plus PCB Mean values pg WHO-TEQ/g fat**
Ireland	2000	24 A-samples	0.24	0.25	0.49
		13 B-samples	0.24	0.24	0.48
Ireland	2004	24 A-samples	0.19	0.18	0.37
		13 B-samples	0.21	0.21	0.41
Ireland	2006	24 A-samples	0.26	0.19	0.45
		13 B-samples	0.30	0.21	0.51
Ireland	2007	24 A-samples	0.21	0.18	0.39
		13 B-samples	0.26	0.24	0.50
Ireland	2008	24 A-samples	0.24	0.16	0.41
		13 B-samples	0.32	0.19	0.51
Ireland	2009	24 A-samples	0.24	0.13	0.37
		13 B-samples	0.22	0.19	0.41
Ireland	2010	24 A-samples	0.20	0.16	0.36
		14 B-samples	0.21	0.25	0.46
Ireland	2011	24 A-samples	0.27	0.18	0.46
		14 B-samples	0.24	0.19	0.42
Ireland	2012	24 A-samples	0.21	0.13	0.36
		14 B-samples	0.21	0.14	0.46
UK	2005	4 samples	0.37	0.22	0.59
UK	2006	4 samples	0.34	0.18	0.52

US	2000-2001	16 samples	0.71	Not reported	Not reported
Germany	2006	68 samples	0.52	0.92	1.44
France	2006	237 samples	0.33	0.57	0.90
Western Europe	2003-2005	138 Milk and milk products from Western European countries	0.39	0.62	0.98
European Union	1997 - 2003	152 Milk and milk products from EC monitoring programmes	0.77	1.65	2.42
Russia	2011	12 samples from two large regions in Russia	1.85	1.01	2.96
Cork Harbour	2008-2009	4 Samples from 10 herds in Cork Harbour region	0.32	0.24	0.56

5. BROMINATED FLAME RETARDANTS AND BROMINATED DIOXINS

General

Brominated Flame Retardants (BFRs) replaced PCB as the major chemical flame retardant in the late 1970s and are commonly used in furniture, fabrics and electronic products as a means of reducing the flammability of combustible organic materials. They act as radical traps, i.e. in case of fire the pyrolysis products are retarded in their reaction with atmospheric oxygen by reaction with the halogen radicals released from the BFR. The benefit of these chemicals is their ability to slow ignition and rate of fire growth, and as a result increase available escape time in the event of a fire.

Brominated dioxins and furans (PBDD/PBDF) can be formed as a by-product of the combustion of these substances.

Different Types of Brominated Flame Retardants

TBBPA tetrabromo bisphenol A

PBBs: Polybrominated biphenyls (structurally similar to PCBs)

HBCD: Hexabromocyclododecane

PBDEs: Polybrominated diphenyl ethers

- Deca-BDE (Decabromodiphenyl ether or BDE-209)
- Octa-BDE (Octabromodiphenyl ether)
- Penta-BDE (Pentabromodiphenyl ether)

TBBPA, the PBDEs and the PBBs contain two brominated carbon rings, making them very stable and efficient in a large number of plastics. PBBs and PBDE are of greatest environmental interest because they are considered as persistent and bioaccumulative. PentaBDE is considered as very poisonous to water organisms. PBDEs are classified as priority substances according to the EU Water Framework Directive. EU has banned the use of Penta-and OctaBDE since 2004. BDE-47 and BDE-99 are the predominant congeners in environmental samples (FSAI 2005). However, only few estimates of human dietary PBDE exposure are available and little is known about other forms of human exposure (e.g.

inhalation, skin contact). Certain PBDEs (Hexa, Hepta, Tetra and Penta BDE) are also classified as POPs under the Stockholm Convention on POPs.

PBBs are also banned.

Brominated Dioxins and Furans (PBDD/PBDF)

These substances are formed unintentionally, either through, incineration of wastes that include consumer products containing brominated flame retardants like PBDEs, accidental fires or as trace contaminants in mixtures of bromine-containing chemicals.

Results of Study.

Five pooled samples were analysed for the above range of BFRs and PBDD/PBDFs. Seventeen PBDE congeners (BDE-17, 28, 47, 49, 66, 71, 77, 85, 99, 100, 119, 126, 138, 153, 154, 183 and 209), some individual PBBs (BB-52, 101, 153 and 209), the totals of Tetra to NonaBBs, hexabromocyclododecane (sum of a-, b- and g-HBCD) and tetrabrombisphenol A (TBBP-A) have been monitored in this study.

Only PBDEs were detected in this study.

The data are summarised in Table 3.

PBDEs

The range for Σ−PBDEs (N=5) was 34.3 to 277 ng/kg fat with a mean of 87.5 ng/kg fat. (Table 3) This compares with the mean value of 95, 202, 143, 93, 152, 200 ng/kg fat, from 2011, 2010, 2009, 2008, 2007 and 2006 respectively (EPA 2012, EPA 2011, EPA 2010, EPA 2009, EPA 2008, EPA 2007, Grümping & Petersen 2007) and also contrasts favourably with the 2005 FSAI study carried out in the same laboratory where the average concentration for Σ−PBDE was 407 ng/kg fat (N=12) FSAI (2006).

Although there are no maximum limits set for PBDEs, these levels are relatively low by international comparisons.

It will be seen that while the overall mean values are low, there are still slightly elevated PBDE concentrations from sample number 1, and from an additional single sample B14. This refers to the contamination outlined in a previous report. (EPA 2011)

While the source of the original contamination has not yet been finally identified, the FSAI/Department of Agriculture investigation is continuing, even though the levels of contamination have reduced considerably.

Similar to the earlier surveys, the main contributors to the total PBDE load were BDE-47 and BDE-99 with a small BDE-153 contribution. No other PBDE isomers were found.

Brominated Dioxins PBDD/PBDFs

No PBDD/PBDF congeners were detected in 2012. This is in line with the 2007, 2008 2009, 2010 and 2011 data.

Table 3: Summary of Milk Fat Data for PBDEs

	Sample 1	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Mean**
	Cork Hbr pg/g fat	Midlands pg/g fat	West pg/g fat	East pg/g fat	N/NW pg/g fat	pg/fat
Pooled from samples	B1 B2 B14	A5 A8 A9	A7 A15 A24	A3 A20 A23	A11 A19 A25	
PBDEs	277	64.2	27.3	34.7	34.3	87.5

7. Non Dioxin PCB results

For the first time non-dioxin PCBs were included in the survey. These have a different toxicological profile to the dioxin like-PCBs. There is a total of 209 different PCB congeners and for analysis purposes it is considered appropriate to measure sum of the six marker or indicator PCBs; PCB 28, 52, 101, 138, 153 and 180. (EU 2011).

The limit for PCBs in milk fat is 40,000 pg/g. The data ranged from 327 to 680 with a mean of 447 expressed as pg/g.

It can be seen that the highest value, from the BI Carrigtwohill/Cobh/Great Island location at Cork Harbour, is less than 2% of the limit value.

The full set of PCB data may be accessed from the link in the Annex.

Given that this is first survey where non-dioxin PCBs were included, it would be best to await future surveys before making any regional comparisons for PCBs.

8. CONCLUSIONS

1. All dioxin levels recorded in this survey compare favourably with those taken from a random selection of similar studies in other EU countries. While assessment of consumer exposure to dioxins through the consumption of milk was not the object of this environmental survey, the highest levels were well below legislative limits.

2. The results are broadly in line with earlier EPA surveys.

3. Non-dioxin PCB data which are included for the first time, are very low compared with EU limits.

4. The results of this survey are in line with the dioxin results from the latest report from the Cork County Council animal health surveillance programme (published in December 2013) which has been operating in the Cork Harbour Region since 1991.

5. The study encompassed sampling for a range of micropollutants including Dioxins, PCBs and Brominated Flame Retardants. The levels found were low by international standards and norms.

References

1. EPA 1996. Dioxins in the Irish Environment, An Assessment Based on Levels in Cows' Milk. EPA, Wexford.

2. EPA 2001. Dioxin Levels in the Irish Environment, Second Assessment Based on Levels in Cows' Milk. EPA, Wexford.

3. EPA 2005. Dioxin Levels in the Irish Environment, Third Assessment Based on Levels in Cows' Milk. EPA, Wexford.

4. EPA 2005b. The Nature and Extent of Unauthorised Waste Activity in Ireland. EPA, Wexford.

5. EPA 2006. National Waste Report, 2005. EPA, Wexford.

6. EPA 2008 (1). Dioxin Levels in the Irish Environment, Fourth Assessment Based on Levels in Cows' Milk. EPA, Wexford.

7. EPA 2008 (2). Dioxin Levels in the Irish Environment, Fifth Assessment Based on Levels in Cows' Milk. EPA, Wexford.

8. EPA 2009 Dioxin Levels in the Irish Environment, Sixth Assessment Based on Levels in Cows' Milk. EPA, Wexford.

9. EPA 2010 Dioxin Levels in the Irish Environment, Seventh Assessment Based on Levels in Cows' Milk. EPA, Wexford.

10. EPA 2011 Dioxin Levels in the Irish Environment, Eighth Assessment Based on Levels in Cows' Milk. EPA, Wexford.

11. EPA 2012 Dioxin Levels in the Irish Environment, Ninth Assessment Based on Levels in Cows' Milk. EPA, Wexford.

12. EPA 2009b. National Waste Report, 2010. EPA, Wexford.

13. Dyke and Coleman, 1997. Dyke, P., Coleman, P., James, R.,.

    Dioxins in Ambient Air, Bonfire Night 1994. Chemosphere Vol. 34, 1191-1201.

14. Gullett et al. PCDD/F Emissions from Uncontrolled Domestic Waste Burning, Organohalogen Compounds 46, 193-196.

15. Hayes & Marnane 2002. Inventory of Dioxin and Furan Emissions to Land, Air and Wastes. EPA, Wexford.

16. DEHLG 2009. Waste Management (Prohibition Of Waste Disposal By

    Burning) Regulations 2009. S.I. No. 286 of 2009.

17. DEHLG 2009. Air Quality Standards Regulations 2011. S.I. No. 180/2011

18. Erikson 1997. Analytical Chemistry of PCBs, Michael D Erikson, Lewis Publishers, 2nd edition, 1997. Pages 79-85

19. EC (European Commission) 2001. Council Regulation (EC) No 2375/2001 of 29 November 2001 amending Commission Regulation (EC) No 466/2001 setting maximum levels for certain contaminants in foodstuffs.

20. EC (European Commission) 2008. Final Report of a Mission carried out in India to Gather Information on the source of Contamination of Gum with Pentachlorophenol and Dioxins. DG (SANCO) 2007-7619 final.

21. EU 2011. Commission Regulation No EU 1259/2011 of 28 March 2012 amending Annexes I and II to Directive 2002/32/EC of the European Parliament and of the Council as regards maximum levels and action thresholds for dioxins and polychlorinated biphenyls.

22. DEFRA 2001. Dioxins and Dioxin-like PCBs in the UK Environment. Dept. of Environment, Food and Rural Affairs, DEFRA Publications, London.

23. Gallani et al, 2004. Gallani, B., Verstraeter, F., Boix, A., von Holst, C., Anklam, E., Levels of dioxins and dioxin-like PCBs in food and feed in Europe, Organohalogen Compounds, **66**, 1893-1900, 2004.

24. Hamm et al 2005. Stephan Hamm, Rainer Grümping, Jurgen Schwietering. Organohalogen Compounds, **67**, 1406-1408, 2005

25. Schuda et al 2004. Schuda, L, Schaum J., Lorber M., Ferrario, J and Sears R. Organohalogen Compounds, **66**, 1952-1957, 2004.

26. Durand et al. 208. Benoit Durand, Barbara Dufour, Daniel Fraisse, Stéphanie Defour, Koenraad Duhem, Karine Le-Barillec. Levels of PCDDs, PCDFs and dioxin-like PCBs in raw cow's milk collected in France in 2006. Chemosphere Volume 70, Issue 4, January 2008, Pages 689-693

27. FSA (Food Standards Agency). 2006. Dioxins and dioxin-like PCBs in foods – EU monitoring 2005. Food Survey Information Sheet, 16/06. http://www.food.gov.uk/science/surveillance/fsisbranch2006/fsis1606

28. FSA (Food Standards Agency). 2007. Dioxins and dioxin-like PCBs in foods – EU monitoring 2006. Food Survey Information 04/07 Sheet.http://www.food.gov.uk/science/surveillance/fsisbranch2007/fsis0407

29. EC (European Commission) 2006 (1). COMMISSION REGULATION (EC) No 199/2006 of 3 February 2006 amending Regulation (EC) No 466/2001 setting maximum levels for certain contaminants in foodstuffs as regards dioxins and dioxin-like PCBs

30. EC (European Commission) 2006 (2). COMMISSION RECOMMENDATION of 6 February 2006 on the reduction of the presence of dioxins, furans, and PCBs in feedingstuffs.and foodstuffs.

31. FSAI (Food Safety Authority of Ireland) 2006. Rainer Grümping, Malte Petersen, Arnold Kuchen, Christina Tlustos. Levels Of Polybrominated Diphenyl Ethers In Swiss And Irish Cow's Milk, Organohalogen Compounds **68** (2006)

32. Grümping and Petersen 2007, Rainer Grümping and Malte Petersen. Organohalogen Compounds **69**, 912-915 (2007)

33. Fuerst 2007. PCDD/PCDF and PCB in Dairy Products from North-Rhine Westphalia

2006 as Compared to Levels since 1990. Organohalogen Compounds **69** (2007)

34. U.S. EPA (Environmental Protection Agency). 2006. An inventory of sources and environmental releases of dioxin-like compounds in the United States for the years 1987, 1995, and 2000. National Center for Environmental Assessment, Washington, DC; EPA/600/P-03/002F. (http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=159286)

35. DEFRA 2006. Emissions of Dioxins and Dioxin-like Polychlorinated Biphenyls from Domestic Sources. Dept. for Environment, Food and Rural Affairs, DEFRA Publications, London.

36. FSAI (Food Safety Authority of Ireland) 2005. Investigation into levels of Dioxins, Furans, PCBs and PBDEs in Irish food 2004. http://www.fsai.ie/publications/reports/dioxins.pdf

37. HPA 2009. The Impact on Health of Emissions to Air from Municipal Waste Incinerators. UK Health Protection Agency. September 2009. http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1251473372218

38. Pratt et al. Polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs) in breast milk of first-time Irish mothers: impact of the 2008 dioxin incident in Ireland. Pratt IS, Anderson WA, Crowley D, Daly SF, Evans RI, Fernandes AR, Fitzgerald M, Geary MP, Keane DP, Malisch R, McBride J, Morrison JJ, Reilly A, Tlustos C. Chemosphere. 2012 Aug;88(7):865-72.

39. EU 2004 Regulation (EC) no 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC

40. DECLG 2010 Persistent Organic Pollutant Regulations 2010 (Statutory Instrument No. 235 of 2010).

41. Amirova and Shahtamirov,(2011) Organohalogen Compounds Vol.73,25-28,2011

42. Cork Co Council (2013). Animal Health Surveillance of Dairy Herds in the Cork Harbour Region 2005-2010.

Bibliography

1. European Dioxin Inventory, North Rhine-Westphalia State Environment Agency on behalf of the European Commission, DG XI, http://europa.eu.int/comm/environment/dioxin/download.htm, 1997 (Stage 1), 2000 (Stage 2).

2. Compilation of EU Dioxin exposure and health data, AEA Technology, produced for the European Commission, DG Environment and UK Department of the Environment, Transport and the Regions, http://europa.eu.int/comm/environment/dioxin/download.htm, 1999.

3. Dioxins and Health Arnold Schecter (Editor) and Thomas A. Gasiewicz (Editor). Wiley-Interscience; 2nd edition, June 2003.

4. Analytical Chemistry of PCBs, Michael D Erikson, Lewis Publishers, 2nd edition, 1997

Glossary

"A" samples	background samples covering the entire country
"B" samples	potential impact samples from areas of perceived potential risk
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4-D	2,4-dichlorophenoxyacetic acid
Aliphatic chemicals	organic chemicals which do not contain benzene rings
Aromatic chemicals	organic chemicals containing benzene rings
BFRs	brominated flame retardants
dielectric constant	capacity to store electrical energy
EPA	Environmental Protection Agency (Ireland)
FSAI	Food Safety Authority of Ireland
G	gramme
GfA	Gesellschaft für Arbeitsplatz und Umweltanalytik laboratory, Münster, Germany
IPC	Integrated Pollution Control
I-TEQ	Toxic Equivalent (weighted toxicity of a mixture of dioxin congeners expressed as PCDD) using NATO convention
lipophilic	refers to the tendency of a substance to dissolve in fats or oils
LOD	limit of detection
LOQ	limit of quantification
NATO	North Atlantic Treaty Organisation
Precursor	A substance from which another substance is formed
PBDEs:	polybrominated diphenyl ethers
PBDD	polybrominated dibenzo-para-dioxin
PBDF	polybrominated dibenzofuran
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-para-dioxin

PCDF	polychlorinated dibenzofuran
Pg	picogram, 10^{-12} of a gramme.
$PM_{2.5}$	Ultrafine airborne particulates, diameter of 2.5 micrometres or less.
POPs	Persistent Organic Pollutants
TEF	Toxic Equivalent Factor (toxicity weighting factor for individual congeners)
USEPA	Environmental Protection Agency (United States)
WHO	World Health Organisation
WHO TEQ	Toxic Equivalent (weighted toxicity of a mixture of dioxin congeners expressed as PCDD) using WHO convention

APPENDIX 1

Table 4: Milk fat related PCDD/F and PCB-TEQ values determined in the background samples A 1 - A 25

Sample	Milk supply area	Dioxins	PCBs	Dioxins & PCBs
		pg/g milk fat	*pg/g milk fat*	*pg/g milk fat*
A1	Mitchelstown Area	0.16	0.13	0.29
A2	Co. Waterford	0.16	0.12	0.28
A3	Dublin South.Co./North Wicklow Area	0.16	0.15	0.31
A4	North Co. Wexford	0.59	0.17	0.76
A5	Charleville, Co Cork Area	0.16	0.08	0.24
A6	Ballyragget, Co Kilkenny Area	0.19	0.12	0.31
A7	Renmore, Co Galway Area	0.17	0.10	0.26

A8	Moate, Co Westmeath Area	0.19	0.11	0.30
A9	Tipperary Town/Thurles Areas	0.19	0.11	0.30
A10	Nenagh, Co. Tipperary Area	0.17	0.11	0.29
A11	Cavan/Longford/Leitrim	0.16	0.14	0.30
A12	Drinagh, Co Cork	0.24	0.17	0.40
A13	Bandon Area	0.16	0.14	0.30
A14	North Kerry Area	0.16	0.13	0.29
A15	Co Sligo	0.23	0.13	0.36
A16	Roscommon/East Galway	0.20	0.12	0.32
A18	Roscommon/Leitrim	0.29	0.15	0.44
A19	Co Monaghan	0.16	0.14	0.30
A20	Co Louth	0.17	0.16	0.32
A21	North Kildare/West Dublin	0.20	0.11	0.31
A22	So Kerry (Cahirciveen area)	0.33	0.12	0.44
A23	South Wexford	0.16	0.14	0.30
A24	SE Co. Mayo	0.16	0.11	0.27
A25	Co. Donegal	0.16	0.14	0.29

Table 5: Milk fat related PCDD/F and PCB-TEQ values determined in the potential impact samples B1 - B 18

Sample No.	**Milk supply area**	**Dioxins**	**PCBs**	**Dioxins & PCBs**
		WHO-TEQ incl. LOQ	**WHO-TEQ incl. LOQ**	**Total WHO-TEQ incl. LOQ**
	Unit	*pg/g milk fat*	*pg/g milk fat*	*pg/g milk fat*
B1	Carrigtwohill/Cobh/Great Island	0.20	0.21	0.41
B2	Aghada/East Cork Harbour	0.16	0.12	0.27
B3	Askeaton area	0.16	0.10	0.26
B4	Tarbert Co. Kerry	0.16	0.13	0.29
B5	Clarecastle, Co.Clare	0.17	0.07	0.25
B6	Cooraclare Co.Clare	0.16	0.13	0.29
B7	Ballydine, So. Tipperary	0.16	0.10	0.25
B8	Swords/Mulhuddart. Co.Dublin	0.16	0.19	0.36
B9	Grannagh, So.Kilkenny	0.24	0.17	0.41
B13	Kinsale (Dunderow) Co.Cork	0.22	0.14	0.36
B14	Ringaskiddy area. Co.Cork	0.21	0.22	0.43
B15	Crossakiel (nr Kells) Co.Meath	0.16	0.10	0.26

B17	Carranstown, Co.Meath	0.24	0.13	0.37
B18	Kinnegad, Co Westmeath	0.16	0.12	0.28

APPENDIX 2

Toxicity Equivalent Factors (TEFs) used for calculation of I-TEQs and WHO-TEQs

PCDD/F parameter	**I-TEF**	**WHO-TEF (1998)**	**WHO-TEF (2005)**
PCDFs			
2,3,7,8-TetraCDF	0,1	0,1	0.1
1,2,3,7,8-PentaCDF	0,05	0,05	0.03
2,3,4,7,8-PentaCDF	0,5	0,5	0.3
1,2,3,4,7,8-HexaCDF	0,1	0,1	0.1
1,2,3,6,7,8-HexaCDF	0,1	0,1	0.1
2,3,4,6,7,8-HexaCDF	0,1	0,1	0.1
1,2,3,7,8,9-HexaCDF	0,1	0,1	0.1
1,2,3,4,6,7,8-HeptaCDF	0,01	0,01	0.01
1,2,3,4,7,8,9-HeptaCDF	0,01	0,01	0.01
OctaCDF	0,001	0,0001	0.0003
PCDDs			
2,3,7,8-TetraCDD	1,0	1,0	1,0
1,2,3,7,8-PentaCDD	0,5	1,0	1,0
1,2,3,4,7,8-HexaCDD	0,1	0,1	0,1
1,2,3,6,7,8-HexaCDD	0,1	0,1	0,1
1,2,3,7,8,9-HexaCDD	0,1	0,1	0,1
1,2,3,4,6,7,8-HeptaCDD	0,01	0,01	0,01

PCB congeners		**WHO-TEF (1998)**	**WHO-TEF (2005)**
Chlorosubstitution Pattern	IUPAC Number		
3,4,4‘,5-Tetrachlorobiphenyl	PCB 81	0,0001	0,0003
3,3‘,4,4‘-Tetrachlorobiphenyl	PCB 77	0,0001	0,0001
2‘,3,4,4‘,5-Pentachlorobiphenyl	PCB 123	0,0001	0,00003
2,3‘,4,4‘,5-Pentachlorobiphenyl	PCB 118	0,0001	0,00003
2,3,4,4‘,5-Pentachlorobiphenyl	PCB 114	0,0005	0,00003
2,3,3‘,4,4‘-Pentachlorobiphenyl	PCB 105	0,0001	0,00003
3,3‘,4,4‘,5,-Pentachlorobiphenyl	PCB 126	0,1	0,1
2,3‘,4,4‘,5,5‘-Hexachlorobiphenyl	PCB 167	0,00001	0,00003
2,3,3‘,4,4‘,5-Hexachlorobiphenyl	PCB 156	0,0005	0,00003
2,3,3‘,4,4‘,5‘-Hexachlorobiphenyl	PCB 157	0,0005	0,00003
3,3‘,4,4‘,5,5‘-Hexachlorobiphenyl	PCB 169	0,01	0,03
2,3,3‘,4,4‘,5,5‘-Heptachlorobiphenyl	PCB 189	0,0001	0,00003

Annex

Laboratory reports from State laboratory and GfA

These can be found at the links below.

Dioxin results 2012

http://www.epa.ie/xxx

BFR results2012

http://www.epa.ie/yyy

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Gníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaol do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaol na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil, Pobal agus Rialtais Áitiúil.

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaol i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- diantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreail;
- scardadh dramhuisce;
- dumpáil mara.

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil - aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí comhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaol mar thoradh ar a ngníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOL

- Monatóireacht ar chaighdeán aeir agus caighdeáin aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntí a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Cainníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdéan aeir agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaol na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaol a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Ghníomhaireacht i 1993 chun comhshaol na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstiúrthóir agus ceithre Stiúrthóir.

Tá obair na Gníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar imní iad agus le comhairle a thabhairt don Bhord.

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An Ghníomhaireacht um Chaomhnú Comhshaoil

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