EPHC

National Dioxins Program: National Action Plan for Addressing Dioxins in Australia

July 2005

Environment Protection and Heritage Council

NOTE

This National Action Plan has been developed by a Project Team of government officers, at the request of the Environment Protection and Heritage Council. The views and opinions expressed in this publication do not necessarily reflect those of any members or member government of the Environment Protection and Heritage Council.

The contents of the Paper should not be used for any purpose other than as a basis for providing comment to the EPHC Standing Committee.

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PREFACE

Starting in mid 2001, a range of studies were undertaken through the National Dioxins Program, which involved measuring emissions from sources such as bushfires, as well as assessing the levels of dioxins in the environment, food and population. The findings of these studies were used to determine the risk dioxins pose to our health and the environment.

The reports from these studies show that the ambient levels of dioxins in the environment are generally low compared with other countries and that levels in the Australian population and in our food are also low.

The next stage in the National Dioxins Program is to determine what actions need to be taken to ensure that these levels remain low and, where feasible, are reduced further or eliminated. The Environment Protection and Heritage Standing Committee welcomes comments on the actions outlined in this National Action Plan. Proposals for other actions which could be considered are also welcome.

Comments, along with name of the submitter, will be made publicly available. People or organisations wishing to remain anonymous should request this in their submission.

Submissions may be made to:

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The closing date for submissions is Friday, 26 August 2005.

All submissions are public documents unless clearly marked "confidential" and may be made available to other interested parties, subject to Freedom of Information Act provisions.

General enquires on this paper or related background material should be directed to 1800 803 772.

Form of submission:
Submissions may be made in hardcopy or electronically emailed to dioxins@deh.gov.au

Electronic submissions should preferably be provided in Microsoft Word format.

In making comments, please set out the basis for your views/conclusion and indicate the relevant page numbers and/or section titles. Where you refer to publications or websites please include full references.

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EXECUTIVE SUMMARY

This National Action Plan sets out a range of actions that could be taken by Australian governments to ensure that the levels of dioxins in Australia remain low and, where feasible, are reduced further or eliminated. The actions include:

Air emissions

- Governments to develop national guidelines for dioxins emissions from combustion facilities including adopting or reaffirming the level of 0.1 ng TEQ/m^3.
- Governments to use recommendations in the Stockholm Convention Best Available Techniques and Best Environmental Practices guidance for new facilities and for existing facilities when they are upgraded.
- Governments to continue with existing measures aimed at reducing particle emissions from domestic woodheaters including community education on the correct operating practices for woodheaters, seeking improvements to woodheater installation and emission standards, and sponsoring research to improve our understanding of woodheater emissions.
- The Australian Government to monitor overseas research looking at emissions of dioxins from diesel, LPG and CNG vehicles to determine whether further action is required in Australia.
- Australian Government to undertake further research on dioxin emissions from bushfires to provide firmer evidence of dioxins to help governments determine appropriate response measures, if any.
- The EPHC Air Toxics Working Group to utilise NDP Ambient Air study data when assessing the relative priority of dioxins, for possible inclusion in the Air Toxics NEPM.

Soils

- In the review of the Site Contamination NEPM during 2005/2006, governments to consider including an investigation levels for dioxins. A health based investigation level for sites contaminated with dioxins will provide a trigger to assist in determining whether a detailed investigation of a site is necessary.
- Governments to continue best efforts towards remediating sites contaminated with significant levels of dioxins and undertake this work in an environmentally sound manner.
- Australian Government to consider further research to improve our knowledge of natural dioxins formation, and the sources and exposure risks of dioxins in the soils of coastal eastern Australia.

Water

- Governments to consider including a level for dioxins in water when undertaking a future update of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.

Sediments

- Governments to consider including a level for dioxins in sediments when undertaking a future update of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.

Biota

- Subject to resources, the Australian Government to give consideration to undertaking further studies of biota in order to assess whether source directed measures are having the desired effect in lowering dioxin levels in the environment.

Wastes

- Where information identifies environmental or human health risks from dioxins in water recycling and biosolids activities, governments to consider including a level for dioxins when undertaking a future update of the National Water Quality Management Strategy (NWQMS):
    - Guidelines for Water Recycling – Managing Health and Environmental Risks
    - Guidelines for Sewerage Systems – Biosolids Management
- Governments to consider including a level for dioxins when undertaking a review of the NWQMS Guidelines for Sewerage Systems: Acceptance of Trade Waste (Industrial Waste) 1994.
- Governments to take into account the Stockholm Convention Best Available Techniques and Best Environmental Practices guidance for production of pulp when new mills or modifications to existing mills are proposed.
- Governments to set a level for dioxins in fertilisers and industrial residues when applied to land for soil amelioration purposes.
- No further action required at this time to amend the level of dioxins and furans in re-refined base oil.
- Governments to continue the removal from use and destruction of scheduled wastes in accordance with the three plans under the National Strategy for the Management of Scheduled Waste.
- Governments to ensure that the Stockholm Convention guidance on Best Available Techniques and Best Environmental Practices is considered in selecting the process to treat the HCB waste so as to prevent or minimise the formation and release of dioxins.

National Pollutant Inventory

- Governments to consider reporting dioxins in toxic equivalents (TEQs) under the National Pollutant Inventory.

Human intake

- Governments to continue with existing programs that discourage cigarette smoking and promote lower saturated fat intake.
- Government to continue to promote the health benefits of exclusive breastfeeding to the age of six months, then the introduction of complementary foods and continued breastfeeding thereafter.
- Subject to resources, governments to consider periodically monitoring the population burden of dioxins in order to assess whether risk reduction strategies are having the desired effect in lowering dioxin levels in humans.

Agricultural products

- Subject to resources, Australian Government to give consideration to undertaking a study in three to five years in order to ensure dioxin levels in livestock commodities remain within international and domestic standards.
- The Australian Government to work with Australian animal production industries to support implementation of voluntary measures to address hazards, including dioxins, in animal feeds.

Food

- Governments to work toward increasing vigilance to prevent contamination of the food supply with dioxins.
- Governments to consider the possibility of setting levels and values for dioxins in foods.

Other actions

- The Australian Government to continue investigating possible legislative avenues with which it can address dioxins in the environment, as obliged under the Stockholm Convention.

Glossary

ATDS	Australian Total Diet Survey
BAT	Best Available Techniques
BEP	Best Environmental Practices
COP	Conference of Parties
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DEH	Department of the Environment and Heritage
EPA	Environment Protection Authority / Agency
EPBC Act	Environment Protection and Biodiversity Conservation Act
EPHC	Environment Protection and Heritage Council
EU	European Union
FRSC	Food Regulation Standing Committee
FSANZ	Food Standards Australia and New Zealand
HCB	Hexachlorobenzene
MfE	Ministry for the Environment, New Zealand
MRL	Maximum Residue Limit
NAP	National Action Plan
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NDP	National Dioxins Program
NPI	National Pollutant Inventory
NRS	National Residue Survey
NWQMS	National Water Quality Management Strategy
OCP	Organochlorine Pesticides
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzodioxins (dioxins)
PCDFs	Polychlorinated dibenzofurans (furans)
POPs	Persistent Organic Pollutants
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin, the most toxic dioxin
TEQ	Toxic Equivalents
UNEP	United Nations Environment Program
WHO	World Health Organization

Units of measurements

	Symbol	
Milligrams	mg	1×10^{-3} (0.001g)
Microgram	μg	1×10^{-6} (0.000 001g)
Nanogram	ng	1×10^{-9} (0.000 000 001g)
Picogram	pg	1×10^{-12} (0.000 000 000 001g)
Femtograms	fg	1×10^{-15} (0.000 000 000 000 001g)

1. INTRODUCTION

1.1 National Dioxins Program

The Commonwealth Government provided $5 million over four years towards the National Dioxins Program (NDP), a program to improve our knowledge on dioxin levels in Australia and to determine the risk to both human health and the environment.

The Program began in 2001 and is being implemented in three phases. Phase one involved gathering information about the current levels of dioxins in the Australian environment, community, food and levels of emissions. Studies under this part of the program began in July 2001 and were completed in 2004.

Phase two used the information gathered in the phase one studies to undertake a risk assessment to determine the potential risks of dioxins to the environment. An assessment was also made of the potential risks for human health from exposure to dioxins either directly from the environment or from dioxins in food.

The final phase of the NDP is to decide on appropriate measures aimed at reducing, and where feasible, eliminating the release of dioxins in Australia. This Action Plan outlines a range of actions that could be implemented.

1.2 What are dioxins?

The term "dioxins" describes a group of compounds that belong to the larger family of persistent organic pollutants. These compounds share similar chemical structures, properties and biological characteristics including toxicity. These compounds can accumulate in the body fat of animals and humans and tend to remain unchanged for long periods. Several hundred of these compounds exist and are members of three closely related families:

- polychlorinated dibenzo-p-dioxins (PCDDs or dioxins)
- polychlorinated dibenzofurans (PCDFs or furans)
- certain co-planar polychlorinated biphenyls (PCBs).

Dioxins are not deliberately produced, but are released into the environment as a result of combustion activities including power generation, waste incineration, metal smelting and from the manufacture of some chemicals. Dioxins are also generated from natural sources such as bushfires and volcanoes. It is estimated that over 96 per cent of dioxins present in the environment have originated from emissions to air. PCBs were produced commercially in large quantities until the late 1970s and used in electrical appliances, such as transformers and capacitors, hydraulic fluids, plasticisers and dye carriers. Some types of PCBs are also generated and released into the environment as unintentional by-products of chemical manufacturing and combustion processes.

The NDP has focused on the 29 most toxic of these compounds which are recognised internationally as being harmful to humans and animals. These are listed in Table 1. To assist the reader, the term "dioxins" is used in this paper to refer to the three families, but there are instances where specific mention is made to furans and PCBs.

Table 1 Dioxin, furans and PCB toxic equivalent factors (both I-TEF or NATO and WHO_{98} TEF).

Congener	IUPAC No.	NATO CCMS or $WH0_{94}$-TEF	WHO_{98}-TEF [3]
Dioxins[a]			
2,3,7,8-TetraCDD [a]	-	1 [1]	1
1,2,3,7,8-PentaCDD	-	0.5	1
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
Furans[b]			
2,3,7,8-TetraCDF [b]	-	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
1,2,3,7,8,9-HexaCDF	-	0.1	0.1
2,3,4,6,7,8-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
Non-ortho PCB [c]			
3,3',4,4'-tetrachlorobiphenyl	PCB#77	0.0005 [2]	0.0001
3,4,4',5-tetrachlorobiphenyl	PCB#81	-	0.0001
3,3',4,4',5-pentachlorobiphenyl	PCB#126	0.1	0.1
3,3',4,4',5,5'-hexachlorobiphenyl	PCB#169	0.01	0.01
Mono-ortho PCB [c]			
2,3,3',4,4'-pentachlorobiphenyl	PCB#105	0.0001	0.0001
2,3,4,4',5-pentachlorobiphenyl	PCB#114	0.0005	0.0005
2,3',4,4',5-pentachlorobiphenyl	PCB#118	0.0001	0.0001
2',3,4,4',5-pentachlorobiphenyl	PCB#123	0.0001	0.0001
2,3,3',4,4',5-hexachlorobiphenyl	PCB#156	0.0005	0.0005
2,3,3',4,4',5'-hexachlorobiphenyl	PCB#157	0.0005	0.0005
2,3',4,4',5,5'-hexachlorobiphenyl	PCB#167	0.00001	0.00001
2,3,3',4,4',5,5'-heptachlorobiphenyl	PCB#189	0.0001	0.0001

2. WHAT DO WE KNOW ABOUT DIOXINS IN AUSTRALIA?

Prior to establishment of the NDP, limited Australian studies showed environmental levels were low, but a lack of information made it difficult to assess dioxin impacts on the environment and human health. Starting in mid 2001, information studies were undertaken by leading Australian scientific organisations, with assistance from overseas experts, under contract to the Australian Government Department of the Environment and Heritage (DEH). Completed in 2004, these studies involved collecting samples from a range of environments across Australia, a cross section of the community, and a range of foods and agricultural commodities. Studies also looked at emissions from bushfires and motor vehicles.

As the laboratory analysis of dioxins is very expensive, the number of samples collected for each study was limited and as a result caution must be taken with interpreting the findings. Despite these limitations, the studies provide the largest survey of dioxin levels ever undertaken in Australia and will provide valuable baseline data for comparison in future work and for determining trends.

The studies show that the ambient levels of dioxins in the environment are generally low compared with other countries and that levels in the Australian population are also low. Specifically the studies showed:

- the total emissions of dioxins to the environment from all sources range from 160-1790 g per year. Uncontrolled combustion (biomass burning, waste burning and accidental fires) contributes an estimated 1360 g or around 70% of all dioxin emissions. Prescribed burning and wildfires contribute between 30-570 g per year, or about 20-30% of the total emissions. As there is still uncertainty about this estimate, the Department of the Environment and Heritage (DEH) has commissioned further research to refine it.
- ferrous and non-ferrous metal production; production of chemicals and consumer goods such as paper; fossil fuel power generation; waste disposal, landfilling and waste incinerators are other main sources of emissions, emitting 420 g or around 23%.
- domestic woodheaters contribute around 4% of dioxin emissions. Dioxin levels are higher in air in urban areas during winter most likely due to smoke from these heaters. However, ambient levels of dioxins in the major cities are still low compared with other countries.
- dioxins from motor vehicles account for less than 2% of total dioxin emissions. Leaded petrol vehicles accounted for about 40-45% of total dioxins emissions in 1998. With the banning of leaded petrol in January 2002 the levels will have substantially declined.
- dioxin levels in soils are generally lower than those reported in many industrial countries. Levels in soils from urban and industrial locations are substantially higher than in agricultural and remote locations. Higher levels of dioxins were found in soils from coastal eastern Australia. It has been suggested in other studies that high dioxin levels may extend along the entire eastern coastline of Australia. The comparatively elevated levels of dioxins in these soils are so far unexplained. The other studies suggest this might be due to historical geological processes. The close proximity of these areas to the coast and possible past periods of submergence by the sea led to elevated chlorine in the soil, a known precursor for dioxin formation. The evidence for dioxin formation involving natural geological processes includes:
    - a lack of identifiable human activities that could give rise to the dioxin levels
    - the dioxin profile does not relate to any current industrial activity

  - analysis of marine sediment core samples extending prior to the European occupation also showing elevated levels of dioxins
  - the occurrence of similar dioxin profiles in soil and sediment samples from other parts of the world, e.g. Mississippi River in the USA, Germany and Finland.

- aquatic environments in urban and industrial areas had higher levels of dioxins in sediments and animals than samples from agricultural and remote locations.
- dioxins emitted to air can deposit on plant, soil and water surfaces, which can then enter the food chain when animals eat leaves, soils or sediments contaminated with dioxins. Dioxins levels in Australian fauna are highest in birds of prey due to their high position in the food chain. Marine mammals living in estuaries close to urban/industrial areas also had relatively high levels. Levels were generally much lower in herbivorous animals such as kangaroos. Overall, compared with fauna from other countries, the levels are generally low.
- the ecological risk assessment concluded that the dioxin levels in fauna reflect the animal's position on the food chain with herbivorous organisms having the lowest levels, while birds of prey had the highest levels. The assessment also concluded that fish are at low risk when exposed to the dioxins levels in the Australian aquatic environment, marine mammals living in open oceans of Australia have no risk, but dolphins in urban/industrial estuaries were at risk. Terrestrial mammals are at a low risk when exposed to background levels of dioxins.
- levels in agricultural commodities, including beef, sheep, pigs, poultry, milk and farmed salmon are low compared with levels in products from other countries. They are well below standards set by the European Union.
- levels in food are low. Food samples collected under the Food Standards Australia New Zealand diet survey were analysed and showed that fish, meat and dairy products were the major food groups contributing to dioxins exposure for the general population.
- levels of dioxins in the Australian population are low by international standards. Levels are higher in older people due to a number of factors including on-going accumulation over a lifetime, the fact that older people were exposed to much higher levels in the 1940s-1960s when regulations governing the control of industrial emissions were minimal, and potential differences in metabolism and body fat.
- for Australians aged two years or older, the monthly intake of dioxins from food was between 3.9-15.8 pg TEQ/kg body weight/month or between 6-23% of the Australian Tolerable Monthly Intake of 70 pg TEQ/kg bw/month set by the National Health and Medical Research Council.

The reports of the National Dioxins Program studies can be accessed on the DEH website at: http://www.deh.gov.au/industry/chemicals/dioxins/index.html

3. WHY ARE DIOXIN LEVELS GENERALLY LOW IN AUSTRALIA?

The generally low levels of dioxins in the Australia environment can be attributed to a number of factors. Firstly, the levels are a reflection of the relatively low level of industrial activity in Australia compared with other countries. For example, in many northern hemisphere countries, dioxin levels are high due to a number of factors such as the extensive industrial complexes which generate dioxins and past burning of municipal waste in incinerators without adequate controls for the cleaning of exhaust gases. The large populations also contribute to higher levels through emissions from sources such as domestic heating and motor vehicles. Stricter controls on dioxin emissions from these sources and the use of improved technology have seen the levels of dioxins in many of these countries decline over the past decade.

The NDP studies found that levels of dioxins were higher in urban areas than agricultural areas in Australia. These elevated levels could be attributed to emissions over many decades from sources such as industrial facilities, motor vehicles and domestic woodheaters. Some of the highest levels in urban areas were associated with former industrial sites contaminated with dioxins due to past chemical production activities.

Secondly, actions taken by Australian governments over the past decade to address other toxic chemicals have most likely also led to reduced emissions of dioxins. Some of these activities include:

- the implementation of clean air regulations by States and Territories requiring industrial facilities to reduce emissions either through the use of more efficient filtering systems or cleaner production techniques
- the banning of backyard rubbish burning
- establishing programs to remove inefficient domestic woodheaters and implementing awareness programs aimed at reducing particle emissions
- in 2002 phasing-out the use of leaded petrol which is a known source of dioxins
- Australian environment ministers rejecting a proposal in 1992 for a centralised high temperature waste disposal facility for the treatment of intractable wastes and instead promoting the separate treatment of each waste stream through programs such as the National Strategy for the Management of Scheduled Wastes[1]. Under this Strategy, three management plans were developed to phase-out and destroy organochlorine pesticides (OCPs), hxachlorobenzene (HCB) and polychlorinated biphenyls (PCBs)
- banning the manufacture and use of chemicals known to be sources of dioxins including pentachlorophenol and 2,4,5-T
- destroying OCPs and PCBs in destruction facilities which operate in accordance with world's best practice
- remediating old industrial sites contaminated with toxic chemicals, including dioxins, such as the 2000 Olympics site at Homebush Bay, Sydney.

[1] The Strategy was endorsed by environment ministers in 1993 and provides for the safe management and disposal of scheduled wastes. The Strategy provides for the development and implementation of the three national plans dealing with organochlorine pesticides, hexachlorobenzene and polychlorinated biphenyls.

4. WHAT ARE THE OBLIGATIONS UNDER THE STOCKHOLM CONVENTION?

In the 1990s, countries recognised the need to take international action aimed at reducing persistent organic pollutants (POPs) to protect the environment and human health. This led to the formation of the Stockholm Convention on Persistent Organic Pollutants which entered into force on 17 May 2004. As at 2 May 2005, 151 countries had signed and 98 had ratified the Convention. Australia ratified the Convention on 20 May 2004.

The objective of the Stockholm Convention is to protect human health and the environment from the effects of POPs. The Convention sets out a range of measures to reduce and, where feasible, eliminate POP releases, including emissions of by-product POPs and to ensure the sound management of stockpiles and wastes that contain POPs.

The Convention focuses on the following twelve POPs which have been used as pesticides, industrial chemicals, or are by-products from industrial processes. These chemicals have been identified for action due to their persistence, bioaccumulation, long-range dispersion and toxicity:

Chemical	**Pesticide**	**Industrial**	**Unintentionally produced**
Aldrin	✓		
Chlordane	✓		
Dieldrin	✓		
Endrin	✓		
Heptachlor	✓		
Hexachlorobenzene (HCB)	✓	✓	✓
Mirex	✓		
Toxaphene	✓		
Polychlorinated biphenyls (PCBs)		✓	✓
DDT	✓		
Dioxins (polychlorinated dibenzo-p-dioxins)			✓
Furans (polychlorinated dibenzofurans)			✓

Under Article 5 of the Convention, Parties are obliged to take measures to reduce, and where feasible, eliminate releases of unintentionally produced POPs, including dioxins, furans, HCB and dioxin-like PCBs. Parties must set out how they would implement these obligations in a National Action Plan (NAP). The actions proposed in this paper would form the basis of Australia's NAP.

Article 5 also requires Parties to promote the development of and (where appropriate) require the use of products or processes to prevent the formation and release of unintentionally produced POPs ; and promote and, in accordance with its NAP, require the use of Best Available Techniques (BAT) and Best Environmental Practices (BEP) for existing and new sources. The Convention defines "Best Available Techniques" as using the most effective and advanced techniques that can be practically adopted to *prevent or minimise* harmful emissions of by-product POPs and other environmental impacts, or *reduce* them to acceptable limits. "Available" techniques means those techniques that are accessible to the operator and that are developed on a scale that allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages. "Best environmental practices" means the application of the most appropriate combination of environmental control measures and strategies.

The Convention requires Parties to use BAT for **new sources** in the following categories as soon as practicable but no later than four years after the entry into force of the Convention for that Party; this would be May 2008 for Australia:

- waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge
- cement kilns firing hazardous waste
- production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching
- thermal processes in the metallurgical industry including secondary copper, aluminium and zinc production and sinter plants in the iron and steel industry.

Parties are also required to promote and require the use of BAT and BEP to prevent the release of dioxins for **existing sources** for the above industries as well as other categories including:

- open burning of waste, including burning of landfill sites
- thermal processes in the metallurgical industry not mentioned above
- residential combustion sources
- fossil fuel fired utility and industrial boilers
- firing installation for wood and other biomass fuels
- specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil
- crematoria
- motor vehicles, particularly those burning leaded gasoline
- destruction of animal carcasses
- textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)
- shredder plants for the treatment of end of life vehicles
- smouldering of copper cables
- waste oil refineries.

An international Expert Group comprising representatives from Parties, including Australia, has developed draft guidelines on BAT and provisional guidance on BEP. These Guidelines are not prescriptive but will assist Parties in ensuring that facilities, which are known sources of dioxins, are operating in line with world's best practice. The first Conference of the Parties of the Stockholm Convention (May 2005) recommended that Parties take the draft guidelines and provisional guidance into consideration, where practicable and feasible, in activities related to unintentionally produced persistent organic pollutants. The Expert Group will undertake further work over the next two years to improve the information contained in the BAT and BEP guidelines with a view their consideration and adoption at the third Conference of the Parties in 2007. Consideration needs to be given to determine how these guidelines will be implemented in a consistent manner in Australia and how they might be reflected in regulatory requirements in jurisdictions.

Article 6 of the Convention requires Parties to develop appropriate measures to eliminate releases of POPs from stockpiles and wastes by:

- developing appropriate strategies for identifying stockpiles, products and articles containing, consisting of or contaminated with POPs
- implementing measures to reduce or eliminate releases from stockpiles and wastes containing POPs in a manner that protects human health and the environment
- taking appropriate measures to ensure that waste products containing dioxins are handled in an environmentally friendly manner and are disposed of in a way that destroys the POPs content
- endeavouring to develop strategies for identifying sites contaminated with POPs; if remediation is required then it must be done in an environmentally sound manner.

The three management plans developed under the National Strategy for the Management of Scheduled Wastes will contribute to meeting these obligations.

5. WAYS TO ADDRESS DIOXINS IN AUSTRALIA

A review of existing national, State and Territory environmental programs and legislation shows that there are a number of measures which apply controls, standards or guidelines for chemicals. Some already cover dioxins whereas others could be modified to include, for example, a guideline level for the emissions of dioxins. Some measures are subject to review over the next one to two years and the need to consider dioxins could be covered in these reviews.

This section outlines the existing measures, identifies gaps and suggests actions to address dioxins in Australia.

5.1 AIR

The inventory of dioxin emissions in Australia (NDP Technical Report No 3) shows that the main sources of dioxins to the environment are from uncontrolled combustion (includes prescribed burning and wildfires, waste burning and accidental fires) which is estimated to contribute nearly 70% of total emissions. The next highest emitters of dioxins to air are metal smelting (including zinc, aluminium, iron and steel) and fossil fuel power generation. Domestic woodheaters contribute around 4%.

Emissions from combustion facilities

The level of 0.1 ng TEQ/m^3 of dioxins has been accepted internationally as a goal for achieving best practice for controlling emissions of dioxins from combustion sources.

In Australia this level has been adopted by most States and Territories with some jurisdictions prescribing this level in legislation while others adopting it as a licence condition (Table 2). The responsibility for licensing facilities rests with the States and Territories and not the Australian Government.

Table 2: Jurisdictional regulations for dioxin emissions to air

	ACT	NSW	QLD	SA	TAS	VIC	WA
Level	0.1 ng/m^3	0.1 ng/m^3 (stack)	0.1 ng/m^3	0.1 ng/m^3	0.1 ng/m^3 * (stack)	0.1 ng/m^3 *	0.1 ng/m^3
How	Lic	Leg	Lic	Lic	Leg	Lic	Lic
Apply		New & existing municipal waste incinerators after 1997. Environment Protection Licences for other industry as necessary.	New facilities and upgrades		New and upgrade of old facilities	New facilities	

Legend:

Leg: Prescribed through legislation

Lic: Prescribed through licensing agreements

* Currently developing a new measure of 0.0037 ng/m^3 at ground level to be set in legislation

As discussed under Section 4, Parties under the Stockholm Convention are required from four years after entry into force for them to promote BAT and BEP for new facilities and existing facilities which are to be modified. Although these Guidelines will not be mandatory for Parties, they must be taken into consideration and will provide a valuable benchmark against which Australian governments can ensure that facilities that are known sources of dioxins are meeting world's best practice.

Actions for Governments:

Develop national guidelines for dioxins emissions from combustion facilities including adopting or reaffirming the level of 0.1 ng TEQ/m^3.

Use recommendations in the Stockholm Convention BAT and BEP guidance for new facilities and for existing facilities when they are upgraded.

Emissions from domestic woodheaters

The ambient air study (NDP Technical Report No 4) has shown that levels of dioxins in ambient air are low compared with other countries. There was an increase in urban areas over winter most likely due to check words used in the Air report presumably due to wood burning for residential heating. Domestic woodheaters account for around 4% of total dioxin emissions.

DEH, along with State and Territory governments, has implemented a range of measures to reduce woodsmoke from domestic heaters in recent years. These measures include woodheater replacement programs, education and awareness programs, development of regulations to minimise excessive smoke from woodheaters, and the development of more stringent particle emission standards. Although the principal objective of these initiatives is to reduce particle emissions from woodheaters, it is expected that the levels of dioxins over the winter months would also be reduced as a result of these initiatives.

Actions for Governments:

Continue with existing measures aimed at reducing particle emissions from domestic woodheaters including community education on the correct operating practices for woodheaters, seeking improvements to woodheater installation and emission standards, and sponsoring research to improve our understanding of woodheater emissions.

Emissions from motor vehicles

The study of dioxin emissions from motor vehicles (NDP Technical Report No 2) has shown that motor vehicles contribute less than 2% of total dioxin emissions, with leaded petrol and diesel fuel vehicles the highest contributors. However, in January 2002 the Commonwealth Government phased out the use of leaded petrol in Australia.

With the phase-out of leaded fuel, it is expected that the total dioxin emissions from motor vehicles will have substantially declined in recent years.

There is little information on the emissions of dioxins from diesel vehicles, but what research has been undertaken indicates that diesel vehicles may contribute a large proportion of the total dioxin emissions from motor vehicles. The reason for the formation of dioxins in diesel engines is still unclear.

In the absence of any dioxin emissions data, vehicles using Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) are assumed to have emission factors similar to passenger cars running on unleaded petrol. However, the motor vehicle study noted that the overall impact of these vehicle types on total dioxin emissions is low due to LPG and CNG vehicles accounting for only a small part of total vehicle kilometres travelled.

Action for the Australian Government:

Monitor overseas research looking at emissions of dioxins from diesel, LPG and CNG vehicles to determine whether further action is required in Australia.

Emissions from bushfires

The bushfires study (NDP Technical Report No 1) shows that prescribed burning and wildfires may account for around 20-30% of total dioxin emissions to the environment. Savannah fires in northern Australia account for 83% of these emissions.

Restrictions cannot be placed on wildfires, but they are placed on hazard reduction control burns to minimise impact on human health from smoke and not to destroy too much native vegetation. As the conditions for the formation of dioxins in bushfires are very complex and are still not fully understood, it would be very difficult to place conditions on permits aimed solely at reducing dioxin emissions.

DEH will fund further research on the formation and emission of dioxins from bushfires. This research will aim to provide a more accurate estimation of the total emissions of dioxins from bushfires in Australia and to determine the extent to which dioxin releases are the result of new dioxin formation during a fire, or re-mobilisation of existing dioxin stored in the top soil, ground litter and vegetation. The CSIRO, in conjunction with the National Research Centre for Environment Toxicology will undertake this research in 2005.

Action for the Australian Government:

Undertake further research on dioxin emissions from bushfires to provide firmer evidence on the formation of dioxins to help governments determine appropriate response measures, if any.

Air toxics NEPM

In February 2001, the National Environment Protection Council (NEPC) established a Working Group to scope the development of a National Environment Protection Measure (NEPM) for Air Toxics, sometimes known as hazardous air pollutants. In June 2001, the Working Group recommended that five priority air toxics be the subject of a NEPM, from a list of 29 air toxics including dioxins. Dioxins were not identified as a priority at that time as there were insufficient data on their levels in Australia.

In June 2001, NEPC commenced the development of a NEPM for Air Toxics to address benzene, toluene, formaldehyde, xylenes and polycyclic aromatic hydrocarbons (PAHs). The draft Air Toxics NEPM and Impact Statement were released for public consultation in May 2003. At the 9th meeting of EPHC in December 2004, Council resolved to make the National Environment Protection (Air Toxics) Measure.

While results from the NDP show that the risk presented by dioxins in ambient air in Australia is very low, dioxins, along with other air pollutants, will be considered for possible future inclusion in the Air

Toxics NEPM. A Working Group has been established under the EPHC to develop a process to prioritise air toxics.

Action for Governments:

The EPHC Air Toxics Working Group to utilise NDP Ambient Air study data when assessing the relative priority of dioxins, for possible inclusion in the Air Toxics NEPM.

5.2 SOILS

The soil study (NDP Technical Report No 5) shows that dioxin levels in remote and agricultural areas are generally lower compared with soils in urban and industrial areas. Overall, the study found that levels in soils are generally low compared to levels in many other countries. The comparatively elevated levels of dioxins in coastal soils in Queensland are so far unexplained. Scientists have suggested that the higher levels of dioxins in coastal eastern Australian soils may be due to historical geological processes. Further research would be needed in order to confirm this view or to determine another sources, if considered warranted.

The area of land with this high level of naturally occurring dioxin is very large. Given the dioxin levels found, it appears that remediation is neither warranted nor indeed feasible.

There are currently no national agreed acceptable level or guidelines in place for dioxins in soils in Australia. However, the *National Environment Protection (Assessment of Site Contamination) Measure 1999* specifies an effective process that covers chemicals that do not have a nationally agreed health investigation level.

Site Contamination NEPM

The *National Environment Protection (Assessment of Site Contamination) Measure 1999* (Site Contamination NEPM) provides general guidance in relation to health-based soil investigation levels. The purpose of the NEPM is to establish a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices by regulators, site assessors, environmental auditors, land owners, developers and industry. The desired environmental outcome for the Site Contamination NEPM is to provide adequate protection to human health and the environment, where site contamination has occurred, through the development of an efficient and effective national approach to the assessment of site contamination.

The Site Contamination NEPM sets health-based investigation levels for a range of chemicals including heavy metals, pesticides and PCBs. However, it does not set health investigation levels. At its 9th meeting in December 2004, EPHC agreed to undertake a review of the Site Contamination NEPM. It was resolved to establish a committee to assist with this review which would develop and release an issues paper.

Some States and Territories have sites contaminated with dioxins, and some of these have been cleaned up, including some orphan sites. Clean-up of a contaminated site is usually required if the levels of contamination pose an unacceptable risk to human health or the environment. Where contaminants are moving off the site, States and Territories will continue to require, encourage or undertake the clean-up of such sites as they come to their attention and as contaminated site policy dictates.

Action for Governments:

In the review of the Site Contamination NEPM during 2005/2006, consider including an investigation level for dioxins. Investigation level for sites contaminated with dioxins may provide guidance which will lead to uniformity of site risk assessment.

Continue best efforts towards remediating sites where dioxins contamination poses an unacceptable risk to the environment or human health and undertake this work in an environmentally sound manner.

Action for the Australian Government

Consider further research to improve our knowledge of natural dioxins formation, and the sources and exposure risks to sources of dioxins in the soils of coastal eastern Australia.

5.3 WATER

Dioxins are insoluble in water, therefore the most effective way of determining levels in aquatic environments is to analyse sediments and aquatic animals. This is discussed in section 5.4.

As part of Australia's National Water Quality Management Strategy, the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 Volume 1* (the *Water Quality Guidelines*) provides a guide for setting water quality objectives required to sustain current, or likely future, environmental values (beneficial uses) for natural and semi-natural water resources in Australia and New Zealand.

These and other National Water Quality Management Strategy guidelines help communities and water authorities achieve consistency for the level of service provided by local water and sewage systems.

The *Water Quality Guidelines* mention dioxins (2,3,7,8-tetrachlorodibenzo-p-dioxin) in marine ecosystems, but as there was insufficient data available on dioxins when the guidelines were being developed, no level is given for dioxins in any water ecosystem.

It is expected that these guidelines will be updated in the next few years. Inclusion of a level for dioxins in water could be considered, although as dioxins are insoluble in water, the setting of a level may be problematic given the difficulty in measuring their presence.

Action for Governments:

Consider including a level for dioxins in water when undertaking a future update of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.

5.4 SEDIMENTS

The results of the aquatic environment study (NDP Technical Report No 6) show that the levels of dioxins in most aquatic environments in Australia are generally low when compared to levels from many other industrialised countries. However, sediments in urban and industrial areas had significantly higher levels of dioxins than sediments in remote and agricultural locations. Some estuaries, for example, Port Jackson, Sydney had very high levels in sediments similar to those found in estuaries adjacent to industrial centres in other countries. These elevated levels may be due to historical contamination from former chemical manufacturing sites near Homebush Bay. These sites are subject to current clean-up activities by the NSW Government.

The *Water Quality Guidelines* applies to sediment quality, but there are no levels for dioxins. These guidelines are expected to be updated in future, with sediment levels a component of the update. Inclusion of a level for dioxins could be considered.

Action for Governments:

Consider including a level for dioxins in sediments when undertaking a future update of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.

5.5 BIOTA

Dioxins emitted to air can deposit on plant, soil and water surfaces. Dioxins can then enter the food chain when animals eat contaminated leaves, soils or sediments. The dioxins are then absorbed into animal fat. Dioxins increase in concentration as they move up the food chain, so that carnivores are more likely to have higher levels than herbivores.

The fauna study (NDP Technical Report No 7) found that levels are generally lower in Australia compared with fauna in other countries. Birds of prey had the highest levels, due to their position at the top of the food chain. Levels were much lower in herbivorous animals such as kangaroos, galahs and dugongs.

There are currently no regulated levels for dioxins in biota in Australia. The ecological risk assessment (NDP Technical Report No 11) noted that more reliable risk estimations would require information on the toxicity of dioxins to Australian wildlife species. However, as Australian ethical committees and current State legislation generally do not allow toxicity testing on native species, the establishment of a level for dioxins in biota would be very difficult. Reduction of emissions in Australia will most likely lead over time to lower levels of dioxins in Australian biota.

Action for Governments:

Subject to resources, the Australian Government to give consideration to undertaking further studies of biota in order to assess whether source directed measures are having the desired effect in lowering dioxin levels in biota.

5.6 WASTES

Sewage effluent and biosolids

The risk to environmental and human health from dioxins in sewage effluent and biosolids is low. The inventory of dioxin emissions (NDP Technical Report No.3) shows that sewage treatment works emit small amounts of dioxins to land. Emissions from biomass burning and paper production represent the most significant contributors to land.

The potential for dioxins to enter sewerage systems is low, primarily due to the limited number of industrial sources that produce dioxins and discharge to sewer. In addition, trade waste policies employed by sewage management authorities may limit or exclude dioxins from entering the sewerage system. Increasing use of recycled sewage and biosolids has the potential to shift some of the load of dioxin presently discharged to waterways to land.

Dioxins in recycled water are currently being considered by the Environmental Contaminant Working Group for the *National Guidelines for Water Recycling - Managing Health and Environmental Risk* being prepared under the National Water Quality Management Strategy (NWQMS). These Guidelines are being developed in consultation with the States and Territories and are due for completion in 2005. They will cover water recycling and water sensitive urban design using a risk management framework already tested on the Australian Drinking Water Guidelines. These Guidelines will supersede current guidelines for reclaimed water and urban stormwater management.

The NWQMS *Guidelines for Sewerage Systems Biosolids Management* were agreed to at the Natural Resource Management Ministerial Council in December 2004. These guidelines are due for public release in mid 2005. A level for dioxins was not included in these guidelines. However, as the knowledge of dioxin levels in biosolids is limited, further work and research is presently being undertaken in this area to confirm what the quantities are and the risks they pose.

Action for Governments:

Where information identifies environmental or human health risks from dioxins in water recycling and biosolids activities, consider including a level for dioxins when undertaking a future update of the National Water Quality Management Strategy:

- Guidelines for Water Recycling – Managing Health and Environmental Risks; and

- Guidelines for Sewerage Systems – Biosolids Management.

Trade Waste

Through the NWQMS *Guidelines for Sewerage Systems: Acceptance of Trade Waste (Industrial Waste) 1994,* (*Trade Waste Guidelines*), trade waste, a liquid waste generated from any industry, business, trade or manufacturing process, must be managed to minimise the cost to the community of processing waste, to ensure environmental protection and encourage waste minimisation.

There are currently no levels set for dioxins. However, the guidelines may be amended where the local sewage authority has an appropriate scientific basis to nominate alternative criteria.

Action for Governments:

Consider including a level for dioxins when undertaking a review of the NWQMS Guidelines for Sewerage Systems: Acceptance of Trade Waste (Industrial Waste) 1994.

National Strategy for the Management of Scheduled Wastes

In 1991, the former Australia and New Zealand Environment Conservation Council (ANZECC) considered a draft strategy based on the recommendations of a joint taskforce to tackle the problem of scheduled wastes. The Strategy was released to address concerns by industry and environment groups on the disposal of this waste. An independent panel was established to investigate the extent and production of scheduled waste and alternative disposal technologies to be used. Based on this recommendation, ANZECC rejected the proposal to establish a centralised high temperature waste disposal facility and instead, establish criteria and arrangements to assess new technologies. The revised Strategy was considered by government and non-governmental agencies and in 1992 ANZECC endorsed the '*National Strategy for the Management of Scheduled Wastes'*.

The Strategy focuses on emerging, alternative, non-incineration waste destruction technologies with the aim to provide for the safe management and disposal of scheduled waste. For the purpose of the Strategy, scheduled wastes means a material or article containing a chemical, or mixture of chemicals exceeding the threshold concentration and threshold quantity, which is:

- organic in nature
- resistant to degradation by chemical, physical or biological means
- toxic to humans, animals, vegetation or aquatic life
- bioaccumulative in humans, flora and fauna.

The key aspects of the Strategy are:

- identification of separate waste streams facilitating distinct and diverse management and disposal options
- nationally agreed and consistent principles and practice
- regulatory support through legislation and regulations
- commercially viable management disposal/destruction strategies for wasteholders
- based on a consultative and open process.

The main development under the Strategy, was the establishment of three management plans which specify threshold concentrations, quantities of chemicals to be covered and phase-out dates for the three groups of chemical wastes:

- Organochlorine Pesticides Waste Management Plan
- Polychlorinated Biphenyls Management Plan
- Hexachlorobenzene Waste Management Plan

The three plans all require that emissions of dioxins to atmosphere from the destruction of scheduled wastes shall not exceed 0.1 ng TEQ/m^3.

While there has been good progress in removing organochlorine pesticides and polychlorinated biphenyls from use and destroying them, the process for the treatment of the hexachlorobenzene

(HCB) waste held at the Orica site in Botany is under review. In determining the treatment process for the HCB waste, consideration should be given to the Stockholm Convention guidance on Best Available Techniques and Best Environmental Practices to prevent or minimise the formation and release of dioxins.

Action for Governments:

Continue the removal from use and destruction of scheduled wastes in accordance with the three plans under the National Strategy for the Management of Scheduled Waste.

Ensure that the Stockholm Convention guidance on Best Available Techniques and Best Environmental Practices is considered in selecting the process to treat the HCB waste so as to prevent or minimise the formation and release of dioxins.

Pulp mill guidelines

Commonwealth Ministers in May 1989 commissioned the CSIRO to undertake a study of bleached chemical pulp mill technology and environmental implications. On the basis of the conclusions from this study, the first set of guidelines, *Environmental Guidelines for New Bleached Eucalypt Kraft Pulp Mills* (*Pulp Mill Guidelines*) for the pulp mill industry were developed and subsequently revised in 1995 to include current State/Territory policies and incorporate new technical information. The objective of these Guidelines is to ensure protection of the environment from emissions generated by future pulp mills.

The guidelines set emission limits to ensure that the best technology and best environmental management practices are used in any new mill. The limits for dioxins in the effluent stream to be discharged to water are set at 15 pg/L.

In 2004 the Tasmanian Government reviewed these guidelines to take into consideration current world's best practice for any future bleached eucalypt kraft mills. They are consistent with the BAT and BEP guidance for production of pulp developed under the Stockholm Convention. The review, undertaken by the Tasmanian Resource Planning and Development Commission, has set new restrictions on a mill's environmental impact which all but eliminates dioxins and cuts organochlorine emissions and organic matter discharged in waste water.

With the discharge to effluent, the Commission has recommended that dioxins be set at a maximum limit of 10 pg/L, a reduction from the previous level of 15 pg/L.

The Stockholm Convention BAT and BEP guidance will be revised in future to include new technologies or practices.

Action for Governments:

Take into account the Stockholm Convention BAT and BEP guidelines for production of pulp when new mills or modifications to existing mills are proposed.

Reuse of industrial residues for land management applications

In October 2002 the EPHC agreed to develop a national approach for the re-use and recycling of industrial residues. The Ministers directed the EPHC Standing Committee to develop a national framework for the reuse and recycling of industrial residues focusing initially on their use in land

management applications. It is envisaged that the framework would provide guidance on management approaches for industrial residues from source to end-use, and its ultimate fate in the environment.

Industrial residues are by-products (wastes) from industry which can be reused and recycled as an efficient means of enabling industry to contribute to sustainable resource management. Industrial residues have the potential to exhibit valuable soil conditioning and fertiliser properties due to their high levels of essential elements, such as zinc and magnesium, which are deficient in some Australian soils. However, there are a number of elements, such as cadmium, that can have adverse affects on the environment and human health, if present in high concentrations.

The EPHC Industrial Residues Working Group is currently working with the Fertiliser Working Group, a Primary Industries Standing Committee body, in developing national standards for contaminants in fertiliser. A standard for dioxins will be included.

Action for Governments:

Set a level for dioxins in fertilisers and industrial residues when applied to land for soil amelioration purposes.

Used Oil Regulations

The *Product Stewardship for Oil Program* was introduced in 2001 by the Australian Government to provide incentives to increase used oil recycling with the aim to encourage the environmentally sustainable management and re-refining of used oil.

The *Product Stewardship (Oil) Act 2000* establishes the general framework and benefit entitlements of the arrangements. The objectives of the Act are to:

- develop a product stewardship arrangement for used oils
- ensure the environmentally sustainable management, re-refining and reuse of used oil
- support economic recycling options for used oil.

Under the *Product Stewardship (Oil) Amended Regulations 2003 (No. 1)*, the total amount of dioxins and furans in re-refined base oil (Category 1) must be less than 10 pg/g of oil. This level was based on methods developed by the United States of America Environment Protection Agency.

A review of the Act in July 2004 was tabled in the House of Representatives in November 2004. The recommendations are now currently out for public consultation. There were no recommendations to amend the level of dioxins and furans in re-refined base oil.

Action for the Australian Government:

No further action required at this time to amend the level of dioxins and furans in re-refined base oil.

5.7 NATIONAL POLLUTANT INVENTORY

The *National Pollutant Inventory (NPI) National Environmental Protection Measure* is an Internet database designed to provide the community, industry and government with information on the types and amounts of certain substances being emitted to the environment.

The NPI contains data on 90 priority substances, including polychlorinated dioxins and furans, which were identified as important because of their possible health and environmental effects. The NPI requires reporting from a wide range of industry and non-industry sources using a variety of techniques. Facilities must report on dioxins and furans if they exceed the reporting threshold i.e. if a facility uses 2,000 tonnes or more of fuel, or 60,000 megawatt hours of energy per year.

Currently, the NPI reports the emissions of polychlorinated dioxins and furans in kilograms per year. However, polychlorinated dioxins and furans are complex mixtures and are usually reported by other programs and studies in toxic equivalents (TEQ). TEQ is a means of scaling the emissions of each type of dioxins and furans according to their relative toxicity.

The reporting of polychlorinated dioxins and furans in TEQs would bring the NPI into line with current world's best practice. It would also provide a more useful data set, simplify reporting by industry and enable easier benchmarking within Australia and between other countries.

At the 9th meeting of EPHC in December 2004, Council resolved to review the NPI NEPM. The NPI NEPM has been operational for six years and as the program is used by a variety of groups, the review was to establish whether the program is currently delivering all the benefits expected of the program.

The review targeted the areas for improvements and built on earlier reviews, evaluating whether previous recommendations were still relevant. The review set out to identify possible changes to design parameters for the NPI. The outcome of the review will provide a starting point for Council to consider whether to embark on a process to vary the NPI NEPM.

The review has been carried out by an independent reviewer under the supervision of an EPH Standing Committee working group and the results have been submitted to EPHC.

Action for Governments:

Consider reporting dioxins in toxic equivalents (TEQs) under the National Pollutant Inventory

5.8 HUMAN INTAKE

The human health risk assessment (NDP Technical Report No 12) found that the public health risk for Australians from the exposure of dioxins from food and other sources is low. However to keep this level low, the report made a number of recommendations with the aim of reducing any potential risks to human health:

- programs to reduce the release of dioxins into the environment need to be ongoing
- ways to block the cycling of dioxins through the food supply need to be identified
- reducing the levels of dioxins in feed given to livestock, poultry and aquaculture fish will help to reduce the levels of dioxins in the food supply

- since foods high in animal fats are a source of exposure to these chemicals, current efforts to promote lower saturated fat intake in the population should continue
- due to the inhalation of dioxins through cigarette smoke, current programs to discourage cigarette smoking should be maintained
- the population burden of dioxin-like compounds should be monitored periodically, to see whether risk reduction strategies are effective.

Action relating to reducing the environmental release of dioxins is considered under sections 5.1 to 5.7 and section 5.11. Action relating to stockfeed is considered under section 5.9.

As the levels of dioxins in breast milk are low by international standards and have declined over the last decade (as outlined in NDP Technical Report No 10) it should be noted that it is the advice of the World Health Organisation and the National Health and Medical Research Council (NHMRC) in Australia that breast milk is the best food for babies.

Efforts to promote lower saturated fat intake in the population are reflected in several recent Australian Government initiatives. The *NHMRC's 2003 Dietary Guidelines for Australian Adults* and the *Dietary Guidelines for Children and Adolescents in Australia* both recommend 'limiting saturated fat' in the diet and provide practical advice on how this can be achieved. This recommendation is supported by the Australian Government's national food selection guide, the *Australian Guide to Healthy Eating* (1998), an educational resource providing advice on eating for good health. Organisations such as Nutrition Australia, the Dieticians Association of Australia and the National Heart Foundation of Australia also support reducing saturated fat intake through provision of professional and consumer-based advice, resources and projects. Other national initiatives, including a focus on healthy eating, although not specifically aimed at reducing saturated fat intake, include: the National strategic framework and agenda for action for public health nutrition, (*Eat Well Australia*, 2000-2010) developed by the Strategic Inter-Governmental Nutrition Alliance and the Australian Government's response to the issue of overweight and obesity in children - *Healthy Weight 2008: the national action agenda for children and young people and their families* (2003).

Tobacco leaf naturally contains both organic carbon and chlorine ions and consequently, as for any thermal process, “combustion” of cigarettes and cigars produces dioxins. On studies undertaken in Germany and Sweden, emissions on average from the smoking of a cigarette were 0.1pg TEQ/cigarette. Recent studies in Australia illustrate that on average the smoking population smoke 14 to 15 cigarettes per day. For those who smoke approximately 20 cigarettes a day, this could result in a dioxin intake of 3 pg/day. For smokers, the health risk from other carcinogenic components of cigarettes far outweigh the likely health risk from dioxins, however, it appears that encouraging people to give up smoking would help reduce their body burden of dioxins.

Australia has a comprehensive tobacco policy expressed in the *National Tobacco Strategy 2004-2009*. The Australian Government discourages cigarette smoking through the national prohibition of tobacco advertising and sponsorship; health warnings on tobacco packaging; the classification and scheduling of smoking cessation pharmacotherapies; customs duty and excise on tobacco products; control of illicit production and distribution; and prohibition of smoking in certain venues such as airports. The Government has introduced regulations to require new, graphic health warnings on cigarette packaging from March 2006. States and Territories are responsible for smoking cessation support services (Quitlines); regulation of retailers, including registration and licensing where applicable; prevention, detection and prosecution of sales to minors; smoking restrictions in non-Australian Government venues (the vast majority); and local restrictions on advertising and sponsorship, including point of sale advertising. Both tiers of government are involved in public information

campaigns. These efforts have given Australia one of the lowest smoking rates in the world (17.4% of the population aged 14 and over were smokers in 2004).

Action for Governments:

Continue with existing programs that discourage cigarette smoking and promote lower saturated fat intake.

Continue to promote the health benefits of exclusive breastfeeding to the age of six months, then the introduction of complementary foods and continued breastfeeding thereafter.

Subject to resources, give consideration to periodically monitoring the population burden of dioxins in order to assess whether risk reduction strategies are having the desired effect in lowering dioxin levels in humans.

5.9 AGRICULTURAL PRODUCTS

Agricultural commodities

The Australian National Residue Survey (NRS) is a program conducted by the Department of Agriculture, Fisheries and Forestry (DAFF). The NRS was established in the early 1960s as the Commonwealth's response to growing concerns about pesticide residues in major meat export markets. The purpose of the NRS now is to monitor and report the level of residues and contaminants in food, inputs to production and/or the environment. Since then, the range of commodities covered by the NRS has expanded and now, about 15 animal, 14 plant and selected fisheries and aquaculture products are monitored. The NRS is not involved in the testing of imported food or animal feedstuffs.

Residue[2] testing is an important part of the national strategy to minimise unwanted residues and environmental contamination in food. Monitoring identifies potential problems and any necessary follow-up action. Residue testing is also an important measure of product quality, particularly for exporting countries such as Australia. The NRS also monitors and reports the level of residues and contaminants in food and inputs to production and/or the environment.

The NRS conducts or is involved in monitoring surveys and surveillance, compliance and residue prevention programs. Residue prevention programs are designed to prevent or minimise the risks of unacceptable residues to public health and trade. Chemical commodity combinations to be included in surveys are determined by the NRS in consultation with industries on the basis of risk assessments, and those combinations of highest risk are including in the NRS monitoring surveys. In conducting risk assessments, the main factors considered include international and/or domestic perceptions of the chemical commodity combination as a possible public health hazard or trade barrier, the toxicity of the chemical or its break-down products and the extent and results of previous monitoring of the chemical commodity combination.

Concentrations of residues of agricultural and veterinary chemicals and environmental contaminants, such as metals, are assessed against Australian standards that are expressed as Maximum Residue Limits (MRL), which are maximum permissible limits for chemical residues in food. MRL's are set by Food Standards Australia New Zealand (FSANZ) and the Australian Pesticides and Veterinary

[2] Residues in agricultural terms are generally used to describe a small amount of a chemical treatment or its breakdown products which remain in or on a product. Residues in food safety include elements, such as metals, or other chemicals which may be present in food either through natural circumstances or as a consequence of industrial or agricultural activities.

Medicines Authority (APVMA). MRLs have been set for PCBs in food such as meats, however there are no current limits set for dioxins and furans.

Contaminants that have been surveyed include organochlorines, organophosphates, PCBs, and antimicrobials. Dioxins were surveyed in 2002-03 for the first time under the NDP and the results were reported in the NDP Technical Report No 8. The NDP study shows that levels of dioxins and dioxin-like PCBs in Australia's meat, milk and fish are low and compare favourably with levels reported in comparable studies from other countries. No samples contained dioxin levels exceeding the European Union standard. In view of the results of this survey, and given the significant costs associated with dioxins testing, DAFF does not support routine on-going testing of livestock commodities but would consider further testing in the next three to five years, subject to resources.

Action for the Australian Government:

Subject to resources, give consideration to undertaking a study in three to five years in order to ensure dioxin levels in livestock commodities remain within international and domestic standards.

Stockfeeds

Regulatory controls over imports of animal feeds are primarily the responsibility of the Australian Government. No specific legislation currently exists to address potential food hazards in imported animal feeds unless they can be shown to be a quarantine risk and dealt with under the *Quarantine Act 1908*. There are currently controls in every Australian jurisdiction to prevent the use of restricted animal material in feeds for ruminants. Other feed controls are managed under the "Uniform Australian Standards for the Labelling and Content of Stock Foods", which was agreed to by the then Standing Committee on Agriculture and Resource Management (now Primary Industries Standing Committee, PISC) in February 1997.

While Australian animal production industries have considered and implemented voluntary measures to address hazards in animal feeds, the regulatory framework has identifiable gaps. Controls over animal feeds across domestic jurisdictions are very variable and there is no current Commonwealth statutory structure to deal with imports of animal feeds beyond the scope of specific quarantine concerns.

The Australian Government red meat industry partnership, SAFEMEAT, recently endorsed a proposed national framework for managing food safety risks associated with stockfeeds. In March 2005, PISC agreed that the Primary Industries Health Committee (PIHC) would establish a working group to examine and evaluate components of a proposed framework for addressing the issue of animal feed controls in Australia. The working group will determine the scope of the framework for national feed standards ensuring coverage of terrestrial and aquatic animal production. Reference will be made to existing animal feed standards to ensure the standard is applied Australia-wide and is effective in controlling all known or anticipated hazards of concern in animal feeds.

Action for the Australian Government:

Work with Australian animal production industries to support implementation of voluntary measures to address hazards, including dioxins, in animal feeds.

Establish a working group to examine and evaluate components of a proposed framework for addressing the issue of animal feed controls in Australia.

5.10 FOOD

FSANZ, working in partnership with Australia's Commonwealth, State and Territory governments and the New Zealand Government, protects the health and safety of the people in Australia and New Zealand by maintaining a safe food supply. A key activity for FSANZ is monitoring the food supply to ensure that existing food regulatory measures provide adequate protection of consumer health and safety. The Australian Total Diet Survey (ATDS) is part of that monitoring.

The ATDS estimates Australian consumers' dietary exposure to substances found in the food supply through the testing of food samples collected from around Australia that are representative of the total diet. In order to achieve more accurate dietary exposure estimates, the foods examined in the ATDS are prepared to a 'table ready' state before they are tested.

The samples collected for the 20th ATDS in 2000/2001 were analysed for dioxins. These results were then combined with dietary information from the 1995 National Nutrition Survey to assess the population's dietary exposure. The resulting dietary exposure assessment contributed to the overall dioxin human health risk assessment conducted by the Department of Health and Ageing as part of the NDP (NDP Technical Report No 12).

For the general population, over 95% of exposure to dioxins is through the diet, with foods of animal origin such as meat, dairy products and fish being the main sources.

An Australian Tolerable Monthly Intake (TMI) value for dioxins and furans of 70 pg TEQ/kg body weight/month, was recommended by the Therapeutic Goods Administration and the National Health and Medical Research Council in 2002. This level was based on the most sensitive reproductive effects of dioxins in animals. The recommended TMI from all sources combined and including dioxins, polychlorinated furans and dioxin-like PCBs, is equivalent to that set by the Joint Expert Committee on Food Additives (JECFA), a committee of the United Nations Food and Agriculture Organization (FAO) and the World Health Organization (WHO). The human health risk assessment found that for Australians aged 2 years or older, the monthly intake of dioxins was between 3.9-15.8 pg TEQ/kg bw/month or between 6-23% of the TMI. Since the completion of the Human Health Risk Assessment of Dioxins in Australia, the Therapeutic Goods Administration has considered available information published post 2002 and found no evidence that would suggest the Australian TMI should be updated at this stage.

As there are limitations associated with the data used to characterise the risk associated with exposure to dioxins from food, in general, conservative assumptions were used to minimise the possibility that risks would be underestimated. On the basis of this analysis the public health and safety risk for all Australians from exposure to dioxins from foods is very low.

The recommendations of the human health risk assessment were considered by the Food Regulation Standing Committee (FRSC) in December 2004. This Committee agreed that source-directed measures that reduce the release of dioxins into the environment are the most appropriate means of ensuring a long term reduction in the exposure of Australians to dioxins. The Committee also agreed to establish a working group to provide the FRSC with additional information relating to potentially setting maximum levels, action levels and/or target levels for dioxins in foods, and the related issues of animal feeds and imported foods. The working group will investigate the feasibility and appropriateness of setting such levels and values, and research the related international food supply interventions and policies.

Action for the Governments:

Work toward increasing vigilance to prevent contamination of the food supply with dioxins.

Consider the possibility of setting levels and values for dioxins in foods.

5.11 OTHER ACTIONS

The Australian Government is also investigating possible legislative avenues with which it can address dioxins in the environment, to ensuring the discharge of Australia's obligations under the Stockholm Convention. One suggested legislative avenue is through approval being required under the *Environment Protection Biodiversity and Conservation Act 1999* for dioxin emissions above a particular level or resulting from particular activities.

Action for the Australian Government

Continue to investigate possible legislative avenues with which it can address dioxins in the environment, as obliged under the Stockholm Convention.

6. WHAT MEASURES DO OTHER COUNTRIES HAVE FOR DIOXINS?

Some countries have implemented standards or levels for dioxins in air, water, soil and other areas including daily human exposure (tolerable daily intake) and levels in food. Examples of the range of guidelines are shown in Table 3 while further information on the range of measures in some countries is provided in Appendix 1.

Air

For emissions from combustion facilities, many countries have adopted the level of 0.1 ng TEQ/m^3 recommended by the World Health Organization (WHO). However, some countries, such as Canada, have set different levels for different industry sectors whether they are new or existing. The USA has a level of 0.2 ng/m^3 and Japan has limits between 0.1 and 5 ng TEQ/m^3.

Soils

There are no common international guidelines for dioxins in soils. Where countries have established guidelines the levels vary according to the land use. Levels in agricultural and residential areas tend to be lower than levels for industrial areas.

Water and sediments

As dioxins are insoluble in water they are very difficult to analyse. Accordingly, very few countries have set guidelines for dioxins in water. However, some countries have set levels for dioxins in sediments with different levels for marine and freshwater.

Biota

Few countries have established guidelines for dioxins in biota. Canada has set levels for mammals and birds.

Foods

There are no common international guidelines for dioxins in foods. The EU has developed standards in EU Regulation (EC) No. 2375/2001 but these only refer to dioxins and furans and do not include dioxin-like PCBs. It is expected that in the future, a new EU standard will encompass dioxin-like PCBs.

Human body burden

A number of countries have established human exposure standards for dioxins, generally referred to as tolerable daily or weekly intakes. Current or proposed tolerable daily intakes (TDIs) range from 1 pg TCDD/kg bw (the Netherlands and Germany), through 4 pg/kg bw (Japan), 5 pg TCDD/kg bw (Sweden, Norway, Finland and Denmark), to 10 pg TCDD or TEQs/kg bw (UK and Canada).

Table 3: Examples of dioxin guideline levels in other countries

AIR[3]	**Levels expressed in TEQs**[4]
Canada	0.1 ng/m^3
UK	1.0 ng/m^3
Ireland	0.1 ng/m^3
US	0.2 ng/m^3
Japan	0.1-5 ng/m^3
SOILS	
Canada	4 ng/kg
USA	1000 ng/kg
Japan	1 ng/kg
Finland	2 ng/kg
Germany	1000 ng/kg
Italy	5000 ng/kg
The Netherlands	1000 ng/kg
Sweden	250 ng/kg
WATER	
UK	0.01 ng/L
US	0.3 ng/L
Japan	0.001 ng/L
SEDIMENTS	
UK	55 ng/kg – saltwater and freshwater
Japan	150 pg/g
The Netherlands	100 ng/kg
HUMAN INTAKE	
Canada	10 pg TEQ/kg bodyweight (bw)/day
UK	10 pg TEQ/kg bw/day
USA	0.006 pg TEQ/kg bw/day
Japan	4 pg TEQ/kg bw/day
Austria	10 pg TCDD/kg bw/day
Denmark	5 pg TCDD/kg bw/day
Finland	5 pg TCDD/kg bw/day
France	1 pg TCDD/kg bw/day
Germany	1 pg TCDD/kg bw/day
Italy	10 pg TCDD/kg bw/day
The Netherlands	1pg TCDD/kg bw/day
Sweden	5 pg TCDD/kg bw/day

[3] Levels shown for air are emission limits for sources.

[4] Countries express the levels of dioxins in different units. To assist in enabling comparisons, the levels for environmental media are shown in ng/m^3 or ng/kg and in pg/kg for human intake.

Appendix 1: Dioxin measures in other countries

New Zealand

In 1995, the New Zealand Ministry for the Environment (MfE) commenced a National Organochlorines Program. The Program assessed the extent of contamination of the New Zealand environment by certain organochlorines including polychlorinated dioxins and furans. The scientific and other reports arising from the Organochlorines Program can be viewed on the MfE's website at http://www.mfe.govt.nz/publications/hazardous/#organochlorines.

Surveys were undertaken of the background level of organochlorines, including dioxins, in environmental media (air, soil, fresh water, estuaries and sediment). The level of dioxins found in the New Zealand environment are generally low compared to other (northern hemisphere) countries for which comparable data has been collected. An inventory of dioxin emissions to air, land, water and reservoir sources has been compiled; a market basket survey of the level of organochlorines in retail foods enabled New Zealanders' dietary intake to be assessed; and a major population-based survey of the levels of dioxin and other organochlorines in the serum of New Zealanders was also undertaken. On the basis of the serum study a dioxin health risk appraisal was undertaken for the New Zealand population.

Air

In October 2001, the MfE released a proposal, *Action Plan for Reducing Discharges of Dioxins to Air*, containing a draft national environmental standard to regulate dioxin emissions from industrial facilities. The original dioxin-specific proposal has now been superseded and integrated into a package of proposed regulations to improve general ambient air quality in respect to other air toxics, including dioxins. Certain combustion activities are to be prohibited, including the open burning of tyres and oil, landfill fires, road-seal burning, new high temperature hazardous waste incinerators, school and hospital incinerators, and the burning of coated wire to recover metals.

Water

A survey of New Zealand's riverine and estuarine environments showed them to be relatively free of dioxins, and markedly lower than concentrations reported in other developed countries.

Soil

There are existing interim soil acceptance criteria for dioxins contained in the Health and Environment Guidelines for Selected Timber Treatment Chemicals (Ministry for the Environment and the Ministry of Health, 1997). It is anticipated that these will be reviewed in tandem with work planned in Australia to develop a possible contaminated soil NEPM for dioxin.

Body

The Ministry of Health in 2002 adopted a new dioxins exposure Interim Maximum Monthly Intake (IMMI) value of 30 pg TEQ/kg body weight/month (approximately 1 pg TEQ/kg body weight /day). This value was established as a result of a WHO reassessment of toxicological data for dioxins. The IMMI represents an approximately 10-fold reduction from what was previously considered to be an "acceptable" level of dioxin exposure. The dioxin criteria recalculation followed the methodology, exposure scenarios and exposure assumptions used in the 1997 Guidelines to derive soil acceptance criteria but replacing the former TDI with the IMMI. In relation to New Zealand, estimated intakes are believed to be currently lower than the WHO range for most of the population, though they appear to have been higher in earlier years.

Canada

Under the *Canadian Environmental Protection Act* (CEPA), the federal *Toxic Substances Management Policy* and the Canadian Council of Ministers of the Environment's (CCME) *Policy for the Management of Toxic Substances*, dioxins are targeted for 'virtual elimination'[5] in the Canadian environment.

In April 1996, the Deputy Minister's Committee of the CCME gave its approval for a task force to work towards assembling the *Canadian Environmental Quality Guidelines* that integrated national environmental quality guidelines for water, soil, sediment, tissue residue and air. The *Canadian Environmental Quality Guidelines* represents the culmination of more than a decade of harmonised, national science-based development work in Canada.

Determination of the Canada Wide Standards (CWS) has focused on anthropogenic sources that are releasing dioxins and furans to the atmosphere and soil in a continuous process. Development of the CWS for dioxins and furans takes into consideration environmental benefits, available technologies, socio-economic impacts, opportunities for pollution prevention and collateral benefits from reductions in other pollutants.

In January 1999 the Federal/Provincial Task Force on Dioxins released the first *Dioxins and Furans and Hexachlorobenzene Inventory of Releases* followed by a revised update published in February 2001, which identified six priority sectors accounting for about 80% of national emissions that have been identified as priorities for action. These are:

- waste incineration
- burning salt laden wood
- residential wood combustion
- iron sintering
- electric arc furnace steel manufacturing
- conical municipal waste combustion.

Air

The CWS, under the *Canadian Environmental Quality Guidelines* for pulp and paper boilers burning salt-laden wood, sets out numeric targets and timeframes for reducing dioxin and furan emissions from new and existing boilers. The dioxin and furan standard for all existing pulp and paper mill boiler emissions will be 0.5 ng/m^3 by 2006 and the standard for new pulp and paper mill boilers will be 0.1$ng/m^{3.}$

Water

There are currently no standards for dioxins in freshwater and marine environments.

Soil

Dioxin and furan contamination in soil is the subject of national guidelines. These guidelines outline ambient or "alert levels" which may be used by jurisdictions as benchmarks for the management and monitoring of dioxins and furans present in the environment. The CWS process has focussed on

[5] Virtual elimination is the reduction of releases to the environment of the most dangerous toxic substances to a level below which these releases cannot be accurately measured.

anthropogenic sources that release dioxins and furans to soil in a continuous process. The development of the standard for dioxins and furans takes into consideration environmental benefits, available technologies, socio-economic impacts, opportunities for pollution prevention and collateral benefits from reductions in other pollutants.

The levels for dioxins and furans in sediment and soil are as follows:

Sediment	
- Freshwater (Interim Sediment Quality Guideline – ISQG)	0.85 ng/kg
- Freshwater (Probable Effect Level – PEL)	21.5 ng/kg
- Marine (ISQG)	0.85 ng/kg
- Marine (PEL)	21.5 ng/kg
Soil	4 ng/kg

Other

The Canadian standard for dioxins and furans in wildlife tissue residue is 0.71 ng/kg for mammals and 4.75 ng/kg for birds.

Canada has also established a tolerable daily intake for dioxins and furans of 10 pg/kg bodyweight per day for people.

United Kingdom

The UK Environment Agency's Strategy, *Managing Chemicals for a Better Environment*, focuses the Agency's chemical management activities on those substances where the Agency can take action to most effectively contribute to environmental improvement. This action may be direct or indirect and may be at any point in the chemical lifecycle. The strategy focuses on chemicals that may directly affect the environment or human health through environmental exposure.

The Environment Agency is currently looking at the risk a chemical poses on the environment; this requires consideration of two factors:

- the hazardous properties of the chemical – e.g. its toxicity
- the likelihood of exposure to that chemical – for example, environmental exposure is likely to be higher for a chemical in wide use across society (e.g. a substance in a domestic cleaning product) than it will be for a chemical used in a few specialist applications at a few chemical plants.

Dioxins have been identified as a group of chemicals listed for further investigation.

The Environment Agency seeks to regulate releases to the environment of dioxin emissions and lower the risk of causing detrimental effects to the environment or human health.

Air

In the UK, dioxin emissions are controlled under the *Pollution Prevention and Control Regulations*, under the *Pollution Prevention and Control Act 1999*. The proposed new European incineration directive will replace three existing directives on the incineration of municipal and hazardous waste, amongst other things, setting a maximum dioxin emission limit of 0.1 ng/m^3 in stack gas. For combustion processes the recommended limit value is 0.1 ng/m^3 and for various metal processes and papermaking processes, the recommended limit is 1.0 ng/m^3.

Water

The UK standards for dioxins in water are:

Freshwater pelagic community	0.01 ng/l
Saltwater pelagic community	No standard
Freshwater sediment benthic community	55 ng/kg (for 3% OC)
Freshwater sediment benthic community	185 ng/kg (for 10% OC)
Marine sediment benthic community	55 ng/kg (for 3% OC)

Note: OC – Octachlorodibenzo-*para*-dioxin

Pelagic communities are those that live in the water (below the surface and above the seafloor)

Benthic communities are those that live in or on sediments.

Soil

There are currently no standards for levels of dioxins or furans in soil.

Other

The UK Ministry for Agriculture, Fisheries and Foods has established a recommended maximum tolerable concentration of 0.66 ng/kg for dioxins in cows milk.

The UK has adopted a tolerable daily intake for dioxins and furans of 10 pg/kg bodyweight per day for people.

United States

Over the last 20 years, the US EPA has looked for ways to reduce dioxins levels in the environment. Collectively, these actions have resulted in strict controls on all known and quantifiable major industrial sources of dioxin releases. As a result of the EPA's efforts, along with efforts by state government and private industry, known and quantifiable industrial emissions of dioxins in the US have been reduced by more than 90% from 1987 levels.

The EPA undertook a major scientific study entitled, *Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds.* The study is commonly referred to as the EPA dioxin reassessment. The study focuses on sources of dioxins, levels of dioxin-like compounds in environmental media, human exposures to dioxins, information on critical human health end points, mode of action, pharmacokinetics, dose-response and finally, key findings pertinent to the potential hazards and risks of dioxins, including a discussion of all important assumptions and uncertainties.

Air

New stringent regulatory requirements promulgated by the EPA under the authority of the *Clean Air Act* set emission limits for dioxins, and other hazardous air pollutants based on maximum achievable control technology. The EPA has recently regulated dioxin emissions from facilities that burn hazardous waste which include waste incinerators, cement kilns and some lightweight aggregate kilns. For example, the limit for discharges of dioxins and furans from municipal waste incinerators is 0.2 ng/m^3.

Water

Dioxin releases to water are managed through a combination of risk-based and technology-based tools established under the *Clean Water Act*. To maintain the level of drinking water in the country, a

maximum contaminant level goal (non-enforceable, voluntary health goal) of zero and a maximum contaminant level of 300 pg/L has been set.

Soil

Under the EPA Superfund, an important aspect is the clean up of dioxin contaminated lands. Around the country there are many Superfund sites which have successfully been cleaned up, however, to prevent further contamination of dioxins to land, the EPA has developed Hazardous Waste Identification and Disposal Rules which identify and strictly limit the disposal options of waste containing dioxins.

The US Public Health Service and the EPA have both issued a directive that 1000 ng/kg is the appropriate criterion to use for dioxins and furans in residential soil.

Wastes

The EPA proposed rules to restrict the use of dioxin-contaminated pulp and paper sludge and guidelines have been developed to limit the dioxin concentration to 31.9 pg/L.

The EPA proposed regulations limiting the dioxin content of cement kiln dust from cement plants and sludge when these by-product materials are used as soil additives.

In October 2003, the US EPA made the decision not to regulate dioxins in land-applied sewage sludge as studies have shown that dioxins from this source do not pose a significant risk to human health or the environment.

Other

The US EPA has set limits on the level of human exposure of dioxins at 0.006 pg/kg bodyweight per day.

Japan

The Law Concerning Special Measures Against Dioxins (the Dioxins Law) came into force in January 2000 to regulate the levels of dioxins in air, water and soil as well as emissions from small incinerators. This law also stipulates basic standards for dioxins in soil. The Dioxins Law stipulates the standards for dioxins as:

Ambient Air	0.6 pg-TEQ/m^3
Water	1 pg-TEQ/L
Sediment	150 pg-TEQ/g
Soil	1,000 pg-TEQ/g
Effluent	10 pg-TEQ/L
Tolerable Daily Intake	4 pg-TEQ/kg bw/day

European Union

The cornerstone of the EU environmental action is the Sixth Environment Action Program entitled *Environment 2010: Our Future, Our Choice* which has the priorities of:

- tackling climate change and global warming

- protecting the natural habitat and wildlife
- addressing environment and health issues
- preserving natural resources and managing waste.

In October 2001, to secure better protection of human health and the environment from the effects of dioxins the Commission adopted a *Communication on a Community Strategy for Dioxins, Furans and Polychlorinated Biphenyls*. The Communication outlines the problem of dioxins, the progress in addressing the problem, the remaining gaps, the basis for community action and develops a strategy to reduce the presence of these compounds in the environment, in feed and food.

Table 4 describes the current guidelines for dioxins applied within Member States of the EU.

Table 4: Current standards and guidelines for dioxins in the Member States of the EU

Country	Incineration of Waste Emissions (I-TEQ/m^3)	Iron/Steel Sintering Emissions (I-TEQ/m^3)	Paper Processing Emissions	Contaminant Soils (I-TEQ/kg)	Water	Fertiliser / Compost (I-TEQ/kg)	Sewerage Sludge	Foodstuffs (TCCD/g)	Daily Human Intake
Austria	0.1 ng	Before 31 Dec 2005 – 0.25 ng After 1 Jan 2005 – 0.1 ng (Electrical arc furnaces 0.4 ng)		No guidelines – in the past were applied to individual cases and were same level as Germany	N	Fertiliser – 50 ng Culture substrates – 20 ng	100 ng I-TEQ/kg	3 ng I-TEQ/kg (feed stock to cows)	10 pg TCCD/kg/bw (A target of 1 pg should be achieved)
Belgium	0.1 ng	New plant – 0.5 ng Existing plant – 2.5 ng			N		0.1 ng I-TEQ m^3	5 pg (foods with >2% fat) 100 pg (foods with ≤2% fat)	No maximum tolerable intake recommended
Denmark	0.1 ng				N				5 pg N-TEQ/kg/bw
Finland	New plant – 1.0 ng Existing plant – limit value 1.0 ng (target value 0.1 ng)			Proposed guideline – 2 ng Limit value – 500 ng (agricultural and residential)	N				5 pg N-TEQ/kg/bw
France	0.1 ng (new and existing)		1 ng I-TEQ/year		N			5 pg I-TEQ/g (milk and milk products)	1 pg I-TEQ/kg/bw
Germany	0.1 ng	0.1 ng	0.1 ng I-TEQ m^3	Agriculture – 5 ng – 40 ng Playgrounds – 100 ng Residential areas – 1,000 ng Industrial areas – 10,000 ng	N	Compost – 17 ng	100 ng	5 pg I-TEQ/kg (milk) 0.9 pg I-TEQ/kg (milk fat)	1 pg I-TEQ/kg/bw

Ireland	0.1 ng	0.1 ng	0.1 ng I-TEQ m^3		N				
Italy	0.1 ng			Farmable – 750 ng/m^2 Non-farmable – 5,000 ng/m^2	Zero emissions into the Venice Lagoon				10 pg I-TEQ/kg
Luxembourg	0.1 ng	0.1 ng	0.1 ng I-TEQ m^3		N				
The Netherlands	0.1 ng	0.4 ng		Residential and agricultural areas – 1,000 ng Dairy farming – 10 ng	Aquatic sediments – 100ng	Compost – 63 ng I-TEQ/kg	190 ng I-TEQ/kg	6 pg I-TEQ/kg (milk and milk products)	10 pg (Government striving towards a maximum daily intake of 1 pg)
Portugal	0.1 ng	N	N	N	N	N	N	N	N
Spain	0.1 ng	N	N	N	N	N	N	N	N
Sweden	New – 0.1 ng Existing – 0.1 to 2 ng		Use of chlorine in production has stopped	Land with sensitive use – 10 ng Land with less sensitive use – 250 ng	250 ng I-TEQ/kg for groundwater extraction			Various dietary guidelines exist for certain types of food	5 pg TEQ/kg/bw
United Kingdom	1.0 ng (with the objective of achieving 0.1ng)	1.0 ng	1.0 ng					0.66 ng (whole milk) 16.6 ng (milk fat)	10 pg

Source: European Commission DG Environment and UK Department of the Environment, Transport and the Regions, *Compilation of EU Dioxin Exposure and Health Data – Task 1 – Member State Legislation and Programmes*, Oxfordshire, 1999

N: There is no dioxin related legislation that goes beyond the requirements of the relevant EC Directives

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