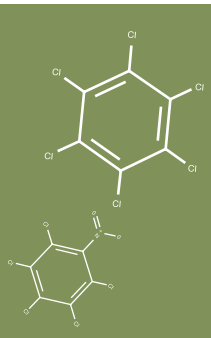
New Zealand's National Implementation Plan under the

Stockholm Convention on **Persistent Organic Pollutants**



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Foreword

The Stockholm Convention on Persistent Organic Pollutants commits governments to protect human health and the environment by reducing and, where feasible, eliminating the production and environmental releases of 12 chemicals listed under the Convention.

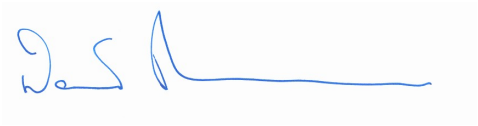
New Zealand became a signatory to the Convention at a diplomatic conference held in Stockholm on 16 May 2001. The Convention came into force on 17 May 2004. New Zealand ratified it on 24 September 2004, and became a party to the Convention on 23 December 2004. As of October 2006 there are 151 signatories to the Convention, of which 131 are ratified parties.

Parties to the Convention are required to develop, and endeavour to put into practice, a national implementation plan setting out how they will implement their obligations under the Convention. Taking into account the history of use of organochlorines in New Zealand, this plan sets out measures that affirm and build on current activities for the purpose of meeting Convention obligations.

The New Zealand National Implementation Plan is to be tabled at the third meeting of the Conference of the Parties, to be held in May 2007.

The Plan will be updated as necessary to reflect decisions made by the New Zealand Government, or by the Conference of the Parties, such as amendments to the Convention or its annexes, including the addition of chemicals to Annexes A, B or C, or the adoption of guidance or guidelines.

The New Zealand Government is fully supportive of the goal of the Stockholm Convention to protect human health and the environment from persistent organic pollutants. By implementing this Plan, we hope to make a difference for New Zealanders and I expect that levels of organochlorines in human tissue will continue to decline. The Plan will be judged a success when concerns about persistent organochlchlorines can be put behind us.



Hon David Benson-Pope
MINISTER FOR THE ENVIRONMENT

Executive Summary

The Stockholm Convention on Persistent Organic Pollutants commits governments to take measures to protect human health and the environment from persistent organic pollutants (POPs). In practice, this means reducing and, where feasible, eliminating the production and environmental releases of the 12 chemicals presently listed as POPs: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, polychlorinated biphenyls (PCBs), dioxins, furans and hexachlorobenzene (HCB).

Article 7 of the Stockholm Convention requires each party to develop a national implementation plan (NIP) setting out how it will address its obligations under the Convention. New Zealand has already achieved, or is currently undertaking, many activities that taken together go a long way towards meeting the Government's obligations under the Stockholm Convention. The New Zealand NIP builds on these past and recent activities, which provide a sound platform from which to identify the additional measures needed. The measures are set out under each of the articles relevant to the Plan.

Table 1: National Implementation Plan: Summary of measures by New Zealand

Article	Responsibility	Function – including measures
Article 3: Eliminate releases from the intentional production and use of POPs	ERMA	ERMA will administer the HSNO Act 1996 in matters relating to: • assessing new chemicals, pesticides or industrial chemicals currently in use that exhibit POP characteristics • permitting the appropriate use of POPs for laboratory-scale research or as a reference standard • managing the existing exempted use and storage of PCBs.
	MED and New Zealand Customs Service	The MED and New Zealand Customs Service will: • administer and enforce the Imports and Exports (Restrictions) Prohibition Order (No. 2) 2004, and the Basel Convention • control movements of POP chemicals and POP hazardous waste across the border.
Article 4: Register of Specific Exemptions	New Zealand is not registered for specific exemptions, so no monitoring is required.	
Article 5: Action Plan to reduce or eliminate releases of dioxins and other Annex C chemicals	MfE	To protect human health and the environment by continuing the minimisation and, where feasible, ultimate elimination of release of dioxins and other Annex C chemicals, MfE will (summarised): • review and update five-yearly a New Zealand Release Inventory of Dioxins and other Annex C chemicals • monitor and periodically evaluate laws and policies to manage releases of dioxins and other Annex C chemicals • identify strategies to minimise releases of dioxins and other Annex C chemicals • promote information (where appropriate) to support the above programmes • report progress under the Action Plan for Dioxins and Other Annex C Chemicals every five years • implement the Action Plan for Dioxins and Other Annex C Chemicals to achieve release reduction or source elimination.

Article	Responsibility	Function – including measures
Article 6: Stockpiles and wastes	ERMA and MfE	To reduce or eliminate release from stockpiles and wastes: • ERMA will administer the system of exemptions for the use and storage of PCBs to achieve the withdrawal and disposal of exempted PCB stocks before 2016 • ERMA and MfE will facilitate the ongoing collection and disposal of miscellaneous and minor PCB stocks • ERMA and MfE, in conjunction with stakeholders, will promote among rural property owners the safe interim storage of historical POPs. In addition, MfE will: • fund in conjunction with regional councils, the disposal of unwanted POP pesticides for a further three years to June 2009 • develop policies, guidelines and administrative systems to facilitate the environmentally sound management of POP-contaminated land • administer the Contaminated Sites Remediation Fund to assist local government to assess and clean-up contaminated sites throughout the country • investigate national environmental standards for contaminated land.
Article 7: National Implementation Plan (NIP)	MfE	MfE will: • prepare a draft National Implementation Plan, consult with stakeholders, and submit New Zealand's Plan to the Stockholm Convention Secretariat by December 2006 • review and update the Plan in accordance with the reporting requirements of Article 15 • respond to requests for international co-operation consistent with commitments under Article 12.
Article 8: Listing of new POPs under the convention	ERMA and MfE	ERMA and MfE will: • monitor international assessments of potential POP chemicals and participate in forums, as appropriate; and, subject to resources, will collect information about these POP candidates in New Zealand • consult with stakeholders in developing a New Zealand position on chemicals recommended by the Persistent Organic Pollutants Review Committee to the Conference of the Parties (to the Stockholm Convention) for listing under the Convention.
Article 9: Information exchange	MfE	MfE will provide and exchange information with parties to the Stockholm Convention, either directly or via the Information Clearing House of the Convention Secretariat.
Article 10: Public information, awareness and education	MfE	MfE will consider the requirements of Article 10 when undertaking projects relevant to the Stockholm Convention.
Article 11: Research, development and monitoring	MfE, MoH, and DoL	MfE and MoH will continue, subject to resources, a bio-monitoring programme (breast milk, serum) appropriate to tracking the New Zealand population's declining exposure to POPs. MfE will monitor the effectiveness of the NIP (relating to dioxin reduction, waste stocks and contaminated sites management). DoL will facilitate the completion of research on the health significance of past occupational exposures to dioxin.
Article 12: Technical assistance	MfE, MFAT, NZAID	MfE, in conjunction with MFAT and NZAID, and subject to resources, will address requests for technical assistance.
Articles 13 and 14: Financial resources	MFAT	MFAT will consider New Zealand's level of commitment to the fourth Global Environment Facility (GEF) replenishment round.

Article	Responsibility	Function – including measures
Article 15: Reporting	MfE	MfE will: • submit New Zealand's NIP to the Stockholm Convention Secretariat by December 2006 • collect the necessary information, and prepare and submit New Zealand reports in accordance with the requirements of the Convention.
Article 16: Effectiveness evaluation	MfE	MfE will: • maintain international liaison and collaborate with the Stockholm Secretariat, as appropriate and subject to resources, in contributing to a global monitoring programme • provide to the Secretariat information gained from existing POP monitoring programmes and from any future research programmes.
Articles 17–30	The remaining articles (Articles 17 to 30) concern the international administration of the convention and are not considered relevant to the New Zealand NIP at this stage.	

Note: For explanations of the abbreviations used in this table, see the Glossary on the following page.

Glossary

ACC	Accident Compensation Corporation
ADI	acceptable daily intake
Annex C chemicals	The chemicals listed under Annex C of the Stockholm Convention, comprising persistent organic pollutants when formed and released unintentionally from anthropogenic sources: polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDDs/PCDFs), hexachorobenzene (HCB) and polychlorinated biphenyls (PCBs).
BAT/BEP	best available techniques/best environmental practice, e.g. BAT/BEP Guidelines
COP	Conference of the Parties
DDT	1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane
Dioxin (singular)	2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD)
Dioxins (plural)	A short-hand way of referring collectively to two groups of chlorine-containing compounds (PCDDs and PCDFs) that share similar chemical structures, properties and biological characteristics, including toxicity[1]
DoL	Department of Labour
ERMA	Environmental Risk Management Authority
GEF	Global Environment Facility
HCB	hexachlorobenzene
HSNO Act	Hazardous Substances and New Organisms Act 1996
MED	Ministry of Economic Development
MFAT	Ministry of Foreign Affairs and Trade
MfE	Ministry for the Environment
MoH	Ministry of Health
OC	organochlorine
NZAID	New Zealand Agency for International Development
PCBs	polychlorinated biphenyls
PCDDs	polychlorinated dibenzo-*p*-dioxins
PCDFs	polychlorinated dibenzofurans
PCP	pentachlorophenol
PM_{10}	particles less than 10 microns in diameter
POPs	persistent organic pollutants
ppm	parts per million
RMA	Resource Management Act 1991
SPREP	Secretariat of the Pacific Regional Environment Programme
TCDD	2,3,7,8-tetrachlorodibenzo-*p*-dioxin (dioxin)
TEQ	Toxic equivalents, is the resultant toxicity given by a mixture of dioxin congeners
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4-D	2,4-dichlorophenoxyacetic acid

[1] A scientifically precise definition of these chemicals can be found in the text of the Stockholm Convention (reproduced in Appendix 5 of this document; refer to Part IV of the Definitions of Annex C).

Part 1: Introduction

Background

International context

The Stockholm Convention on Persistent Organic Pollutants aims to protect human health and the environment from the effects of persistent organic pollutants (POPs). The Convention includes:

- measures aimed at eliminating 10 manufactured chemicals, through the eventual banning of their production and use
- a range of control measures aimed at continuously minimising and, where feasible, eliminating releases of Annex C chemicals (unintentional POPs)
- measures to ensure the sound management of stockpiles and wastes that contain POPs.

POPs are chemical substances that have toxic properties, resist degradation in the environment, bioaccumulate through the food chain, and are transported through air, water and migratory species, within and across international boundaries. The scientific criteria characterising POP chemicals are set out in Annex D of the Convention. They are significant because low-dose exposure to some POPs may pose a threat to human health and the environment. There is clear evidence, particularly in the northern hemisphere, of the long-range dispersal of these substances via the atmosphere, water and migratory species to regions where they have never been used or produced, and where they accumulate in terrestrial and aquatic systems.

A significant feature of POP chemicals in humans and other mammals is that mothers transfer part of their own "body burden" to embryos and foetuses *in utero*, and to infants via breast milk, so that it will take many generations for the presence of POPs to be eliminated. Health experts agree internationally that the benefits of breastfeeding for an infant are demonstrated and outweigh the potential adverse effects of POP exposure. It has also been shown that determined efforts and co-ordinated programmes do result in the elimination of sources, reduced formation and releases and, subsequently, reduced exposures. Despite the bioaccumulative character of POPs, affirmative measures aimed at reducing releases and/or eliminating sources can make a difference, and this helps explain why over 150 governments have made a commitment to the Stockholm Convention.

International action on POPs was endorsed by the United Nations Environment Programme (UNEP) Governing Council in 1995 and led to negotiations, beginning in 1998, on the text of a legally binding international agreement. At a diplomatic conference held in Stockholm on 16 May 2001, over 90 countries became signatories to the Stockholm Convention on Persistent Organic Pollutants. The Convention became international law on 17 May 2004 and was ratified by New Zealand in September 2004. As of May 2006 there are 151 signatories, of which 125 are ratified parties. The full text of the Convention is available at: http://www.pops.int/

The Stockholm Convention requires parties to apply control measures on the 12 POPs that have been used as pesticides or industrial chemicals, or are unwanted by-products. It also allows for the addition of new POP chemicals in future. The initial 12 POPs are listed in Table 2.

New Zealand is also a party to two other international chemical-related conventions – the Basel and Rotterdam Conventions – which, together with the Stockholm Convention, provide an international framework governing the environmentally sound management of hazardous chemicals and wastes throughout their life-cycles.

Table 2: The 12 POPs specified under the Stockholm Convention

Chemical	Pesticide	Industrial chemical	Unintentionally formed by-product (Annex C chemical)
Aldrin	✓		
Chlordane	✓		
Dieldrin	✓		
Endrin	✓		
Heptachlor	✓		
Hexachlorobenzene (HCB)	✓	✓	✓
Mirex	✓		
Toxaphene	✓		
Polychlorinated biphenyls (PCBs)		✓	✓
DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane)	✓		
Dioxins (polychlorinated dibenzo-*p*-dioxins)			✓
Furans (polychlorinated dibenzofurans)			✓

The role of the Ministry for the Environment

The Ministry for the Environment is New Zealand's designated national authority for the Stockholm Convention. Accordingly, the Government's responsibility for developing and implementing a national implementation plan (NIP) for meeting Stockholm Convention obligations lies with the Ministry for the Environment.

Finalising the NIP

The Ministry consulted with relevant government departments and agencies in preparing the NIP. A draft plan was available for public comment for an eight-week period. The NIP was finalised by taking into account the 26 submissions received from national stakeholders, including local government and non-government organisations, and from one national women's group. The NIP is endorsed by the New Zealand Government.

Contact point

General enquiries on the New Zealand NIP should be addressed to:
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Overview of New Zealand's National Implementation Plan

Principal obligations

The Convention requires parties to adopt and implement measures aimed at reducing or eliminating the release of POPs into the environment with the aim of reducing the exposure of humans, animals and environmental organisms.

In accordance with Article 7 of the Stockholm Convention, the Ministry for the Environment has prepared this National Implementation Plan (NIP), which sets out how New Zealand plans to implement its obligations under the Convention. The New Zealand NIP is to be submitted to the Conference of the Parties (COP) via the Stockholm Secretariat on or before 23 December 2006 (within two years of the Convention's coming into force for New Zealand).

Historical context for the Plan

New Zealand historically imported, manufactured and used POP chemicals (as described in Part 2 in the section on Article 3), resulting in impacts that are significant in the national context.

- From the manufacture of 2,4,5-T in New Plymouth there is evidence of dioxin exposure within the workplace, and to longer-term local residents who lived in close proximity to the plant between 1962 and 1987.
- From the widespread historical use of POPs pesticides in agriculture and horticulture there is evidence of mainly localised areas of contamination, with some broader low-level contamination also remaining but with no significant presence in food products.
- From the timber industry's use of pentachlorophenol, which contained dioxins as contaminants, there is evidence of historical workplace exposure, and of localised soil contamination where POPs and other chemicals were applied to timber.
- From the use, storage and handling of PCBs and POPs pesticides, and from combustion activities giving rise to the release of unintentional POPs (e.g. dioxins, furans), there is evidence of historical population exposure to these contaminants. Exposure is likely to have involved multiple pathways, including dietary intake, and perinatal, inhalation and dermal exposures.

Summary of past and current activities

New Zealand has already achieved, or is currently undertaking, many activities that, taken together, go a long way towards meeting the Government's obligations under the Stockholm Convention. To provide a context and a basis for the NIP, these past and present activities are briefly outlined below.

Eliminating releases from intentional production and use (Article 3)

Two laws, amended during 2003, ensure that New Zealand's legal framework is in compliance with Stockholm Convention requirements.

- The Hazardous Substances and New Organisms (HSNO) Act 1996 was amended to ban the production, importation and use in New Zealand of the POP substances specified under the Convention.
- The Import Control Act 1988, renamed the Imports and Exports (Restrictions) Act 1988, was amended to enable controls to apply, via the Imports and Exports (Restrictions) Prohibition Order (No. 2) 2004, to the export of POPs as chemicals, and to the import/ export of POP hazardous wastes.

These laws mean that all POP pesticides listed under the convention are banned from use, and that any presently exempted use of PCBs must be phased out and waste stocks disposed of by 2016. This phase-out programme has been administered by the Ministry of Health since 1993 under the Toxic Substances Regulations 1983, and the completion of this programme is now being administered by the Environmental Risk Management Authority (ERMA).

Reducing and eliminating releases from unintentional production (Article 5)

Four significant historical sources of releases of unintentional POPs (dioxins and other Annex C chemicals) in New Zealand have been addressed over the past two decades. In each of these situations, the formation of dioxins (in particular) and their release to the environment was an unintended consequence of a manufacturing process and/or the use of a manufactured product.

- Leaded petrol is no longer used as a fuel, and its removal has greatly reduced motor vehicle exhaust as a source of dioxins.
- Elemental chlorine is no longer used in pulp and paper production as a bleaching agent.
- Pentachlorophenol is no longer used as a timber treatment.
- 2,4,5-T herbicide has not been manufactured in New Zealand since 1987.

As a basis for identifying priorities to achieve further reductions in releases, the Ministry for the Environment prepared a dioxin inventory: *New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources* (Ministry for the Environment, 2000).

A set of seven national environmental standards, as national regulations under the Resource Management Act 1991 (RMA), now ban certain activities that would otherwise give rise to dioxins and other air toxics. The activities banned are: landfill fires, burning insulated wire, burning oil or tyres in the open, and burning road seal. In addition, new high-temperature hazardous waste incinerators are not permitted, and the incineration of waste by schools and hospitals is to be banned (unless the facility obtains a resource consent by September 2006).[2]

[2] For further details, see the Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Regulations 2004 at: http://gpacts.knowledge-basket.co.nz/regs/regs/text/2004/2004309.txt.

Stockpiles and wastes (Article 6)

The Ministry for the Environment and regional councils are undertaking a national collection of unwanted and unused agricultural chemicals in rural New Zealand, including POP pesticides. These collections complement collections previously initiated by local government in some regions. Any POP wastes that require shipping and destruction offshore are managed in accordance with the Basel Convention.

A Contaminated Sites Remediation Fund has been established by the Government to achieve, in partnership with regional councils and other parties, the remediation of high-risk contaminated sites. The first major expenditure from the fund is being used to clean-up an ex-POP pesticide manufacturing site in Mapua, Tasman, contaminated by DDT and dieldrin. The Fund is also facilitating the management and clean-up of a number of other smaller-scale contaminated sites, including those contaminated by POPs.

To facilitate and encourage clean-up activity, the Income Tax Act 2004 has been amended (Taxation [Base Maintenance and Miscellaneous Provisions] Act 2005) to allow tax deductions for business expenditure related to contaminated land remediation. This measure is expected to encourage greater activity in the clean-up and management of contaminated land.

Research, development and monitoring (Article 11)[3]

A major baseline research programme, the Organochlorines Programme,[4] was conducted by the Ministry for the Environment between 1996 and 2001. It identified that, overall, the level of dioxins, PCBs and other POPs in the New Zealand environment, in food and in people was generally very low in comparison to most other countries with comparable data.

Studies commissioned by the Ministry of Health[5] showed that levels of dioxins, PCBs and organochlorine pesticides in the breast milk of New Zealand women had declined by about 70% over the 10-year period 1988 to 1998. In general, the exposure of New Zealanders to these POPs is low relative to exposures in most other countries where comparable studies have been carried out.

The Department of Labour has commissioned epidemiological studies to clarify the health outcomes resulting from exposure of former workers to PCP in the timber industry.

Levels of dioxins have been determined in people and in residential soil adjacent to a New Plymouth factory that manufactured chlorinated pesticides up to 1987. Occupational health studies are ongoing.

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[3] Government reports on POPs are referenced in Appendix 2.

[4] Ministry for the Environment reports from the Organochlorines Programme can be viewed and downloaded from: http://www.mfe.govt.nz/publications/hazardous/index.html#organochlorines.

[5] See Bates *et al*, 2001, Appendix 2.

Policy context for the Plan

The policy context for the Plan is that:

- the public expects to be protected from exposure to environmental contaminants such as dioxins, PCBs and organochlorine pesticides
- the broad-scale New Zealand situation is well researched, and shows that the actual level of exposure to POPs among the general population is low, as evidenced by New Zealand studies of dietary intake, human serum and breast milk
- the Stockholm Convention obligations make explicit a number of requirements to minimise and/or eliminate the release of POPs.

As outlined in the preceding section, New Zealand is well placed to meet its Stockholm Convention obligations as considerable work has already been achieved or is underway.

The Government's response to POP issues and the approach to formulating the National Implementation Plan are considered precautionary but pragmatic, and in line with best international practice.

The NIP builds on legislative reform and policy developed over the past decade to progressively improve chemicals management and reduce the impact of wastes. For example, laws and regulations are now in place that tightly control the import, export, manufacture and use of POPs and the disposal of POPs hazardous waste, including its collection, handling and transport. More specifically, the Government:

- has introduced national environmental standards to improve air quality nationwide, including the minimising of releases of dioxins
- is developing policy to manage risks from contaminated land
- has introduced regulatory measures to ensure that local governments reduce releases of dioxins, including from old and polluting waste incinerators
- has banned the building of new hazardous waste incinerators
- has banned the open burning of certain materials that would generate toxins
- is funding the disposal of some of the collected and redundant agrichemicals, including POPs, particularly from rural areas
- is completing the phase-out and disposal of PCBs.

These measures are considered in more detail in the following sections addressing:

- Article 3: Reduce/eliminate the production and use of POPs (pesticides and industrial chemicals)
- Article 5: Reduce/eliminate the release of unintentional POPs (Annex C chemicals)
- Article 6: Reduce/eliminate the release of POPs from stockpiles and wastes, including contaminated sites.

A Senior Officials Group and an Organochlorines Technical Advisory Group have been convened by the Ministry of Health to monitor the progress of research and policy on organochlorine issues. Programmes across government making a contribution to achieving Stockholm Convention objectives are listed in Appendix 1.

Goal

The Goal of the NIP is to protect human health and the environment from persistent organic pollutants by implementing the Stockholm Convention.

Objectives

New Zealand's overall objectives for the NIP are to:

- communicate the actions undertaken to implement the Stockholm Convention
- eliminate the remaining uses of POPs
- implement an Action Plan for Dioxins and Other Annex C Chemicals to minimise and, where feasible, eliminate releases of unintentionally produced POPs[6]
- dispose of POP stockpiles, and manage sites contaminated by POPs
- comply with the Stockholm Convention.

Key outcomes

Key outcomes expected from implementing the NIP include:

- the present margin of safety for protecting human health from POPs will be extended as body burdens decline
- the present high quality of New Zealand primary products (especially meat and dairy foods) will be further safeguarded
- the status of New Zealand's clean environment will be strengthened
- New Zealand will fully comply with the Stockholm Convention.

These outcomes support the Government's goal of achieving sustainable development under the *Sustainable Development for New Zealand Programme of Action* (Department of Prime Minister and Cabinet, 2003).

[6] Dioxins, furans, PCBs and HCB when produced unintentionally.

Part 2: New Zealand's Response to the Articles of the Stockholm Convention

Article 3: Eliminate Releases from the Intentional Production and Use of POPs

Article 3 of the Stockholm Convention requires parties to (paraphrased):

- take legal and administrative measures necessary to eliminate the production and use (unless exempted) of the 10 POP chemicals listed in Annexes A and B
- control imports/exports for this purpose (such as allowing movements for the purpose of environmentally sound disposal)
- assess and prevent the production and use of new chemicals exhibiting POP characteristics.

Article 3 is concerned with establishing the legal and administrative framework for eliminating the intentional production and use of POPs. In this section the history of New Zealand's past use of POPs is summarised, followed by an outline of the legal and administrative framework established and measures taken in New Zealand to comply with Article 3.

History of organochlorine pesticide use in New Zealand

New Zealand's past use of POP pesticides from the mid-1940s to the 1960s was mainly in agriculture, horticulture and timber treatment (see Table 3). Smaller amounts were also used in public parks and by home gardeners. The use of POPs to assist food production was progressively restricted by regulation, so that by the mid-1970s their use had largely ceased. All Stockholm Convention POPs pesticides were formally deregistered by the Pesticides Board in 1989. The use of chlordane, dieldrin and pentachlorophenol by the timber treatment and manufacturing industry also ceased about this time.

Table 3: Summary of Stockholm POPs pesticide historical usage in New Zealand[7]

Pesticide	Application
DDT	Used as a pasture insecticide to control grass grub (*Costelytra zealandia*) and porina (*Wiseana sp.)* caterpillars. It was frequently mixed with fertiliser or lime and applied to agriculture pastures, as well as to lawns, market gardens and parks.
Aldrin and dieldrin	These were introduced in 1954 as stock remedies in sheep sprays or dips for controlling sheep ectoparasites. Aldrin was used to control horticultural pests such as wireworm, soldier fly and blackvine weevil, and in limited quantities to control household spiders. Dieldrin was used for controlling carrot rust fly, crickets and armyworm, and was also used for timber preservation (mostly in plywood glues) and to mothproof carpets.
Chlordane	A broad-spectrum agricultural insecticide, chlordane was also used in the timber industry as a treatment against termites and borer, and as an insecticide in glues used for the manufacture of plywood, finger jointed and laminated timber.
Hexachlorobenzene (HCB)	HCB was used experimentally between 1970 and 1972 as a seed-dressing fungicide for cereal grain.
Heptachlor, endrin and toxaphene	Only small amounts of these pesticides were ever used in New Zealand.
Other organochlorines	
Lindane (γ-HCH)	Lindane was used as an insecticide in agriculture for the control of lice on cattle, ectoparasites (lice, keds and blowflies) in sheep, and grass grub in pasture. It was also used for insect control on vegetables and in orchards. Household uses included flyspray, flea control and carpet moth.
Pentachlorophenol (PCP)	It is estimated that around 5500 tonnes of PCP were used in the New Zealand timber industry over a 35- to 40-year period as a timber preservative and also as an antisapstain (fungicidal) treatment for freshly cut timber (mainly *Pinus radiata*). Its use in the timber industry ceased in 1988. PCP was also used to a relatively minor extent by the pulp and paper industry and the tanning industry, in mushroom culture, in home gardens, and on roofs to control moss and algae.

History of PCB use in New Zealand

Polychlorinated biphenyls (PCBs) were manufactured from 1930 to the late 1970s and used widely in industry throughout the world. PCBs were imported and used (but not manufactured) in New Zealand. Uses were many and varied, including as electrical transformer oils, dielectric fluids, electrical capacitors, heat transfer fluids, hydraulic fluids, solvent extenders, flame retardants, plasticisers, some paints and printing inks, immersion oils and sealants. The unusual industrial versatility of PCBs is directly related to their chemical and physical properties, which include resistance to acids and bases, compatibility with organic materials, resistance to oxidation and reduction, excellent electrical insulating properties, thermal stability, and non-flammability.

A programme to withdraw PCBs from service in New Zealand and to effect their disposal via high-temperature incineration in Europe was initiated in the mid-1980s (see also 'Activities to manage stockpiles of POP pesticides', under the Article 6 section). Small quantities of PCBs are exempted to remain in service subject to a monitoring regime. Under national legislation (the Hazardous Substances and New Organisms [HSNO] Act 1996), all PCBs must be completely withdrawn from use and destroyed no later than 2016. The task of administering the existing PCB exemptions register under the Toxic Substances Regulations 1983 has now transferred from the Ministry of Health to ERMA.

[7] The organochlorines listed in this table were all deregistered by May 1992 and no longer used as pesticides in agriculture, horticulture and industry.

Legal measures taken to comply with Article 3

The HSNO Act 1996 is the principal piece of legislation that regulates the use of chemicals in New Zealand. Specifically, the Act regulates the importation, manufacture and use of hazardous substances and imposes life-cycle controls on those substances. The Act was amended in 2003 to bring it into line with the legal requirements of the Stockholm Convention. The HSNO (Stockholm Convention) Amendment 2003 prohibits or restricts imports and the use of certain POP substances. The amendment came into force on 23 December 2004, the same day the Convention came into force for New Zealand. This means that:

- pesticides and industrial chemicals specified as POPs under the Stockholm Convention are banned from importation, production and use in New Zealand
- New Zealand has adopted a timetable to monitor and phase out, by 2016, any PCBs still in use, such as PCBs in electrical transformers, ballasts and capacitors (this timetable is in advance of the Convention deadline of 2025)
- exemptions allow for the importation of POPs for small-scale research and the laboratory use of analytical standards, as provided for under the Stockholm Convention.

The Import Control Act 1988 (renamed the Imports and Exports [Restrictions] Act 1988) was also amended so that import/export controls could be put in place by Order in Council, as required under the Stockholm Convention. Regulations under the Act – the Imports and Exports (Restrictions) Prohibition Order (No. 2) 2004 – came into force on 29 July 2004. The regulations allow for the export of a POP chemical as provided for under Article 3.2 of the convention, and also require that POP waste be administered as a hazardous waste in accordance with the requirements of the Basel Convention, for the purpose of environmentally sound disposal.

The HSNO Act 1996 is administered by ERMA, while the Imports and Exports (Restrictions) Act 1988 is administered by the Ministry of Economic Development. The New Zealand Customs Service (Customs) is the border enforcement agency and monitors the cross-border movement of goods for compliance with the relevant legislative requirements. This includes a requirement for importers and exporters to lodge electronic entries with Customs for goods imported into and exported from New Zealand. In practice, shipments identified as being covered by an import or export prohibition are held by Customs until the importer/exporter produces the required approval from the government agency administering the legislation.

ERMA assesses new substances in accordance with the requirements of Article 3.3 of the Stockholm Convention. In addition, ERMA operates a programme of reassessment of existing approved substances in accordance with the requirements of Article 3.4. Candidate substances are screened against a number of criteria, including hazardous properties such as chronic toxicity and persistence and/or bioaccumulation in the environment. For existing approved substances, a potential candidate list is drawn up and subject to public consultation, and the outcome of this is used to establish a priority listing of substances for reassessment.

Government administration of the above two pieces legislation aims to ensure that the legal requirements of Article 3 are met. These measures are summarised in Table 4 on the following page.

Table 4: Summary of Article 3 obligations and legal measures taken to eliminate the production and use of POPs

Summary of obligations of Article 3	Status (✓ = achieved)	Legal measures
Article 3.1(a): Prohibit and/or take the legal and administrative measures to eliminate production and use, and import/export, of the chemicals listed in Annex A (except as under Article 3.2).	✓	The HSNO 1996 (as amended by the HSNO [Stockholm Convention] Act Amendment 2003), prohibits the production, use and import of POPs pesticides, but permits exempted use of PCBs as per the Toxic Substances Regulations 1983 but subject to phase-out no later than December 2016. The Imports and Exports (Restrictions) Act 1988, via the Imports and Exports (Restrictions) Prohibition Order (No. 2) 2004, prohibits export of POPs (except as conditionally provided under Article 3.2).
Article 3.1(b): Restrict the production and use of the chemicals listed in Annex B (DDT).	✓	New Zealand has not notified an intention to use DDT, so no action is required.
Article 3.2(a): Import Annex A/B chemicals only: (i) for environmentally sound disposal (see Article 6.1(d); or (ii) for use as permitted to New Zealand under Annex A or Annex B.	✓	The HSNO 1996 allows limited exempted import and use of POP chemicals. The Imports and Exports (Restrictions Prohibition Order (No. 2) 2004 provides for the import of POP waste for the purpose of environmentally sound disposal.
Article 3.2(b): Export Annex A/B chemicals only: (i) for environmentally sound disposal (see Article 6.1(d) (reinforced by Article 3.2[c]) (ii) to a party that is permitted to use that chemical under Annex A or Annex B, or (iii) to a state not party to this Convention meeting annual certification conditions.	✓	The Imports and Exports (Restrictions Prohibition Order (No. 2) 2004 prohibits the export of POPs except as conditionally provided under Article 3.2. POPs wastes for export purposes are administered under the Basel Convention.
Article 3.3: Regulate to prevent the production and use of new chemicals exhibiting POP characteristics.	✓	Under the HSNO Act 1996 administered by ERMA, toxicity, persistence and bioaccumulation are recognised in the Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001.
Article 3.4: Take into consideration the criteria in paragraph 1 of Annex D when conducting assessments of pesticides or industrial chemicals currently in use.	✓	Under the HSNO Act 1996 administered by ERMA, POP characteristics are recognised in regulations (as noted above).
Article 3.5: Use of POPs for laboratory-scale research or as a reference standard is enabled.	✓	The HSNO Act 1996 administered by ERMA.
Article 3.6: Ensure the use of Annex A chemicals (i.e. PCBs under Annex A, Part II) is carried out in a manner that prevents or minimises human exposure and release into the environment and as further recommended (see Annex A Part II[b] [i], [ii] and [iii]).	✓	Exempted use and storage are provided for by the HSNO Act 1996 for PCBs as per the Toxic Substances Regulations 1983, but subject to completed phase-out no later than December 2016.

Article 3 measures to eliminate intentional production and use

ERMA will administer the HSNO Act 1996 in matters relating to:

- assessing new chemicals, pesticides or industrial chemicals currently in use that exhibit POP characteristics (Articles 3.3 and 3.4)
- permitting the appropriate use of POPs for laboratory-scale research or as a reference standard (Article 3.5)
- managing the existing exempted use and storage of PCBs (Article 3.6).

The New Zealand Customs Service and the Ministry of Economic Development will:

- administer and enforce the Imports and Exports (Restrictions) Prohibition Order (No. 2) 2004, and the Basel Convention
- control movements of POP chemicals and POP hazardous waste across the border.

Article 4: Register of Specific Exemptions

New Zealand has not registered for any specific exemptions, and so no measures are necessary at this stage.

Article 5: Measures for Annex C Chemicals

A draft Action Plan for Dioxins and Other Annex C Chemicals (unintentional POPs) has been prepared to set out how New Zealand intends to comply with the obligations of Article 5 of the Stockholm Convention. The Plan can be found in Part 3 of this document.

Article 6: Stockpiles and Wastes

Article 6 measures to reduce or eliminate releases from stockpiles and wastes are (paraphrased):

Article 6.1(a) to (c): to manage POP stockpiles and wastes to protect human health and the environment by identifying and managing in an environmentally sound manner (handling, collecting, transporting, storing, disposing) chemical stockpiles and products/ articles in use (consisting of or contaminated by POPs) on becoming wastes.

Article 6.1(d) (i) to (iv): to require environmentally sound management of all POPs wastes, and products/articles on becoming wastes (specifically excluding recovery, recycling, reclamation, direct reuse or alternative uses of such wastes).

Article 6.1(e): to develop strategies for the identification and environmentally sound management of POP-contaminated sites.

Article 6.2: to be guided by the Conference of the Parties on the environmentally sound disposal of POP wastes (destruction levels, methods of disposal, etc) in co-operation with the Basel Convention.

In the New Zealand context, measures on stockpiles and wastes can be addressed under three categories: PCBs, POP pesticides and POP-contaminated sites.

Convention obligations for PCBs

In summary, Article 6 requires parties to reduce/eliminate releases of PCBs from stockpiles and wastes. Further and specific obligations relating to PCBs are detailed in Annex A, Part II, encompassing their progressive removal from use, measures to reduce exposures and risk, and identifying and safely managing and disposing of articles and wastes consisting of PCB solids (above 50 ppm) and liquids (consisting of PCBs above 50 ppm and above 50 ml in volume).

The terms used in the Convention text are "make determined efforts" for PCBs greater than 5 litres or 500 ppm, and "endeavour to" identify and remove from use equipment containing PCBs greater than 50 ppm or 50 ml (of greater than 50 ppm). Specifically, the Convention places the following obligation on parties with respect to PCBs (paraphrased from Article 6 and Annex A Part II).

- Take measures, as necessary, for the discovery, identification, collection and disposal of remaining PCB liquids in priority order (concentration, volume) down to 50 ppm and 50 ml, by 2025.
- Identify, collect and manage/dispose of PCB solids greater than 50 ppm (e.g. fluorescent tube ballasts, cable sheaths, caulking and painted products).
- Ensure that POPs as products and articles, on becoming waste, are handled, collected, transported, stored and disposed of in an environmentally sound manner.

Activities to manage PCB stockpiles

A nationwide programme to withdraw PCBs from service in New Zealand and to effect their disposal was initiated in the mid-1980s under the (now repealed) Toxic Substances Act 1979 administered by the Ministry of Health. In June 1988 the Hazardous Wastes Task Group (comprising the Ministry for the Environment, Ministry of Health, Ministry of Energy, Department of Scientific and Industrial Research and the Electricity Corporation) published a report entitled *A Strategy for Managing PCBs*. This report was the forerunner for the *Code of Practice on Safe Management of PCBs*, which was published in September 1988 and later reprinted in 1993. The strategy set out in the Code of Practice stated that all PCBs must be withdrawn from service and disposed of within five years, and that owners of PCBs must undertake responsibility for all costs for managing PCBs, including storage, disposal and clean-up costs.

The timeline of the *Code of Practice* was twice extended, as provided in the Toxic Substances Regulations, to encourage PCB owners to identify and remove PCBs. The need for identification and removal of PCBs from factories in the meat and dairy export sector was highlighted by European Union plant hygiene inspectors, which added further impetus to the programme.

Most bulk stocks of PCBs (i.e. equipment containing greater than 10% PCBs and volumes greater than 5 litres) have now been collected and shipped to Europe for destruction. The programme involved a major effort directed at all industrial sectors, with the following features.

- The programme involved risk management assessment, planning, policy, and implementation phases (see Hazardous Wastes Task Group, 1988).
- The programme targeted electrical generation, transmission and end users, such as the government sector (including education, broadcasting, rail, defence and hospitals), most large commercial buildings, and industries (e.g. ports, airports, meat processing, dairy, timber, pulp and paper, and manufacturing).
- Initial efforts focused on the withdrawal and destruction of high-strength / bulk liquid PCB stocks (starting with PCBs greater than 5000 L or 500 ppm) associated with the use of transformers, including those from power stations and sub-stations.
- A network of collection depots was set up and operated by some electrical contracting companies to deal with small holdings of PCBs. This scheme was very successful in providing a drop-off point, mainly for electricians to dispose of PCB lighting ballasts and small power factor correction capacitors.
- A number of sites were cleaned up where PCBs had escaped due to spillage or electrical equipment malfunction.
- The HSNO Act 1996 Act banned the use and storage of PCBs while allowing for exemptions under a permit scheme to facilitate an ongoing programmed phase-out.
- On being decommissioned, PCBs are classified as hazardous wastes and managed in accordance with the Basel Convention. PCBs presently exempted for use by the electrical supply industry must be completely withdrawn and destroyed no later than 2016.
- A cumulative total of 1467.7 tonnes of PCBs (including oil, capacitors, casings, lighting ballasts) has been collected and destroyed up to 2004 (see Table 5 below).

- Disposal of PCBs has been achieved exclusively via export to Europe and destruction through high-temperature incineration.
- PCB exports for disposal peaked in the mid-1990s and then declined, as reflected in the export tonnages per annum set out in the Table 5.

On current estimates, over 90% of the significant PCB holdings (comprising high volumes and/or high-risk locations such as schools, hospitals and export industries) in New Zealand have now been withdrawn and disposed of. However, small amounts of PCBs (mainly fluorescent tube ballasts) continue to be identified and removed from service for disposal.

Table 5: Tonnes of PCBs exported for disposal up to 2004

Year	Metric tonnes (1000 kg) exported for disposal
Pre-1992	240
1992	250.9
1993	Nil
1994	472.2
1995	121.5
1996	84.8
1997	217.7
1998	Nil
1999	32.2
2000	25.7
2001	Nil
2002	Nil
2003	12.6
2004	10.1
Total	**1,467.7 tonnes**

Measures for managing PCBs

Stockholm Convention obligation: higher-risk PCBs

Annex A, Parts II(a)(i) and (ii): Make determined efforts to identify, label and remove from use PCBs greater than 500 ppm (0.05%), and volumes greater than 5 litres (containing greater than 500 ppm).

The removal and destruction of stocks of medium to high concentration per volume PCBs (greater than 500 ppm / 5 litres) are believed to be substantially completed. A follow-up on exempted use and storage of PCBs should check that Stockholm Convention obligations are being complied with (i.e. Annex A, Part II (i) to (iii): "measures to reduce exposures and risk, to control the use of PCBs"). This could be achieved through a review by ERMA of PCB exemptions for use and storage, with a view to the timely completion of PCB withdrawal and disposal, to be achieved at the very latest by 2016.

Stockholm Convention obligation: lower-risk PCBs

Annex A, Part II(a)(iii): Endeavour to identify and remove from use equipment containing greater than 50 ppm (0.005%) and volumes greater than 50 ml.

UNEP guidelines indicate a wide range of historical uses of PCBs. Judgement is needed on how New Zealand should act to meet the Stockholm Convention obligation for lower-risk PCB wastes because it is doubtful that the scope and infrastructure of the previous withdrawal programme placed an emphasis on "miscellaneous and minor" stocks.

This category involves PCB fluorescent tube ballasts in older buildings,[8] and miscellaneous PCB items, particularly in rural areas, such as power factor correction capacitors and motor-start capacitors[9] (e.g. for wash-down and bore-water pumps). Present "guestimates" indicate that there may still be more than 100 tonnes of PCBs still in use (fluorescent tube ballasts 75%, other capacitors 25%). As a total this could be considered a significant quantity, although in reality such items may be considered low risk and are dispersed throughout the country. A pilot field survey of pre-1980 buildings and of rural areas could be undertaken in conjunction with stakeholders.

A survey of scrap metal merchants would be a useful cross-check for the presence of PCBs in the waste stream associated with discarded equipment.

Stockholm Convention obligation: collection and disposal

Article 6.1(d) (paraphrased): Take appropriate measures so that (POPs/PCB) wastes, including products and articles upon becoming wastes, are handled, collected, transported, stored and disposed of in an environmentally sound manner.

The primary objective of a collection and disposal programme would be to ensure that, as far as practicable, PCB wastes are managed in accordance with the requirements of the Stockholm Convention. In practice, this means maintaining an active collection and disposal network among electrical contractors and the local authority sector. Collectors providing an interim storage service for PCB wastes need an exemption permit from ERMA.

The success of an intervention strategy to prevent inappropriate PCB disposal (e.g. uncontrolled discard, uncontrolled disposal to landfill, entry to the scrap metal or waste oil streams) depends on the awareness and actions of personnel involved in the disposal of obsolete electrical items that have become wastes (e.g. electricians, health protection officers, building demolition contractors, farm workers, operators at transfer stations and landfills, and scrap metal and waste oil merchants).

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[8] Lighting ballasts can be found in fluorescent, mercury, sodium and neon lights as a small capacitor. Ballasts manufactured in the USA post-1978 have stamped on them "No PCBs". Unlabelled ballasts should be assumed to contain PCBs.

[9] Motor-start capacitors are small capacitors used with single-phase motors to provide starting torque (electrical appliances may include washing machines, water pumps, ventilating fans and air conditioners).

Such an initiative could be seen as a timely follow-up to the publication *Phasing Out Small PCB Holdings* (Ministry of Health, 1995). A short, sharp campaign would be more cost-effective than maintaining a specialised collection network for many years to cater for an ongoing dribble of PCB wastes.

A nationwide collection service of spent fluorescent tubes has been initiated by Medi-Chem Waste Service Ltd to recover and recycle mercury and other materials. An allied initiative to properly dispose of old PCB ballasts could potentially utilise this same infrastructure.

Proposed strategy for miscellaneous PCB stocks

The quantity of miscellaneous and minor PCB items still in use is uncertain. The Convention places an obligation on New Zealand to ensure that a collection and disposal network is in place so that such items, on discovery, are managed appropriately. The viability of the existing collection network should be assessed and managed to ensure adequate regional/national coverage.

It is also proposed that stakeholders be consulted (including the electrical and lighting industry, and the scrap metal and waste oil industry) to better estimate remaining miscellaneous PCB stocks and to facilitate the operation of the collection and disposal network. Thereafter, there could be either:

- passive follow up, to establish a level of infrastructure and awareness appropriate to the passive identification, interim storage and environmentally sound disposal of PCB items that trickle in, or
- active follow up, if warranted, involving an intervention strategy to actively identify, remove from use, collect and dispose of miscellaneous items containing PCBs (e.g. fluorescent tube ballasts, capacitors once in common use in farms appliances, and other PCB items not yet considered in a local context).

Article 6 measures for managing PCBs

ERMA will administer the system of exemptions for the use and storage of PCBs to achieve the withdrawal and disposal of exempted PCB stocks before 2016.

ERMA and the Ministry for the Environment will facilitate the ongoing collection and disposal of miscellaneous and minor PCB stocks.

Activities to manage stockpiles of POP pesticides

Article 6.1(a) to (c) (paraphrased): Manage POP stockpiles and wastes to protect human health and the environment by identifying and managing, in an environmentally sound manner (handling, collecting, transporting, storing, disposing), chemical stockpiles and products/articles in use on becoming wastes.

Context

Most regional councils have been proactive in dealing with hazardous wastes (which include agrichemical POPs). Significant collection and disposal of agrichemical POPs occurred between 1997 and 1999, when seven councils worked together to collect and ship 120 tonnes of intractable agrichemicals (including POPs) for disposal overseas. Since then, some regions have maintained ongoing collections, while others have run less frequent programmes. Some collections were sponsored by the Ministry for the Environment's Sustainable Management Fund, but most were funded by local government.

The Ministry for the Environment, in conjunction with regional councils and unitary authorities, has undertaken – and will continue until 2009 to undertake – follow-up collections of unwanted and unused agricultural chemicals, including POP pesticides, in rural New Zealand. Councils fund and co-ordinate the collection of the chemicals and cover the associated marketing, collection, packaging, storage and other additional costs, and the Ministry pays for final disposal costs.

The collection programme has two stages. The first stage is to remove as much as possible of the historical legacy of agrichemicals stored in rural sheds across the country. A key focus is the removal of unwanted POP pesticides. Collections may also focus on smaller quantities of POPs in urban properties using mobile ("hazmobile") and/or waste transfer stations as collection points. This stage is to continue until 30 June 2009. The second stage is to establish long term systems to ensure that stockpiles of agrichemicals do not build up again.

Under the present collection programme involving 13 regional councils (out of 16), over 290 tonnes of unwanted agrichemicals will have been collected between 2003 and June 2006, of which 228 tonnes were intractable agrichemicals, including POPs. A further 175 tonnes of unwanted intractable agrichemicals are estimated to remain on rural properties among New Zealand's 16 regions. Eight regions are now considered "effectively clear" of intractable agrichemical stockpiles, and collection efforts will focus on clearing the remaining regions. Information documenting past and present efforts to collect intractable agrichemicals can be viewed on the Ministry for the Environment's website.[10]

In compliance with Article 6.1(a) to (c) of the Stockholm Convention, and pursuant to the HSNO Act 1996, ERMA issued a Storage and Disposal of Persistent Organic Pollutants Notice 2004.[11] The notice sets out the conditions and requirements for ensuring that POP wastes are managed in an environmentally sound manner (handling, collecting, transporting, storing, disposing of chemical stockpiles). The notice directs collectors to comply with all relevant requirements of NZS 8409:2004, including, in particular, section 3 (Land transport of agrichemicals), section 4 (Storage and supply of agrichemicals), and section 7 (Emergency preparedness and management).

The Ministry for the Environment and ERMA have produced a pamphlet entitled *Do You Have Banned Pesticides on Your Farm?* The pamphlet explains the requirement to store POPs and other unwanted agrichemicals safely until they can be properly disposed of.

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[10] See: http://www.mfe.govt.nz/publications/hazardous/intractable-agricultural-chemicals-feb06/html/index.html

[11] Hazardous Substances (Storage and Disposal of Persistent Organic Pollutants) Notice 2004, *New Zealand Gazette* 174 (22 Dec), 2004.

Article 6 measures for managing stockpiles of POPs pesticide

ERMA and the Ministry for the Environment, in conjunction with stakeholders, will promote among rural property owners the safe interim storage of historical POPs.

The Ministry for the Environment will fund, in conjunction with regional councils, the disposal of unwanted POP pesticides for a further three years to 30 June 2009.

Activities to manage POP-contaminated land

Article 6.1(e): Endeavour to develop strategies for identifying sites contaminated by chemicals listed in Annex A, B or C (i.e. POPs); if remediation of those sites is undertaken it shall be performed in an environmentally sound manner.

Context

Managing land contaminated by POPs is part of the more general issue of managing land contaminated as a result of chemicals use. Different aspects of contaminated land management are addressed under the Resource Management Act 1991 (RMA), the HSNO Act 1996, the Health Act 1956, the Building Act 2004 and the Health and Safety in Employment Act 1992. Whereas the Ministry for the Environment is the central government agency having responsibility for overall policy on contaminated land, local authorities (regional, city and district councils) undertake the practical function of administering the legislation. The policy and legislative framework on contaminated land management is still evolving.

Activities relevant to managing POP-contaminated land

Guidelines

The Ministry for the Environment has published a number of good practice guidelines. Those relevant to the identification and environmentally sound management of POP-contaminated land include:

- *Health and Environmental Guidelines for Selected Timber Treatment Chemicals*, 1997
- *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand*, 2003
- *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values*, 2003
- *Contaminated Land Management Guidelines No. 3: Risk Screening System*, 2004
- *Contaminated Land Management Guidelines No. 4: Classification and Information Management Protocols*, 2006

- *Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils*, 2004.
- *Identifying, Investigating, and Managing Risks Associated with Former Sheep-dip Sites: A Guide for Local Authorities*, November 2006.

Investigation and remediation activity

There has been significant activity by local government and industry to identify, investigate and clean-up contaminated sites. For example, a number of councils have commenced work on a process of identifying sites that appear on the Ministry's Hazardous Activities and Industries List (HAIL). There have also been investigations into agricultural land historically contaminated with POPs pesticide residues (e.g. investigation of horticultural sites in the Waikato, Bay of Plenty, Auckland and Tasman regions). The Waikato Pesticides Awareness Committee Inc investigated contaminated sheep-dip sites within the framework of a project that was funded by the Ministry's Sustainable Management Fund. Several regional councils have been active in promoting the investigation and remediation of timber treatment and wood waste disposal sites contaminated with dioxins, while the Auckland Regional Council has also investigated DDT and PCB seabed contamination arising from historical discharges from a dockyard.

Contaminated Sites Remediation Fund

A Contaminated Sites Remediation Fund is administered by the Ministry for the Environment to provide government financial assistance for the clean-up of high-priority sites where no party is clearly liable. The Fund has provided NZ$6 million over three years (2003–2006) to clean-up specific contaminated sites. In May 2006 the Government announced an additional $1.5 million each year for the next three years (2006/07–2008/09) for the Fund to continue to assist regional councils with the investigation and remediation of contaminated sites. The first major expenditure from the fund is being used to clean New Zealand's most contaminated site: the former Fruitgrowers Chemical Company site at Mapua, in Tasman District. This ex-industrial pesticide manufacturing site is contaminated by DDT, dieldrin and lindane.

The Ministry for the Environment is leading the clean-up of the Mapua site in conjunction with, and with financial assistance from, the Tasman District Council. Remediation work is progressing well using a newly developed mechano-chemical dehalogenatation process to decontaminate the soil to an acceptable level prior to its on-site reinstatement. As of November 2006, over 5200m^3 of an estimated 6000m^3 of contaminated soil had been treated and reinstated. Contaminated marine sediments located adjacent to the site are also being removed and replaced with clean material. Approximately 1.4 tonnes of pure pesticide, including original sacks of product, have so far been discovered buried on the site. On completion of the remediation, 40% of the land is to be set aside as public space, with the remaining area designated for residential and commercial land use.

Up to NZ$1 million per year of the Contaminated Sites Remediation Fund is allocated on a contestable basis to local government for the clean-up of high-priority sites in their jurisdiction. Over 20 projects for the investigation, remediation planning and actual clean-up of contaminated sites have been part-funded by government, with the remaining contribution coming from local government, landowners and industry. Some of the sites involve POPs; for example, the fund is contributing to investigations by the Bay of Plenty Regional Council and the Whakatane District Council into sites around Whakatane where dioxin-contaminated wood waste was dumped.

Other POP-related funded projects include an investigation into former horticultural areas in Auckland, site investigations into former sheep-dips on the Rarangi aquifer in Marlborough, remediation planning for a disused agrichemical contractor's spray-shed in Christchurch, and remediation planning for a timber treatment plant in the Otago region.

Timber treatment sites

The timber industry has cleaned up several former timber treatment sites contaminated with timber preservative chemicals (including pentachlorophenol) in accordance with Ministry for the Environment guidelines. The Ministry is continuing to monitor the risks posed by contaminants on sawmill and timber treatment sites and the need for risk management strategies. An assessment of the likely extent of dioxin contamination at sawmill sites is contributing to a revised estimate of the national reservoir of dioxin in soils.

Tax deductions for remediating contaminated land

The Income Tax Act 2004 has been amended to facilitate and encourage clean-up and management of contaminated land. The new legislation, the Taxation (Base Maintenance and Miscellaneous Provisions) Act 2005, was enacted on 21 June 2005. It provides tax deductions for business expenditure related to contaminated land clean-up and management. The amendments (now in force) have removed barriers to business spending on contaminated land clean-up and management by providing for:

- an immediate tax deduction, which is now available for restoring contaminated land (other than for land developers)
- a memorandum account, called the Environmental Restoration Account (ERA), in which site restoration and monitoring costs can be matched against prior business income. Essentially, this means businesses can set aside money now for future site restoration, such that the cost of meeting restoration obligations in the future reduces the overall tax liability of the business in the present and there is no impact on a taxpayer's operating cash position.

Legal framework for contaminated land management

The Resource Management Act 1991 (RMA) was amended in June 2005 in several respects that bring clarity and emphasis within a legal framework to the management of contaminated land by local authorities (including land contaminated by POPs). The Act now includes a definition of contaminated land. Regional councils are specifically assigned a function (section 30 [10(ca)]) to investigate land for the purposes of identifying and monitoring contaminated land, and territorial authorities are specifically assigned a function (section 31[1][b]) to control any actual or potential effects of the use, development or protection of land, including for the purpose of preventing or mitigating any adverse effects of the development, subdivision or use of contaminated land. Territorial authorities may require that data on land contamination be collected and assessed before an application for a residential sub-division is approved. The Ministry for the Environment has, in partnership with local authorities, prepared a guideline for the management of contaminated land information (Ministry for the Environment, 2006).

Current initiatives

The Ministry for the Environment has commenced work investigating national environmental standards under the RMA for contaminated land. The purpose of the standards would be to provide landowners, businesses and local government with certainty about whether contaminated land is sufficiently cleaned to protect people. The standard would specify levels of contaminants in soil (including certain POPs) that are low enough so that risks to people are acceptable, and may include a generic methodology to derive New Zealand risk-based soil values applicable to any contaminant.

The following additional guidance has been prepared by the Ministry for the Environment to facilitate the identification and management of land contaminated by POPs and other contaminants:

- *Identifying, Investigating and Managing Risks Associated with Former Sheep-dip Sites: A Guide for Local Authorities*, 2006.

Article 6 measures for managing POP-contaminated land

The Ministry for the Environment will:

- develop policies, guidelines and administrative systems to facilitate the environmentally sound management of POP-contaminated land
- administer the Contaminated Sites Remediation Fund to assist local government to assess and clean-up contaminated sites throughout the country
- investigate national environmental standards for contaminated land.

Guidance from the Conference of Parties

As per Article 6.2 of the Convention concerning co-operation between the bodies of the Stockholm and Basel Conventions, technical guidelines have been prepared addressing the environmentally sound management of wastes consisting of, containing or contaminated by POPs and other halogenated compounds.[12] Further guidance is being prepared. Apart from constituting an information resource, parties are reminded to take account of this guidance on the environmentally sound disposal of POP waste.

[12] Two guidelines have been prepared: (i) general technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with POPs; and (ii) technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs) (refer to COP.1/INF/12.)

A summary of obligations and measures for stockpiles and wastes

A summary of Article 6 obligations and the status of the elements supporting the measures are listed in Table 6.

Table 6: Summary of Article 6 obligations to reduce or eliminate releases from stockpiles and wastes

Summary of Article 6 obligations	Elements supporting measures	Status (✓ = achieved)
Article 6.1(a) to (c) Parties are required to: • develop strategies for identifying POPs as stockpiles, including products and articles in use consisting of or contaminated by POPs • identify, to the extent practicable, these POP stockpiles and articles • manage the stockpiles appropriately (including articles on becoming wastes) in a safe, efficient and environmentally sound manner.	Plan a programme to identify, withdraw from service and dispose of major stocks of PCBs in the electrical industry MfE/ERMA administer the discovery and identification, collection and disposal of remaining PCBs liquids and solids in priority order (concentration, volume) down to 50 ppm and 50 ml, by 2016 MfE/ERMA plan for the identification, collection and disposal of minor and miscellaneous stocks of PCBs MfE/local authority plan for the identification, collection and disposal of POPs waste pesticides	✓ Measures ongoing and being planned Measures are being planned Measures are ongoing and being planned
Article 6.1(d) (i) to (iv) Parties are to take appropriate measures so that POP wastes (chemical stockpiles, articles on becoming wastes) are: • handled, collected, transported and stored in an environmentally sound manner • disposed of in an environmentally sound manner (recovery, recycling, reclamation, direct reuse or alternative use of such wastes specifically excluded); and if exported, take account of relevant international rules, standards and guidelines.	Nationwide withdrawal from service and destruction of 90% of all PCB liquids, 1990–2004 Administration by ERMA of timely withdrawal from service and destruction of remaining exempted PCB liquids ERMA Notice (Hazardous Substances [Storage and Disposal of Persistent Organic Pollutants] Notice 2004; New Zealand Gazette, No. 174, 22 December 2004) meets Convention requirements for the environmentally sound management of POPs waste pesticides, including disposal The MfE/local authority POPs pesticides stockpile collection and disposal programme is under way The Ministry of Economic Development administers export permits for POPs wastes (e.g. PCBs, pesticides) exported for destruction under the Basel Convention	✓ Ongoing ✓ Ongoing Ongoing
Article 6.1(e) Parties are to endeavour to develop appropriate strategies for identifying sites contaminated by POPs, and if remediation is undertaken, it is to be performed in an environmentally sound manner.	Amendments to the Resource Management Act 1991 assign roles for local government in the administration of contaminated land (including POPs) Further development of government policy on the management of contaminated land Clean-up of a major POPs pesticide manufacturing site Environmentally sound management and clean-up of other POP-contaminated sites, as feasible	✓ Ongoing Ongoing Ongoing
Article 6.2 Be guided by the Conference of the Parties (COP) on the environmentally sound management and disposal of POPs, including guidance prepared under the Basel Convention with respect to levels of POPs destruction, methods of disposal, and low POP levels.	Take account of COP technical guidance	Further COP guidance is pending

Article 7: National Implementation Plan

Summary of obligations of Article 7	Comment	Status
Article 7(1)(a): Develop and endeavour to implement the NIP	NIP is prepared	✓
Article 7(1)(b): Submit the NIP to the convention Secretariat before 23 Dec 2006	NIP is submitted to the convention Secretariat	✓
Article 7(1)(c): Review and update the NIP as specified by the COP	See reporting schedule under Article 15	Ongoing
Article 7(2): Co-operate through international and regional agencies; consult stakeholders	Stakeholder consultation on draft NIP scheduled from June 2006 See also Article 12 with respect to international co-operation	Ongoing
Article 7(3): Integrate the NIP in sustainable development strategies	Via Cabinet approval of the NIP	Ongoing

The Ministry for the Environment prepared and consulted with national stakeholders on a draft plan during 2006. The NIP was then finalised, approved by Cabinet, and submitted to the UNEP Secretariat in December 2006.

Parties are endeavouring to integrate their NIPs into their sustainable development strategies, where appropriate. In supporting the goal of sustainable development, the Ministry for the Environment's *Statement of Intent 2005–2008* (Ministry for the Environment, 2005a) refers to a healthy environment as a strategic priority. Ministry work programmes that support the goal of the Stockholm Convention include the development of national environmental standards for dioxins and other air toxics, the cleaning up of the legacy of previous practices that were not environmentally sound (such as the careless handling of toxic chemicals), and work to promote the New Zealand Waste Strategy.

Article 7 measures for a National Implementation Plan

The Ministry for the Environment:

- has prepared a draft National Implementation Plan, consulted with stakeholders, and submitted New Zealand's Plan to the Stockholm Convention Secretariat by December 2006
- will review and update the Plan in accordance with the reporting requirements of Article 15
- will respond to requests for international co-operation consistent with commitments under Article 12.

Article 8: Listing of New POPs

Article 8 sets out the process and criteria by which new POPs are proposed, assessed and listed.

Under Article 8 of the Convention, parties can submit a proposal to the Persistent Organic Pollutants Review Committee for assessment against the screening criteria specified in Annex D. If the Committee decides the chemical meets the criteria, a draft risk profile is prepared in accordance with Annex E. The Committee must also take into consideration the socio-economic issues listed in Annex F in preparing an evaluation of possible control measures. The Committee submits recommendations to meetings of the Conference of the Parties (to the Stockholm Convention).

The 31 members of the Committee representing five regions are government-designated experts on chemical assessment or management. Australia will hold a seat on the Committee for a four-year term, being one of seven countries representing the Western Europe and Other States region. Meetings are open to observers and are held at least once a year. The first meeting of the Committee, held during 7–11 November 2005, initiated consideration of the following chemicals for listing in Annex A of the Convention:[13]

- pentabromodiphenyl ether – a flame retardant used mainly in polyurethane materials incorporated into upholstery and furnishings
- chlordecone – an agricultural insecticide (not registered for use as a pesticide/animal remedy in New Zealand)
- hexabromobiphenyl – a flame retardant used in synthetic fibres and plastics
- lindane – a parasiticide (presently used in a small number of products in New Zealand for the human therapeutic treatment of head lice)
- perfluorooctane sulfonate – a chemical with the property of being both lipid- and water-repellent. It is used widely as a surface-active agent for textiles and leather products, metal plating, food packaging, fire-fighting foams, floor polishes, denture cleansers, shampoos, coatings and coating additives, in the photographic and photolithographic industry, and in hydraulic fluids in the aviation industry.

Article 8 measures

ERMA, in conjunction with the Ministry for the Environment, will:

- monitor international assessments of potential POP chemicals and participate in forums, as appropriate; and, subject to resources, will collect information about these POP candidates in New Zealand
- consult with stakeholders in developing a New Zealand position on chemicals recommended by the Persistent Organic Pollutants Review Committee to the Conference of the Parties (to the Stockholm Convention) for listing under the Convention.

[13] Further information on these chemicals and the work of the POPs Review Committee can be viewed on the Stockholm Convention website: http://www.pops.int/.

Article 9: Information Exchange

Under Article 9, parties are required to facilitate or undertake information exchange relevant to:

- the reduction or elimination of the production, use and release of POPs
- alternatives to POPs, including information relating to their risks as well as their economic and social costs.

This information can be exchanged either directly or via the Information Clearing House of the Secretariat.

The Ministry for the Environment is New Zealand's designated focal point for exchanging information relevant to the Convention. New Zealand has undertaken various organochlorine-related studies over the past decade (see Appendix 2). Reports are generally placed on the website of the agency that undertook the work.

Article 9 measure

The Ministry for the Environment will provide and exchange information with parties to the Stockholm Convention, either directly or via the Information Clearing House of the Convention Secretariat.

Article 10: Public Information, Awareness and Education

Article 10 (paraphrased) requires parties to promote and facilitate awareness of POPs among policy- and decision-makers, and, along with industry and professional users, to provide up-to-date information to the public as well as appropriate education and training programmes. Public participation in developing responses to and implementing the Convention is emphasised. The mechanism by which to estimate the annual quantities of POPs released or disposed of should also be considered.

The generally accepted practice underlying environmental decision-making in New Zealand is to consult with stakeholders, and provide public information through a range of media, including publications, workshops and the internet.

During the latter stages of the Organochlorines Programme, 1995–2001, public meetings were held in all regions of New Zealand to present the findings of research, promote public understanding of POPs issues, discuss issues of concern raised, and provide opportunities for public input to the development of government policy. The practice of providing information, undertaking education and outreach activities and consulting was considered an essential part of the success of the Organochlorines Programme. A variety of communication tools were employed, including print media (bulletins, pamphlets, lay persons' reports, scientific reports), conference presentations, public meetings, radio interviews with visiting experts, and submissions.

Undertaking broad-scale research involved the commitment of a diverse network of scientific, technical and managerial personnel involving government and industry sectors, and the research community. An Organochlorines Consultative Group, comprising representatives from central and local government, industry and NGOs, was established for the duration of the Programme to facilitate policy advice and stakeholder input. Further information on the work undertaken is referred to under Article 11.

Government activity on POPs issues in New Zealand has now moved into a phase of directly implementing the measures of the Stockholm Convention (see Appendix 1). Oversight of POPs-related programmes and interests across government is being co-ordinated by a Senior Officials Group on Organochlorines convened by the Ministry of Health.

Most recently, a pamphlet *Do You Have Banned Pesticides on Your Farm?* has been promoted to the rural sector. The pamphlet outlines the legal requirements for the storage of POPs and other unwanted agrichemicals pending their collection for disposal.

The Ministry for the Environment has prepared *The Users Guide to Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004*.[14] The Users Guide provides a "plain English" description for practitioners in local government of how best to implement the regulation. The *Users Guide* refers to the standards addressing dioxins and other toxics, ambient air quality, the woodburner design standard, and the control of greenhouse gases at landfills.

New Zealand does not have a national database suitable for use as a pollutant release and transfer register for POPs, because the control of releases of pollutants to the environment is administered as a regional council function. However, the particular requirement to estimate releases of unintentional POPs, addressed under Article 5, is being undertaken at a national level. Also, records are being kept of the quantities of POPs being collected and disposed of.

Article 10 measure

The Ministry for the Environment will consider the requirements of Article 10 when undertaking projects relevant to the Stockholm Convention.

[14] See *The Updated Users Guide to Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004 (Including Amendments 2005) (second draft)*, Ministry for the Environment, 2005b.

Article 11: Research, Development and Monitoring

Article 11 requires parties to encourage research, development and monitoring of POPs on their:

- sources, releases and transport to the environment
- presence, levels, trends and effects on humans and the environment
- socio-economic and cultural impacts
- release reduction and/or elimination
- harmonised methodologies for making inventories and analytical techniques for measuring releases.

In taking this action, parties should also:

- support and further develop international programmes aimed at research, data collection and monitoring
- support efforts to strengthen national scientific and technical research capabilities
- take into account the concerns and needs of developing countries to improve their capability to participate
- undertake research towards alleviating the effects of POPs and make the results of this available to the public
- encourage and/or undertake co-operation with regard to the storage and maintenance of this generated information.

Government reports relating to POPs are listed in Appendix 2. A brief overview of the Government's POPs-related research and monitoring is set out below.

Ministry for the Environment

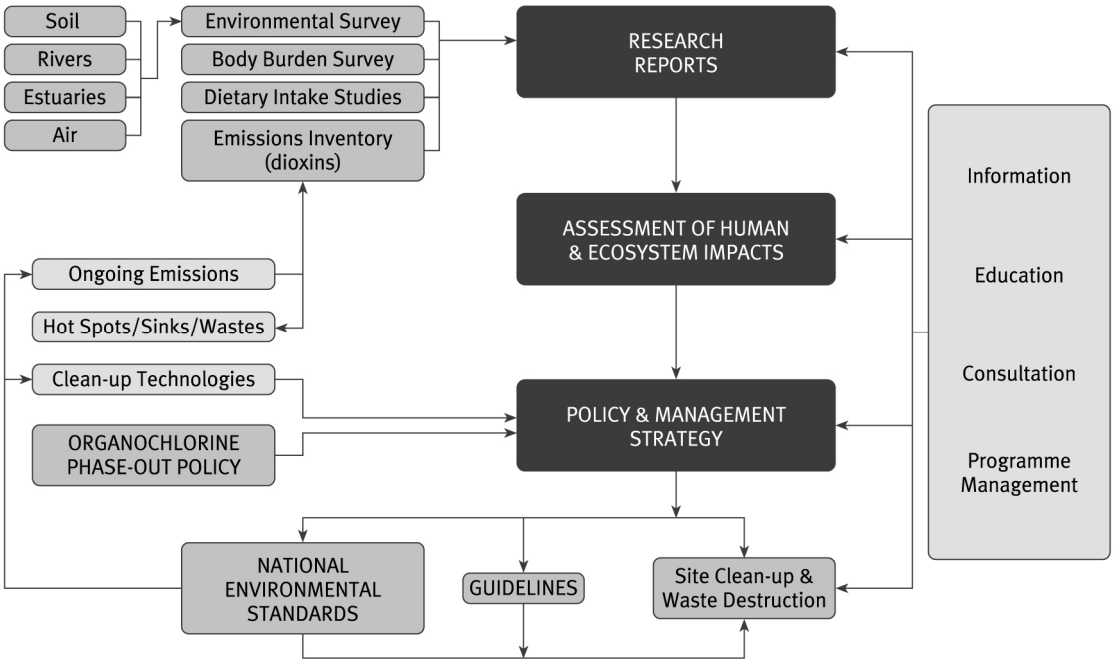
The Organochlorines Programme in the Ministry for the Environment was set up in 1995 to establish the state of the New Zealand environment with respect to organochlorine chemicals and to identify priorities for further work. Under the Programme, completed in 2001:

- levels of organochlorines in the wider New Zealand environment were studied
- the sources of dioxins emitted to air, land and water were identified and quantities estimated
- the levels of dioxins and PCBs in the diet of New Zealanders and the levels of POPs present in human serum were measured, and risk evaluations were undertaken.

Ministry for the Environment reports from the Organochlorines Programme can be viewed and downloaded from: http://www.mfe.govt.nz/publications/hazardous/index.html#organochlorines.

An overview of the conceptual design of the Organochlorines Programme is presented in Figure 1.

Figure 1: An overview of the New Zealand Organochlorines Programme



Ministry of Health

The Ministry of Health published a study in 2001 of the concentration of persistent organochlorine contaminants, including polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDDs/PCDFs), polychlorinated biphenyls (PCBs), and organochlorine pesticides in the milk of New Zealand women (Bates *et al*, 2001). The main objective of the study was to investigate whether measures to reduce exposure to persistent organochlorine compounds in New Zealand had led to detectable reductions in the levels of these compounds in human milk over the period 1988 to 1998. This research also enabled New Zealand to participate in the third round of the World Health Organization (WHO) study of levels of PCDDs/PCDFs and PCBs in human milk.

Planning for a fourth WHO-co-ordinated survey of levels of POPs in human milk is under way internationally under the auspices of the Global Environment Monitoring System / Food Contamination Monitoring and Assessment Programme (GEMS/Food). The programme presently involves collaboration among some 80 countries. A Ministry of Health-commissioned study that will assess the levels of POPs in breast milk in New Zealand consistent with the WHO protocols is beginning in October 2006 and is scheduled for completion in mid-2008. The findings from this study will be compared with previous data to detect trends in POPs exposure. The results will be shared with the WHO.

New Zealand Food Safety Authority

The New Zealand Food Safety Authority (NZFSA) runs several wide-ranging residue monitoring programmes for products of animal origin. In addition, a New Zealand Total Diet Survey looking at the total dietary intake of key nutrients, contaminants and residues is undertaken every five or six years. Another programme carried out by NZFSA is the Food Residues Surveillance Programme, an ongoing monitoring programme primarily for horticultural and imported produce. The results of NZFSA's residues testing programmes are available on the web at www.nzfsa.govt.nz/consumers/food-safety-topics/chemicals-in-food/residues-in-food/index.htm.

Of the nine pesticide POPs specified under the Stockholm Convention, the analytical methods used in NZFSA programmes are able to test for the following seven organochlorines: aldrin, chlordane, dieldrin, DDT, endrin, heptachlor and hexachlorobenzene. Mirex and toxaphene are not tested for in NZFSA programmes because these chemicals were never registered for use in food production. Dioxins, furans and PCBs are not presently monitored by the NZFSA.

In the most recent New Zealand Total Diet Survey (2003/04), the only POPs detected were DDT metabolites and dieldrin, both of which arise from the historical use of these pesticides. Dietary intake (per bodyweight) of dieldrin accounted for 4.31% of the acceptable daily intake (ADI) for the 6–12 months infants (the highest of the age/sex groups modelled). The estimated dietary intake for the 6–12 months group for total DDT metabolites accounted for 0.43% of the ADI. Dietary exposure of other age/sex groups was considerably less.[15]

In the 2003/04 Food Residues Surveillance Programme, the only POPs found in New Zealand produce were in one sample of tomatoes, which had 0.02 mg/kg of both DDE (4,4') and DDT (4,4'). No POPs were found in the 2004/05 programme. Results for 2005/06 have yet to be reported.

Department of Labour

Research into the health effects on timber workers exposed to pentachlorophenol (PCP)

The use of PCP for antisapstain and the preservative treatment of timber ceased in 1989. Questions remain about the health effects among former timber workers resulting from their exposure to PCP. Two years ago the Government provided funding to undertake research into the health effects of work-related PCP exposure. The Department of Labour has commissioned an epidemiological study to clarify the health outcomes resulting from exposure of former workers to PCP in the timber industry.

[15] The ADIs for DDT and dieldrin are 10 ug/kg bw/day and 0.1 ug/kg bw/day, respectively. The source for these figures is IPCS, 2002.

The research consists of two streams:

- a historical cohort study focusing on mortality and cancer incidence
- a cross-sectional morbidity study investigating the prevalence of chronic health problems in a random sample of people who had worked in the timber industry at the time PCP was used.

The two-year study aims to ascertain whether former timber workers exposed to PCP are dying earlier, developing cancers more often, or suffering more chronic health problems. This work is currently being undertaken by the Centre for Public Health Research of Massey University. It involves both a mortality and a morbidity study. It is expected that this research will be completed in the latter part of 2007.

Research into the health effects arising from dioxin exposure among former process workers at the Ivon Watkins Dow plant (Paritutu, New Plymouth) involved in the manufacture of 2,4,5-T herbicide

The manufacture of 2,4,5-T at the Ivon Watkins Dow (IWD) plant in New Plymouth ceased in 1987. (Tetrachlorodibenzo-*p*-dioxin, or TCDD, was a contaminant in 2,4,5-T associated with the manufacture of this herbicide.) For many years most public policy attention around this site focused on claims of environmental pollution, but following the release of reports commissioned by the Ministry of Health in late 2004 and early 2005 into dioxin levels in a sample of local residents, attention shifted to the public health and occupational health effects of dioxin exposure associated with the plant itself. In response, the Department of Labour in New Plymouth established a process for former workers to register their concerns.

Two separate worker-related dioxin exposure studies have commenced.

- Dow AgroSciences, in conjunction with the University of Otago, recently completed a General Mortality Study of former IWD workers. They are also undertaking a study of current and former workers to examine any link between historical work-related dioxin exposures and health status. This work is scheduled to be completed in mid-2007.
- The Centre for Public Health Research (Massey University) has obtained funding for a three-year research study into dioxin exposure levels and the health status of former IWD workers. This work is scheduled to be completed in late 2008.

Article 11 measures

The Ministry for the Environment and Ministry of Health will continue, subject to resources, a bio-monitoring programme (breast milk, serum) appropriate to tracking the New Zealand population's declining exposure to POPs.

The Ministry for the Environment will monitor the effectiveness of the NIP (relating to dioxin reduction, waste stocks and contaminated sites management).

The Department of Labour will facilitate the completion of research on the health significance to workers and former workers of past occupational exposures to dioxin.

Article 12: Technical Assistance

Article 12 (summarised) requires parties to recognise that rendering timely and appropriate technical assistance in response to requests from developing country parties and parties with economies in transition is essential to the successful implementation of this Convention.

The parties shall co-operate to provide timely and appropriate technical assistance to developing parties and parties with economies in transition, to assist them, taking into account their particular needs, to develop and strengthen their capacity to implement their obligations under this Convention.

New Zealand, through the New Zealand Agency for International Development (NZAID), works with developing countries to mainstream sound environmental management into all development assistance. NZAID places a high priority on developing countries' requests for capacity building in environmental management and has recently developed a policy to guide environmental assistance activities within the Agency's overall poverty elimination mandate. The policy focuses NZAID's activities on partner priorities that are most closely linked to poverty.

As a small donor, NZAID also works closely with larger donors to align activities and approaches.

Much of New Zealand's regional and bilateral development assistance is focused on the Pacific. Currently NZAID allocates NZ$6.025 million per annum to its Pacific Regional Environment Programme, with an additional NZ$0.075 million allocated to the Secretariat of the Pacific Regional Environment Programme (SPREP) for core and programme funding. Recent or ongoing New Zealand-assisted programmes that help achieve Stockholm Convention objectives include:

- the Pacific Year of Action Against Waste Project, managed by SPREP, which aims to assist all SPREP member countries to address their current solid waste management issues (US$64,363 in 2005); this, alongside other similarly focused waste projects, is progressively working to reduce total volumes of waste being generated by supporting recycling, reuse and recovery initiatives, and improved disposal practices for the remaining solid waste
- development of a Pacific Regional Waste Management Strategy, managed by SPREP (US$170,882 in 2004/05)
- the Rarotonga Monitoring Project for testing for POPs in lagoon water (NZ$75,000 over 2004–2006)
- the Kiribati Pollution Enabling Project to improve enforcement of pollution control measures, mandated in the Kiribati Environment Act 1999 and Regulations 2001 (AU$45,296 over 2004–2006)
- the Tokelau Community Waste Management Project (NZ$165,000 over 2003–2005)
- a food-basket survey for Fiji carried out by the University of the South Pacific in conjunction with ESR (NZ$192,500 over 2004/05).

The Ministry for the Environment hosted a UNEP regional consultation with SPREP member countries on the draft BAT/BEP (best available techniques/best environmental practice) guidelines over 2–4 March 2005 in Wellington. The aim of the consultation was to inform countries about the draft guidelines, obtain feedback on regional needs, and help countries prepare for the first meeting of the Conference of the Parties to the Stockholm Convention (May 2005) concerning the draft BAT/BEP guidelines. Arising from this consultation, the Ministry worked with SPREP in preparing a model Dioxin Action Plan – BAT/BEP User Guideline suitable for Pacific Island countries.

Article 12 measure

The Ministry for the Environment, in conjunction with the Ministry of Foreign Affairs and Trade and NZAID, and subject to resources, will address requests for technical assistance.

Articles 13 and 14: Financial Resources

The Global Environment Facility (GEF) was launched in 1991 to provide grants and concessional funds to eligible countries for projects that benefit the global environment and promote sustainable livelihoods in local communities. Countries are eligible for GEF funds if they qualify for World Bank loans, or receive technical assistance grants through a country programme of the United Nations Development Programme (UNDP). The facility is jointly implemented by the UNDP, the United Nations Environment Programme and the World Bank.

Under Article 14 of the Convention, the GEF has been given interim designation as the principal entity entrusted with the operations of a financial mechanism referred to in Article 13. New Zealand has committed 4 million Standard Drawing Rights (SDR) [16] to each of the past three replenishment rounds. The GEF's current funding mandate covers ozone depletion, climate change, international waters and biodiversity, land degradation and, most recently, POPs.

Articles 13 and 14 measure

New Zealand committed SDR4 million (NZ $8.4 million) to the fourth Global Environment Facility (GEF) replenishment round.

[16] Standard Drawing Rights (SDR) is based on five major currencies. SDR is converted to national currencies using an average daily exchange rate over a period of time.

Article 15: Reporting

Article 15 (paraphrased): Parties are required to report periodically on the measures taken, and on their effectiveness in meeting the objectives of the Convention. Reporting will include:

- data on the total quantities of production, import and export of the chemicals listed in Annexes A and B
- a list of countries from which it has imported and exported each of these substances.

The format and frequency of reporting were decided by the first Conference of the Parties (COP). New Zealand's international reporting requirements and a schedule for the next six years to 2011 are as follows.

Table 7: New Zealand's reporting requirements, 2007–2011

Report	Date for submission to Secretariat	To be tabled at
National Implementation Plan	By December 2006	COP-3 May 2007
First National Report	By December 2006	COP-3 May 2007
Report on progress in elimination of PCBs (and every five years)	By December 2008	COP-4 May 2009
Second National Report (and every four years)	By December 2010	COP-5 May 2011
Report on review of Action Plan for Dioxins and Other Annex C Chemicals (and every five years)	By December 2010	COP-5 May 2011

National Implementation Plan (NIP)

The NIP is required to be submitted to the Stockholm Secretariat on or before 23 December 2006, this being within two years of the date of entry into force of the Convention for New Zealand (23 December 2004).

First National Report

New Zealand's first National Report (as for all parties) is to be submitted to the Stockholm Secretariat by December 2006 for tabling at COP-3 in May 2007. The format for national reports can be viewed on the Stockholm Convention's website.[17] The purpose of reporting is to assess progress towards achieving the Convention's obligations. This reporting is simplified by there being no production and use of POPs pesticides in New Zealand (with the exception of small quantities imported for laboratory use as analytical standards).

[17] The format for national reports can be viewed at: http://www.pops.int/

Reporting beyond 2006

This requires, progressively:

- progress reports on eliminating the use of PCBs, by December 2008 and every five years thereafter
- a second National Report, reporting on the range of measures identified in the NIP, by December 2010 and every four years thereafter
- the Action Plan for Dioxins and Other Annex C Chemicals – reporting on the range of measures identified in the Action Plan, by December 2010 and every five years thereafter. In essence this requires a five-yearly rolling review of measures to reduce dioxin releases, and updates of dioxin release inventory estimates.

Article 15 measures

The Ministry for the Environment will:

- submit New Zealand's National Implementation Plan to the Stockholm Convention Secretariat by December 2006
- collect the necessary information, and prepare and submit New Zealand's reports in accordance with the requirements of the Convention.

Article 16: Effectiveness Evaluation

Article 16 (paraphrased): Parties, in accordance with their technical and financial capabilities and using existing monitoring programmes and mechanisms (where possible), are to co-operate on a regional basis, when appropriate, and contribute to a global monitoring programme for the Convention.

Article 16 requires the Conference of the Parties (COP) to periodically evaluate the effectiveness of the Convention, beginning four years after coming into force (i.e. in 2008).

The second meeting of the COP, in May 2006, decided to complete the first effectiveness evaluation at its fourth meeting in 2009. The evaluation, to be compiled by the Secretariat of the Convention, will be based on a global monitoring report, national reports and non-compliance information. A working group will co-ordinate and oversee implementation of a global monitoring plan and report progress to the third meeting of the COP.

Article 16 measures

The Ministry for the Environment will:

- maintain international liaison and collaborate with the Stockholm Secretariat, as appropriate and subject to resources, in contributing to a global monitoring programme
- provide to the Secretariat information gained from existing POP monitoring programmes and from any future research programmes.

Articles 17 to 30

The remaining articles (Articles 17 to 30) concern the international administration of the Convention and are not considered relevant to the New Zealand NIP at this stage.

Part 3: An Action Plan for Dioxins and Other Annex C Chemicals

Article 5: Measures for Unintentional POPs

Introduction

This Action Plan for Dioxins and Other Annex C Chemicals has been prepared to set out how New Zealand intends to comply with the obligations of Article 5 of the Stockholm Convention. Article 5 requires parties to take measures to reduce or eliminate releases of the unintentionally produced POPs listed in Annex C: PCDDs, PCDFs, PCBs and HCB. For ease of reference, PCDDs, PCDFs are sometimes collectively referred to in this Plan as "dioxins". This also reflects the fact that much of the previous New Zealand work on unintentional POPs has been directed mainly at the PCDDs and PCDFs, and to a lesser extent at dioxin-like PCBs.

This Action Plan:

- presents background information about dioxins and other Annex C chemicals
- explains the New Zealand context for the Action Plan
- sets out measures
- builds on past efforts to address dioxin-related issues and reduce releases
- focuses on consolidating measures and improving data quality concerning the release of dioxins and other Annex C chemicals to all media, but with particular emphasis on releases of dioxins to air.

Goal

The goal of the Action Plan for Dioxins and Other Annex C Chemicals is to protect human health and the environment from unintentionally produced POPs.

Objective

The objective of the Action Plan for Dioxins and Other Annex C Chemicals is to identify, characterise and address the release of unintentionally produced POPs, as required under Article 5 and Annex C of the Stockholm Convention, in working towards the goal of their continuing minimisation and, where feasible, ultimate elimination.

Outcomes

The outcomes from implementing the Action Plan will be that:

- the present margin of safety in protecting human health from dioxins and other Annex C chemicals will be extended as body burdens decline
- risks from historical residues of dioxins and PCBs on contaminated sites will be addressed
- the quality of New Zealand primary food products (especially meat and dairy products) will be further safeguarded
- the status of New Zealand's clean environment will be strengthened.

Context for the Action Plan for Dioxins and Other Annex C Chemicals

What are unintentional POPs?

Some POPs may be unintentionally produced and released, often as by-products or inadvertent contaminants. The Stockholm Convention lists PCDD, PCDF, HCB and PCB as the unintentionally produced Annex C POPs that should be addressed under Article 5 of the convention.

PCDDs/PCDFs have never been produced intentionally (other than for research) and are a group of tricyclic chlorinated aromatic chemicals, of which 17 have significant toxicity. They are persistent in the environment, lipophilic (reside in fat), can bioaccumulate through the food chain, and can produce a range of toxic effects. They are formed in some chemical production processes and in thermal processes where carbon and chlorine are present.

Most attention has been focused on those compounds that exhibit "dioxin-like" toxicity, comprising 17 isomers of PCDD/PCDF and 12 PCBs. The term "dioxin" (singular), or TCDD, is usually used to refer to the congener 2,3,7,8-TCDD (2,3,7,8-tetrachlorodibenzo-*p*-dioxin). TCDD was a toxic contaminant in the herbicide 2,4,5-T.

Both HCB and PCB have been intentionally produced and used for a variety of purposes. They can also be formed as by-products in various chemical production processes and thermal processes in a manner analogous to the formation of PCDD/PCDF, although there are much fewer data than for PCDD/PCDF.

Most Annex C POPs can be found throughout the world in air, soil, sediment and water. Once in the environment, these POPs can accumulate in the fatty tissue of animals such as birds, fish, shellfish, marine mammals and domestic animals, and in people. POPs break down only very slowly and can remain in the environment and in people's bodies for a very long time.

Animal studies show that some dioxin and dioxin-like compounds are extremely toxic. Although less is known about their impact on human health, it is widely assumed that dioxins have the potential to cause neurobehavioural, developmental, reproductive and immunotoxic effects at low doses. Significantly, dioxin (TCDD) is classified as a human carcinogen (IARC).[18] Annex C chemicals can travel great distances on air currents and in water – even to polar regions – affecting people and wildlife far from their point of release. Since the early 1970s dioxin and dioxin-like compounds have caused a great deal of public concern, and have been the subject of extensive investigation by the scientific community and regulatory agencies.

Further information on Annex C chemicals (dioxins, furans, PCBs and HCB) is provided in Appendix 3.

How are people exposed to dioxins and other Annex C chemicals?

Annex C chemicals (PCDDs/PCDFs, HCB and PCBs) may be released routinely in very small amounts to air, land or water as well as being present in products and wastes. Releases to the environment from a variety of sources can lead to low-level exposure to the general population, usually via the food chain. There are also international examples where industrial releases, and where contaminated material introduced into animal feedstocks, led to localised human exposure. Occupational exposure has been significant in the past.

Dioxins and other Annex C chemicals released into air can be carried a great distance before settling on soil or water. If these POPs settle on pastoral land they may be taken up by grazing animals and stored in the animals' fat. These POPs can also enter our rivers, lakes and estuaries in effluent discharges, where they may be taken up by fish and shellfish.

Most New Zealanders' exposure to Annex C chemicals is generally very low. Over 90% of our exposure is thought to come from eating foods of animal origin, such as meats, dairy products and fish. To a much lesser extent we may also be exposed when we breathe air and come into contact with contaminated materials.

The bioaccumulative character of these and other POPs and their presence in breast milk helps explain why the Stockholm Convention is overwhelmingly supported by most governments.

Historical sources of Annex C chemicals in New Zealand

Annex C chemicals are not deliberately manufactured, but are released to the environment from a variety of industrial discharges and combustion processes, and as unwanted by-products in various chlorinated chemical formulations. Historically, the manufacture and use of chlorinated aromatic chemicals have been sources of dioxins in the New Zealand environment. Notable examples include the wood preservative and biocide pentachlorophenol (PCP), phenoxy herbicides, and the PCBs. Other processes, such as the manufacture of chlorine-bleached pulp, have led to environmental contamination and the trace contamination of pulp and paper products, particularly by TCDD.

[18] TCDD (2,3,7,8-tetrachlorodibenzo-para-dioxin) was evaluated by the International Agency for Research on Cancer (IARC) in 1997. Based on human epidemiology data, dioxin was categorised by IARC as a "known human carcinogen".

Combustion and other thermal processes where chlorine and carbon are present appear to result in the formation of dioxins and other Annex C chemicals (e.g. the incineration of wastes; the production of iron and steel and other metals, including scrap metal reclamation; fossil fuel plants; domestic coal and wood fires; automobile engines; and accidental fires). Tighter government regulations, improved industrial processes and the use of modern pollution control equipment have resulted in a lowering of releases of dioxins produced unintentionally.

For general information on dioxins and other Annex C chemicals, see: http://www.mfe.govt.nz/issues/hazardous/contaminated/dioxins.html

What do we know about dioxins and other Annex C chemicals in New Zealand?

In preparing to meet Stockholm Convention obligations on Annex C chemicals, the Government has available to it the research undertaken by the Ministry for the Environment and the Ministry of Health. This research has generated a wealth of data on the levels of dioxin and other dioxin-like compounds in human breast milk and in human serum, in the diet of New Zealanders, and in the environment (air, soil, rivers and estuaries, and some biota).

These scientific studies indicate the following.

- The background levels of dioxins and other Annex C chemicals in the New Zealand environment (air, soil, rivers, estuaries) are generally low compared with the levels recorded in many other countries.
- The level of dioxins in the serum of non-occupationally exposed New Zealanders tends to be at the lower end of the range of concentrations measured internationally.
- Levels of dioxins (and organochlorine pesticides) in the milk of New Zealand women (in which the results from two separate groups of women were compared) declined by about 70% over the 10-year period 1988 to 1998. In general, the exposure of New Zealanders to dioxins and other POPs is low relative to exposures in most other countries where comparable studies have been carried out.
- The levels of dioxins in New Zealand foods, including our meats, dairy products and fish, are low: the current dietary intake of dioxins by New Zealanders is considered relatively low when compared internationally, and is below the World Health Organisation's tolerable daily intake.
- An independent report to the Ministry for the Environment on the health risks of dioxins concluded that the current background exposures to dioxin-like compounds for the New Zealand population have only a small margin of safety, and steps should be taken to further reduce exposures.
- With the possible exception of coastal marine mammals, such as Hector's dolphin, there is minimal risk to wildlife from background exposures to dioxins.

Unborn children may be exposed to POPs via the placenta, and nursing infants are exposed to the POPs present in breast milk. The presence of low levels of dioxins (and other POP contaminants) in human serum and breast milk is a sensitive and emotional issue, and reinforces the commitment the New Zealand Government has to the Stockholm Convention. The view of the Ministry of Health (as is the view of the WHO, and infant and child health groups in New Zealand and internationally) is that the benefits of breastfeeding far outweigh any risks from POP contaminants. Breastfeeding is considered the best way to provide the nutritional requirements to ensure optimum physical and intellectual development of a baby, and the presence of low levels of POP chemicals does not alter that assessment.[19]

The Ministry of Health advises that:

- modelling of exposures in infants and children shows that New Zealand babies reach similar tissue levels of dioxins to their mothers after about six months of breastfeeding
- other modelling studies undertaken in the United States show that children who were bottle-fed as babies and children who were breastfed as babies have similar (low) dioxin levels in their bodies by age 10
- breast milk does not contribute any greater lifetime dioxin body burden.

The research and technical reports arising from the New Zealand Organochlorines Programme can be viewed and downloaded from: http://www.mfe.govt.nz/publications/hazardous/#reports2

A list of these and other reports relevant to POPs in New Zealand is presented in Appendix 2. In particular, the environmental studies, and the dietary intake, serum and breast milk studies, serve as reference data important to the future monitoring of the Convention undertaken nationally and internationally.

Levels of dioxins are falling

Over the past decades the amount of dioxins released into our environment has decreased. The reasons for this include:

- phasing out leaded petrol from 1986 (completed by 1996)
- the timber industry ceasing the use of PCP in 1988 (PCP was deregistered in 1991)
- discontinuing the manufacture of 2,4,5-T in 1987
- upgrades of industrial plants that historically emitted dioxins
- prohibiting the import (1987) and use (1994) of PCBs
- the collection and disposal overseas of PCBs
- the closure of many smaller school and hospital waste incinerators that were poorly designed and/or operated.

A study for the Ministry of Health (Bates *et al*, 2001) measured the levels of dioxins in the breast milk of nursing mothers. As indicated above, the study confirmed that a progressive decline in the body burden of dioxins is occurring (a 70% decline over the 10-year period 1988 to 1998).

Since 2000, additional measures have been, and are being, implemented to minimise releases of dioxins and other Annex C chemicals. The measures outlined in this Plan (e.g. national

[19] Refer also to Ministry of Health, 2006.

environmental standards that ban landfill fires and other activities) are expected to ensure a continuing decline in environmental levels.

Stockholm Convention measures

Measures required

The measures to be taken in order to comply with the Stockholm Convention concerning Article 5 can be summarised as requiring parties to take measures to reduce and, where feasible, ultimately eliminate releases of Annex C chemicals from anthropogenic sources. These obligations are set out in the text of Article 5 and in Annex C (reproduced in Appendices 3 and 4).

Recent measures taken by New Zealand

National environmental standards

The main measure taken recently to reduce the release of dioxins and other Annex C chemicals has been the development and entry into force of national environmental standards as regulations under the Resource Management Act 1991. In particular, the National Environmental Standard Relating to Certain Air Pollutants, Dioxins and Other Toxics[20] specifically bans certain activities that produce dioxins and other air toxins (for details, see the discussion under 'Article 5(a)(ii)' below).

Emissions inventory

In 1998 the Ministry for the Environment estimated emissions of dioxins from industry and domestic activities (for details, see the discussion under 'Article 5(a)(i)' below). Landfill fires, now banned, were previously identified as New Zealand's most significant source of dioxin releases to air. The overall pattern of emissions indicated contributions from industrial combustion processes (including secondary metal processing and waste incineration), non-industrial sources (primarily domestic wood and waste burning), and uncontrolled fires. Releases to land, mainly in residues that were landfilled, were of a comparable magnitude to emissions to air, whereas releases to water were much less of an issue. The recent introduction of National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics, along with other measures, are likely to result in a change to the pattern of emissions estimated in 1998.

[20] Resource Management National Environmental Standards (Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004, including Amendments 2005.

New Zealand also has reservoirs of POPs in contaminated soils, waste dumps and landfills. The POPs present in these reservoirs can potentially be redistributed back into our environment over a long period of time. The importance of these reservoirs relative to current ongoing emissions is unknown. Dioxin historically released into the New Zealand environment was estimated at between 1.45 and 1.7 kg I-TEQ,[21] arising from the rural use of 2,4,-T herbicide, in addition to the use of pentachlorophenol at sawmills, miscellaneous contributions to landfills, and from pulp and paper production (Ministry for the Environment, 2000). Not included in this estimate, due to a lack of available data, was the likely TEQ contribution from the historical use of 2,4-D herbicide and a closed reservoir of wastes from the historical manufacture of chlorophenols.

Priorities

This Action Plan for Dioxins and Other Annex C Chemicals is focused on minimising and, where feasible, eliminating releases of unintentional POPs to all media, with particular emphasis on releases to air. As outlined in earlier work (Ministry for the Environment, 2001), this rationale has the following basis.

- The sources of discharges of dioxins and other Annex C chemicals to air and the pathways of population exposures are relatively well understood.
- Most of the dioxins stored in the body tissue of the average New Zealander have originated from processes that discharged dioxins and other Annex C chemicals to air.
- Most dioxins and other Annex C chemicals released to air are newly created. Reducing these releases to air will diminish the amounts of Annex C chemicals that end up persisting in the environment.

Matters to be addressed

Matters to be addressed as Article 5 obligations are summarised in the following section and form an agenda for consideration and inclusion in this Action Plan for Dioxins and Other Annex C Chemicals to identify, characterise and minimise the release of these chemicals.

Framework for the Action Plan for Dioxins and Other Annex C Chemicals

The framework for the Action Plan for Dioxins and Other Annex C Chemicals is given by the obligations of Article 5 of the Convention. The full text of Article 5 is reproduced in Appendix 4, but to facilitate the reading of these obligations for the purposes of preparing this Plan, a paraphrased summary is set out in Table 8.

[21] TEQ, toxic equivalents, is the resultant toxicity given by a mixture of dioxin congeners.

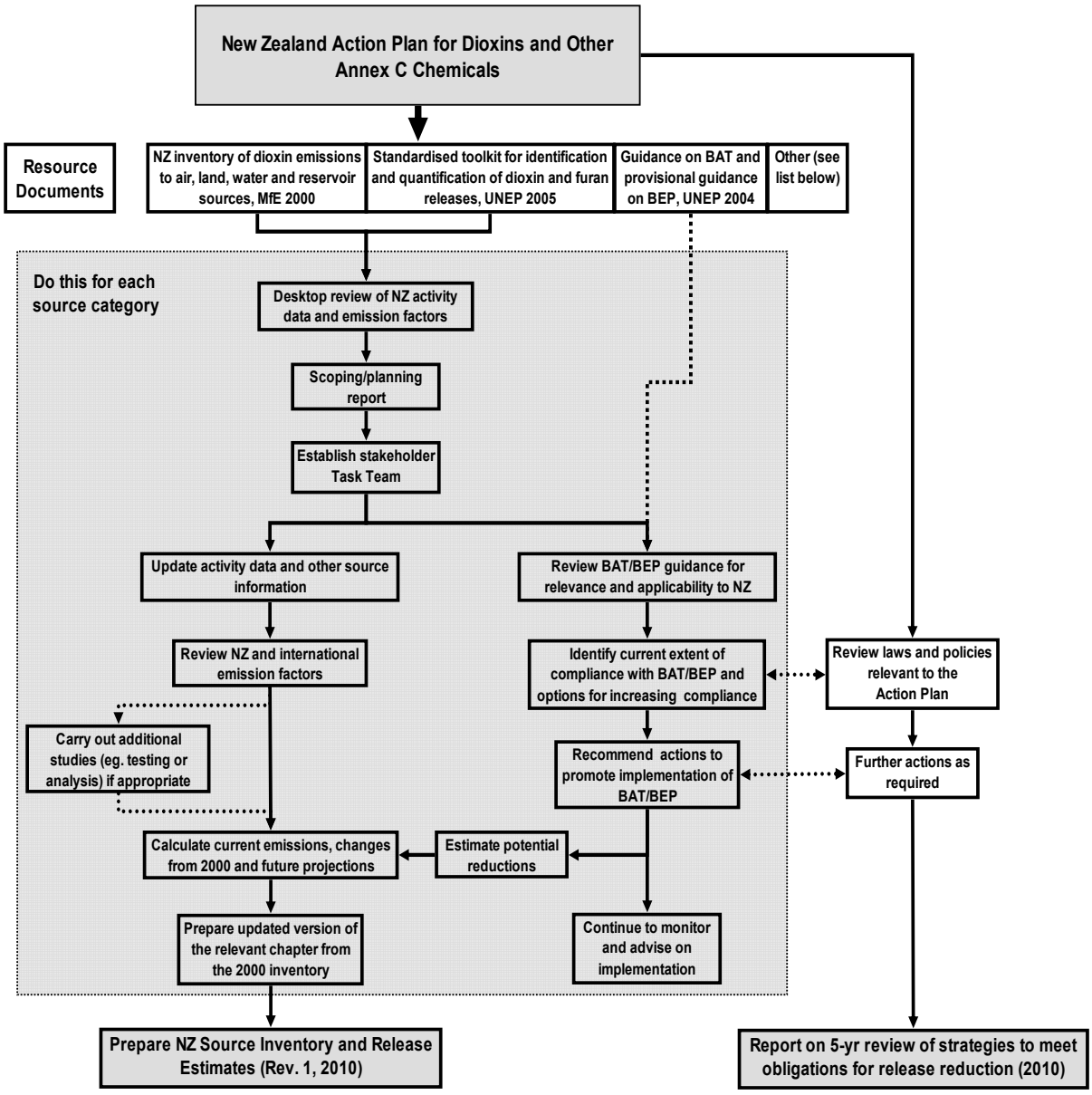
Table 8: Summary of Article 5 obligations

Summary of Article 5 obligations (paraphrased)
Article 5(a)(i): Evaluate current and projected releases, including the development and maintenance of source inventories and release estimates, taking into consideration the source categories identified in Annex C.
Article 5(a)(ii): Evaluate the efficacy of laws and policies to manage releases.
Article 5(a)(iii): Identify strategies to meet dioxin reduction obligations, taking into account the evaluations in (i) and (ii).
Article 5(a)(iv): Take steps to promote education and training and raise awareness of the strategies.
Article 5(a)(v): Review, evaluate and report on strategies every five years in meeting release reduction obligations.
Article 5(a)(vi): Develop a schedule for implementation of the Action Plan, including the strategies and the measures identified in them.
Article 5(b): Promote the application of available, feasible and practical measures that can readily achieve a realistic and meaningful level of release reduction or source elimination.
Article 5(c): Promote the development and use of substitute or modified materials, products and processes to prevent the release of Annex C chemicals.
Article 5(d): Promote/require BAT/BEP for new installations (sources) in accordance with Part II of Annex C.
Article 5(e): Promote BAT/BEP for existing installations (sources) in accordance with Parts II and III of Annex C.

Elements of the Action Plan for Dioxins and Other Annex C Chemicals

An overall framework for the proposed Action Plan for Dioxins and Other Annex C Chemicals is illustrated in Figure 2, while each element of the plan is addressed below.

Figure 2: Outline of the Action Plan for Dioxins and Other Annex C Chemicals



Source: Bingham & Graham, 2006.

Article 5(a)(i): evaluate current and projected releases, including the development and maintenance of source inventories and release estimates, taking into consideration the source categories identified in Annex C

A *New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources* was published by the Ministry for the Environment in March 2000. The investigatory work leading up to the compilation of the inventory was begun in 1998. Subsequently, the Stockholm Convention was negotiated (including Article 5), UNEP Chemicals prepared the *Standardised Toolkit for Identification and Quantification of Dioxin and Furan Releases*,[22] and the advance draft of the *BAT/BEP Guidelines* was circulated by UNEP Chemicals in December 2004.[23]

The first New Zealand Inventory of Dioxin Emissions was followed up by a focused assessment of emissions to air from the secondary metallurgical industry, undertaken in 2002/03 (Ministry for the Environment, 2004a). In a preliminary review (Sinclair Knight Mertz, 2005), the New Zealand dioxin inventory was compared to the UNEP Toolkit. The review found that the New Zealand inventory was comprehensive in addressing the potential sources of dioxins and was still relevant because a reasonable level of New Zealand test data for emissions were available at the time the inventory was prepared. Table 9 presents a summary of the New Zealand inventory, published in 2000 from 1998 data, and re-collated to the format of the UNEP Standardised Toolkit.

Table 9: Summary of dioxin releases to air, land and water in New Zealand for 1998, giving TEQ/annum*

From UNEP category	Source	Best estimate air gTEQ/a	Total to air (%)	Best estimate land gTEQ/a	Total to land (%)	Best estimate water gTEQ/a	Total to water (%)	Total to all media gTEQ/a
1	Waste incineration	3.58	11.09	2.97	6.5	–		6.55
2	Ferrous and non-ferrous metals production	1.75	5.42	7.01	15.33	0.015	0.67	8.78
3	Power generation and heating/cooking	7.28	22.55	5.32	11.63	–		12.60
4	Production of mineral products	0.46	1.43	0.78	1.7	–		1.61
5	Transport	0.64	1.98	–		–		0.64
6	Uncontrolled combustion processes	18.30	56.69	5.7	12.47	–		24.00
7	Production and use of chemicals and consumer goods	0.04	0.13	0.83	1.82	0.275	12.22	0.72
8	Miscellaneous	0.23	0.71	–		–		0.23
9	Disposal/landfilling	–		23.11	50.55	1.96	87.11	25.08
	Total TEQ/annum	**32.28**	**100**	**45.72**	**100**	**2.25**	**100.00**	**80.21**

* TEQ, toxic equivalents, is the resultant toxicity given by a mixture of dioxin congeners.

[22] See UNEP Chemicals, 2005. The first edition of the Toolkit was released in 2003; the second edition was released in February 2005. The Toolkit is a guide and methodology for compiling inventories, and notes that the best inventories use local test data.

[23] See UNEP Chemicals (unpublished draft circulated December 2004).

The 2005 review also identified areas where activity data should be updated to improve the quality of New Zealand's Release Inventory of Dioxins and other Annex C Chemicals. These areas are listed below as items 1 to 15 in the work programme. For example, most of the small incinerators situated among the country's 2700 schools were expected to cease operating by the time the National Environmental Standard applies on 1 October 2006.[24]

The aim is for the update to provide information on trends and progress towards achieving reductions in these priority areas. Sources were also identified where obtaining New Zealand emission data is desirable to reduce uncertainty and thereby refine the overall inventory.

Producing an updated Release Inventory of Dioxins and other Annex C Chemicals will involve checking, refining and improving the quality of the data, in addition to updating the activity data for 2003, where this is worthwhile. Priority areas of the inventory will also undergo a more detailed review than the one conducted in February 2005 to identify whether further updates to activity data and/or emission factors are justified.

The structure of the updated New Zealand Release Inventory of Dioxins and other Annex C Chemicals should be aligned with that of the UNEP Toolkit for ease of comparison with inventories produced internationally. UNEP emission factors should be used where there are no New Zealand-derived factors and there is no other clear justification for the factors currently used in the New Zealand inventory.

Work objective

To further review and update a New Zealand Release Inventory of Dioxins and other Annex C Chemicals, including future projections, in priority areas to reflect changes since activity data were collected in 1998 and 2003; and, as, appropriate, to incorporate new emission factor data and align with international protocols for inventory preparation.

Expected output

To update the New Zealand Release Inventory of Dioxins and other Annex C Chemicals (first revision) relative to the selected reference year, and including future projections, by December 2007, and provide updates thereafter as necessary to report to the Convention Secretariat by December 2010.

Work programme

Following is the agenda to progressively update the release estimates for dioxins and other Annex C chemicals in readiness for reporting by December 2010.

Item 1 Review activity data for waste incineration (including medical care, quarantine, schools and other small facilities) and investigate and revise emission factors if indicated.

Item 2 Review release estimates to land from New Zealand's waste incinerators in line with the outcome of Item 1.

[24] The Ministry of Education has been especially proactive in promoting this measure, and recently estimated that around 600 incinerators, or about 85% of the total, will have ceased operating by this date.

Item 3 Update New Zealand estimates for releases to land from secondary steel production to include waste lime and slag, either based on the UNEP Toolkit figures or gather New Zealand data, as appropriate.

Item 4 Update secondary metallurgical industry estimates to reflect New Zealand data gathered in 2003.

Item 5 Convert New Zealand emission factors for power generation and heating from fuel (mass) consumption to energy values to allow a comparison with the UNEP Toolkit.

Item 6 Review international data and, as feasible, local data for their relevance to estimating releases to air from New Zealand's domestic solid-fuel heating appliances.

Item 7 Review emission factors for domestic solid-fuel heating releases to land.

Item 8 Update estimates for releases to air and as wastes from biomass combustion for power and heating by collating available industry measurement data.

Item 9 Review the emission factors for estimating releases to air, land and water from cement manufacturing in New Zealand. Include emissions from brick, ceramic and asphalt production if activity data are available.

Item 10 Review vehicle estimates using the UNEP fuel consumption-based emission factors if appropriate New Zealand data are available, and update estimates based on these factors and any relevant changes in the characteristics and performance of the vehicle fleet.

Item 11 Review local and international information on estimates of releases to air and land from uncontrolled combustion (e.g. structural fires, burning of plastics, domestic and rural waste burning, agricultural burn-off, including additional research if necessary) and update New Zealand estimates, as appropriate.

Item 12 Confirm that releases to air, land and water from biomass drying, smoke houses and drycleaning are inconsequential in the New Zealand context.

Item 13 Review the New Zealand approach to recording landfill releases (treated as a discharge to land versus a reservoir source by UNEP), noting the importance of tracking the fate of waste streams for assessing exposure potential, and review and update local and international data on waste composition, waste leaching and landfill leachate.

Item 14 Investigate whether more recent emission test data are available for emissions to air, land and water from pulp and paper, or sample discharges to water from the pulp and paper mills.

Item 15 Collect data on current practices for the disposal and/or combustion of treated timber.

Article 5(a)(ii): Evaluate the efficacy of laws and policies to manage releases

The Resource Management Act 1991 (RMA) is the primary piece of legislation for environmental management in New Zealand, which has the purpose of promoting the sustainable management of natural and physical resources.

Regional councils have the primary functions under the Act for controlling discharges to air, land and water. The tools available to regional councils for managing discharges are regional policy statements, regional plans and resource consents. All regional councils have proposed or operative plans to address discharges to air, land and water. Many of these contain rules that relate to activities that produce unintended releases of dioxins and other POPs (e.g. prohibitions on the open burning of certain substances, and consent requirements for metal processes above a certain size).

The Minister for the Environment can issue national policy statements and make national environmental standards to be promulgated as regulations. The Minister may also "call-in" resource consent applications if it is in the national interest to do so.

The RMA framework allows councils and the Minister to develop a mix of regulation, promotion and education for addressing environmental issues, including controlling dioxin and other Annex C chemical emissions.

Central government gazetted the Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Regulations in October 2004, with amendments in December 2004 and July 2005. National environmental standards, prepared in accordance with sections 43 and 44 of the Act, are mandatory technical environmental regulations implemented by agencies and parties with responsibilities under the RMA. The standards automatically set a bottom line to controls placed by local government.

The standards prohibit seven activities that would otherwise discharge significant quantities of dioxins and other toxics into the air:[25]

(i) lighting fires and burning of waste at landfills

(ii) burning of tyres in the open

(iii) burning of coated wire in the open

(iv) bitumen burning for road maintenance

(v) burning of oil in the open (with some exceptions)

(vi) operating an incinerator at a school or a health-care institution, unless a resource consent is obtained by September 2006

(vii) operating new high-temperature hazardous waste incinerators.

[25] Regulations 6–12, Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Regulations 2004.

Included in the national environmental standard package is the requirement for large landfill sites (over 1 million tonnes in design capacity) to collect and destroy greenhouses gases (by September 2007).[26] Although the purpose of this regulation is to control greenhouse gas emissions at landfills, its effect will also be to reduce the likelihood of a spontaneous or accidental fire, and in that sense this regulation can be seen as a POPs release reduction measure.

A detailed explanation of the above national environmental standards is given in *The Updated Users Guide to Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Regulations 2004 (Including Amendments 2005) (second draft)*, (Ministry for the Environment, 2005b).

In addition to the standards listed above, two other national environmental standards directed at improving air quality will also have significant effects on minimising the release of dioxins and other Annex C chemicals from combustion.

- Ambient air quality standards,[27] from September 2005, place limits on allowable levels of PM_{10} and will require air quality improvements in airsheds where the standard is exceeded.[28] Reducing emissions of particulates to comply with the standard will also reduce releases of dioxins and other Annex C chemicals associated with particulate matter.
- New woodburners sold for installation in domestic dwellings after 1 September 2005 are required to meet new flue gas particulate and thermal efficiency design standards.[29]

These measures are significant in view of the estimate that domestic home heating from the burning of wood presently contributes up to 17% of the annual total dioxin releases to air (Ministry for the Environment, 2000). The best ways to encourage families to make their homes more energy efficient and to install cleaner heating systems are being investigated under the Government's Warm Homes Project, to reduce the effects of home heating on the environment while at the same time allowing people to stay warm.

Unleaded petrol was introduced to New Zealand in 1986 and the use of halogenated lead scavengers ceased in 1995. The Government has now introduced tighter controls on vehicle build standards for emission control in line with internationally accepted standards and has announced plans to further tighten these further in coming years. Although the main objective is to reduce air pollution generally, such measures may also have the beneficial effect of reducing releases of dioxins from land transport sources, presently estimated at between 0.8% to 2.3% of total releases to air (Ministry for the Environment, 2000).

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[26] Regulations 25–27, Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Regulations 2004.

[27] Regulations 13–19, Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Regulations 2004.

[28] The fine particle standard requires councils to clean-up the air by 1 September 2013 to the target level of 50 micrograms of fine particles per cubic metre of air over any daily 24-hour period.

[29] Regulations 22–24, Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Regulations 2004.

Work objective

To monitor and periodically evaluate the efficacy of New Zealand's environmental management framework for managing sources of dioxins and other Annex C chemicals.

Expected output

To report on the adequacy of New Zealand's environmental management framework for managing sources of dioxins and other Annex C chemicals, by 2010.

Work programme

Item 16 Monitor the implementation of, and compliance with, the National Environmental Standard Regulations (Air Quality) relating to dioxins, the PM_{10} standard and the standard for domestic woodburners.

Item 17 Monitor implementation and compliance for phasing in tighter vehicle emissions standards. Evaluate the potential for achieving any reductions in dioxins from such controls.

Item 18 Estimate reductions in dioxins achieved from implementing national environmental standards via updates to the national inventory.

Item 19 Review progress in addressing release reductions from priority activities, including the disposal of farm plastics, school incinerators, and the use of PVC in building materials, and identify areas (if any) in relation to these or other sources where regulation or other central government initiatives are required to implement BAT/BEP (best available techniques/best environmental practice) controls on priority activities (see also Item 34).

Article 5(a)(iii): Strategies to meet Annex C chemicals reduction obligations taking into account the evaluations in (i) and (ii)

Several strategies have been identified that will help minimise the release of dioxins and other Annex C chemicals:

- updating and reviewing the New Zealand Release Inventory of Dioxins and other Annex C Chemicals against the BAT/BEP guidelines to identify any priority areas to be addressed to achieve reductions in the release of dioxins and other Annex C chemicals
- implementing the National Environmental Standards on Air Quality (regulations relating to certain air pollutants, dioxins, and other toxics)
- improving waste management practices via industry-based schemes for particular waste products to avoid their open burning (e.g. used tyres, used oil).

These strategies are incorporated into the present Action Plan for Dioxins and Other Annex C Chemicals.

Work objective

To prepare a strategy to meet dioxin and other Annex C chemicals reduction obligations based on the review of the New Zealand Dioxin Inventory and the legislative review, and to implement subparagraphs (b) to (e) of Article 5 of the Convention.

Expected output

An Action Plan for Dioxins and Other Annex C Chemicals to implement subparagraphs (b) to (e) of Article 5 of the Convention (i.e. the final version of the current document).

Work programme

The following items are in addition to the tasks identified to implement Articles 5(i) and (ii) of the Convention.

Item 20 Monitor the action plans for Annex C chemicals of other countries.

Item 21 Take into account the *Action Plan for Reducing Discharges of Dioxin to Air* (Ministry for the Environment, 2001) and the supporting documents.

Item 22 Consult on and review a draft Action Plan for Dioxins and Other Annex C Chemicals, and submit the final plan to the Convention Secretariat before December 2006.

Article 5(a)(iv): Steps to promote education and training, and to raise awareness of the strategies

Minimising releases of dioxins and other Annex C chemicals

Generally, actions that improve air quality will also result in reduced formation of dioxins and other Annex C chemicals; for example, not burning refuse and plastics, using a modern and efficient home-heating appliance when burning wood and coal, and not burning chemically treated timber or driftwood (which contains high levels of chlorine from sea salt).

The Ministry for the Environment's *Users Guide* to the National Environmental Standard Regulations (Ministry for the Environment, 2005b) raises awareness of those activities prohibited under the National Environmental Standard because they discharge dioxins and other toxic compounds. The main audience for this guide is local government.

The Action Plan for Dioxins and Other Annex C Chemicals includes measures to promote improved practices where regulation is not warranted. This may involve liaison with industry when preparing relevant codes of practice, and promotion to regional councils to include consideration of controls on dioxins emissions and activities they already regulate (e.g. submissions on resource consents, where appropriate). Raising awareness among the general public of the importance of not burning treated timber, plastics and other wastes will also help minimise releases of Annex C chemicals. The Action Plan for Dioxins and Other Annex C Chemicals was open to comment from industrial sectors and stakeholder groups.

Work objective

To promote the Action Plan for Dioxins and Other Annex C Chemicals and the strategies within it.

Expected output

Stakeholders are informed about the Action Plan for Dioxins and Other Annex C Chemicals.

Work programme

Item 23 Promote awareness of the Action Plan via the Ministry for the Environment's website.

Item 24 Inform industry and regional councils of the Action Plan through work with stakeholder Task Teams on the inventory update and implementation of BAT/BEP.

Item 25 Promote the Action Plan among other stakeholders, including through the work of Task Teams on the inventory update and implementation of BAT/BEP.

Item 26 Promote the Action Plan under relevant Ministry for the Environment programmes, including the work on farm plastics, construction and demolition wastes, and the Warm Homes project.

Article 5(a)(v): review, evaluate, and report on strategies every five years in meeting Annex C chemicals reduction obligations

This Action Plan for Dioxins and Other Annex C Chemicals contains strategies for achieving reductions in the unintentional production of POPs. Article 5(a)(v) of the Convention requires a review of the Action Plan for Dioxins and Other Annex C Chemicals every five years.

Work objective

To evaluate the Action Plan for Dioxins and Other Annex C Chemicals and the strategies within it.

Expected output

A report on progress under the Action Plan for Dioxins and Other Annex C Chemicals every five years.

Work programme

Item 27 Review progress in implementing the strategies in the Action Plan for Dioxins and Other Annex C Chemicals.

Item 28 Evaluate how successful the strategies have been in achieving dioxin reductions, both overall and in relation to specific priority areas, including the disposal of farm plastics, school incinerators, and the use of PVC in building materials.

Item 29 Revise the strategies, where appropriate, to achieve further reductions and update the Action Plan for Dioxins and Other Annex C Chemicals.

Item 30 Prepare a report summarising the above.

Article 5(a)(vi): A schedule for implementation of the Action Plan, including the strategies and measures identified therein

The Action Plan for Dioxins and Other Annex C Chemicals sets out strategies and measures to be implemented over the period 2006–2010.

Article 5(b): Promote the application of available, feasible and practical measures that can expeditiously achieve a realistic and meaningful level of release reduction or source elimination

The terms "expeditiously", "realistic" and **"**meaningful" are interpreted as referring to measures that can be implemented relatively easily, without undue delays and/or significant costs.

The National Environmental Standards for Certain Air Pollutants, Dioxins and Other Toxics have prohibited a number of activities (see discussion under Article 5[a][ii]). This measure effectively eliminates some sources of dioxins and other Annex C chemicals, such as landfill fires and road seal burning.

The Ministry for the Environment has prepared a *Users Guide* (Ministry for the Environment, 2005b) to promote understanding and facilitate implementation of the new national environmental standards. To facilitate compliance with the new standards, the Ministry of Education has already identified best practices to enable schools to avoid waste incineration and is currently working with schools to adopt alternatives for managing waste, including composting, recycling and landfilling. Health-care institutions are expected to incorporate new technologies, such as steam sterilisation and autoclaving, as part of an integrated waste management approach to treat medical wastes.

Two initiatives to reduce the open burning of waste in rural areas are worth noting. It is estimated that annually 8000 tonnes of plastic are used in New Zealand agriculture as baleage wrap (7000 tonnes) and agrichemical containers (1000 tonnes). Although the plastic used to manufacture these products is potentially recyclable, in practice contamination issues make it difficult to recycle these particular plastic products. Work is ongoing to manage unwanted farm plastics, including the following.

- The feasibility of recycling baleage wrap into plastic sheet suitable for feed pad floors, or pipe for culverts or drains, is presently being investigated by the Wellington region's Enviromart Waste Exchange.
- A product stewardship scheme involving the cleaning and recycling of plastic waste agrichemical containers is being developed by the New Zealand Agrichemical Education Trust.

These initiatives, supported by the Ministry for the Environment, have the potential to significantly reduce the quantity of wastes otherwise burnt on farms and currently contributing to air pollution and releases of dioxins and other Annex C chemicals.

Other measures for reducing sources of dioxins and other Annex C chemicals are identified under the discussion on Articles 5(c) to (e).

Work objective

To promote measures to expeditiously achieve reductions in releases of dioxins and other Annex C chemicals and the elimination of specific sources.

Expected output

Information on measures for reducing and eliminating dioxin and other Annex C chemicals that can be readily implemented by target groups.

Work programme

Item 31 Promote the *Users Guide* on the national environmental standards to reduce releases of dioxins and other air toxics.

Item 32 Support other initiatives that minimise releases of dioxins and other Annex C chemicals.

Article 5(c): Promote the development and use of substitute or modified materials, products and processes to prevent releases of Annex C chemicals

There are a number of examples in New Zealand where the application of substitute or modified materials, products and processes has already led to significant reductions in releases, or potential releases. These include the elimination of elemental chlorine from the bleaching of pulp and paper, the phase-out of unleaded petrol, the use of improved wood stoves under the National Environmental Standard, and the move towards steam sterilisation of health-care and quarantine wastes. It is expected that further opportunities will be identified during the work with stakeholders on the implementation of BAT/BEP.

The preparation of guidance on substitution is to be co-ordinated by the Convention Secretariat, including information on substitute and modified materials, and on products and processes to prevent the generation and release of dioxins and other Annex C chemicals. It is proposed that this guidance be reviewed when it becomes available.

Article 5(d): Promote/require the use of BAT/BEP for new installations (sources) in accordance with Part II of Annex C

The sources listed in Part II of Annex C comprise waste incinerators (including co-incinerators of municipal, hazardous or medical wastes), thermal processes in secondary metallurgical industries, cement kilns firing hazardous wastes, and the production of pulp using elemental chlorine for bleaching.

New high-temperature hazardous waste incinerators are a prohibited activity under the National Environmental Standard. New cement kilns or pulp and paper facilities are unlikely in the foreseeable future. Any new waste incinerator (low-temperature or non-hazardous) or secondary metallurgical facility would attract the regulatory attention of regional councils.

Work objective

To identify the most appropriate measures to promote or require BAT/BEP for new Part II, Annex C, sources.

Expected output

A report on regulatory and non-regulatory means to promote or require BAT/BEP for new Part II, Annex C, sources.

Work programme

Item 33 Work with stakeholder Task Teams to review the significance of Part II, Annex C, sources to New Zealand releases of Annex C chemicals, and to determine the most appropriate methods for implementing BAT/BEP and/or the use of substitute or modified materials, products and processes.

Item 34 Report on any significant issue involving BAT/BEP concerning new Part II, Annex C, sources, including any requirements for changes to laws and policies (see Item 19), and further work on education and awareness (see Items 24 and 25).

Article 5(e): Promote the use of BAT/BEP for all existing installations (sources) in accordance with Parts II and III of Annex C

The aim of this article is to promote the use of BAT/BEP to new and existing sources not otherwise addressed under Article 5(d). To set the context for this obligation, Table 10 shows the findings from an initial review of the BAT/BEP guidelines against current New Zealand practice. The capacity to minimise releases of dioxins and other Annex C chemicals has been categorised for the various sources as high, medium or low. Residential waste burning and home heating exhibit a high capacity for further reduction in releases, while the metals industry and boilers show a medium capacity for reduction.

Table 10: Potential to apply BAT/BEP and reduce releases from specific source categories

Source categories Part II, Annex C	Meets BAT/BEP	Annex C chemicals reduction capacity
Waste incinerators	No	Medium
Secondary metallurgical industry thermal processes	Most do; some don't	Medium
Hazardous waste incinerators	Yes	Nil
Cement kilns	Yes	Nil
Pulp and paper	Yes	Nil

Source categories Part III, Annex C	Meets BAT/BEP	Annex C chemicals reduction capacity
Residential waste open burning	No	High
Residential combustion for domestic heating	No	High
Other metallurgical thermal processes (not in Part II)	Most do; some don't	Medium
Boilers (fossil fuel)	Not all	Medium
Boilers (biomass)	Not all	Medium
Crematoria	Not all	Low
Motor vehicles	No	Low
Animal carcasses	No	Low
Chemical production	Yes	Low
Open burning (landfills)	Yes	Nil
Copper cable smouldering	Yes	Nil
Textile and leather	No concern	Nil
Vehicle shredding	No concern	Nil
Waste oil refining	No concern	Nil

Work objective

To identify the most appropriate measures to promote the application of BAT/BEP for new and existing Annex C, Parts II and III, sources.

Expected output

A report on the regulatory and non-regulatory means to promote BAT/BEP for new and existing Annex C, Parts II and III, sources.

Work programme

Item 35 Work with stakeholder Task Teams to review the significance of Annex C, Part III, sources to New Zealand releases of dioxins and other Annex C chemicals, and to determine the most appropriate methods for implementing BAT/BEP and/or the use of substitute or modified materials, products and processes.

Item 36 Report on any significant issue involving BAT/BEP concerning Annex C, Part III, sources, including any requirements for changes to laws and policies (see Item 19), and further work on education and awareness (see Items 24 and 25).

Summary of the Action Plan for Dioxins and Other Annex C Chemicals

Implementation and oversight of the Action Plan for Dioxins and Other Annex C Chemicals is the responsibility of the Ministry for the Environment. In summary, the Action Plan for Dioxins and Other Annex C Chemicals to minimise and, where feasible, ultimately eliminate releases of unintentional POPs to air has been compiled in accordance with the following measures.

Measures (M)

M.1 Review, and update five-yearly, a New Zealand Release Inventory of Dioxins and Other Annex C Chemicals **[Article 5(a)(i)]** (Items 1–15).

M.2 Monitor and periodically evaluate laws and policies to manage releases of dioxins and other Annex C chemicals **[Article 5(a)(ii)]** (Items 16–22).

M.3 Identify strategies to minimise releases of dioxins and other Annex C chemicals **[Article 5(a)(iii)]** (Items 20–22).

M.4 Promote information (where appropriate) to support the above programmes **[Article 5(a)(iv)]** (Items 23–26).

M.5 Report progress under the Action Plan for Dioxins and Other Annex C Chemicals every five years **[Article 5(a)(v)]** (Items 27–30).

M.6 Implement the Action Plan for Dioxins and Other Annex C Chemicals to:

- maintain and promote the implementation schedule **[Article 5(a)(vi)]**
- promote the measures of the Action Plan **[Article 5(b)]** (Items 31–32)
- take account of guidance prepared by the Conference of the Parties **[Article 5(c)]**

- provide consideration of BAT/BEP requirements for any new Annex C, Part II, installations (sources) **[Article 5(d)]** (Items 33–34)
- provide consideration of BAT/BEP requirements for all existing installations (sources) in accordance with Parts II and III of Annex C **[Article 5(e)]** (Items 35–36).

In addition, the Ministry for the Environment is to:

- **submit** the New Zealand Action Plan for Dioxins and Other Annex C Chemicals (as a component of the National Implementation Plan) to the Convention Secretariat by December 2006
- **report** the New Zealand Release Inventory for Dioxins and Other Annex C Chemicals, Revision 1, to the Convention Secretariat by December 2010
- **report** a five-yearly review of strategies to meet obligations for reducing and, where feasible, eliminating releases of dioxins and other Annex C chemicals to the Convention Secretariat by December 2010.

Appendices to the New Zealand National Implementation Plan for the Stockholm Convention

Appendix 1: Government Activity on the Stockholm Convention

Appendix 2: Government Reports on Persistent Organic Pollutants

Appendix 3: Chemicals Listed in Annex C: Definition, Risks, Toxicity

Appendix 4: Reproduction of Article 5, Stockholm Convention

Appendix 5: Reproduction of Annex C, Stockholm Convention

Appendix 1: Government Activity on the Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants raises issues that relate directly to activities undertaken by, or to the interests of, a number of government agencies.

Ministry for the Environment

Ministry for the Environment activity helping to achieve Stockholm Convention objectives includes:

- overall responsibility for administering the Convention as New Zealand's designated national authority
- funding the disposal of obsolete agrichemicals (including chlorinated pesticides and PCBs)
- air quality – a national environmental standard for dioxins and other air toxics, and for PM_{10}
- Warm Homes (reducing open fires) – a national environmental standard for new woodburners
- responsibility for policy on contaminated land, including the preparation of technical guidelines and standards, and administration of the Contaminated Sites Remediation Fund
- The New Zealand Waste Strategy[30] – improved management of wastes to minimise open burning
- liaison with local government and industry concerning the national environmental standard and guidelines
- monitoring and reporting on Convention obligations
- administration of the HSNO Act 1996.

[30] See Ministry for the Environment 2004b *New Zealand Waste Strategy 2002 – Reviewing Progress and Moving Forward*.

Table A.1: Government agency activity directly contributing to Stockholm Convention objectives

Government agency	Activity
ERMA	Assessment and regulation of POPs under the HSNO Act 1996; administration of PCB use and storage exemptions (delegated to the Ministry of Health until 31 March 2007)
Ministry of Health	Advising on health policy and provision of health care; health protection criteria for POPs in drinking water; advising on historical residential exposure to dioxin from industrial emissions; Organochlorines Technical Advisory Group; Senior Officials Group on Organochlorines
New Zealand Food Safety Authority	Advising on dietary intake of organochlorines; monitoring of maximum residue limits in produce
Department of Labour	Advising on historical occupational exposure to dioxin from the manufacture of chlorophenols, and historical occupational exposure to PCP/dioxin in sawmills
ACC	Access to medical benefits for workers exposed to dioxin and PCP
MFAT/NZAID	New Zealand's international involvement on POPs issues; co-ordination of the Government's financial and technical assistance provided under the Convention (e.g. to SPREP countries in the Pacific region)
Transport	Vehicle fleet emission strategy
Education	Advising schools of best practice alternatives to waste incineration, including composting, recycling and landfilling
MED	Administration of Basel Convention for the export of hazardous waste
Customs	Border control of exports and imports of POPs
Inland Revenue	Improved tax deductions for the costs of remediating contaminated land

Table A.2: Government agencies with an interest in Stockholm Convention outcomes

Department	Interest
Agriculture and Forestry	Status of organochlorine substances previously used for agriculture, horticulture and timber treatment
Building and Housing	Administration of the Building Act 2004 in respect of the likely presence of hazardous contaminants
Conservation	Wildlife exposure to POPs, particularly the status of New Zealand's marine mammals
Land Information New Zealand	Administration of POP-contaminated land if on Crown or former Crown land
Office of Treaty Settlements	Contamination status of land under claim, or land used for Treaty settlements
Te Puni Kokiri	Advocacy of Maori issues in health and a clean environment
Tourism	Enhancement of New Zealand's clean, green status
Veterans' Affairs	Exposure of ex-servicemen to Agent Orange (dioxin contaminant)
Women's Affairs	Advocacy of women's issues in health

Appendix 2: Government Reports on Persistent Organic Pollutants

Ministry for the Environment

- *A Strategy for Managing PCBs,* PCBs Core Group Hazardous Waste Task Group, 1988
- *The Herbicide 2,4,5-T: Technical Report of an Investigation into Residues of the Herbicide and Its Dioxin Component in Sheepmeats*, 1989
- *Ambient Concentrations of Selected Organochlorines in Rivers*, 1998
- *Ambient Concentrations of Selected Organochlorines in Soil*, 1998
- *Concentrations of PCDDs, PCDFs and PCBs in Retail Foods and an Assessment of Dietary Intake for New Zealanders*, 1998
- *Reporting on Persistent Organochlorines in New Zealand*, 1998
- *Ambient Concentrations of Selected Organochlorines in Estuaries*, 1999
- *Ambient Concentrations of Selected Organochlorines in Air*, 1999
- *Organochlorines Programme Environmental Survey Database and Users Manual*, 1999
- *New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources*, 2000
- *An Action Plan for Reducing Discharges of Dioxin to Air*, 2001
- *Concentrations of Selected Organochlorines in Serum from the Non-Occupationally Exposed New Zealand Population*, 2001
- *Dioxin Discharges from Waste Incinerators: Technical Specifications for National Environmental Standards*, 2001
- *Evaluation of Toxicity of Dioxins and Dioxin-Like PCBs: A Health Risk Appraisal for the New Zealand Population*, 2001
- *The Cost Effectiveness of Reductions in Dioxin Emissions to Air from Selected Sources*, 2001
- *Dioxin Concentrations in Residential Soil, Paritutu, New Plymouth*, 2002
- *Dioxin and Furan Emissions to Air from Secondary Metallurgical Processes in New Zealand*, 2004
- *Updated Users Guide to Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004 (including Amendments 2005)*, 2005

Ministry of Health

- *Safe Management of PCBs: Code of Practice*, 2nd edition, 1988, Department of Health (reprinted 1993)
- *Dioxin Levels in Milk and Food Paper Packaging Products: A Follow up Survey Monitoring the Dioxin Levels in Milk Products, and an Initial Investigation of Dioxin Levels in Some Food Paper Packaging*, 1994
- *1987/1988 New Zealand Total Diet Survey*, ESR Health, 1994
- *1990/1991 New Zealand Total Diet Survey. Part 1: Pesticide Residues*, ESR Health, 1995
- *Phasing out Small PCB Holdings: Information Booklet for the Technical and Trade Associations,* 3rd edition, 1995
- *Investigation of Organochlorine Contaminants in the Milk of New Zealand Women*, A report from the Institute of Environmental Science and Research to the Ministry of Health, Bates *et al*, 2001
- *New Plymouth, Paritutu Community Dioxin Exposure Assessment Study*, Baker *et al*, 2003
- *A Study of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) Exposures in Paritutu, New Zealand*, Fowles *et al*, 2005

Appendix 3: Chemicals Listed in Annex C: Definition, Risks, Toxicity[31]

1 What are the chemicals listed in Annex C?

1.1 Definition

The chemicals listed in Annex C of the Stockholm Convention comprise: polychlorinated dibenzo-*p*-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB).

1.2 Characteristics

The chemicals listed in Annex C, in addition to their documented toxicity, are persistent, bioaccumulative and undergo long-range transport. Persistent chemicals do not easily degrade in the environment. Bioaccumulative chemicals are usually fat soluble and build up in higher trophic levels, including in humans. The chemicals listed in Annex C, as semi-volatile compounds, undergo a series of evaporations and condensations in the environment, making them mobile.

1.3 Uses

PCDD and PCDF have never been used as commercial products nor were they intentionally manufactured for any reason other than for laboratory purposes.

PCBs have been used as coolants and lubricants in transformers, capacitors and other electrical equipment because they do not burn easily and are good insulators. Among other things, products that may contain PCB include old fluorescent lighting fixtures and electrical devices containing PCB capacitors.

HCB has been widely used as a pesticide to protect the seeds of onions and sorghum, wheat and other grains against fungus. It has also been used to make fireworks, ammunition and synthetic rubber, and as a solvent in the production of pesticide. [Note: in New Zealand, HCB was only ever used in small quantities experimentally between 1970 and 1972 as a seed-dressing fungicide for cereal grain.]

The following guidelines and guidance, however, do not apply to the commercial production of PCB and HCB, but rather to those processes that inadvertently lead to their formation and release.

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[31] Adapted from: UNEP Chemicals (unpublished draft circulated December 2004). *(Advance Draft) Guidelines on Best Available Techniques and Provisional Guidance on Best Environmental Practices Relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants*, prepared by the BAT/BEP Expert Group established by INC-6, December 2004.

2 What are the risks to humans of chemicals listed in Annex C?

2.1 Exposure

Because these chemicals exist throughout the environment, almost all living creatures, including humans, have been exposed to the chemicals listed in Annex C. Human exposure to Annex C chemicals arises mainly via the dietary consumption of animal fats, including breast milk, but can also arise from accidental or occupational situations. The health effects that have been associated with these exposures depend on a variety of factors, including the level of exposure, and the duration and frequency of exposure.

2.2 PCDD and PCDF

Much of the information on the toxicity of these chemicals is based on extensive studies of the most toxic member of the family, 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) in experimental animals. TCDD and related compounds can produce a wide variety of effects in animals and might produce many of the same effects in humans. Chloracne is a skin condition indicative of dioxin poisoning in humans.

The International Agency for Research on Cancer (IARC), under the World Health Organisation (WHO), identified 2,3,7,8-TCDD as the most toxic of all dioxin compounds, and as carcinogenic to humans, based mainly on studies of cases involving occupational heavy exposure. Animal studies have also shown an increased risk of cancer from long term exposure to PCDD/PCDF.

TCDD exposure results in a wide variety of reproductive and developmental effects in a number of species of experimental animals, including reduced viability, structural alterations, growth retardation and functional alterations. There is also evidence of neurobehavioral effects and effects on immune and various endocrine functions, including those of the thyroid. Because of this evidence in animals, particularly at high doses but in some cases at doses close to those with relevance for human beings, scientists are concerned about the potential for these same effects to occur in humans, especially the effects of prenatal exposure on developing children.

2.3 PCB

The most commonly observed health effects in people exposed to large amounts of PCB are skin conditions. IARC has also determined that PCBs are probably carcinogenic to humans. A few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCB for two years developed liver cancer.

Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. In the Yusho and Yucheng incidents, each involving about 2000 cases, Japanese and Taiwanese people were exposed to high concentrations of PCB and PCDF through consumption of contaminated rice oil. Liver disease mortality was two to three times more frequent than national rates in both cohorts (IARC).

PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of the health effects of PCB in the general population examined children of mothers who were exposed to PCB, which showed that PCBs may be associated with developmental or endocrine effects. Women who were exposed to relatively high levels of PCB in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than the babies of women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behaviour. Some of these behaviours, such as problems with motor skills and a decrease in short-term memory, lasted for several years.

2.4 HCB

The United States Department of Health and Human Services has determined that HCB may reasonably be expected to be a carcinogen. Studies in animals show that long term ingestion of large amounts of HCB can damage the liver, thyroid, nervous system, bones, kidneys, blood, and immune and endocrine systems.

3 How is the toxicity of chemicals listed in Annex C measured?

3.1 Toxic equivalency

For PCDD/PCDF the most toxic compounds have chlorines in the 2, 3, 7 and 8 positions. For PCB, the highest toxicity is with compounds where the molecule can assume a planar conformation, analogous to that of PCDD/PCDF. The toxicity of mixtures of these materials is evaluated as a single number called the toxic equivalent (TEQ).

To determine the TEQ of a mixture, the amount of each of the toxic members of the family is multiplied by a weighting factor relative to the most toxic chemical, 2,3,7,8-TCDD. This weighting factor is called a toxic equivalency factor (TEF). The first scheme, derived by the Committee on Challenges of Modern Society of the North Atlantic Treaty Organisation in 1988 and called TEFs, covered 17 PCDDs/PCDFs. Twenty-nine of the 419 individual PCDDs, PCDFs and PCBs were TEFs assigned by WHO in 1997. This list was recently updated after a reassessment in 2005 (see Table A.3 below). HCB does not have a toxic equivalency factor.

3.2 Tolerable intakes

The tolerable daily intake (TDI) is the amount of intake per kg of body weight per day of a chemical substance judged not to give rise to manifestations of health effects if such an amount is taken every day for an entire lifetime. The TDI established by WHO in 1998 for chemicals contributing to TEQ was set at 1.4 pg TEQ/kg body weight/day. In 2001, the Joint FAO/WHO Expert Committee on Food Additives set a provisional tolerable monthly intake (PTMI) of 70 pg TEQ/kg body weight/month, which approximates to 2.3 pg/kg body weight/day. New Zealand has an interim maximum monthly intake (IMMI) of 30 pg TEQ/kg body weight/ month.[32]

[32] Establishment of a maximum intake for dioxin, *Public Health Perspectives* 2002, 5(4): 6.

Table A.3: Toxic equivalency factors for PCDDs, PCDFs and dioxin-like PCBs for humans and mammals

PCDD/PCDF congener	TEF value
2,3,7,8-TCDD	1
1,2,3,7,8-PeCDD	1
1,2,3,4,7,8-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
OCDD	0.0003
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.03
2,3,4,7,8-PeCDF	0.3
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDF	0.0003

PCB congener	TEF value
Non-ortho PCBs	
PCB #81	0.0003
PCB #77	0.0001
PCB #126	0.1
PCB #169	0.03
Mono-ortho PCBs	
PCB #105	0.00003
PCB #114	0.00003
PCB #118	0.00003
PCB #123	0.00003
PCB #156	0.00003
PCB #157	0.00003
PCB #167	0.00003
PCB #189	0.00003

Source: Van den Berg *et al*, 1998 and 2006.

For further information

- Government of Japan 2003. *Information Brochure Dioxins.* Government of Japan, Ministry of the Environment: Tokyo. www.env.go.jp/en/chemi/dioxins/brochure2003.pdf
- International Agency for Research on Cancer (IARC) monographs: http://monographs.iarc.fr/
- Joint FAO/WHO Expert Committee on Food Additives (JECFA), Fifty-seventh meeting, Rome, 5–14 June 2001, Summary and Conclusions. www.fao.org/es/esn/jecfa/index_en.stm
- United States Centers for Disease Control. *TOXFAQs for Hexachlorobenzene*. Agency for Toxic Substances and Disease Registry. www.atsdr.cdc.gov/tfacts90.html
- United States Centers for Disease Control. *TOXFAQs for Polychlorinated Biphenyls*. Agency for Toxic Substances and Disease Registry. www.atsdr.cdc.gov/tfacts17.html
- WHO (World Health Organization). *Dioxins and Their Effect on Human Health.* WHO: Geneva. www.who.int/mediacentre/factsheets/fs225/en/

Appendix 4: Reproduction of Article 5, Stockholm Convention

Article 5: Measures to reduce or eliminate releases from unintentional production

Each party shall at a minimum take the following measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimisation and, where feasible, ultimate elimination:

(a) Develop an action plan or, where appropriate, a regional or subregional action plan within two years of the date of entry into force of this Convention for it, and subsequently implement it as part of its implementation plan specified in Article 7, designed to identify, characterise and address the release of the chemicals listed in Annex C and to facilitate implementation of subparagraphs (b) to (e). The action plan shall include the following elements:

  (i) An evaluation of current and projected releases, including the development and maintenance of source inventories and release estimates, taking into consideration the source categories identified in Annex C.

  (ii) An evaluation of the efficacy of the laws and policies of the Party relating to the management of such releases.

  (iii) Strategies to meet the obligations of this paragraph, taking into account the evaluations in (i) and (ii).

  (iv) Steps to promote education and training with regard to, and awareness of, those strategies.

  (v) A review every five years of those strategies and of their success in meeting the obligations of this paragraph; such reviews shall be included in reports submitted pursuant to Article 15.

  (vi) A schedule for implementation of the action plan, including for the strategies and measures identified therein.

(b) Promote the application of available, feasible and practical measures that can expeditiously achieve a realistic and meaningful level of release reduction or source elimination.

(c) Promote the development and, where it deems appropriate, require the use of substitute or modified materials, products and processes to prevent the formation and release of the chemicals listed in Annex C, taking into consideration the general guidance on prevention and release reduction measures in Annex C and guidelines to be adopted by decision of the Conference of the Parties.

(d) Promote and, in accordance with the implementation schedule of its action plan, require the use of best available techniques for new sources within source categories which a Party has identified as warranting such action in its action plan, with a particular initial focus on source categories identified in Part II of Annex C. In any case, the requirement to use best available techniques for new sources in the categories listed in Part II of that Annex shall be phased in as soon as practicable but no later than four years after the entry into force of the Convention for that Party. For the identified categories, Parties shall

promote the use of best environmental practices. When applying best available techniques and best environmental practices, parties should take into consideration the general guidance on prevention and release reduction measures in that annex and guidelines on best available techniques and best environmental practices to be adopted by decision of the Conference of the Parties.

(e) Promote, in accordance with its action plan, the use of best available techniques and best environmental practices:

(i) For existing sources, within the source categories listed in Part II of Annex C and within source categories such as those in Part III of that Annex.

(ii) For new sources, within source categories such as those listed in Part III of Annex C which a Party has not addressed under subparagraph (d).

When applying best available techniques and best environmental practices, Parties should take into consideration the general guidance on prevention and release reduction measures in Annex C and guidelines on best available techniques and best environmental practices to be adopted by decision of the Conference of the Parties.

(f) For the purposes of this paragraph and Annex C, "best available techniques" means the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for release limitations designed to prevent and, where that is not practicable, generally to reduce releases of chemicals listed in Part I of Annex C and their impact on the environment as a whole. In this regard:

(i) "techniques" includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned

(ii) "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

(iii) "best" means most effective in achieving a high general level of protection of the environment as a whole.

"Best environmental practices" means the application of the most appropriate combination of environmental control measures and strategies.

"New source" means any source of which the construction or substantial modification is commenced at least one year after the date of:

(i) entry into force of this Convention for the Party concerned or

(ii) entry into force for the party concerned of an amendment to Annex C where the source becomes subject to the provisions of this Convention only by virtue of that amendment.

(g) Release limit values or performance standards may be used by a party to fulfil its commitments for best available techniques under this paragraph.

Appendix 5: Reproduction of Annex C, Stockholm Convention

Unintentional production

Part I: Persistent organic pollutants subject to the requirements of Article 5

This annex applies to the following persistent organic pollutants when formed and released unintentionally from anthropogenic sources:

- chemical
- polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/PCDF)
- hexachlorobenzene (HCB) (CAS No. 118-74-1)
- polychlorinated biphenyls (PCB).

Part II: Source categories

Polychlorinated dibenzo-*p*-dioxins and dibenzofurans, hexachlorobenzene and polychlorinated biphenyls are unintentionally formed and released from thermal processes involving organic matter and chlorine as a result of incomplete combustion or chemical reactions. The following industrial source categories have the potential for comparatively high formation and release of these chemicals to the environment:

(a) waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge

(b) cement kilns firing hazardous waste

(c) production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching

(d) the following thermal processes in the metallurgical industry:

  (i) secondary copper production

  (ii) sinter plants in the iron and steel industry

  (iii) secondary aluminium production

  (iv) secondary zinc production.

Part III: Source categories

Polychlorinated dibenzo-*p*-dioxins and dibenzofurans, hexachlorobenzene and polychlorinated biphenyls may also be unintentionally formed and released from the following source categories, including:

(a) open burning of waste, including burning of landfill sites

(b) thermal processes in the metallurgical industry not mentioned in Part II

(c) residential combustion sources

(d) fossil fuel-fired utility and industrial boilers

(e) firing installations for wood and other biomass fuels

(f) specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil

(g) crematoria

(h) motor vehicles, particularly those burning leaded gasoline

(i) destruction of animal carcasses

(j) textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)

(k) shredder plants for the treatment of end of life vehicles

(l) smouldering of copper cables

(m) waste oil refineries.

Part IV: Definitions

1 For the purposes of this Annex:

(a) "polychlorinated biphenyls" means aromatic compounds formed in such a manner that the hydrogen atoms on the biphenyl molecule (two benzene rings bonded together by a single carbon-carbon bond) may be replaced by up to 10 chlorine atoms; and

(b) "polychlorinated dibenzo-*p*-dioxins" and "polychlorinated dibenzofurans" are tricyclic, aromatic compounds formed by two benzene rings connected by two oxygen atoms in polychlorinated dibenzo-*p*-dioxins and by one oxygen atom and one carbon-carbon bond in polychlorinated dibenzofurans and the hydrogen atoms of which may be replaced by up to eight chlorine atoms.

2 In this annex, the toxicity of polychlorinated dibenzo-*p*-dioxins and dibenzofurans is expressed using the concept of toxic equivalency which measures the relative dioxin-like toxic activity of different congeners of polychlorinated dibenzo-*p*-dioxins and dibenzofurans and coplanar polychlorinated biphenyls in comparison to 2,3,7,8-tetrachlorodibenzo-*p*-dioxin. The toxic equivalent factor values to be used for the purposes of this Convention shall be consistent with accepted international standards, commencing with the World Health Organization 1998 mammalian toxic equivalent factor values for polychlorinated dibenzo-*p*-dioxins and dibenzofurans and coplanar polychlorinated biphenyls. Concentrations are expressed in toxic equivalents.

Part V: General guidance on best available techniques and best environmental practices

This Part provides general guidance to parties on preventing or reducing releases of the chemicals listed in Part I.

A General prevention measures relating to both best available techniques and best environmental practices

Priority should be given to the consideration of approaches to prevent the formation and release of the chemicals listed in Part I. Useful measures could include:

(a) the use of low-waste technology

(b) the use of less hazardous substances

(c) the promotion of the recovery and recycling of waste and of substances generated and used in a process

(d) replacement of feed materials which are persistent organic pollutants or where there is a direct link between the materials and releases of persistent organic pollutants from the source

(e) good housekeeping and preventive maintenance programmes

(f) improvements in waste management with the aim of the cessation of open and other uncontrolled burning of wastes, including the burning of landfill sites. When considering proposals to construct new waste disposal facilities, consideration should be given to alternatives such as activities to minimize the generation of municipal and medical waste, including resource recovery, reuse, recycling, waste separation and promoting products that generate less waste. Under this approach, public health concerns should be carefully considered

(g) minimisation of these chemicals as contaminants in products

(h) avoiding elemental chlorine or chemicals generating elemental chlorine for bleaching.

B Best available techniques

The concept of best available techniques is not aimed at the prescription of any specific technique or technology, but at taking into account the technical characteristics of the installation concerned, its geographical location and the local environmental conditions. Appropriate control techniques to reduce releases of the chemicals listed in Part I are in general the same. In determining best available techniques, special consideration should be given, generally or in specific cases, to the following factors, bearing in mind the likely costs and benefits of a measure and consideration of precaution and prevention:

(a) General considerations:

  (i) The nature, effects and mass of the releases concerned: techniques may vary depending on source size.

  (ii) The commissioning dates for new or existing installations.

  (iii) The time needed to introduce the best available technique.

  (iv) The consumption and nature of raw materials used in the process and its energy efficiency.

(v) The need to prevent or reduce to a minimum the overall impact of the releases to the environment and the risks to it.

(vi) The need to prevent accidents and to minimise their consequences for the environment.

(vii) The need to ensure occupational health and safety at workplaces.

(viii) Comparable processes, facilities or methods of operation which have been tried with success on an industrial scale.

(ix) Technological advances and changes in scientific knowledge and understanding.

(b) General release reduction measures: When considering proposals to construct new facilities or significantly modify existing facilities using processes that release chemicals listed in this annex, priority consideration should be given to alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of such chemicals. In cases where such facilities will be constructed or significantly modified, in addition to the prevention measures outlined in section A of Part V the following reduction measures could also be considered in determining best available techniques:

(i) Use of improved methods for flue-gas cleaning such as thermal or catalytic oxidation, dust precipitation, or adsorption.

(ii) Treatment of residuals, wastewater, wastes and sewage sludge by, for example, thermal treatment or rendering them inert or chemical processes that detoxify them.

(iii) Process changes that lead to the reduction or elimination of releases, such as moving to closed systems.

(iv) Modification of process designs to improve combustion and prevent formation of the chemicals listed in this Annex, through the control of parameters such as incineration temperature or residence time.

C Best environmental practices

The Conference of the Parties may develop guidance with regard to best environmental practices.

References

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