Environmental Protection Agency

Dioxin Levels in the Irish Environment: Seventh Assessment (Summer 2009)

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.

The EPA is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Environment, Heritage and Local Government.

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- large scale industrial activities (e.g., pharmaceutical manufacturing, cement manufacturing, power plants);
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- Prosecuting those who flout environmental law and damage the environment as a result of their actions.

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- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

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- Office of Climate, Licensing and Resource Use
- 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

Seventh Assessment
(Summer 2009)

Based on Levels in Cows' Milk

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December 2010

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DIOXIN LEVELS IN THE IRISH ENVIRONMENT

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(Summer 2009)

Based on Levels in Cows' Milk

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EXECUTIVE SUMMARY

Background

In order to maintain surveillance of dioxins, furans and other micro pollutants, the Environmental Protection Agency carried out in Summer 2009 a follow-up survey to the 1995, 2000, 2004, 2006, 2007 and 2008 surveys of dioxin in cows' milk (EPA 1996, EPA 2001, EPA 2005, EPA 2008 (1) and (2), EPA (2009)).

"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.1 The most toxic of these is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The toxic responses include dermal 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.

In accordance with current practice, testing for dioxin-like polychlorinated biphenyls (PCBs) was included for each sample.

In view of increased international awareness of the issue of the presence in the environment of brominated flame retardants (BFRs) and brominated dioxins, it was decided to repeat the 2006 2007 and 2008 sampling for these substances at the same time as the dioxin survey. Five samples, representative of different regions, were analysed. Each sample consisted of three pooled samples from the dioxin survey.

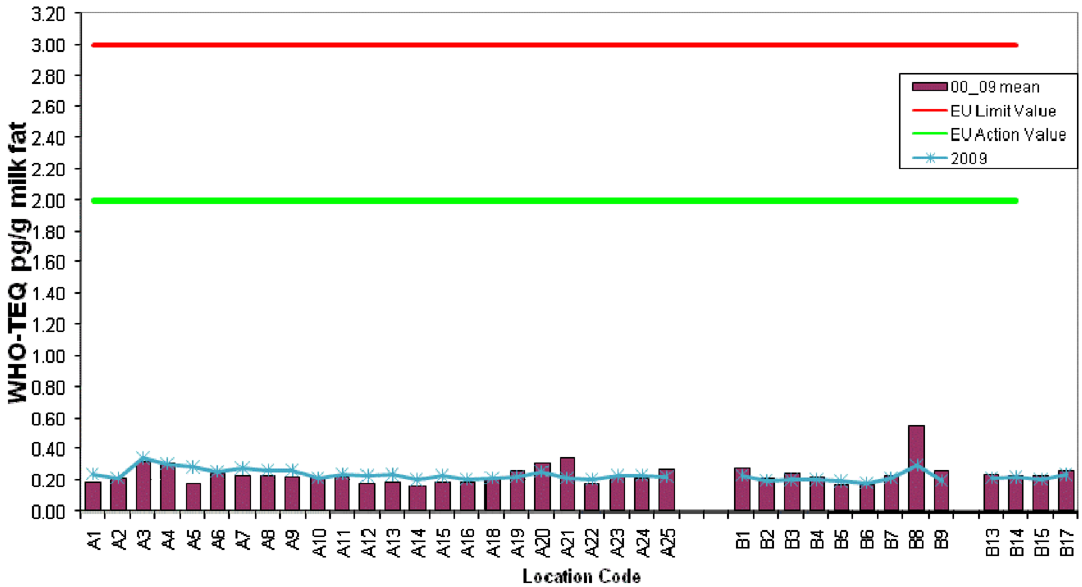
Sources of Dioxins

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. Some significant sources internationally are:

- Accidental fires
- Backyard burning of household waste and bonfires
- Cement kilns (especially where hazardous waste is co-incinerated)
- Chlorine bleaching of wood pulp
- Coal fired power plants
- Copper production
- Forest fires and other natural fires
- Incineration of medical waste
- Incineration of municipal or hazardous waste
- Production of steel
- Residential combustion (especially where treated wood is used)
- Sinter plants
- Traffic

Brominated dioxins (PBDDs and PBDFs) are also formed unintentionally, mainly through incineration of wastes or accidental fires that include consumer products containing brominated flame retardants (BFRs).

Figure 1 Dioxins/Furans
2009 Data Compared with 2000-2009 Averages



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 (13 samples)

The reported ranges for dioxins in milk fat (37 samples) were 0.180 to 0.346 pg WHO-TEQ[1]/g with a mean of 0.233 WHO-TEQ/g. When PCBs were included, the range is 0.301 to 0.897 pg WHO-TEQ with a mean of 0.385 WHO-TEQ/g.

BFRs and brominated dioxins (PBDD/PBDF) were also measured as part of the main survey. A broad range of the common BFRs was tested but only Polybrominated Diphenyl Ethers (PBDEs) were found. The range for PBDEs (5 samples) was 65 to 332 ng/kg fat with a mean of 143 ng/kg fat, in line with earlier surveys. These levels are relatively low by international comparisons.

1 See Glossary for explanation of terms

Conclusions

1. The levels of dioxins found in the 2009 surveys are well below the EU limit in milk and milk products of 3.0 pg WHO-TEQ/g for dioxins only (Figure 1), and 6.0 pg WHO-TEQ/g for dioxins and PCBs combined. The results are also in line with earlier similar EPA surveys[2] .

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

3. The Brominated Flame Retardants (BFR) data were low by international comparisons and in line with earlier surveys.

4. There was no evidence to link the data from the survey to the Pork feed contamination incident in late 2008.

[2] *See Figure 1, p. 21*

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 arise mainly as unintentional by-products of incomplete or poorly controlled combustion and from certain chemical processes.

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 and 2008 surveys of dioxin in cows' milk (EPA 1996, EPA 2001, EPA 2005, EPA 2008 (1) and (2), EPA (2009)) in Summer 2009. 37 samples were taken and the sample locations were nominally the same as for the earlier surveys. However, in some instances, because of the recent rationalisation of the dairy industry, 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 polychlorinated biphenyls (PCBs) was also included in this programme.

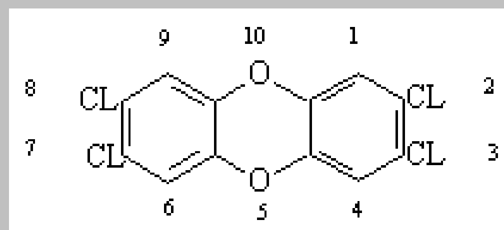
It is generally accepted that the principal mechanism of environmental release of dioxins in this country is by low level emission from multiple sources to the atmosphere. Due to their physical and chemical properties, dioxins tend to be adsorbed onto dust and soot particles. These in turn are deposited by atmospheric fallout on soil and vegetation such as grass, which is directly ingested by grazing cows. Owing to their lipophilic and persistent properties, PCDD/F are transferred into the milk fat of the lactating cow. Therefore, milk constitutes an efficient and rapid elimination pathway of these contaminants. If milk production is exclusively based on grazing, the resulting PCDD/F levels in cows' milk reflect the atmospheric PCDD/F deposition on the pasture. Dioxin levels in milk samples taken during the grazing season can therefore be used as indicators for the actual average local dioxin exposure by atmospheric deposition.

In view of increased international awareness of the issue of the presence in the environment of brominated flame retardants (BFRs) and brominated dioxins and furans (PBDD/F), it was decided to take the opportunity to sample for these substances at the same time as the dioxin survey. Five samples, representative of different regions, were analysed. Each sample consisted of three pooled sub-samples from the dioxin survey.

Samples were taken in June and July 2009 when the cows could be expected to be grazing outdoors. Details are given in Tables 1 and 2.

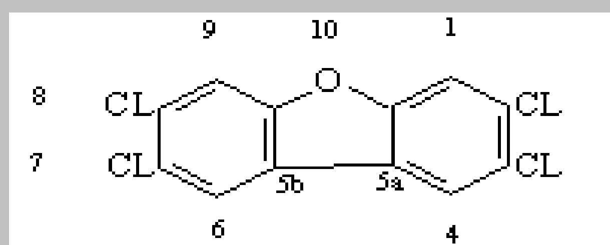
Toxicity of Dioxins

The toxicity of individual dioxin and dibenzofuran compounds (or congeners) varies considerably. PCDDs have two benzene rings connected by two oxygen atoms; in the PCDFs the two rings are connected by one oxygen atom. 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).



2,3,7,8-TCDD

The most toxic dibenzofuran is 2,3,7,8-tetrachloro-dibenzofuran (2,3,7,8-TCDF) which is similar in toxicity to 2,3,7,8-TCDD.



2,3,7,8-TCDF

The toxic responses include dermal effects, immunotoxicity and carcinogenicity, as well as reproductive and developmental toxicity.

Mechanism of Toxicological Action

A broad variety of data, primarily on TCDD but also on other members of the class of dioxin-like compounds, has shown the importance of the Aryl hydrocarbon Ah (dioxin) receptor in mediating the biological effects of dioxin. These data have been collected using many experimental models in multiple species and also from studies on human exposure.

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 manufacture of some chlorinated compounds is known to result in the formation of PCDDs and PCDFs as unwanted by-products. However the manufacture and usage of many such substances, mainly chlorinated pesticides with significant dioxin contamination, is now banned. Internationally the main sources of dioxins in recent years have been identified as a wide range of combustion processes where they may be formed when organic materials and chlorine compounds are burned together**.** These processes can be more efficient if the precursor[3] chemicals are already present in a form that is close to that found in dioxins and dioxin-like PCBs. For example, organic chlorine may be more readily converted to dioxins and dioxin-like PCBs than inorganic chlorine. Aromatic[3] chemicals are more readily converted to dioxins and dioxin-like PCBs than aliphatic[3] substances. Such sources can include incineration of all types of wastes, metallurgical operations such as smelting and scrap metal recovery furnaces and the burning of fuels such as coal, wood (especially where the wood contains preservatives) and petroleum products. Other sources are motor vehicle emissions especially heavy diesel trucks (U.S. EPA 2006) and emissions from both accidental and natural fires and volcanoes. Emissions from leaded fuels, which were significant in the past, have almost disappeared. Sources such as bonfires and illegal or uncontrolled burning of domestic waste, according to research conducted in the UK (Dyke and Coleman, 1997) and by U.S. EPA (Gullett et al, 2000) are also significant although obviously difficult to quantify.

For many countries in Europe the main source of dioxins in the past was emissions from poorly controlled municipal solid waste (MSW) incinerators. However, the introduction of strict controls on emissions has resulted in the closure of many old incinerators which could not be upgraded. In the UK for example, total emissions from MSW incineration plants, which were the major source of dioxin emissions in 1990 at 600 g I-TEQ, were reduced to around 2 g I-TEQ by 1999, corresponding to less than 1% of all UK releases (DEFRA 2001). A recent report from the UK Health Protection Agency (HPA) reviewed research on the links between emissions from municipal waste incinerators and effects on health. It concluded that modern and well managed municipal waste incinerators make only a very small contribution to local concentrations of air pollutants and any potential damage to the health of those living close-by is likely to be very small, if detectable. (HPA 2009). There are no municipal solid waste incinerators operating in Ireland.

Domestic coal fires are also believed to be a relatively significant source of dioxin emissions, particularly when domestic waste, plastic or treated wood is used on these fires. The burning of damp fuel, including unseasoned logs, and of salt-laden wood from coastal areas can give rise to increased dioxin emissions (DEFRA 2006). Dioxins are also found in paper products arising from the bleaching with chlorine of naturally occurring phenols present in wood pulp and in the manufacture of some chlorinated compounds. Forest fires are also a significant source of dioxins.

A well known example of an accident involving release of dioxins was the explosion in 1976 at Seveso, Italy, where some of the contents of a 2,4,5-trichlorophenol manufacturing plant were released into the atmosphere causing severe local contamination with trichlorophenol and 2,3,7,8- TCDD. Dioxins also attracted particular attention during the Vietnam War where they were found to be present as a contaminant in the defoliant Agent Orange, a mixture of 2,4,5-T and 2,4-D. High levels of dioxins were found in poultry and eggs from Belgium in 1999. The cause of the contamination is thought to have been contamination of animal feed. In July 2007,

[3] *See Glossary for explanation of terms*

the European Commission issued a health warning to its Member States after high levels of dioxins were detected in a food additive - guar gum, produced from the seeds of the guar bean, - used as thickener in small quantities in meat, dairy, dessert or delicatessen products. The source was traced to a shipment of guar gum from India that was contaminated with pentachlorophenol (PCP), a pesticide subject to severe restrictions in EU countries. PCP generally contains dioxins as a contaminant. (EC 2008). A more recent incident occurred in Ireland in late 2008 where routine testing of the food chain found pig feed and pork tainted with PCBs and dioxins. The Irish government, as a result, ordered a recall of all domestically produced pork products from the market. The incident was traced to the alleged burning of PCB contaminated oil at a single pig feed recycling plant. Uncontrolled burning of some common PCB mixtures can give rise to the efficient formation of certain dibenzofuran compounds. (see also p. 20)

Dioxin compounds have no commercial value and have never been intentionally synthesised other than for laboratory use. Monitoring data for dioxins date only from the 1970s as the analytical capabilities for their detection did not exist before then due to the extremely low concentrations at which they were present in the environment. However, there can be little doubt that dioxins formed from anthropogenic activities have existed, at least to some extent, as long as there has been fire.

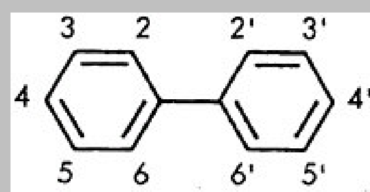
Until relatively recently, very little firm information on dioxin emission sources existed for Ireland. Accordingly the EPA commissioned a desk study to provide an estimate of dioxin emissions to air, land and water during the calendar year 2000 and also an estimate of projected emissions in 2010 (Hayes & Marnane 2002). The study also attempted to quantify significant dioxin sources in Ireland. The report estimated that in 2000, notwithstanding the inherent uncertainties of the calculations, more than half of all air emissions could be attributed to domestic burning of waste. In a nationwide investigation by the EPA it was estimated that 287,000 tonnes of household waste, representing 700,000 persons, was uncollected in 2003. In addition 80% of Local Authorities have identified backyard burning as a significant issue, especially in rural areas where a local waste collection may not be available (EPA 2005b). Hayes & Marnane also identified building fires, household heating, cooking with fossil fuel and iron and steel production as the main other sources of dioxin emissions in 2000. The sole iron and steel production facility in the State has since closed.

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" and the "See Something, Say Something" phone hotlines. These measures were highlighted as examples of good practice in waste minimisation at a recent EU "Expert Workshop on Dioxin Emissions from Domestic Sources" (http://www.bipro.de/dioxin-domestic/sub/meetings.htm). This meeting also emphasised the importance of awareness programmes in Member States regarding appropriate fuel and appliance use and issues such as dioxin release from backyard burning were also highlighted. Very recently these initiatives were enhanced by new 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)

It may also be anticipated that measures to improve energy efficiency put in place through the National Climate Change Strategy 2007-2012, with a increased focus on wasteful fuel consumption and waste management and consequent emphasis on non-combustion energy alternatives, will also tend to have a positive impact on dioxin levels in the future.

Toxicity of PCBs

Polychlorinated biphenyls (PCBs) are chlorinated hydrocarbons which were synthesised by direct chlorination of biphenyl but whose production has now been discontinued. PCBs consist of a biphenyl (two benzene rings with a carbon to carbon bond between carbon 1 on one ring and carbon 1' on the second ring) with a varying number of chlorine atoms substituting for hydrogen atoms on the biphenyl rings.



Basic PCB structure

Depending on the number and location of the chlorine atom substituents, there are 209 possible PCB congeners. Some PCB congeners have a "coplanar" structure with the two biphenyl rings lying in the same plane. Of these, there are 12 mono-ortho (chlorine in 2 or 6 position in structure above) and non-ortho substituted PCBs which show similar toxicological properties to dioxins and are often termed "dioxin-like 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.

Toxic Equivalency Factors (TEFs) for Assessing Mixtures of Dioxins and Dioxin-like Compounds

Because real samples containing dioxins are made up of complex mixtures, a system of Toxic Equivalents has been developed in order to address the problem of reporting of differing toxicities and environmental behaviour of these substances. This procedure uses a scheme of

weighting factors which expresses the toxicity of each individual PCDD and PCDF in terms of an equivalent amount of the congener 2,3,7,8-TCDD. This weighting factor, called a toxic equivalent factor (TEF), is multiplied by the concentration of the individual compounds in a mixture to give a 2,3,7,8-TCDD toxic equivalent, (TEQ) which is the sum of the concentrations of the individual congeners multiplied by their TEFs. The TEFs for the various PCDD, PCDF and dioxin-like PCB congeners are listed in Annex 1.

Systems for Establishing TEFs

A number of different systems for establishing toxic equivalent factors now exist. The NATO/CCMS (North Atlantic Treaty Organisation's Committee on Challenges of Modern Society) I-TEQ system which was used in the EPA 1996 report, defines most of the older data. The newer system devised by the World Health Organisation (WHO) in 1998 also incorporates PCBs. The WHO have also suggested that the TEQ scheme be re-evaluated every five years and that TEFs be reanalysed in the light of any new scientific information. Clearly it is important when comparing data to define correctly the TEQ units and also whether PCBs are being considered. Usually I-TEQ concentrations will be a little lower than WHO-TEQs as some of TEFs have been revised upwards by the WHO. The TEF values for both systems are tabulated in Annex 1. In general, it can be safely assumed that older data will have been calculated according to the I-TEQ system.

Treatment of Levels Below Detection Limits

In calculating TEQs for compounds that are not found in concentrations above the limit of detection, the conventional approach up to relatively recently was to use <u>one half</u> of the detection level for non-detects (congeners not found at the analytical detection level). A recent EC Directive which set maximum levels for dioxins in foodstuffs stipulated that limits of quantification (LOQs) [1] be used instead of limits of detection (LODs)[2] and also that the full LOQ should be taken in the calculation of non-detects (EC 2001). This is a totally conservative approach to estimating TEQs at trace levels, and it can lead to an over-estimation of concentrations in low level samples. This method, which was generally introduced in 2002, has been used in the calculations below and should be borne in mind when making comparisons with older low level studies. As not all reported data consider non-detects, it is important to clarify this issue when comparing low level data from different sources.

[1]Limit of quantification is commonly defined as:

> *The limit of quantification is the smallest concentration of unknown that can reliably be **quantified** by the instrumental method. The accepted limit is that concentration of analyte, which produces an instrumental response that is ten times as large as the standard deviation S of the instrumental noise level (L.O.Q. = 10 x S/N)*

[2]Limit of detection as used in analytical chemistry is commonly defined as:

> *The limit of detection is the smallest concentration of unknown that can reliably be **detected** by the instrumental method. The accepted limit is that concentration of analyte, which produces an instrumental response that is three times as large as the standard deviation S of the instrumental noise level (L.O.D. = 3 x S/N)*

2. NATIONAL DIOXIN SURVEY

Background

This survey was planned as a follow-up to the national surveys carried out in 1995, 2000, 2004 2006, 2007 and 2008. As far as possible, the same approach was adopted in terms of time of year and location of samples. However, unlike the 1995 survey, the analyses included the 12 dioxin-like PCBs.

Samples were taken in June and July 2009 when the cows could be expected to be grazing outdoors. Details are given in Tables 1 and 2.

Sampling strategy

Two types of sampling stations were chosen:

Type A background stations covering the entire country (24 samples)
Type B potenial impact stations in areas of perceived potential risk (13 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. The samples were then taken to the nearest EPA regional laboratory where they were frozen at –20° C. Shipment of samples was by overnight courier in ice boxes to the laboratory (see below).

Analysis

The laboratory chosen for the analyses was the same one used for previous surveys, Gesellschaft für Arbeitsplatz und Umweltanalytik (GfA) laboratory in Münster, Germany. This laboratory is very experienced in the analysis of dioxins in milk and other food matrices and has undertaken analyses for clients in many countries. The laboratory is fully accredited for the analysis of PCDDs, PCDFs and PCBs in food matrices, including milk.

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. This method is considered to be the most suitable for low-level dioxin measurements. The analytical methodology is in compliance with the requirement for the

analysis of foodstuffs for PCDD/Fs and PCBs as laid down by the EU directive 2002/69 and its amendment 2004/44.

Results and Tables

The data showing WHO-TEQs for milk fat are shown in Tables 1 and 2 with a statistical summary in Table 3.

Data for whole milk are also available and are shown in Annex 2 as fresh-weight data for individual congeners. However, 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 also given in Annex 2.

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. (Annex 2)

Table 1

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
		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*
A1	Mitchelstown Area (T)	0.239	0.122	0.361
A2	Co. Waterford (T)	0.213	0.13	0.343
A3	Dublin South.Co./North Wicklow Area (T)	0.346	0.121	0.467
A4	North Co. Wexford (T)	0.306	0.122	0.428
A5	Charleville, Co Cork Area (T)	0.287	0.105	0.392
A6	Ballyragget, Co Kilkenny Area (T)	0.259	0.169	0.428
A7	Renmore, Co Galway Area	0.278	0.114	0.392
A8	Moate, Co Westmeath Area	0.267	0.175	0.442
A9	Tipperary Town/Thurles Areas	0.268	0.119	0.387
A10	Nenagh, Co. Tipperary Area	0.215	0.124	0.339
A11	Cavan/Longford/Leitrim	0.24	0.114	0.354
A12	Drinagh, Co Cork (T)	0.228	0.132	0.36
A13	Bandon Area (T)	0.236	0.135	0.371

A14	North Kerry Area (T)	0.204	0.147	0.351
A15	Co Sligo	0.229	0.122	0.351
A16	Roscommon/East Galway	0.205	0.117	0.322
A18	Roscommon/Leitrim	0.217	0.137	0.354
A19	Co Monaghan (T)	0.225	0.139	0.364
A20	Co Louth	0.257	0.127	0.384
A21	North Kildare/West Dublin (T)	0.215	0.149	0.364
A22	So Kerry Cahirciveen area) (T)	0.206	0.109	0.315
A23	South Wexford	0.229	0.124	0.353
A24	SE Co. Mayo	0.231	0.105	0.336
A25	Co. Donegal	0.225	0.14	0.365

Sample corresponding to A17 was taken only in the 1995 survey
(T) Denotes sampling from a road tanker. All other "**A**" samples were taken from bulk silos.

Table 2

Milk fat related PCDD/F and PCB-TEQ values determined in the potential impact samples B1 - B 17

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	0.233	0.148	0.381
B2	Ahgada/East Cork Harbour	0.2	0.148	0.348
B3	Askeaton area	0.203	0.214	0.417
B4	Tarbert Co. Kerry	0.204	0.21	0.414
B5	Clarecastle Co.Clare	0.195	0.106	0.301
B6	Cooraclare Co.Clare	0.18	0.139	0.319
B7	Ballydine, So. Tipperary	0.217	0.102	0.319
B8	Swords/ Mulhuddart. Co.Dublin	0.300	0.597	0.897
B9	Grannagh. So.Kilkenny	0.201	0.232	0.433
B13	Kinsale (Dunderow) Co.Cork	0.214	0.203	0.417
B14	Ringaskiddy area. Co.Cork	0.219	0.131	0.35
B15	Crossakiel (nr Kells). Co.Meath	0.206	0.155	0.361
B17	Carranstown Co.Meath	0.236	0.122	0.358

Samples corresponding to B10, B11, B12 and B16 from 1995 or 2000 were not taken in more recent surveys.

All "**B**" samples were taken from road tankers.

Table 3

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	**3.0**		**6.0**	**3.0**		**6.0**	**3.0**		**6.0**
EU Action level	**2.0**	**2.0**		**2.0**	**2.0**		**2.0**	**2.0**	
Minimum	0.204	0.105	0.315	0.180	0.102	0.301	0.180	0.102	0.301
Maximum	0.346	0.175	0.467	0.300	0.597	0.897	0.346	0.597	0.897
Mean	0.243	0.129	0.372	0.216	0.193	0.409	0.233	0.151	0.385
Median	0.230	0.124	0.363	0.206	0.148	0.361	0.225	0.131	0.361

Discussion

<u>Summary</u>

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 3.

<u>Dioxins</u>

Considering the entire set of samples (Tables 1 and 2), the reported WHO-TEQ ranges for dioxins in milk fat are 0.180 to 0.346 pg with overall mean values of 0.233 WHO-TEQ/g. The highest value was the A3 sample by a marginal amount.

<u>PCBs</u>

The highest dioxin-like PCB level was the B8 sample at 0.597 WHO-TEQ/g, less than 30% of the EU action level. This sample was taken from North Co. Dublin and the levels found would be typical of those found internationally in a semi – urban environment. The mean value was

0.152 pg WHO-TEQ/g with a range of 0.102 to 0.597 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 0.301 to 0.897 pg WHO-TEQ with a mean of 0.385 WHO-TEQ/g. Again, the highest value was the B8 sample.

Pork Feed Contamination Incident

The samples taken for this survey were examined for relevance to the pork-feed contamination incident, referred to in Section 1, which was estimated to have occurred in the period September-November 2008.

The contamination was allegedly caused by combustion gases coming into direct contact with the feed material and where an inappropriate fuel containing PCB waste was used.

Formation and dispersion of certain PCDF (dibenzofuran) isomers in a single step can be a consequence of low temperature burning of PCBs. On the other hand, the formation of PCDDs (dioxins) would involve the severing the carbon bond between two phenyl rings and is not considered a likely outcome. (Erikson1997). This means that predominance of certain PCDF isomers, in this case, 2,3,4,7,8 PCDF or 2,3,7,8 PCDF which can be formed from the common PCBs 138 and 153 respectively, would be possibly indicative of burning of PCBs. No evidence of unusual predominance of these specific isomers over other PCDF or PCDD isomers was found in the milk survey samples.

It seems reasonable to conclude therefore that the results of the 2009 survey were unaffected by the above incident.

Figure 1 Dioxins/Furans
2009 Data Compared with 2000-2009 Averages

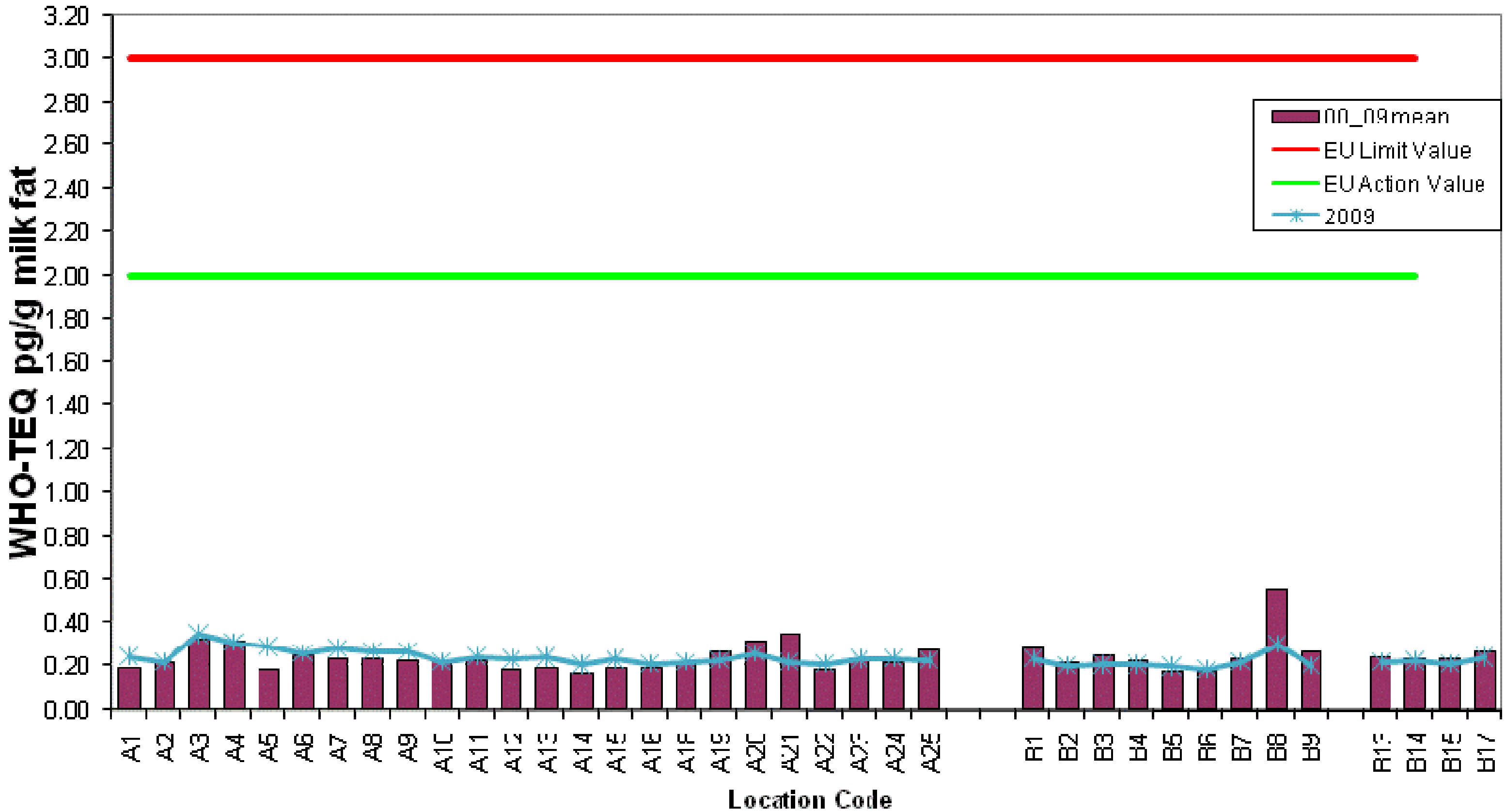


Figure 2 PCBs
2009 Data Compared with 2000-2009 Averages

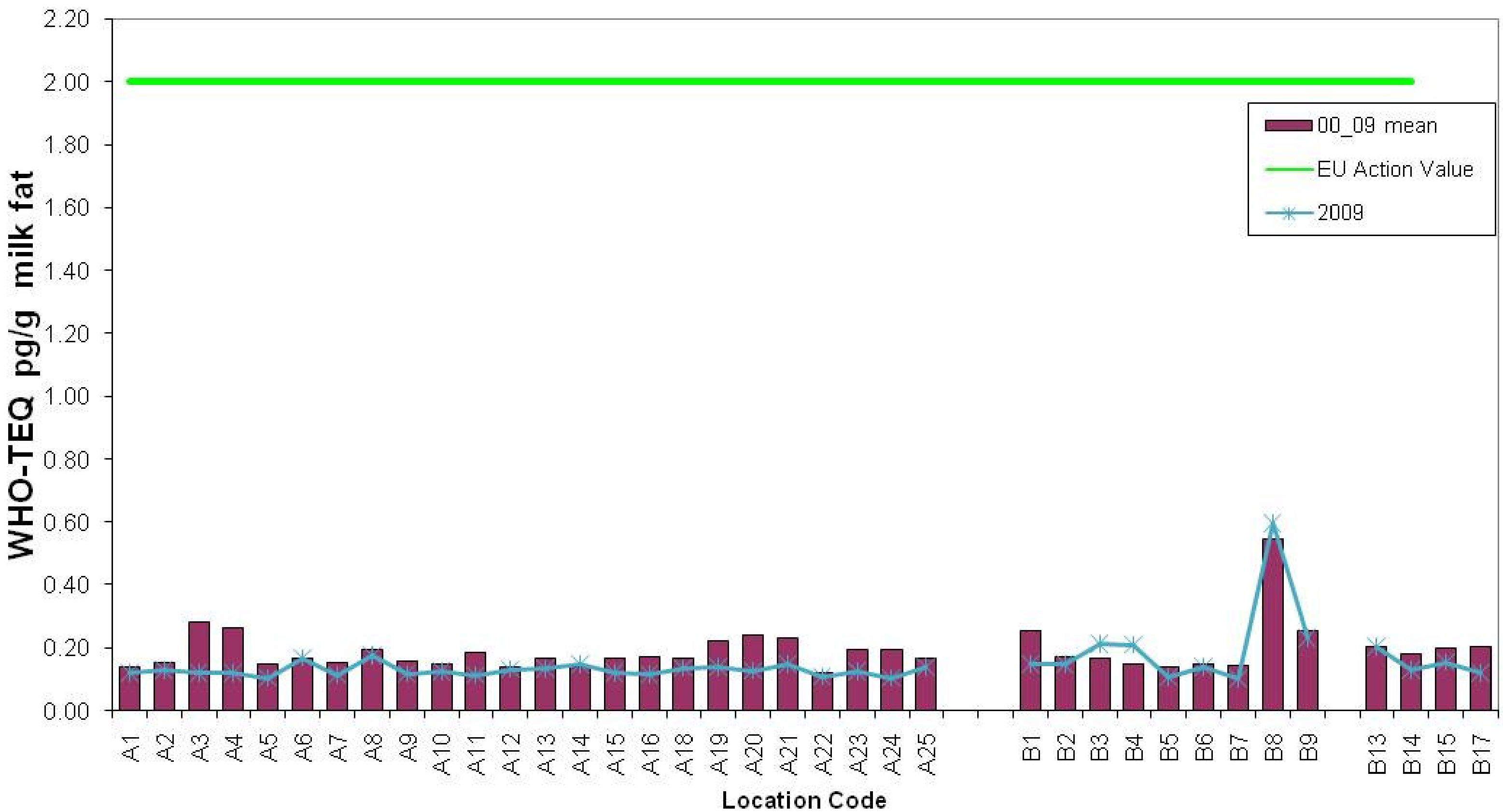
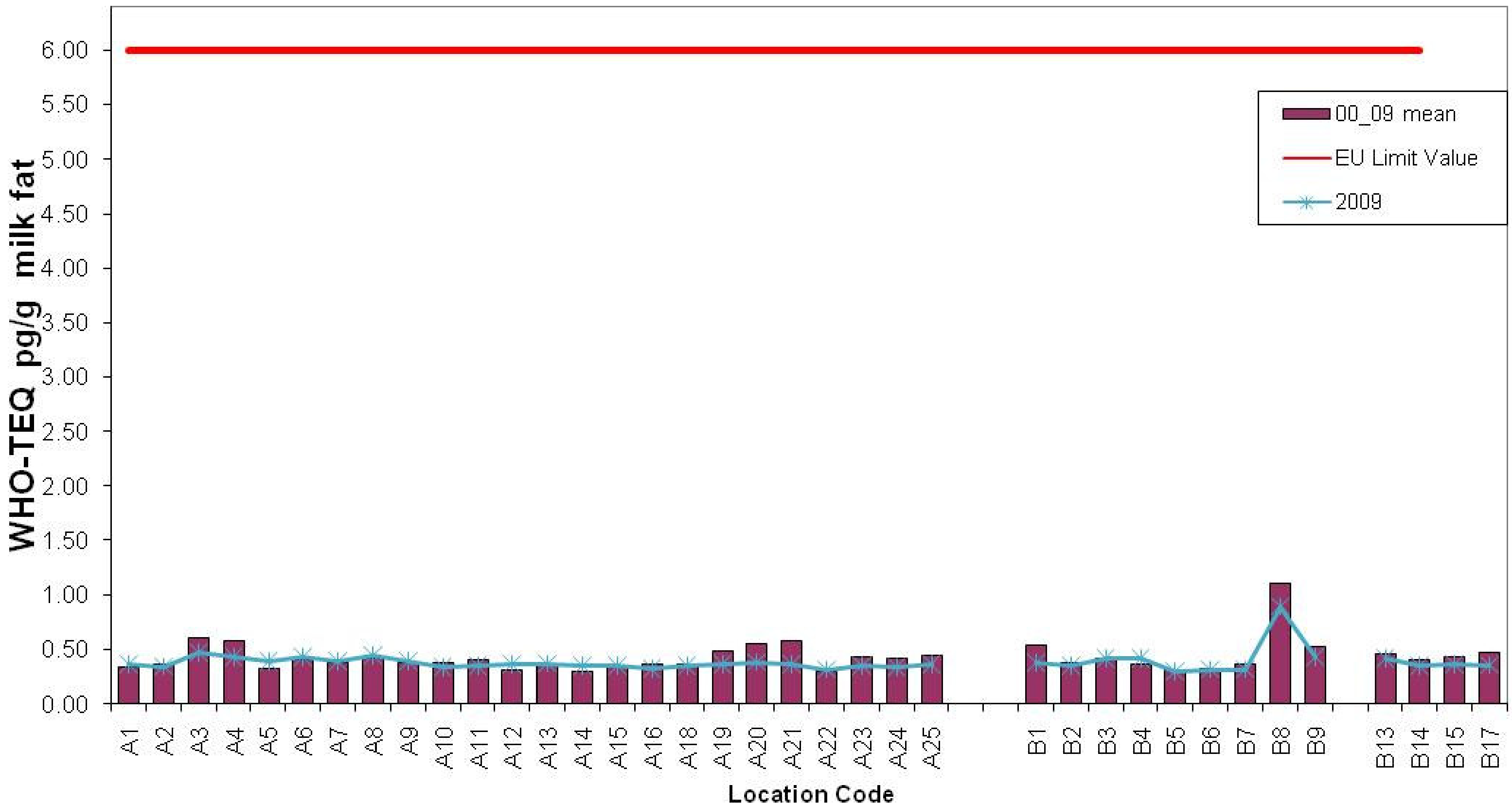


Figure 3 Dioxins/Furans + PCBs
2009 Data Compared with 2000-2009 Averages



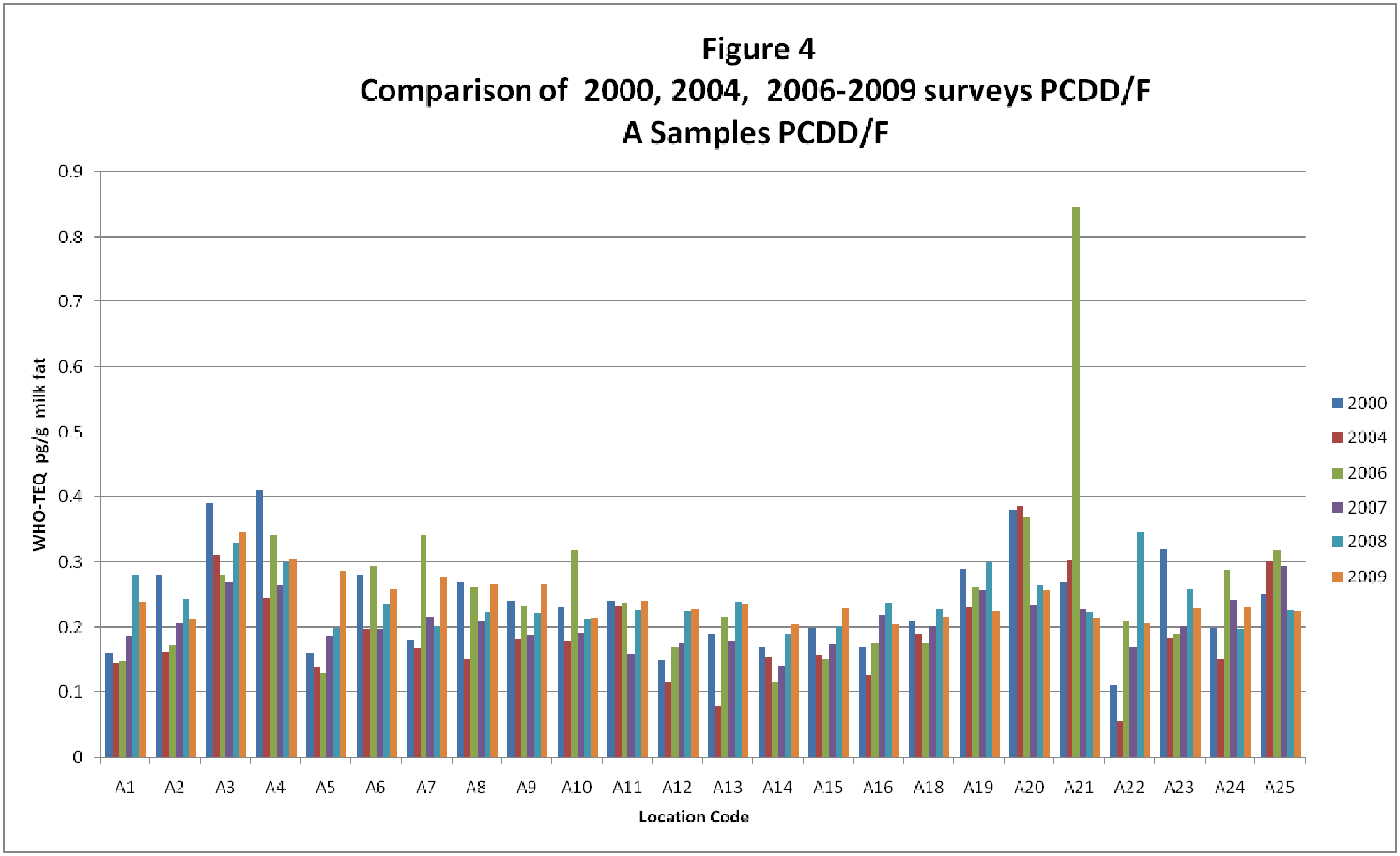


Figure 4
Comparison of 2000, 2004, 2006-2009 surveys PCDD/F
A Samples PCDD/F
WHO-TEQ pg/g milk fat
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
A15
A16
A18
A19
A20
A21
A22
A23
A24
A25
Location Code
2000
2004
2006
2007
2008
2009

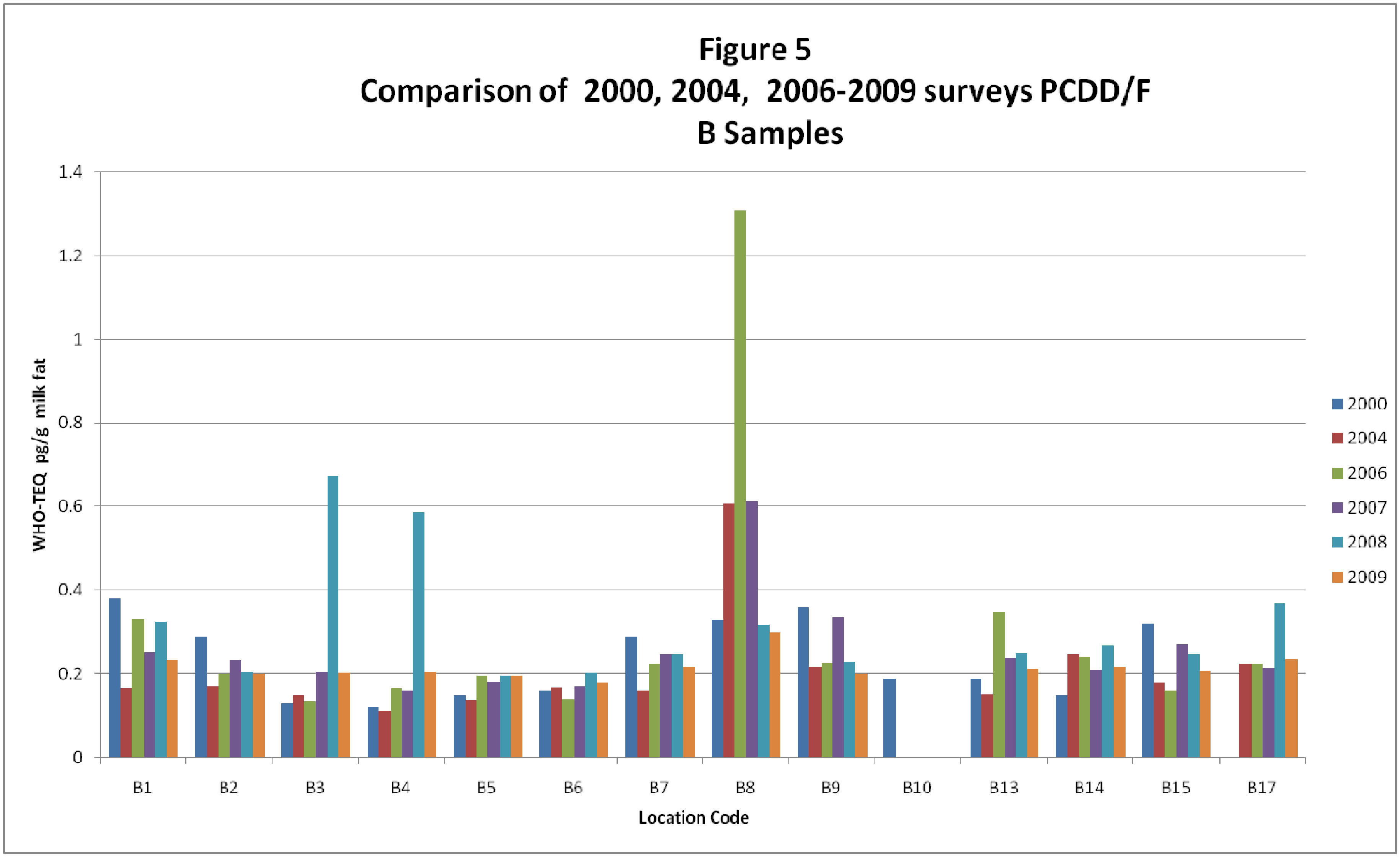
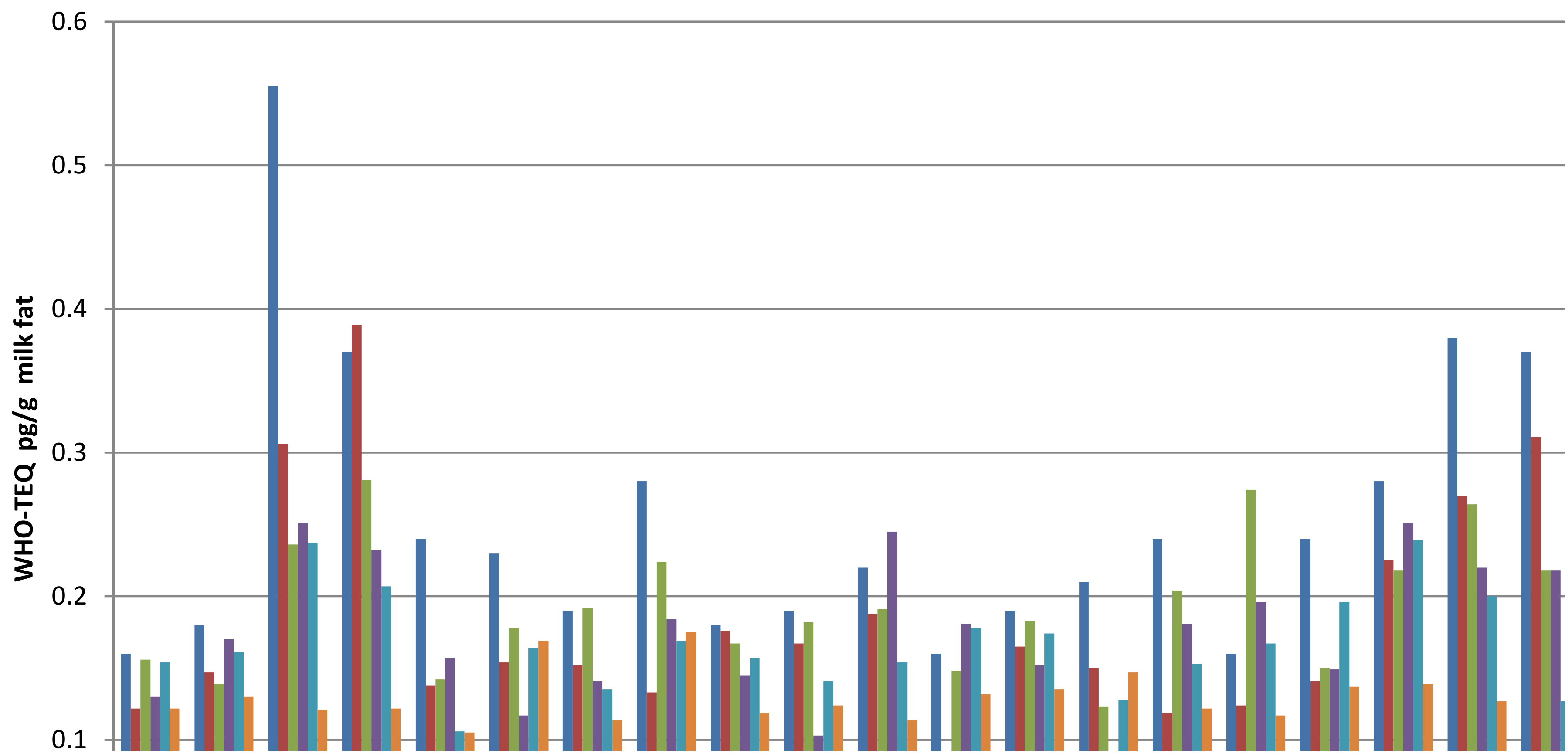


Figure 5
Comparison of 2000, 2004, 2006-2009 surveys PCDD/F
B Samples
WHO-TEQ pg/g milk fat
1.4
1.2
1
0.8
0.6
0.4
0.2
0
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B13
B14
B15
B17
Location Code
2000
2004
2006
2007
2008
2009

Figure 6 Comparison of 2000, 2004, 2006 - 2009 surveys for PCBs A Samples



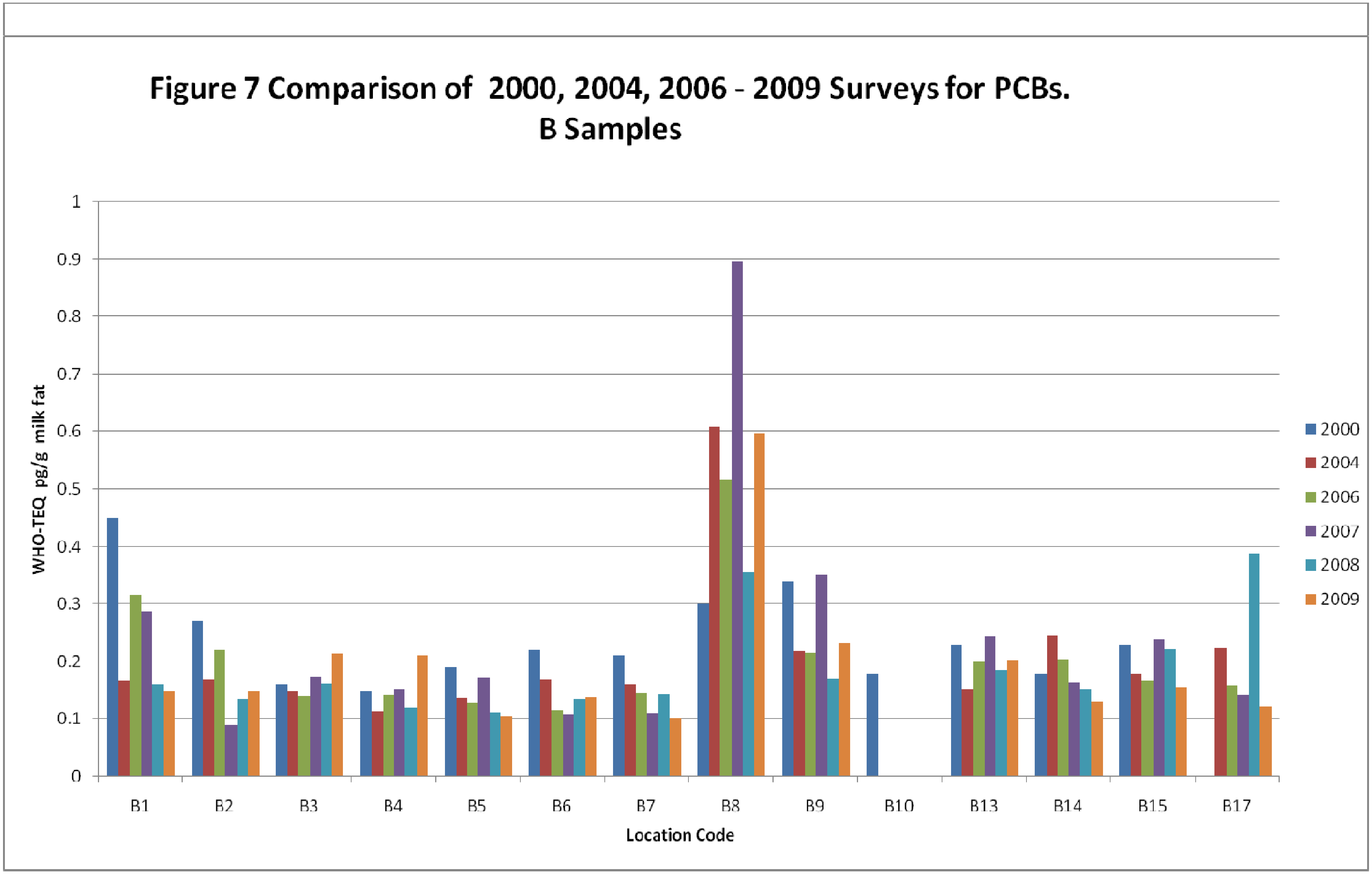


Figure 7 Comparison of 2000, 2004, 2006 - 2009 Surveys for PCBs.
B Samples
WHO-TEQ pg/g milk fat
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B13
B14
B15
B17
Location Code
2000
2004
2006
2007
2008
2009

3. COMPARISON WITH EARLIER DIOXIN SURVEYS

Figures 1, 2 and 3 show the 2009 data in terms of the averages for the period 2000 to 2009 for dioxins, PCBs and dioxins + PCBs, respectively. It also shows the degree of compliance with regulatory limits. Figures 4-7 show a more detailed comparison with the individual data points for the A and B samples for both dioxins and PCBs. Comparisons with 1995 survey are not used since those results were reported using the old ITEQ units.

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).

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 2009 survey was 0.233 pg WHO-TEQ/g compared to corresponding mean values of 0.269, 0.225, 0.275, 0.195 and 0.24 pg WHO-TEQ/g for the 2008, 2007, 2006, 2004 and 2000 surveys, respectively. It can be seen that the 2009 results are broadly in line with the earlier similar EPA surveys.

In the case of PCBs the 2009 mean value of 0.151 pg WHO-TEQ/g was marginally lower than the 2008, 2007, 2006 and 2004 mean values 0.170, 0.200, 0.196 and 0.187 pg WHO-TEQ/kg respectively.

It can be seen from Figure 1, read in conjunction with Tables 1 & 2, that locations having average dioxin concentrations of less than 0.2 pg WHO-TEQ/g were typically in west Munster and north 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.

As mentioned in previously reports, the highest levels have historically been found in the B8 sample (Figs 2 & 5) which in earlier surveys was taken from a large single farm in the North Dublin suburbs. This farm has been destocked, so an alternative composite sample from several farms in a slightly more rural area of North County Dublin was taken in 2008 and 2009. This probably explains the reduction to values more typical of the other East Coast samples for this sampling point.

4. OTHER STUDIES IN MILK AND DAIRY PRODUCTS

Data submitted to the EU Commission on 152 dairy samples (milk and milk products) between 1997 and 2003 from the then 15 member states plus Iceland and Norway as part of an EU-wide survey showed an overall mean of 0.77 pg WHO-TEQ/g fat (Gallani et al, 2004). No upper or lower limits are shown in the study.

Dairy samples analysed by GfA between 2003 and 2005 on behalf of mainly Western European clients showed an overall mean of 0.35 pg WHO-TEQ/g fat for dioxins with a range of 0.11 to 1.33 WHO-TEQ/g. (Hamm et al, 2005, n =138).

Data from a German monitoring programme of dairy product samples from North-Rhine Westphalia gave an overall mean for dioxins of 0.52 pg WHO-TEQ/g fat and 0.92 pg WHO-TEQ/g fat dioxin-like PCBs. The ranges were 0.30 to 0. 97 WHO-TEQ/g fat and 0.34 to 1.42 WHO-TEQ/g fat for dioxins and dioxin-like PCBs respectively. (Fuerst 2006)

A US EPA study of samples taken from eight different regions in the US in July 2000 and January 2001 showed an overall composite mean of 0.71 pg WHO-TEQ/g fat. Again no upper or lower limits are shown in the study. (Schuda et al 2004)

Samples taken on behalf of the UK Food standards Agency in 2005 showed a mean of 0.37 pg WHO-TEQ/g and a range 0 32 to 0.48 pg WHO-TEQ/g A similar 2006 study showed a mean of 0.34 pg WHO-TEQ/g with a range of 0.19 to 0.52 pg WHO-TEQ/g (FSA 2005, FSA 2006, n=4 in each case).

A French national survey carried out in April 2006 of 239 raw cow's milk samples from 93 plants showed average concentrations of 0.33 pg PCDD/Fs and 0.57 pg dioxin-like PCBs in raw cows' milk. (Durand et al 2008)

These comparisons are summarised in Table 4.

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

Dioxin Limits in Milk

The EU limit for dioxins and furans for milk and milk products is set at 3.0 pg WHO-TEQ/g fat. When PCBs are included it is 6.0 pg WHO-TEQ/g fat (EC 2006 (1)).

The EU action level for dioxins and furans is 2.0 pg WHO-TEQ/g fat. The action level for PCBs is also set at 2.0 pg WHO-TEQ/g fat. There is no separate limit for 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 4:

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 13 B-samples	0.24 0.24	0.25 0.24	0.49 0.48
Ireland	2004	24 A-samples 13 B-samples	0.19 0.21	0.18 0.21	0.37 0.41
Ireland	2006	24 A-samples 13 B-samples	0.26 0.30	0.19 0.21	0.45 0.51
Ireland	2007	24 A-samples 13 B-samples	0.21 0.26	0.18 0.24	0.39 0.50
Ireland	2008	24 A-samples 13 B-samples	0.24 0.32	0.16 0.19	0.41 0.51
Ireland	2009	24 A-samples 13 B-samples	0.24 0.22	0.13 0.19	0.37 0.41
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

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).

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 5.

PBDEs
The range for Σ−PBDEs (N=5) was 65 to 322 ng/kg fat with a mean of 143 ng/kg fat. (Table 5) This compares with the mean value of 93 ng/kg fat from 2008, 152 ng/kg fat from 2007 and 200 ng/kg fat from 2006 (EPA 2008, 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.

As in the earlier surveys, the main contributors (c. 80%) to the total PBDE load were BDE-47 and BDE-99, with smaller contributions from BDE-100 and BDE-153. A small contribution from BDE-154 was detected in Sample 5. No other PBDE isomers were found. This is consistent with expectations (see above).

Brominated Dioxins PBDD/PBDFs
No PBDD/PBDF congeners were detected in 2009. This is in line with the 2007 and 2008 data. The WHO-TEQs for PBDD/PBDF listed in Table 5 can therefore be simply described as Maximum Values reflecting the detection levels of the individual congeners.

Table 5

Summary of Milk Fat Data for PBDEs and PBDD/F

	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	A17 A15 A24	A3 A20 A23	A11 A19 A25	
PBDEs	**65**	**139**	**71**	**109**	**332**	**143**
PBDD/F *(WHO-TEQ* **)**	***1.35***	***0.41***	***1.45***	***0.52***	***0.63***	***0.87***

6. CONCLUSIONS

1. All 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. The Brominated Flame Retardants (BFR) and Brominated Dioxin survey showed similarly low levels to the most recent EPA surveys.

4. There was no evidence to link the data from the survey to the Pork feed contamination incident in late 2008.

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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)
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.
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

Annex 1

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

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

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

Annex 2

Laboratory reports from GfA

These can be found at the links below.

Dioxin results 2009
http://www.epa.ie/downloads/pubs/other/dioxinresults/name,30487,en.html

BFR results2009
http://www.epa.ie/downloads/pubs/other/dioxinresults/name,30488,en.html

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 agus Rialtais Áitiúil a dhéanann urraíocht uirthi.

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

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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