



Ministry for the
Environment
Manatū Mō Te Taiao



New Zealand's updated National Implementation Plan

UNDER THE STOCKHOLM CONVENTION ON PERSISTENT
ORGANIC POLLUTANTS

New Zealand Government

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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 chemicals listed under the Convention called persistent organic pollutants.

The Convention came into force in 2004, and New Zealand was one of the original signatories.

New Zealand published its first national implementation plan in 2006, and added an Addendum to that plan concerning the listing of endosulfan in 2014. This 2018 updated national implementation plan reports on measures to implement Convention obligations relating to 13 more persistent organic pollutants.

New Zealand continues to actively support the goal of the Stockholm Convention. Since 2004, it has had in place a comprehensive system of laws and regulations to tightly control the initial 12 persistent organic pollutants. New Zealand has updated its regulations to include controls on all the new chemicals added to the Convention. A range of government agencies cooperate to enforce the regulations and implement the Convention.

New Zealand government agencies periodically undertake biomonitoring of New Zealanders' serum and breast milk, and test the level of POPs in the food chain and environment. Other efforts include support services for people exposed to certain persistent organic pollutants, providing funding for chemicals collection and site remediation, and addressing other legacy contaminations.

As a result, New Zealand has achieved key targets set out in its first national implementation plan. These include phasing out the use of polychlorinated biphenyls in 2016, ahead of the Convention's deadline of 2025. Dioxin releases into the air have been reduced, thanks to increasing uses of renewable energy, improvements in fleet emission control technology and the introduction of regulations on air quality. The levels of dioxins in New Zealand mothers' milk and in New Zealanders' serum have also been steadily dropping.

This updated plan describes the measures New Zealand has taken and will prioritise to fully comply with the Convention. Some issues remain with legacy persistent organic pollutants that New Zealand needs to address. By implementing this plan, New Zealand will continue to contribute to the international efforts in limiting the effects of persistent organic pollutants on human health and the environment.



Vicky Robertson
Secretary for the Environment

Executive summary

The Stockholm Convention on Persistent Organic Pollutants (the Convention) commits governments to take measures to protect human health and the environment from persistent organic pollutants (POPs).

Article 7 of the Convention requires each party to develop, implement and update a national implementation plan (NIP). New Zealand submitted a substantial NIP in 2006, to implement the Convention, and an Addendum in 2014, to implement the amendment agreed at the fifth Conference of the Parties in 2013 to list endosulfan.

This NIP (NIP2) addresses amendments to the Convention since New Zealand's first NIP (NIP1). This update is required by 15 December 2018 for new chemicals listed under the Convention in 2009, 2013 and 2015. NIP2 also references the chemicals added to the Convention in 2017 (ahead of the Convention's deadline to update the NIP with 2017 listings).

NIP2 updates New Zealand's activities to address its obligations under the Convention. The updated measures are outlined under each relevant article and summarised in table 1.

Table 1: National Implementation Plan 2018 summary of New Zealand measures

Article	Responsibility	Function – including measures
Article 3: Eliminate releases from the intentional production and use of persistent organic pollutants (POPs)	Environmental Protection Authority (EPA)	EPA administers the Hazardous Substances and New Organisms (HSNO) Act 1996 in matters relating to: <ul style="list-style-type: none"> prohibition on import, production, use, storage and disposal of POPs assessing new and existing chemicals that exhibit POP characteristics permitting the appropriate use of POPs for laboratory-scale research or as a reference standard.
	EPA and New Zealand Customs Service (Customs)	EPA and Customs: <ul style="list-style-type: none"> administer and enforce the Imports and Exports (Restrictions) Prohibition Order (No 2) 2004 and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) control movements of POP chemicals and POP hazardous waste across the border.
Article 4: Register of specific exemptions	Ministry for the Environment (MfE) will register specific exemptions, as appropriate.	
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 continue to: <ul style="list-style-type: none"> review and update five yearly a New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources (report the next inventory by April 2019) monitor laws and policies to manage releases of dioxins and other Annex C chemicals

Article	Responsibility	Function – including measures
		<ul style="list-style-type: none"> • 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 • continue to implement the Action Plan for Dioxins and Other Annex C Chemicals to achieve release reduction or source elimination.
Article 6: Stockpiles and wastes	EPA and MfE	<p>To reduce or eliminate releases from stockpiles and wastes:</p> <p>EPA:</p> <ul style="list-style-type: none"> • enforces any bans on POPs under the HSNO Act 1996 • promotes the safe interim storage and disposal of POPs through the Hazardous Substances (Storage and Disposal of POPs) Notice 2004 • grants permits to export POPs or POP wastes for destruction under the Imports and Exports (Restrictions) Prohibition Order (No 2) 2004. <p>MfE:</p> <ul style="list-style-type: none"> • administers the Contaminated Sites Remediation Fund to help local government to assess and clean up contaminated sites throughout the country • provides national direction through the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 and Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 • administers the Waste Minimisation Act 2008, which provides funding for chemical (including POPs) recovery schemes through the Waste Minimisation Fund, and for product stewardship schemes.
Article 7: NIP	MfE	<p>MfE will:</p> <ul style="list-style-type: none"> • review and update the NIP in accordance with the requirements of Article 7 • submit New Zealand's updated NIP to the Secretariat of the Stockholm Convention (Convention Secretariat) by 15 December 2018.
Article 8: Listing of new POPs under the Convention	EPA and MfE	<p>EPA and MfE will continue to:</p> <ul style="list-style-type: none"> • monitor international assessments of potential POP chemicals and participate in forums, as appropriate; and, subject to resources, collect information about these POP candidates in New Zealand • consult with stakeholders in developing a New Zealand position on chemicals recommended by the POPs Review Committee to the Conference of the Parties to the Convention for listing under the Convention.
Article 9: Information exchange	MfE	<p>MfE will continue to provide and exchange information with parties to the Convention, either directly or via the Convention Secretariat.</p>

Article	Responsibility	Function – including measures
Article 10: Public information, awareness and education	MfE	MfE will continue to consider the requirements of Article 10 when undertaking projects relevant to the Convention.
Article 11: Research, development and monitoring	MfE, Ministry of Health (MOH), Ministry for Primary Industries (MPI)	<p>MfE and MOH will continue, subject to resources, a biomonitoring programme (serum) appropriate for tracking the New Zealand population’s exposure to POPs.</p> <p>MfE will continue to monitor the effectiveness of the NIP (relating to dioxin reduction, waste stocks and contaminated sites management) and monitor POPs in the environment.</p> <p>MPI will monitor POPs in the food chain (relating to the New Zealand Total Diet Study and the National Chemical Contaminants Programme, as appropriate).</p>
Article 12: Technical assistance	MfE, Ministry of Foreign Affairs and Trade (MFAT)	MfE, in conjunction with MFAT, 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 Global Environment Facility replenishment rounds.
Article 15: Reporting	MfE	MfE will collect the necessary information and prepare and submit future New Zealand reports, in accordance with the requirements of the Convention.
Article 16: Effectiveness evaluation	MfE	<p>MfE will continue to:</p> <ul style="list-style-type: none"> maintain international liaison and collaborate with the Convention Secretariat, as appropriate and subject to resources, in contributing to a global monitoring programme provide to the Convention Secretariat information gained from existing POP monitoring programmes and from any future research programmes.
Articles 17–30	The remaining articles concern the international administration of the Convention and are not considered relevant to this updated NIP.	

Chapter 1: National implementation plan process and the Stockholm Convention

This chapter summarises the national implementation plan (NIP) process in New Zealand and the persistent organic pollutants (POPs) listed under the Stockholm Convention on Persistent Organic Pollutants (the Convention) since 2001.

1.1 New Zealand and the Stockholm Convention

The Convention is a multilateral environmental agreement committing governments to take measures to protect human health and the environment from the negative effects of POPs. Its goal is to reduce and, where feasible, eliminate the production and environmental release of the chemicals listed under the Convention.

New Zealand signed the Convention in 2001 and ratified it in 2004. The Ministry for the Environment (MfE) leads New Zealand's participation in the Convention and coordinates the Convention's implementation across government.

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1.2 National implementation plan process in New Zealand

Article 7 of the Convention requires each party to develop an NIP. The NIP outlines how a country will address its obligations under the Convention. New Zealand submitted its first NIP in 2006, followed by an Addendum in 2014.

1.2.1 National Implementation Plan 2006 (NIP1)

NIP1 is available on either the Convention or MfE websites.¹

NIP1 outlined how New Zealand implemented measures to meet Convention obligations on the initial 12 chemicals listed under the Convention in 2001 and which entered into force in New Zealand in 2004 (see tables 2–4 for the relevant Convention annexes for these listed chemicals).

¹ Ministry for the Environment. 2006b. *New Zealand's National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

1.2.2 National Implementation Plan Addendum 2014 (NIP Addendum)

New Zealand submitted an Addendum to NIP1 concerning the 2011 listing of technical endosulfan and its related isomers. The Addendum is available on the Convention website.²

1.2.3 National Implementation Plan 2018 (NIP2)

NIP2 should be read in conjunction with NIP1. It outlines New Zealand's implementation measures in relation to the chemicals listed since NIP1. These chemicals are considered 'new POPs' for NIP2. This means full details on each chemical will be included, as per the requirements in Article 7 of the Convention.

NIP2 also reports on New Zealand's achievements in phasing out the 12 initial POPs.

Developing National Implementation Plan 2

NIP2 was developed by a working group led by MfE, with participation from the Environmental Protection Authority, Ministry for Primary Industries, Ministry of Health, and Ministry of Foreign Affairs and Trade.

Context for this plan

NIP1 outlined New Zealand's historical importation, manufacture and use of POP chemicals. It presented New Zealand's efforts in:

- eliminating releases from intentional production and use of POPs
- reducing and eliminating releases from unintentional production of POPs
- reducing and eliminating stockpiles, and waste management
- research, development and monitoring the effects of POPs on New Zealanders and the environment.

New Zealand had banned all original POPs by the time it signed the Convention. By 2006, New Zealand already had laws and regulations in place to tightly control the import, export, manufacture and use of POPs and the disposal of POP hazardous waste, including its collection, handling and transport. NIP2 implements the Convention in relation to new POPs agreed since NIP1.

The controls on POPs added to the Convention in 2017 come into force in New Zealand on 18 December 2018. All the controls on listings added since 2004 are in force. In 2010, however, New Zealand lodged a notice of non-acceptance for nine POPs added to the Convention in 2009, due to an issue with residual 'articles in use' for some of those POPs. New Zealand filed another notice of non-acceptance in 2014 for hexabromocyclododecane (HBCD), which was added to the Convention in 2013. New Zealand withdrew the two notices of non-acceptance in December 2016. The 2015 listings of hexachlorobutadiene (HCB), pentachlorophenol (PCP) and polychlorinated naphthalenes (PCNs) entered into force for New Zealand in December 2016 (one year from notification). An updated NIP must therefore be filed with the Secretariat of the Stockholm Convention (Convention Secretariat) within two years of the new listings coming into effect for New Zealand. This updated NIP is due on 15 December 2018.

² See Stockholm Convention. 2008. *National Implementation Plans*. Retrieved from <http://chm.pops.int/Implementation/NationalImplementationPlans/NIPTransmission/tabid/253/Default.aspx> (11 December 2018).

Goal

NIP2's goal is to protect human health and the environment from POPs, by implementing the Convention.

Objectives

New Zealand's objectives for NIP2 are to:

- communicate the actions taken to implement the Convention
- assess progress taken to date to eliminate and reduce the use of POPs in New Zealand
- identify actions needed to eliminate and reduce the use of 'new POPs'
- update and continue to implement New Zealand's action plan for dioxins and other unintentionally produced POPs
- dispose of POP stockpiles and manage sites contaminated by POPs
- comply with the Convention.

Outcomes

New Zealand's anticipated outcomes for NIP2 are to:

- continue to protect human health from POPs as body burdens decline, as shown from previous biomonitoring studies
- continue to safeguard the present high quality of New Zealand primary products (especially meat and dairy foods)
- manage the effects of POPs on New Zealand's environment and continue to protect New Zealand's environment from POPs
- fully comply with the Convention.

1.3 Persistent organic pollutants listed under the Stockholm Convention

The Convention requires parties to apply control measures on the POPs listed. When New Zealand ratified the Convention in 2004, 12 chemicals were listed as POPs. Since then, a further 16 chemicals have been added to the Convention (some under multiple annexes). Tables 2–4 outline these chemicals, when they were listed under the Convention, and when New Zealand implemented the measures.

Listed chemicals are divided into three groups (annexes) according to how each is produced and the level of restriction required.

Annex A of the Convention contains a list of POPs to be eliminated (table 2). Convention parties have an obligation to eliminate production and use as well as imports and exports of these chemicals, except for when a country has registered for a specific exemption when accepting the listing.

Table 2: Chemicals listed in Annex A of the Convention – to be eliminated

Chemical	Year listed under Stockholm	Date entered into force for New Zealand
Aldrin	2001	2004
Chlordane	2001	2004
Dieldrin	2001	2004
Endrin	2001	2004
Heptachlor	2001	2004
Hexachlorobenzene (HCB)	2001	2004
Mirex	2001	2004
Polychlorinated biphenyls (PCBs)	2001	2004
Toxaphene	2001	2004
Alpha hexachlorocyclohexane (alpha-HCH)	2009	2016
Beta hexachlorocyclohexane (beta-HCH)	2009	2016
Chlordecone	2009	2016
Hexabromobiphenyl	2009	2016
Hexabromodiphenyl ether (hexaBDE) and heptabromodiphenyl ether (heptaBDE)	2009	2016
Lindane	2009	2016
Pentachlorobenzene (PeCB)	2009	2016
Tetrabromodiphenyl ether (tetraBDE) and pentabromodiphenyl ether (pentaBDE)	2009	2016
Technical endosulfan and its related isomers	2011	2012
Hexabromocyclododecane (HBCD)	2013	2016
Hexachlorobutadiene (HCBD)	2015	2016
Pentachlorophenol (PCP) and its salts and esters	2015	2016
Polychlorinated naphthalenes (PCNs)	2015	2016
Decabromodiphenyl ether (decaBDE) (commercial mixture, c-decaBDE)	2017	2018
Short-chain chlorinated paraffins (SCCPs)	2017	2018

Annex B of the Convention lists POPs to be restricted to uses contained in the annex (table 3).

Table 3: Chemicals listed in Annex B of the Convention – restricted use

Chemical	Year listed under Stockholm	Date entered into force for New Zealand
1,1,1-trichloro-2, 2-bis (4-chlorophenyl) ethane (DDT)	2001	2004
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F)	2009	2016

Annex C of the Convention lists POPs produced and released as unintentional by-products of specific processes (table 4). The obligation is to take measures to avoid the unintentional production and release of the listed POPs.

Table 4: Chemicals listed in Annex C of the Convention – avoid unintentional production and release

Chemical	Year listed under Stockholm	Date entered into force for New Zealand
Hexachlorobenzene (HCB)	2001	2004
Polychlorinated biphenyls (PCBs)	2001	2004
Polychlorinated dibenzo-p-dioxins (PCDDs)	2001	2004
Polychlorinated dibenzofurans (PCDFs)	2001	2004
Pentachlorobenzene (PeCB)	2009	2016
Polychlorinated naphthalenes (PCNs)	2015	2016
Hexachlorobutadiene (HCBD)	2017	2018

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Chapter 2: Overview of New Zealand and its regulatory framework to implement the Stockholm Convention

This chapter provides an overview of New Zealand and its historical use of persistent organic pollutants (POPs). It outlines the regulatory framework to control POPs in New Zealand in the broader context of hazardous substances management.

2.1 Country profile and history of use in New Zealand

New Zealand's low population density, strong agricultural and natural resource-based economy means implementing the Stockholm Convention on Persistent Organic Pollutants (the Convention) presents different challenges and opportunities, compared with other countries. In general, the predominant use of POPs in New Zealand has been as pesticides. In most cases, limited amounts of industrial POPs were manufactured in New Zealand and, where this occurred, it was much smaller in scale compared with elsewhere in the world. Most POPs were imported, often as part of consumer products.

This means New Zealand faces challenges in the ongoing implementation of the Convention and protecting the environment and human health from POPs. Generally, POPs still present in New Zealand are as a result of stockpiling rather than residue from manufacturing plants. The decentralised system of environmental governance means most policies are implemented at the regional and local level, however, the level of expertise and resources available varies between councils and regions.

Historical use of the 12 initial POPs is presented in New Zealand's 2006 National Implementation Plan.³ New Zealand's past use of POP pesticides from the mid-1940s to the 1960s was mainly in agriculture, horticulture and timber treatment. Smaller amounts were also used in public parks and by home gardeners. New Zealand did not manufacture POPs as active ingredients. The use of some well-known initial POPs, such as 1,1,1-trichloro-2, 2-bis (4-chlorophenyl) ethane (DDT), chlordane and dieldrin, ceased from the mid-1970s to late 1980s.

Under the Hazardous Substances and New Organisms (HSNO) Act 1996,⁴ all polychlorinated biphenyls (PCBs) were required to be completely withdrawn from use and destroyed no later than 2016. It is likely small amounts remain, particularly on rural properties where the owners may not realise they have PCBs stored.

Some POPs listed under the Convention since 2001 have never been manufactured (end-use formulation) or used in New Zealand. Others, such as lindane, bromodiphenyl ethers (BDEs), hexabromocyclododecane (HBCD) and pentachlorophenol (PCP), have been more prevalent, predominately through imported products rather than manufacture.

³ Ministry for the Environment. 2006b. *New Zealand's National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

⁴ See www.legislation.govt.nz/act/public/1996/0030/99.0/DLM381222.html for the full Act.

Use of perfluorooctane sulfonic acid (PFOS) firefighting foams was banned in 2006. The New Zealand Government is investigating cases of non-compliant use of PFOS firefighting foams and legacy contamination.

This historical import, manufacture and use of POP chemicals has impacted New Zealand's environment and people.

2.2 Domestic policy and regulatory controls

Article 3 of the Convention requires parties to establish the legal and administrative framework for eliminating the intentional production and use of POPs. This section updates New Zealand's policy and regulatory framework relating to the Convention's implementation.

2.2.1 Policy framework across government

The Convention and management of POPs require cross-government coordination. Each relevant agency's main functions, and their contribution to the Convention's implementation, are summarised below.

Ministry for the Environment

The Ministry for the Environment (MfE) leads New Zealand's participation in the Convention. Its role is to advise the New Zealand Government on environmental issues. MfE is responsible for environmental legislation relevant to POPs, in particular the Resource Management Act 1991 (RMA), HSNO Act 1996 and Waste Minimisation Act 2008 (WMA). MfE also monitors the performance of the Environmental Protection Authority (EPA) on behalf of the Minister for the Environment. As such, MfE is responsible for coordinating the implementation of the Convention across government and leads participation in the Convention's Conference of the Parties.

New Zealand Customs Service

The New Zealand Customs Service (Customs) is the border enforcement agency. It monitors the cross-border movement of goods for compliance with 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 or exporter produces the required approval from the government agency administering the legislation.

Environmental Protection Authority

EPA (previously the Environmental Risk Management Authority) has regulatory responsibilities for contributing to the efficient, effective and transparent management of New Zealand's environment and natural and physical resources. It also has the function of enabling New Zealand to meet its international obligations.

In relation to the Convention's implementation, EPA is responsible for regulating hazardous substances (including POPs) under the HSNO Act 1996. This includes pesticides, household chemicals, cosmetics and other dangerous goods. EPA is responsible for approving new

hazardous substances for use in New Zealand and implementing rules to manage any risks to people and the environment associated with the use of hazardous substances.

EPA is also responsible for regulating and enforcing any bans on POPs listed under the HSNO Act 1996. Regulation of storage, handling and disposal is done through the Hazardous Substances (Storage and Disposal of POPs) Notice 2004.⁵

Under the Imports and Exports (Restrictions) Prohibition Order (No 2) 2004 (I&E Order 2004),⁶ EPA is authorised to grant permits for exportation of chemicals and hazardous waste (including POP wastes) in accordance with New Zealand's obligations under the Convention and other international agreements.

Ministry of Health

The Ministry of Health (MOH) is responsible for advising on health policy, including environmental health, health protection criteria for POPs in drinking water and the impact on public health from exposure to POPs. MOH periodically commissions biomonitoring studies of the concentrations of POPs in the New Zealand population (see chapter 7).

Ministry of Foreign Affairs and Trade

The Ministry of Foreign Affairs and Trade advises on New Zealand's international involvement on POP issues. It coordinates the New Zealand Government's financial support to the Convention (via the Global Environment Facility).

Ministry for Primary Industries

The Ministry for Primary Industries (MPI) is responsible for issues relating to POPs in foods, particularly dioxins. POPs used as agricultural compounds need to comply with the Food Act 2014 and its regulations relating to maximum residue levels for agricultural compounds. In addition, the Animal Products Act 1999 sets limits for agricultural compounds and contaminants in animal produce for export. MPI works closely with Food Standards Australia New Zealand to protect consumers from any risk posed by POPs not used as agricultural compounds in food by making sure appropriate food standards are included in the joint Australia New Zealand Food Standards Code.

MPI is also responsible for policy and regulation of agricultural compounds and veterinary medicines (ACVMs), including their import and manufacture. This includes prohibiting the use of POPs as agricultural compounds. MPI periodically releases studies relating to New Zealand's primary industry and POPs (see chapter 7).

Ministry of Business, Innovation and Employment

The Ministry of Business, Innovation and Employment (MBIE) is responsible for policy relating to workplace safety, including administration of the Health and Safety at Work Act 2015 (HSWA).⁷

⁵ See www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Policies/Hazardous-Substances-Storage-and-Disposal-of-Persistent-Organic-Pollutants-Notice-2004.pdf for further information.

⁶ See www.legislation.govt.nz/regulation/public/2004/0202/latest/DLM271701.html for the full Order.

⁷ See www.legislation.govt.nz/act/public/2015/0070/55.0/DLM5976660.html for the full Act.

MBIE also has policy oversight of the Imports and Exports (Restrictions) Act 1988 (although MfE has oversight of the I&E Order 2004).

WorkSafe New Zealand

WorkSafe is New Zealand's primary workplace health and safety regulator. WorkSafe is responsible for the use, storage and handling of hazardous substances in workplaces, which can include POPs.

2.2.2 Regulatory framework

New Zealand has a largely decentralised system of environmental governance. Many regulatory and compliance functions are undertaken by local government within a policy framework set nationally by central government.

Hazardous Substances and New Organisms Act 1996

The HSNO Act 1996 is the primary legislation that implements New Zealand's principal obligations under the Convention. The Act's purpose is to protect the environment and health and safety of people and communities by preventing or managing the adverse effects of hazardous substances and new organisms. The passing of the HSNO Act in June 1996 represented one of the most significant reforms of environmental legislation since the RMA in 1991.

Schedule 1AA under the HSNO Act contains the text of the Convention and its annexes. When the Convention is amended, this schedule also needs to be updated.

Schedule 2A (POPs) prohibits any POP, or product containing a POP, from being imported into, manufactured or used in New Zealand (subject to limited exceptions, such as the use of listed POPs in research and development within a contained laboratory). Schedule 2A lists all POPs added to the Convention between 2001 and 2017. Schedule 2A will be updated as New Zealand implements future amendments to the Convention.

Schedule 2A-listed POPs, including wastes and unused stocks of POPs, are subject to rules relating to collection, storage and disposal, as specified in the Hazardous Substances (Storage and Disposal of POPs) Notice 2004,⁸ which is administered by EPA.

EPA is the decision-making body for hazardous substances (including POPs) under the HSNO Act. Several agencies undertake enforcement, depending on where the hazardous substance is being used. EPA has an explicit enforcement role in respect of POPs. HSNO Act enforcement agencies include EPA, WorkSafe, MPI, MOH, New Zealand Transport Agency, New Zealand Police, Civil Aviation Authority of New Zealand, Maritime New Zealand, regional councils and territorial authorities. MfE and EPA are strengthening the hazardous substances compliance system, to better manage chemicals (including POPs) in New Zealand.

⁸ See www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Policies/Hazardous-Substances-Storage-and-Disposal-of-Persistent-Organic-Pollutants-Notice-2004.pdf for the full Notice.

Resource Management Act 1991

The RMA⁹ is New Zealand's primary legislation that outlines how the environment should be managed. The Act provides an overarching guide for environmental management, with national direction on significant issues, including the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 and Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, which are important mechanisms in New Zealand's implementation of the Convention.

The Resource Management (National Environmental Standards for Air Quality) Regulations 2004 set seven standards banning activities that discharge significant quantities of dioxins and other toxins into the air. This includes banning the burning of insulated copper wire, oil or tyres in the open, burning road seal, and high-temperature incineration of hazardous wastes.

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011¹⁰ set planning controls and soil contaminant values. The regulations ensure that land affected by contaminants (including POPs) in the soil is appropriately identified and assessed before it is developed and, if necessary, that the land is remediated or the contaminants contained to make the land safe for human use. More information about the contaminated land regulatory framework is given in chapter 6.

Health and Safety at Work Act 2015

The HSWA¹¹ is New Zealand's workplace health and safety law. It came into effect on 4 April 2016. The Act governs how hazardous substances are used in the workplace, which can include controls relevant to POPs and their handling by workers.

Agricultural Compounds and Veterinary Medicines Act 1997

The ACVM Act's¹² purpose is to prevent or manage risks associated with the use of agricultural compounds. The Act ensures the provision of sufficient consumer information about agricultural compounds, and that their use does not result in breaches of domestic food residue standards.

Many products under the ACVM Act have hazardous substance components. As such, an approval under the HSNO Act 1996 is required first before an approval can be given under the ACVM Act. This means no products approved under the ACVM Act should contain POPs, because a HSNO approval will not be given to a POP or POP-containing product (except in limited circumstances). In addition, the ACVM (Exemptions and Prohibited Substances) Regulations 2011¹³ prohibit the use of POPs as agricultural compounds.

⁹ See www.legislation.govt.nz/act/public/1991/0069/226.0/DLM230265.html for the full Act.

¹⁰ See www.legislation.govt.nz/regulation/public/2011/0361/latest/DLM4052228.html for full Regulations.

¹¹ See www.legislation.govt.nz/act/public/2015/0070/55.0/DLM5976660.html for the full Act.

¹² See www.legislation.govt.nz/act/public/1997/0087/latest/DLM414577.html for the full Act.

¹³ See www.legislation.govt.nz/regulation/public/2011/0327/latest/DLM3982848.html for the full Regulations.

Imports and Exports (Restrictions) Prohibition Order (No 2) 2004

New Zealand is party to several multilateral agreements relating to the management, import and export of certain chemicals and hazardous waste, such as the Basel, Rotterdam and Stockholm conventions (see below).

The I&E Order 2004 contains lists of chemicals covered by the Stockholm Convention (Schedule 1) and Rotterdam Convention (Schedule 2). The lists have been updated to include new chemicals added to the Stockholm Convention between 2009 and 2017.

The I&E Order 2004 puts in place a permit system for the export of Rotterdam, Basel and Stockholm Convention chemicals (including POPs).

Waste Minimisation Act 2008

MfE administers the WMA.¹⁴ This Act encourages a reduction in the amount of waste generated and disposed of in New Zealand. It aims to protect the environment from harm and provide environmental, social, economic and cultural benefits.

Under the WMA, the Minister for the Environment can grant accreditation to recognised product stewardship schemes. One such initiative is the Agrecovery rural recycling programme. This is aimed at managing hazardous chemicals in rural New Zealand. Agrecovery has been funded to enable POPs and other hazardous substances to be collected and disposed of safely (see more in chapter 6).

Local Government Act 2002

The Local Government Act 2002¹⁵ empowers councils to promote the well-being of communities. The purpose of local government is to:

- enable democratic local decision-making and action by, and on behalf of, communities
- promote the social, economic, environmental and cultural well-being of communities in the present and for the future.

Local authorities have regulatory responsibilities under the HSNO Act 1996, RMA and WMA.

Recent legislative reforms

Recent reforms of the HSNO Act 1996 and RMA, as well as the introduction of the HSWA, have changed how hazardous substances are managed in New Zealand.

Changes to the RMA relating to hazardous substances

The RMA was amended in 2017 to remove the control of hazardous substances as an explicit function of councils under sections 30 and 31 of this Act. This means councils no longer have an explicit obligation to regulate hazardous substances in RMA plans, policy statements or resource consents.

The changes, however, still allow councils to set planning controls or conditions on resource consents in relation to hazardous substances. Councils still have a responsibility to achieve integrated management of the natural and physical resources of the region or district. This

¹⁴ See www.legislation.govt.nz/act/public/2008/0089/49.0/DLM999802.html for the full Act.

¹⁵ See www.legislation.govt.nz/act/public/2002/0084/167.0/DLM170873.html for the full Act.

includes safeguarding the life-supporting capacity of air, water, soil and ecosystems and avoiding, remedying or mitigating any adverse effects of activities on the environment.

Councils can use this function to place additional controls on hazardous substance use or any discharge of hazardous substances to the environment under the RMA. Councils do this if existing HSNO Act or HSWA regulations are not adequate to address specific environmental effects of hazardous substances in any particular case (including managing the risk of potential effects on the local environment). The areas not specifically addressed by the HSNO Act and HSWA are, in general, location or area-specific issues, such as sensitive environments, or unique ecological areas or issues, such as discharge to air of hazardous waste by-products (ie, dioxins).

Working Safer reforms

The system for managing hazardous substances in workplaces changed in December 2017, following the passage of the HSWA. The reforms resulted in changes to the management of hazardous substances in the workplace, which is now covered by both the HSWA administered by WorkSafe and the HSNO Act 1996 administered by EPA.

WorkSafe has taken over the setting of rules for use of hazardous substances in the workplace. This includes controls such as handling, signage, storage and tracking of hazardous substances. These rules have been moved to the new Health and Safety at Work Act (Hazardous Substances) Regulations 2017¹⁶ and are overseen by WorkSafe.

Since December 2017, EPA became the main enforcement agency for checking whether chemicals are approved and for environmental controls (including rules relating to disposal of POPs). Before this, WorkSafe was the primary enforcement agency of all HSNO rules in workplaces.

Wider multilateral agreements

New Zealand also implements other international conventions relevant to POPs. These are discussed below.

Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (Basel Convention)

New Zealand ratified the Basel Convention in December 1994. The I&E Order 2004, established under the Imports and Exports (Restrictions) Act 1988, allows imports and exports of hazardous wastes only when permitted in circumstances that comply with the Basel Convention.

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention)

New Zealand ratified the Rotterdam Convention in 2003 and fulfils its principal obligations under it through the I&E Order 2004.

¹⁶ See www.legislation.govt.nz/regulation/public/2017/0131/25.0/DLM7309401.html for the full Regulations.

2.2.3 Non-regulatory initiatives

In addition to a comprehensive regulatory framework, New Zealand has developed non-regulatory initiatives that have contributed to the implementation of the Stockholm Convention. These include the Contaminated Sites Remediation Fund,¹⁷ Waste Minimisation Fund¹⁸ and product stewardship initiatives¹⁹ (see more in chapter 6).

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¹⁷ Ministry for the Environment. No date(a). *Contaminated Sites Remediation Fund*. Retrieved from www.mfe.govt.nz/more/funding/contaminated-sites-remediation-fund (11 December 2018).

¹⁸ Ministry for the Environment. 2018b. *About the Waste Minimisation Fund*. Retrieved from www.mfe.govt.nz/more/funding/waste-minimisation-fund/about-waste-minimisation-fund (11 December 2018).

¹⁹ Ministry for the Environment. 2018a. *About product stewardship in New Zealand*. Retrieved from www.mfe.govt.nz/waste/we-all-have-role-play/responsible-product-management/about-product-stewardship (11 December 2018).

Chapter 3: Initial Annex A and Annex B persistent organic pollutants

This chapter summarises the measures in annexes A and B of the Stockholm Convention on Persistent Organic Pollutants (the Convention) for persistent organic pollutants (POPs). It also provides an update on New Zealand’s efforts to eliminate polychlorinated biphenyls (PCBs) and legacy pesticides, such as 1,1,1-trichloro-2, 2-bis (4-chlorophenyl) ethane (DDT), since the 2006 National Implementation Plan (NIP1).

3.1 Convention obligations

Article 3 of the Convention requires that parties eliminate releases from the intentional production and use of POPs. When New Zealand ratified the Convention in 2004, 12 initial POPs were listed. Full details of New Zealand’s approach to these POPs are found in NIP1.²⁰

3.2 Initial persistent organic pollutants

Table 5 shows the measures New Zealand needs to comply with for the initial POPs listed in annexes A and B.

Table 5: Initial persistent organic pollutants and their historical use in New Zealand

Annex A chemicals	Measure	Year	Description
Aldrin	Restriction in accordance with Annex A	2004	Introduced in New Zealand in 1954 as stock remedy in sheep sprays or dips for controlling sheep ectoparasites. Used to control horticultural pests and in limited quantities to control household spiders.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	
Chlordane	Restriction in accordance with Annex A	2004	A broad-spectrum agricultural insecticide. 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.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	
Dieldrin	Restriction in accordance with Annex A	2004	Introduced in New Zealand in 1954 as stock remedy in sheep sprays or dips for controlling sheep ectoparasites. Used to control agricultural pests and also used for timber preservation (mostly in plywood glues) and to mothproof carpets.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	

²⁰ Ministry for the Environment. 2006b. *New Zealand’s National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

Annex A chemicals	Measure	Year	Description
Endrin	Restriction in accordance with Annex A	2004	Only small amounts were ever used in New Zealand.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	
Heptachlor	Restriction in accordance with Annex A	2004	Only small amounts were ever used in New Zealand.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	
Hexachlorobenzene (HCB)	Restriction in accordance with Annex A	2004	Used experimentally between 1970 and 1972 as a seed-dressing fungicide for cereal grain.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	
Mirex	Restriction in accordance with Annex A	2004	Only limited quantities were used for control of public health pests.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	
Polychlorinated biphenyls (PCBs)	Restriction in accordance with Annex A	2004	Manufactured from 1930 to late 1970s. Used widely in industry throughout the world. 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.
	Prohibition on production	2004	
	Prohibition on all uses	2016	
	Prohibition on import	2004	
	Prohibition on export	2004	
Toxaphene	Restriction in accordance with Annex A	2004	Only small amounts were ever used in New Zealand.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	
Annex B chemicals	Measure	Year	
1,1,1-trichloro-2, 2-bis (4-chlorophenyl) ethane (DDT)	Restriction in accordance with Annex B	2004	Used mainly as a pasture insecticide to control grass grub (<i>Costelytra zealandica</i>) and porina (<i>Wiseana sp.</i>) caterpillars. It was frequently mixed with fertiliser or lime and applied to agriculture pastures, as well as to lawns, market gardens and parks.
	Prohibition on production	2004	
	Prohibition on all uses	2004	
	Prohibition on import	2004	
	Prohibition on export	2004	

3.3 Progress since National Implementation Plan 1

New Zealand has not produced any NIP1 chemicals listed in annexes A or B since their phase out in the late 1980s. See chapter 6 for information about the waste management of POPs.

3.3.1 Phasing out polychlorinated biphenyls

New Zealand's PCB inventory and disposal programme pre-dates the Convention (refer to New Zealand's NIP1).²¹ All uses of PCBs were initially banned under the Toxic Substances Act 1979, with some registered exemptions, until this Act was repealed. The Hazardous Substances and New Organisms (HSNO) Act 1996, which followed, banned the importation, manufacture, use and storage of PCBs in New Zealand while allowing for the continuation of exemptions to facilitate a programmed phase-out. All PCBs in New Zealand had to be withdrawn from use and destroyed no later than 31 December 2016. Before that date, management and disposal of PCBs were covered by the Hazardous Substances (Storage and Disposal of Polychlorinated Biphenyls) Notice 2007 (PCBs Notice).

The New Zealand PCB phase-out is now complete, ahead of the Convention's deadline of 2025. Between 2010 and 2016, almost NZ\$2 million was allocated by Ministry for the Environment (MfE) through the Waste Minimisation Fund for the collection and environmentally sound disposal of PCBs, and 174.188 tonnes of PCBs were disposed of (table 6). New Zealand's national reports (available on the Convention website)²² include four-yearly reporting on PCBs.

Table 6: Polychlorinated biphenyls waste disposal (in tonnes)

Year	Total quantity of disposal (t)
2010	109.400
2012	12.556
2014	48.664
2016	3.568

It is possible that small amounts of PCBs (as with other POPs) will continue to be found. PCBs must now be managed similarly to other POPs, and a framework is in place to manage their storage and disposal. The Hazardous Substances (Storage and Disposal of POPs) Notice 2004²³ was updated in 2016, replacing the PCBs Notice, to allow for the disposal of PCBs to be managed in a similar way to other POPs. The 2016 Notice sets requirements for:

- the storage of PCBs
- notification by collectors of PCBs to the Environmental Protection Authority (EPA)
- specific controls to be met in relation to packaging, emergency management, and identification duties of collectors.

²¹ Ministry for the Environment. 2006b. *New Zealand's National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

²² See <http://chm.pops.int/Countries/Reporting/NationalReports/tabid/3668/Default.aspx>.

²³ See www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Policies/Hazardous-Substances-Storage-and-Disposal-of-Persistent-Organic-Pollutants-Notice-2004.pdf for the full Notice.

A practical guide is available for anyone involved in the handling, storage, transport and disposal of PCBs.²⁴

New Zealand has taken seriously its efforts to reduce the levels of PCBs. In addition to facilitating the collection and disposal of PCBs, prosecution mechanisms have also been used, when necessary. For example, in July 2014, a company was fined NZ\$10,000 for storing 36 tonnes of PCBs and failing to provide a management plan to EPA that adequately provided for the PCB's ultimate disposal, as required by a compliance notice served in 2013.²⁵

Because New Zealand has no suitable facilities for the destruction of PCBs and PCB-containing equipment, such material must be sent to an approved overseas facility for destruction. This requires a permit from EPA for the export of hazardous waste, in accordance with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

See www.epa.govt.nz/industry-areas/hazardous-substances/rules-for-hazardous-substances/polychlorinated-biphenyls-pcbs for more information.

3.3.2 'DDT Muster'

NIP1 refers to a range of recovery programmes of POPs. In 2014, MfE funded the 'Identification, Collection and Offshore Disposal of POPs and Unknown Agrichemicals' project, commonly known as the 'DDT Muster'.²⁶ The project was initiated because of a concern that at least 5 tonnes of DDT along with other legacy POP pesticides remained on rural properties because people were unsure of how to dispose of them.²⁷ The muster provided the opportunity for individuals and businesses still holding any amount of DDT and other legacy POP pesticides on their property to make a confidential booking for them to be collected and sent off-shore for disposal.

Table 7 shows the volumes of DDT and other legacy POP pesticides transported overseas for destruction from 2013 to 2017.

Table 7: Volume of legacy persistent organic pollutant pesticides exported for destruction (kilograms per year)

Year	Total quantity of disposal (kg)
2013	8,337
2014	8,128
2015	15,876
2016	17,418

²⁴ Environmental Protection Authority. 2017. *Safe Management of PCBs: Code of Practice*. Wellington: Environmental Protection Authority. Retrieved from www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Guidance/Safe-Management-of-PCBs.pdf for further information (11 December 2018).

²⁵ See WorkSafe. 2017. *Laws and Regulations: Julian's Electrical and Energy Conservation Limited*. Retrieved from worksafe.govt.nz/laws-and-regulations/prosecutions/court-summaries/julians-electrical-and-energy-conservation-limited (11 December 2018).

²⁶ Ministry for the Environment. No date. *Waste Minimisation Fund funded projects*. Retrieved from www.mfe.govt.nz/more/funding/waste-minimisation-fund/projects-funded-date (11 December 2018).

²⁷ The Great DDT Muster. 2017. *Great DDT Muster FAQ's – Ridding NZ of POPs*. Retrieved from thegreatddtmuster.co.nz/the-great-ddt-muster-faqs for further information (11 December 2018).

2017	17,766
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MfE funding for the DDT Muster is now concluded, but the collection of POPs is still available, subject to collection fees.

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Chapter 4: New Annex A and Annex B persistent organic pollutants

This chapter addresses the new chemicals added to annexes A and B of the Stockholm Convention on Persistent Organic Pollutants (the Convention) in 2009, 2013, 2015 and 2017.

4.1 Convention obligations

Article 3 of the Convention requires that parties eliminate releases from the intentional production and use of persistent organic pollutants (POPs). Since the first National Implementation Plan (NIP1), 16 chemicals have been added to the Convention by the Conference of the Parties.

4.2 New persistent organic pollutants

Table 8 shows the measures New Zealand needs to comply with for the POPs added to annexes A and B of the Convention since NIP1. These POPs were used in New Zealand as pesticides and/or industrial chemicals.

Table 8: Persistent organic pollutants listed 2009–17, and New Zealand’s implementation measures

Annex A chemicals	Measure	Year	Exemption/articles in use
Alpha hexachlorocyclohexane (alpha-HCH)	Restriction in accordance with Annex A	2016	N/A
	Prohibition on production	2011	
	Prohibition on all uses	2011	
	Prohibition on import	2011	
	Prohibition on export	2011	
Beta hexachlorocyclohexane (beta-HCH)	Restriction in accordance with Annex A	2016	N/A
	Prohibition on production	2011	
	Prohibition on all uses	2011	
	Prohibition on import	2011	
	Prohibition on export	2011	
Chlordecone	Restriction in accordance with Annex A	2016	N/A
	Prohibition on production	2011	
	Prohibition on all uses	2011	
	Prohibition on import	2011	
	Prohibition on export	2011	
Decabromodiphenyl ether (commercial mixture, c-decaBDE)	Restriction in accordance with Annex A	2018	Specific exemptions for: <ul style="list-style-type: none"> parts for use in vehicles, specified in paragraph 2 of Part IX of Annex A of the Convention aircraft for which type approval has been applied for before December 2018 and has been received before December 2022 and
	Prohibition on production	2018	
	Prohibition on all uses	2018	
	Prohibition on import	2018	
	Prohibition on export	2018	

Annex A chemicals	Measure	Year	Exemption/articles in use
			<p>spare parts for those aircraft</p> <p>Articles in use notifications for articles where decaBDE has been used as an additive in plastics (such as in electrical and electronic equipment, wires, cables and pipes), in textiles (such as in carpets, upholstery, window blinds and curtains, and mattresses) and in adhesives, sealants and coatings – present in New Zealand before 18 December 2018.</p>
Hexabromobiphenyl	<p>Restriction in accordance with Annex A</p> <p>Prohibition on production</p> <p>Prohibition on all uses</p> <p>Prohibition on import</p> <p>Prohibition on export</p>	<p>2016</p> <p>2011</p> <p>2011</p> <p>2011</p> <p>2011</p>	N/A
Hexabromocyclododecane (HBCD)	<p>Restriction in accordance with Annex A</p> <p>Prohibition on production</p> <p>Prohibition on all uses</p> <p>Prohibition on import</p> <p>Prohibition on export</p>	<p>2016</p> <p>2016</p> <p>2016</p> <p>2016</p> <p>2016</p>	Articles in use notification for expanded polystyrene and extruded polystyrene, which were manufactured before 1 January 2017
Hexabromodiphenyl ether (hexaBDE) and heptabromodiphenyl ether (heptaBDE) (commercial octabromodiphenyl ether (c-octaBDE))	<p>Restriction in accordance with Annex A</p> <p>Prohibition on production</p> <p>Prohibition on all uses</p> <p>Prohibition on import</p> <p>Prohibition on export</p>	<p>2016</p> <p>2011</p> <p>2011</p> <p>2011</p> <p>2011</p>	N/A
Hexachlorobutadiene (HCBD)	<p>Restriction in accordance with Annex A</p> <p>Prohibition on production</p> <p>Prohibition on all uses</p> <p>Prohibition on import</p> <p>Prohibition on export</p>	<p>2016</p> <p>2016</p> <p>2016</p> <p>2016</p> <p>2016</p>	
Lindane	<p>Restriction in accordance with Annex A</p> <p>Prohibition on production</p> <p>Prohibition on all uses</p> <p>Prohibition on import</p> <p>Prohibition on export</p>	<p>2016</p> <p>2011</p> <p>2015</p> <p>2011</p> <p>2011</p>	Exemption for human health pharmaceutical for control of head lice and scabies second-line treatment, which ended 25 August 2015
Pentachlorobenzene (PeCB)	<p>Restriction in accordance with Annex A</p> <p>Prohibition on production</p> <p>Prohibition on all uses</p> <p>Prohibition on import</p> <p>Prohibition on export</p>	<p>2016</p> <p>2011</p> <p>2011</p> <p>2011</p> <p>2011</p>	N/A
Pentachlorophenol (PCP) and its salts and esters	<p>Restriction in accordance with Annex A</p> <p>Prohibition on production</p> <p>Prohibition on all uses</p>	<p>2016</p> <p>2008</p> <p>2008</p>	N/A

Annex A chemicals	Measure	Year	Exemption/articles in use
	Prohibition on import	2008	
	Prohibition on export	2016	
Polychlorinated naphthalenes (PCNs)	Restriction in accordance with Annex A	2016	N/A
	Prohibition on production	2016	
	Prohibition on all uses	2016	
	Prohibition on import	2016	
	Prohibition on export	2016	
Short-chain chlorinated paraffins (SCCPs)	Restriction in accordance with Annex A	2018	Articles in use notification for articles where SCCPs have been used as additives in rubber and plastic goods, in adhesives and sealants, and as water-proofing and flame-retardant agents for textiles – present in New Zealand before 18 December 2018.
	Prohibition on production	2018	
	Prohibition on all uses	2018	
	Prohibition on import	2018	
	Prohibition on export	2018	
Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether)	Restriction in accordance with Annex A	2016	N/A
	Prohibition on production	2011	
	Prohibition on all uses	2011	
	Prohibition on import	2011	
	Prohibition on export	2011	
Annex B chemicals	Measure	Year	Exemption/articles in use
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F) ²⁸	Restriction in accordance with Annex A	2016	N/A
	Prohibition on production	2011	
	Prohibition on all uses	2011	
	Prohibition on import	2011	
	Prohibition on export	2011	

4.3 Overview of regulatory controls

Section 2.2.1 outlines the regulatory controls that apply to the elimination of POPs. Once the chemicals have been added to Schedule 2A of the HSNO Act 1996, their production, import and use is prohibited in New Zealand. However, the manufacture or import of POPs in containment for small amounts for use as laboratory analytical standards or research and development may be allowed under section 30 of the HSNO Act. The Hazardous Substances (Storage and Disposal of POPs) Notice 2004 applies to all of these chemicals. Controls on the export of POPs as chemicals, and the import and export of POP hazardous wastes are set under Schedule 1 of the Imports and Exports (Restrictions) Prohibition Order (No 2) 2004.

²⁸ This chemical is regulated by the HSNO Act 1996 as perfluorooctane sulfonic acid (PFOS) (CAS No: 1763-23-1), its salts and any derivatives of the formula C₈F₁₇SO₂X, where X = halide, amide, esters and other derivatives, including polymers.

4.4 Eliminating releases from intentional production and use

The main information relevant to Article 3 is summarised for each chemical. The information is organised by the year in which the chemical was added to the Convention.

4.4.1 Persistent organic pollutants added to the Convention in 2009

Alpha hexachlorocyclohexane and beta hexachlorocyclohexane

The intentional use of alpha hexachlorocyclohexane (alpha-HCH) and beta hexachlorocyclohexane (beta-HCH) as an insecticide was phased out many years ago. These chemicals are, however, still produced as an unintentional by-product of lindane.

The manufacture of alpha-HCH, beta-HCH and lindane has not occurred in New Zealand (table 9).

Table 9: History of use and controls of alpha hexachlorocyclohexane and beta hexachlorocyclohexane

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996		Ongoing implementation issues
		Other controls	
Major by-product of lindane manufacture in other countries, but not used in New Zealand.	Prohibited, as listed in Schedule 2A of the HSNO Act in 2011.	Registration of hexachlorocyclohexane as agricultural compounds or as ingredients in agricultural compounds has been prohibited since September 2004.	n/a

Chlordecone

Internationally, chlordecone, a synthetic chlorinated organic compound, was used mainly as an agricultural pesticide. It was first produced in 1951 and introduced commercially in 1958. No use or production of chlordecone in New Zealand has been reported (table 10). Trade names for chlordecone include Kepone® and GC-1189.

Table 10: History of use and controls of chlordecone

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996		Ongoing implementation issues
		Other controls	
No reported use in New Zealand.	Prohibited, as listed in Schedule 2A of the HSNO Act in 2011.	Registration of chlordecone as agricultural compounds or as ingredients in agricultural compounds is prohibited under the Agricultural Compounds and Veterinary Medicines Act 1997.	n/a

Hexabromobiphenyl

Hexabromobiphenyl belongs to the group of polybrominated biphenyls. This industrial chemical has been used as a flame retardant in synthetic fibres and plastics, mainly in the

1970s. According to available information, hexabromobiphenyl is no longer produced or used in most countries, including New Zealand (table 11). Alternatives are available for all uses. Trade names include FireMaster BP-6 and FireMaster FF-1.

Table 11: History of use and controls of hexabromobiphenyl

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996		Ongoing implementation issues
		Other controls	
No significant use in New Zealand.	Prohibited, as listed in Schedule 2A of the HSNO Act in 2011.	n/a	n/a

Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether)

Hexabromodiphenyl ether (hexaBDE) and heptabromodiphenyl ether (heptaBDE) are the main components of commercial octabromodiphenyl ether (c-octaBDE). These chemicals belong to the bromodiphenyl ether (BDE) family.

Polybromodiphenyl ether congeners (including tetrabromodiphenyl ether (tetraBDE), pentabromodiphenyl ether (pentaBDE), hexaBDE and heptaBDE) inhibit or suppress combustion in organic materials and, therefore, were used as additive flame retardants.

The main former use of c-octaBDE was in acrylonitrile-butadiene-styrene thermoplastics, particularly those used for electronic goods, such as computer monitor and television casings, photocopiers, microwave ovens, laptops and printers. It was also used in coatings and lacquers, and in polyurethane foam for auto upholstery.

Production of c-octaBDE stopped in the European Union (EU), United States of America and Pacific Rim in 2004, and no information is available indicating it is being produced in developing countries.

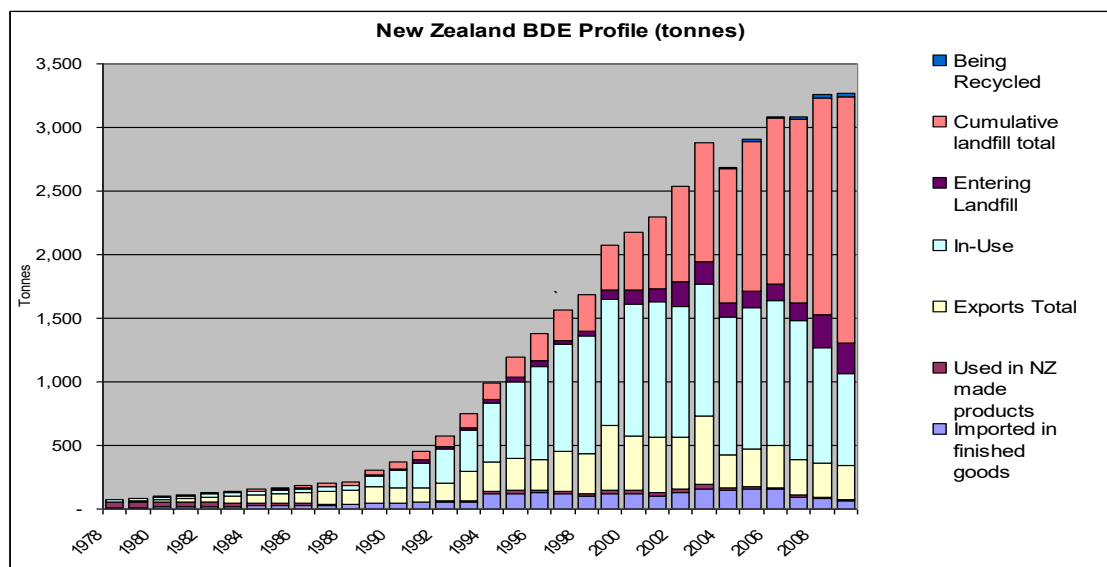
New Zealand is likely to have had a lower level of BDEs in imported and exported products than the EU and North America. This is due to the absence of a regulation that required household goods to contain flame retardants in New Zealand (compared with EU countries and the United Kingdom of Great Britain and Northern Ireland, which had this requirement introduced in the late 1980s).

The main source of BDEs in New Zealand has come from imports of finished consumer products imported within the past decades (mainly from developing countries), polymer resin used in the manufacture of New Zealand products, and in chemical compound form for production of polymer products for specific applications. Such applications include drapes, furnishings and furniture in hospitals, schools, cinemas and other public places. BDEs were never manufactured in New Zealand.

Consumer products that may contain BDEs include electrical and electronic equipment (televisions, stereos, computers, printers, faxes, switches, plugs), household appliances (electrical heaters, hairdryers, hair tongs, dishwashers, fridges, kettles, toasters) and furniture and upholstery (curtains, drapes, car interiors) (table 12).

Figure 1 lists estimated quantities of BDEs in various sources in the New Zealand environment between 1978 and 2010.

Figure 1: New Zealand bromodiphenyl ether profile, 1978–2010



Source: Keet et al, 2010

Note: All figures in the graph are annual tonnages, except for the landfill figures, which represent the cumulative tonnages of bromodiphenyl ethers present in landfills.

Annual 'in-use' tonnages comprise the net amount in any one year made up from (i) the imported goods still in use *plus* (ii) the products made in New Zealand and still in use in New Zealand (ie, both (i) and (ii) are accumulated over the product lifetimes) *minus* (iii) any exports and (iv) articles disposed to land.

Very few articles containing commercial pentaBDE and octaBDE are recycled in New Zealand (table 12).

Table 12: History of use and controls of hexabromodiphenyl ether and heptabromodiphenyl ether

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996	Other controls	Ongoing implementation issues
Not manufactured in New Zealand but used in articles imported and manufactured because was present as flame retardants in plastics (for example, casings of electronic equipment).	Prohibited, as listed in Schedule 2A of the HSNO Act in 2011.	n/a	Management of existing articles, and waste-stream management when they become waste.

Lindane

Lindane is the common name for the gamma isomer of hexachlorocyclohexane. It has been used as a broad-spectrum insecticide for seed and soil treatment, foliar applications, tree and wood treatment, and against ectoparasites in both veterinary and human applications. Its household use included fly spray, flea control and carpet moth.

The Pesticides Act 1979 banned lindane's use as an agricultural pesticide in 1989. The Agricultural Compounds and Veterinary Medicines (ACVM) Regulations 2001 were amended in 2004 to prohibit lindane as an agricultural compound or ingredient in agricultural compounds. The ACVM (Exemptions and Prohibited Substances) Regulations 2011 revoked and replaced the ACVM Regulations 2001. All uses were prohibited when lindane was added to Schedule 2A of the HSNO Act in 2011, except for a specific exemption as a treatment for human head lice

and scabies. Pharmaceutical products were formulated in New Zealand with imported lindane active ingredients, but this manufacture ceased before the expiry of the exemption on 25 August 2015 (table 13).

Table 13: History of use and controls of lindane

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996		Ongoing implementation issues
		Other controls	
Before 1989, used as a broad-spectrum insecticide. Its use was more generally prohibited in New Zealand in 2011, but, until 25 August 2015, it was used in human health pharmaceuticals (medicated shampoo under prescription) to control scabies and lice under an exemption.	Prohibited, as listed in Schedule 2A of the HSNO Act in 2011. The listing had an exemption for use on human head lice and scabies, but this expired on 25 August 2015.	Registration as agricultural compounds or ingredients in agricultural compounds prohibited since September 2004 under the Agricultural Compounds and Veterinary Medicines (ACVM) Act 1997.	Residues in some sites resulting from historic use.

Pentachlorobenzene

Pentachlorobenzene (PeCB) belongs to a group of chlorobenzenes. It was used in polychlorinated biphenyl (PCB) products, in dyestuff carriers, as a fungicide, a flame retardant and as a chemical intermediate, in particular, for the production of quintonzene.

PeCB might still be used as an intermediate in some manufacturing processes, or produced unintentionally during combustion, thermal and industrial processes. It may also be present as impurities in products such as solvents or pesticides.

In 2011, the Environmental Risk Management Authority (the Environmental Protection Authority's predecessor) reassessed and then revoked the approval for quintonzene. Reasons for the decision included that the revocation would remove an avoidable source of POPs and be consistent with New Zealand's commitment under the Convention.

No use is reported in New Zealand (table 14).

Table 14: History of use and controls of pentachlorobenzene

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996		Ongoing implementation issues
		Other controls	
No significant use in New Zealand.	Prohibited, as listed in Schedule 2A of the HSNO Act in 2011.	Registration as agricultural compounds or ingredients in agricultural compounds prohibited from September 2004.	n/a

Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride

Perfluorooctane sulfonic acid (PFOS) and its closely related compounds are members of the large family of perfluoroalkyl sulfonate substances. PFOS is both intentionally produced and an unintended degradation product of related chemicals. Intentional use of PFOS was widespread globally and included: the electronic and semi-conductor industry, electroplating industry,

certain medical devices, firefighting foams, photo imaging, aviation hydraulic fluids, and coatings for textiles, carpets, leather, upholstery, paper and packaging, rubber, and plastics, and insect baits for control of ants and termites.

In New Zealand, PFOS was used in several of the above applications but the most dispersive use was in firefighting foams. Globally, the firefighting foams based on PFOS chemistry were only ever produced by one manufacturer (3M), and it ceased this manufacture by 2003. PFOS-based foams were prohibited in New Zealand by the HSNO Act 1996 Fire Fighting Chemicals Group Standard 2006. A submission to a public consultation process led by the Environmental Risk Management Authority in 2006 indicated that 3M had already by then ceased importing PFOS-based firefighting foams into New Zealand.

In 2017, PFOS was found in soil and groundwater at some New Zealand air force bases and airports, likely originating from the historic use of firefighting foams (table 15).

An investigation was subsequently undertaken by EPA, to determine whether stocks of non-compliant PFOS firefighting foams were still present in New Zealand. This investigation covered all commercial airports, petroleum production and storage facilities, chemical plants, ports and local shipping. In a small number of cases, EPA identified legacy stocks of PFOS foams as still being in use. A small number of cases were also identified of contamination of equipment and foam product with residues from past use of PFOS foams. A full inventory of PFOS stocks and contaminated material has yet to be completed.

Where PFOS foams, or high levels of PFOS contamination of foams, have been identified, operators have been required to remove this product and to decontaminate their equipment. PFOS wastes, above the low POPs content level of 50 milligrams per kilogram, are being exported for high temperature incineration overseas, because New Zealand has no domestic facilities capable of treating these wastes. These shipments are permitted under the provisions of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

Ministry for the Environment (MfE) is leading more wide-ranging investigations, to identify the extent and source of PFOS and other per- and poly-fluoroalkyl substances (PFAS) in New Zealand.

Table 15: History of use and controls of perfluorooctane sulfonic acid (PFOS)

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996	Other controls	Ongoing implementation issues
<p>Many of the known applications of PFOS products were used in New Zealand, including in firefighting foams. Firefighting foam manufactured with PFOS was the standard since the 1970s until the early 2000s in international aviation, because these foams put out liquid fuel fires quickly, thus improving safety for passengers, air crew and fire fighters.</p>	<p>All uses prohibited, as listed in Schedule 2A of the HSNO Act in 2011, and no exemptions were provided.</p> <p>Before listing in Schedule 2A, the HSNO Act Fire Fighting Chemicals Group Standard of 2006 prohibited all known PFOS containing foams.</p> <p>The wording of the listing under the Imports and Exports (Restrictions) Prohibition Order (No 2) 2004 was updated in December 2018, to more</p>	<p>n/a</p>	<p>Investigation of non-compliant use of PFOS-containing firefighting foam is ongoing. Operators possessing such foams, or products contaminated with PFOS, are subject to compliance and enforcement action by EPA under the provisions of the HSNO Act. This can involve requirements to prepare a compliance plan that details how the PFOS foam will be removed and disposed of,</p>

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996		Ongoing implementation issues
		Other controls	
All known PFOS-based firefighting foams were prohibited in 2006 by the HSNO Act Fire Fighting Chemicals Group Standard, by when all relevant importation had already ceased.	accurately reflect the intention of the Convention. This amendment does not affect its listing status.		and how equipment will be cleaned to remove residues of PFOS contamination. All wastes containing PFOS above the Stockholm Convention low POPs content level of 50 milligrams per kilogram are required to be exported from New Zealand for high-temperature incineration, in accordance with provisions of the Basel Convention. MfE and regional councils are undertaking research to identify the non-foam industries and activities in New Zealand that may have used PFOS. This research will help regional councils with the identification of potentially PFOS-contaminated sites in the region.

Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether)

Tetrabromodiphenyl ether (tetraBDE) and pentabromodiphenyl ether (pentaBDE) are the main components of commercial pentabromodiphenyl ether (c-pentaBDE). They inhibit or suppress combustion in organic materials and, therefore, were used as additive flame retardants.

Between 90 per cent and 95 per cent of the use of c-pentaBDE was for the treatment of polyurethane foam.²⁹ These foams were used mainly in automotive and upholstery applications, such as vehicle seats and fittings and foams used for furniture, mattresses, carpet underlay, and electronic equipment. Production of c-pentaBDE stopped around 2004. In that year, Europe and North America banned the use of c-pentaBDE and c-octaBDE. TetraBDE and pentaBDE were not manufactured in New Zealand (table 16).

Table 16: History of use and controls of tetrabromodiphenyl ether and pentabromodiphenyl ether

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996		Ongoing implementation issues
		Other controls	
Not manufactured in New Zealand. Imported as	Prohibited, as listed in Schedule 2A of the HSNO Act in 2011.	n/a	Management of existing articles and waste-stream

²⁹ Stockholm Convention. 2017. *Guidance on developing and updating National Implementation Plans (NIPs)*. Retrieved from chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx (13 December 2018).

flame retardants in, and for the manufacture of, flexible polyurethane foam (furniture, upholstery and packaging) and non-foam polyurethane in casings, building materials, furniture, textiles and packaging.			management when they become waste.
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4.4.2 Persistent organic pollutants added to the Convention in 2013

Hexabromocyclododecane

The main uses of hexabromocyclododecane (HBCD) globally are as a flame retardant additive in expanded polystyrene (EPS) and extruded polystyrene (XPS), while its use in textile back-coating applications and electric and electronic appliances is smaller. EPS and XPS are used in insulation for buildings and refrigerated trucks and containers. HBCD provides fire protection to EPS and XPS during the service life of these products in buildings, vehicles and other materials, as well as protection while stored. Its production has decreased in recent years, and raw material suppliers have transitioned to non-HBCD-containing alternative flame retardants in EPS and XPS, as well as in other applications.

New Zealand made a notification of non-acceptance in 2014, under Article 22(4) of the Convention, relating to the listing of HBCD because of its continued use as a flame retardant in polystyrene products, principally EPS. The continued use was because of the unavailability in New Zealand of sufficient and reliable supplies of EPS containing an alternative flame retardant at that time. Because of the small size of most EPS product producers in New Zealand, and the range of products they produce, accepting the listing and registering for the specific exemption provided for EPS and XPS used in buildings was impractical.

MfE and EPA worked with Plastics New Zealand, which represented the EPS product manufacturers, to establish a voluntary industry accord (the Accord) whereby industry undertook to phase out all use of HBCD-flame-retarded EPS by 1 January 2017, in place of an immediate acceptance of the listing. From this date, it was intended that all obligations of the listing would be met, but without the need to register for the specific exemption. In this way, all use of HBCD-containing EPS could cease in New Zealand almost three years earlier than would be required if the listing was initially accepted with the five-year exemption period.

Industry was able to meet the terms of the Accord, and all imports of HBCD-containing EPS ceased before the end of 2016. Consequently, the notification of non-acceptance was withdrawn in December 2016, when this chemical was listed in Schedule 2A of the HSNO Act 1996. An articles in use notification was sent to the Convention Secretariat, to allow the continued use of existing articles containing HBCD manufactured before 1 January 2017 (table 17).

Table 17: History of use and controls of hexabromocyclododecane (HBCD)

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996	Other controls	Ongoing implementation issues
HBCD was never manufactured in New Zealand and no records exist of it being imported as a chemical. It was	Prohibited, as listed in Schedule 2A of the HSNO Act in 2016 with allowance for continued use of	n/a	Management of existing articles and waste disposal, when those articles become waste.

imported incorporated in polystyrene resin for manufacture into expanded polystyrene (EPS) foam packaging and in various EPS construction products, and in manufactured EPS and extruded polystyrene products from the 1990s until 2016.	articles in use manufactured before 1 January 2017. Previously was approved provided it was used in accordance with relevant group standard.		
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It was estimated in a 2013 study that an average of 4800 tonnes per year of HBCD-containing EPS was used in New Zealand during 2004–10. This represented an annual usage of between 24 tonnes and 48 tonnes of HBCD (based on a content in EPS of between 0.5 per cent and 1 per cent). An additional 5 tonnes to 10 tonnes per year of HBCD was estimated to be imported in sheets of XPS over the same period.³⁰

No evidence was found that any HBCD was being used in coating of textiles made in New Zealand, although it may have been present in imported textiles.

The 2013 study also presented a simple ‘model’ of annual EPS production rates and annual HBCD-containing wastes arising over time (see figure 2).³¹ The model was based on several assumptions.

- Widespread use of EPS construction products started in the mid-1990s, and the production rate had doubled by 2010.
- All production of EPS construction materials containing HBCD would cease in 2018 (this was taken to be the end of the Convention-specific exemption period, but, under the Accord discussed above, was able to be brought back to the end of 2016).
- Most of the construction products are expected to have a usable life of up to 50 years, although some will be taken out of service well before that time as a result of building modifications and demolition.
- The following waste generation rates were used to produce the waste plots: 10 per cent of the construction products were assumed to be taken out of service after 10 years, followed by a further 15 per cent at 20 years, 20 per cent at 30 years, 25 per cent at 40 years and 25 per cent at 50 years.

The model was based on the annual manufacturing quantities for EPS construction products (average 4400 tonnes per year), because this is the main category for HBCD use, but it could be considered there would be an additional 10 per cent of HBCD-containing EPS used in packaging. Also, the annual imports of XPS sheets may contribute an additional 15 per cent to the total quantities of flame retarded polystyrene.

Although the model is intended to be purely indicative, the main points are:

- in 2018, the total quantities of wastes arising from the use of HBCD-containing EPS in construction products will be about 2000 tonnes per year, and the total quantities of HBCD-containing wastes will be about 2500 tonnes per year (assuming an additional

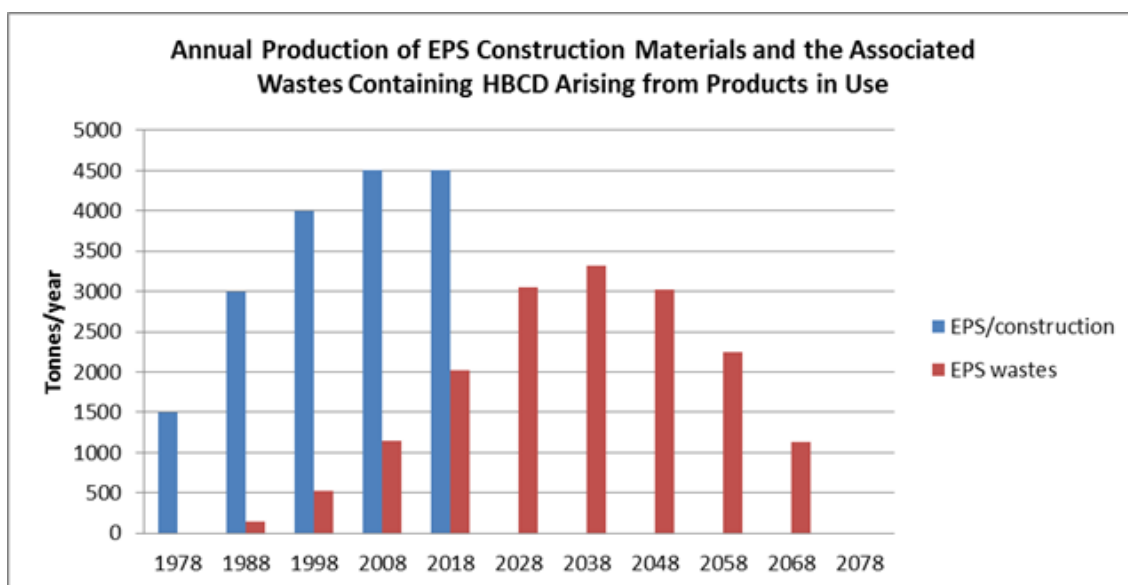
³⁰ Graham B. 2013. *Lifecycle analysis of the brominated flame retardant hexabromocyclododecane (HBCD) in New Zealand*. Wellington: Environmental Protection Authority.

³¹ See Graham, 2013, above note.

25 per cent contribution from flame retardant packaging wastes and imported XPS products)

- by 2038, the waste quantities will increase to about 3300 tonnes per year of EPS construction products, plus an additional 1125 tonnes per year of other HBCD-containing wastes
- the annual waste quantities will then gradually decline over time, until there is no significant production of HBCD-containing wastes by about 2078.

Figure 2: Simple model of expanded polystyrene construction product manufacturing in New Zealand, and the associated hexabromocyclododecane-containing wastes arising over time



Source: Graham, 2013

4.4.3 Persistent organic pollutants added to the Convention in 2015

Pentachlorophenol

Pentachlorophenol (PCP) and its salts were used globally as a biocide, pesticide, disinfectant, defoliant, anti-sapstain agent, anti-microbial agent, and wood preservative in the agriculture and forestry sectors (for wooden utility poles and railway sleepers and trays used in mushroom farming).

In New Zealand, PCP salts were widely used as an anti-sapstain fungicide on freshly sawn timber. Timber was either lightly sprayed or dipped in a PCP solution (table 18).

PCP was also used at a limited number of sites in a mixture with diesel oil in the pressure treatment of poles and sleepers as a timber preservative. In addition, limited use of sodium PCP was made in the 1960s and 1970s for the preservation of building timbers. New Zealand set up special support services in 2010 for former sawmill workers exposed to PCP (see more in chapter 7).

The use of PCP as an anti-sapstain chemical for timber and as a preservative ended in 1988. In 1991, PCP was deregistered as a pesticide by the New Zealand Pesticides Board. In 2008, it was reassessed under the HSNO Act 1996, and approval for all uses was revoked.

Records of PCP use in New Zealand are incomplete. However, for the 40 years from 1950, around 5500 tonnes to 6000 tonnes of PCP was imported and used in the timber industry. At the height of its use during the 1970s, nearly 200 tonnes per year were used for anti-sapstain treatment of green timber and 100 tonnes per year for preservative treatment.³²

PCP-treated timber is still in use, notably in some poles used with power or telephone lines. Total stock is not known, and alternatives, such as concrete and chromated-copper-arsenate treated timber, are now used for poles and railway sleepers.

In 2016, New Zealand notified the Convention Secretariat of existing PCP-treated timber utility poles, cross-arms and railway sleepers as articles in use.

Table 18: History of use and controls of pentachlorophenol

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996	Other controls	Ongoing implementation issues
<p>Previously used as a herbicide, insecticide, fungicide, algacide, disinfectant and in antifouling paint. In particular, it was used as a timber treatment product from the 1950s to 1980s.</p> <p>Use as a timber preservative and timber anti-sapstain treatment in New Zealand ceased in 1988. Its pesticide registration ceased in 1991, and approval of all other uses was revoked in 2008.</p>	<p>Prohibited, as listed in Schedule 2A of the HSNO Act in 2016.</p>	<p>Deregistered in New Zealand by the (then) Pesticides Board in 1991.</p>	<p>Management of existing articles in use, and environmentally sound management of these at end of their current use when they become waste. Example of known use includes existing railway sleepers (ties) and power poles. See case study in chapter 6.</p>

Hexachlorobutadiene

Hexachlorobutadiene (HCBD) is a halogenated aliphatic compound, created mainly as a by-product in the manufacture of chlorinated aliphatic compounds. It is most commonly used as a solvent for other chlorine-containing compounds.

HCBD is no longer intentionally produced, and alternatives are available. HCBD was not produced or significantly used in New Zealand (table 19).

Table 19: History of use and controls of hexachlorobutadiene

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996	Other controls	Ongoing implementation issues
<p>Never produced or used significantly in New Zealand.</p>	<p>Prohibited, as listed in Schedule 2A of the HSNO Act in 2016.</p> <p>No approval for use before the listing in Schedule 2A.</p>	<p>No record in Environmental Protection Authority databases of it being present as a component in products in New Zealand.</p>	<p>No known issues.</p>

³² Tonkin and Taylor Ltd and SPHERE. 2008. *Assessment of Dioxin Contamination at Sawmill Sites. Report for Ministry for the Environment*. Wellington: Ministry for the Environment.

Polychlorinated naphthalenes

Commercial polychlorinated naphthalenes (PCNs) are mixtures of up to 75 chlorinated naphthalene congeners plus by-products. Production of PCNs for high-volume uses started around 1910 in both Europe and the United States of America. PCNs make effective insulating coatings for electrical wires. Some were used as wood preservatives, as rubber and plastic additives, for capacitor dielectrics, and in lubricants. They are also unintentionally generated during high-temperature industrial processes in the presence of chlorine, including release as by-products of waste incineration.

No information is available on historic uses of PCNs in New Zealand (table 20). However, based on overseas information, the global production of PCNs stopped in the 1970s and 1980s, which indicates that PCNs are likely to have been substituted by other chemicals.

Table 20: History of use and controls of polychlorinated naphthalenes

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996		Ongoing implementation issues
		Other controls	
Never produced or used significantly in New Zealand.	Prohibited, as listed in Schedule 2A of the HSNO Act in 2016. No approval for use before the listing in Schedule 2A.	No record in Environmental Protection Authority databases of it being present as a component in products in New Zealand.	No known issue.

4.4.4 Persistent organic pollutants added to the Convention in 2017

Decabromodiphenyl ether

Like other BDEs, commercial mixture decabromodiphenyl ether (c-decaBDE) was used mainly as an additive flame retardant. Its consumption peaked in the early 2000s. Available production data indicates about 75 per cent of all world production of BDEs was c-decaBDE. Today, c-decaBDE is manufactured in only a few countries. Many countries have already restricted or initiated voluntary programmes to phase out c-decaBDE production. Total production of c-decaBDE from 1970 to 2005 was between 1.1 million tonnes to 1.25 million tonnes.³³

C-decaBDE has a variety of applications, including in plastics, textiles, adhesives, sealants, coatings and inks. C-decaBDE-containing plastics are used in electrical and electronic equipment, wires and cables, pipes, and carpets. In textiles, c-decaBDE was used mainly in upholstery, window blinds, curtains and mattresses for public and domestic buildings, and in the transportation sector. The amount of c-decaBDE used in plastics and textiles globally varies, but up to about 90 per cent of c-decaBDE ends up in plastic and plastics used in electronics, while the remainder is used in coated textiles, upholstered furniture and mattresses.

Several non-POP chemical alternatives are already on the market for the substitution of c-decaBDE in plastics and textiles. Furthermore, non-chemical alternatives and technical

³³ Stockholm Convention. 2017. *Guidance on developing and updating National Implementation Plans (NIPs)*. Retrieved from chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx (13 December 2018).

solutions, such as non-flammable materials and physical barriers, respectively, are also available.

Trade names for decaBDE include DE-83R, DE-83, Bromkal 82-ODE, Bromkal 70-5, Saytex 102E, FR1210, Flamecut 110R and FR-300-BA.

While decaBDE has been phased out globally, it is possible it is present in New Zealand in some of the existing and currently imported products, including older cars and electronic equipment. Therefore, New Zealand notified the Convention Secretariat of existing articles in use containing decaBDE and registered specific exemptions for parts for use in vehicles, and aircraft and aircraft parts under Article 4 of the Convention. This means New Zealand can continue to use decaBDE for a particular purpose (table 21).

Figure 1 contains estimated quantities of BDEs in various sources of the New Zealand environment between 1978 and 2010.

Table 21: History of use and controls of commercial mixture decabromodiphenyl ether (c-decaBDE)

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996	Other controls	Ongoing implementation issues
<p>Never produced in New Zealand.</p> <p>Included as a component in products imported from other countries. Products include plastics in vehicles, electrical equipment and textiles.</p> <p>Limited import of flame retardant masterbatches containing decaBDE took place until 2017.</p>	<p>Prohibited, as listed in Schedule 2A of the HSNO Act from 18 December 2018, with specific exemptions for:</p> <ul style="list-style-type: none"> • parts for use in vehicles specified in paragraph 2 of Part IX of Annex A of the Convention • aircraft for which type approval has been applied for before December 2018 and has been received before December 2022, and spare parts for those aircraft <p>and articles in use notifications for articles where decaBDE has been used as an additive in plastics (such as in electrical and electronic equipment, wires, cables and pipes), in textiles (such as in carpets, upholstery, window blinds and curtains, and mattresses) and in adhesives, sealants and coatings – present in New Zealand before 18 December 2018.</p> <p>Before listing, it was allowed to be used as a component chemical in products, in accordance with relevant group standard.</p>	<p>n/a</p>	<p>Management of legacy and imported products, and waste disposal when those products become waste.</p>

Short-chain chlorinated paraffins

Chlorinated paraffins, including short-chain chlorinated paraffins (SCCPs), have been produced commercially since the 1930s. At present, China is the largest producer of chlorinated paraffins.

SCCP production has decreased globally as countries have established control measures. Use of SCCPs in metalworking and for fat liquoring of leather was prohibited in the EU in 2003. From 13,000 tonnes per year in 1994 (in 15 EU countries), use decreased to an estimated 530 tonnes per year in 2010 (in 27 EU countries). In 2012, use of SCCPs in the EU was further restricted to fire retardants in rubber used in conveyor belts in the mining industry and fire retardants in dam sealants. The United States of America prohibited use of SCCPs in 2013. Japanese industry voluntarily discontinued use in metalworking in 2007. In Canada, the production of chlorinated paraffins stopped in 2008, and the manufacture, use, sale, offer for sale and import of SCCPs were prohibited in 2013.³⁴

Main SCCP applications have been as a plasticizer in polyvinylchloride (PVC), in metal-working fluids, paints, coatings, sealants, rubber, as a fire retardant or a water repellent. They have also been used in leather production. SCCPs have been used to replace PCBs, and many uses are similar. SCCPs have, however, been reported as unsuitable for uses requiring high heat stability (eg, capacitors and transformers).

SCCPs have been used in the production of flame-resistant, water-repellent and rot-preventing textile finishes in sail cloths, industrial protective clothing and tarpaulins that could be bought by the public. The major historical use of chlorinated paraffins was in military tenting and other textile applications where fire risk must be controlled. SCCPs were applied mainly as a flame retardant for back-coating of textiles in the EU and less so for waterproofing.

In New Zealand, it is possible that existing fire-resistant clothing and equipment may contain SCCPs. Therefore, New Zealand notified the Convention Secretariat of existing articles in use containing SCCPs and reflected this in domestic law (table 22).

Table 22: History of use and controls of short-chain chlorinated paraffins

History of use in New Zealand	Relevant controls under Hazardous Substances and New Organisms (HSNO) Act 1996	Other controls	Ongoing implementation issues
<p>Never produced in New Zealand.</p> <p>Many of the applications listed above in the paragraph text have been used in New Zealand.</p>	<p>Prohibited, as listed in Schedule 2A of the HSNO Act from 18 December 2018, with articles in use notifications for:</p> <ul style="list-style-type: none"> articles where short-chain chlorinated paraffins (SCCPs) have been used as additives in rubber and plastic goods, in adhesives and sealants, and as water-proofing and flame-retardant agents for textiles—present in New Zealand before 18 December 2018. 	<p>n/a</p>	<p>Management of existing articles such as firefighting clothing and equipment, and waste disposal when they become waste.</p>

³⁴ Basel Convention. 2018. *Revised draft technical guidelines*. Retrieved from [basel.int/Implementation/POPsWastes/TechnicalGuidelines/TechnicalGuidelines\(versionMarch2018\)/tabid/6303/Default.aspx](https://www.basel.int/Implementation/POPsWastes/TechnicalGuidelines/TechnicalGuidelines(versionMarch2018)/tabid/6303/Default.aspx) (13 December 2018).

	Before listing, there was an approval for this chemical under CAS No: 85535-84-8 (trade name: Witaclor 149). In addition, some chemicals were allowed to be used as components in products under relevant group standards.		
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SUPERSEDED

Chapter 5: New Zealand implementation of the Stockholm Convention: Part 3

Annex C persistent organic pollutants

This chapter updates New Zealand’s activities to reduce or eliminate releases of unintentionally produced persistent organic pollutants (POPs).

5.1 Convention obligations

Article 5 of the Stockholm Convention on Persistent Organic Pollutants (the Convention) requires parties to take measures to reduce or eliminate releases of unintentionally produced POPs. These are listed in Annex C of the Convention and are chemicals produced and released as unintended by-products of specific processes. The goal is to continue to minimise, and where feasible, ultimately eliminate these releases.

5.2 Annex C persistent organic pollutants

Table 23 shows the chemicals listed in Annex C of the Convention and when they entered into force in New Zealand. Hexachlorobutadiene (HCBD) was adopted as a new Annex C listing at the 2017 Conference of the Parties and came into force in New Zealand legislation on 18 December 2018 (this chemical is already listed in Annex A).

Table 23: Chemicals listed in Annex C of the Convention

Chemical	Year listed under Stockholm Convention	Date entered into force for New Zealand
Hexachlorobenzene (HCB)	2001	2004
Polychlorinated biphenyls (PCB)	2001	2004
Polychlorinated dibenzo-p-dioxins (PCDD)	2001	2004
Polychlorinated dibenzofurans (PCDF)	2001	2004
Pentachlorobenzene (PeCB)	2009	2016
Polychlorinated naphthalenes (PCNs)	2015	2016
Hexachlorobutadiene (HCBD)	2018	2018

5.3 Progress since National Implementation Plan 1

The 2006 National Implementation Plan (NIP1) outlines New Zealand’s Action Plan for Dioxins and Other Annex C Chemicals.³⁵ The Ministry for the Environment (MfE) is responsible for the Action Plan’s implementation and oversight. In summary, the Action Plan to minimise and, where feasible, ultimately eliminate releases of unintentional POPs to air, has been compiled

³⁵ Ministry for the Environment. 2006b. *New Zealand’s National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

in accordance with the measures set out in box 1. The main activities under the Action Plan are to undertake a five-yearly New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources (see section 5.3.1).

Box 1: Updated action plan for dioxins and other Annex C chemicals

- Review and update every five years the New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources.
- 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:
 - maintain and promote the implementation schedule
 - promote the measures of the action plan
 - take account of guidance prepared by the Conference of the Parties
 - provide consideration of best available techniques/best environmental practices (BAT/BEP) requirements for any new Annex C, Part II installations
 - provide consideration of BAT/BEP requirements for all existing installations (sources) in accordance with Part II and Part III of Annex C.

The Ministry for the Environment will:

- submit the New Zealand Action Plan for Dioxins and Other Annex C Chemicals (as a component of the National Implementation Plan (NIP)) to the Secretariat of the Stockholm Convention on Persistent Organic Pollutants (Convention Secretariat) in December 2018
- report the New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources for the years 2008 and 2012 to the Convention Secretariat in December 2018
- report a five-yearly review of strategies to meet obligations for reducing and, where feasible, eliminating releases of dioxins and other Annex C chemicals (as a component of the NIP) to the Convention Secretariat in December 2018
- report the New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources for 2018 to the Convention Secretariat by April 2019.

5.3.1 New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources

NIP1 outlines the Action Plan for Dioxins and Other Annex C Chemicals. This includes the requirement to update the New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources every five years.

The New Zealand inventory measures polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) because they are considered to constitute a sufficient basis for identifying and prioritising sources of all such substances, as well as for devising

applicable control measures for all Annex C POPs and evaluating their efficacy. For ease of reference, PCDDs and PCDFs are collectively referred to as 'dioxins' in this NIP.

New Zealand has not developed an inventory of polychlorinated biphenyl (PCB), pentachlorobenzene (PeCB), hexachlorobenzene (HCB) or polychlorinated naphthalene (PCN) because of the complexity and cost of testing and sampling. This is in line with the guidance provided by the Convention. The New Zealand Government managed a register of exemptions to keep PCB stocks until the end of 2016 (see chapter 3 for PCB phase-out). A separate inventory is not deemed necessary.

HCB was used experimentally in New Zealand between 1970 and 1972. A separate inventory for this substance is not deemed necessary.

The first inventory of dioxin emissions was published in 2000³⁶ from 1998 data (see NIP1³⁷). Since NIP1, New Zealand has completed two further inventories measuring dioxins. The second inventory update was published in 2011 using 2008 data,³⁸ and the third update was published in 2014 using 2012 data.³⁹ The methodology for New Zealand's inventories is based on the Standardised Toolkit for Identification and Quantification of Dioxin and Furan Releases (the United Nations Environment Programme (UNEP) Toolkit).

MfE is undertaking its fourth inventory, and this report will be available by April 2019.

5.3.2 Findings from the 2008 and 2012 inventories

The dioxin release estimates for 1998, 2008 and 2012 are summarised in table 24.⁴⁰ This is based on nine of the UNEP Toolkit source categories, which are the summary levels used for country reports under the Convention. The estimates shown for 2008 are based on the revised estimates for 2012. Any comparisons with the 1998 estimates should be made with caution because these pre-date the use of UNEP Toolkit and were based on fewer source sub-categories than were used for more recent estimates.

The values shown for 1998 releases to land are effectively a combination of the estimates shown for releases to land and in residues for both 2008 and 2012.

The figures at the bottom of the table for total dioxin releases to all vectors suggest that significant changes occurred in the releases between 1998 and 2008, but this is not the case.

³⁶ Ministry for the Environment. 2000. *New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources: 2000*. Retrieved from www.mfe.govt.nz/sites/default/files/dioxin-emissions-inventory-mar00.pdf (13 December 2018).

³⁷ Ministry for the Environment. 2006b. *New Zealand's National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

³⁸ Ministry for the Environment. 2011b. *New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources: 2011*. Retrieved from www.mfe.govt.nz/sites/default/files/dioxin-emissions-inventory-feb11.pdf (11 December 2018).

³⁹ Ministry for the Environment. 2014a. *Update of the New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources*. Retrieved from www.mfe.govt.nz/publications/hazards/2014-update-of-new-zealand-inventory-of-dioxin-emissions-air-land-and-water-and (11 December 2018).

⁴⁰ Ministry for the Environment. 2014a. *Update of the New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources*. Retrieved from www.mfe.govt.nz/publications/hazards/2014-update-of-new-zealand-inventory-of-dioxin-emissions-air-land-and-water-and (11 December 2018).

Most of the changes are simply due to a lowering of the UNEP Toolkit release factors for some of the more significant sources.

A few notable changes have occurred since 2008.

Reductions shown for the waste incineration category were due to the closure of most of these facilities, and those shown for ferrous and non-ferrous metal production reflect a marked fall-off in overall activity for this sector.

Reductions for the transport category are primarily because of improvements in the New Zealand vehicle fleet.

Table 24: Summary of annual dioxin releases 1998, 2008, 2012 by source category

Source categories	Annual releases (grams toxic equivalency per year)										
	Air			Water			Land			Residue	
	1998	2008	2012	1998	2008	2012	1998	2008	2012	2008	2012
Waste incineration	3.58	0.72	0.79	0.00	0.00	0.00	0.97	0.00	0.00	0.05	0.05
Ferrous and non-ferrous metal production	1.75	0.68	0.40	0.02	0.02	0.01	7.01	0.21	0.21	10.54	9.71
Heat and power generation	7.28	3.31	3.33	0.00	0.00	0.00	5.32	0.61	0.41	0.78	0.75
Production of mineral products	0.46	0.09	0.07	0.00	0.00	0.00	0.78	0.22	0.18	0.03	0.03
Transportation	0.64	0.71	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uncontrolled combustion	18.30	4.78	2.44	0.00	0.00	0.00	5.70	1.04	0.78	0.00	0.00
Production of chemicals and consumer goods	0.04	0.05	0.05	0.28	0.01	0.01	0.83	0.08	0.09	0.00	0.00
Miscellaneous	0.23	0.18	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste treatment	0.00	0.00	0.00	1.96	1.36	1.39	23.11	12.48	12.57	6.40	6.40
Totals	32.28	10.51	7.94	2.26	1.38	1.41	45.72	14.65	14.24	17.79	16.93
Totals for all release vectors	1998			2008			2012				
	80.26			44.33			40.51				

Source: Ministry for the Environment, 2014

Changes between 2008 and 2012

Appendix 1 of the 2012 inventory includes figures showing the changes between 2008 and 2012 for each UNEP Toolkit subcategory. The most notable changes are outlined below.

Releases to air

- Secondary steel production – the release reduction is due to a real reduction in plant emissions.
- Secondary lead production – releases ceased due to plant closure.

- Coal and gas-fired electricity generation – the reductions are due to reduced activity rates (fuel use).
- Industrial and commercial coal use – increased releases due to increased fuel use.
- Four-stroke engines – reduced releases due to improvements in the vehicle fleet.
- Two-stroke engines – the reduction in releases is simply due to a more precise estimate of fuel use.
- Waste dumps, vehicles and structure fires – reduced releases due to reductions in fire numbers.

Releases to land

- Waste dumps, vehicle and structure fires – reduced releases are due to reductions in fire numbers.
- Grassland and savannah fires – reduced releases due to reductions in the area burned.
- Lime kilns – the reduction in releases is simply due to a change in calculation method.

Releases in residues

- Secondary aluminium, brass and bronze – reduced releases are due to reduced production rates.
- Metal shredding – increased releases due to the addition of a new plant.

Releases by individual subcategories

All of the release estimates for both 2008 and 2012 are summarised in Appendix 1 of the 2012 inventory, while the 2012 releases to each of the vectors are summarised in the body of the inventory. See www.mfe.govt.nz/publications/hazards/2014-update-of-new-zealand-inventory-of-dioxin-emissions-air-land-and-water-and.

The greatest releases of dioxins to air for 2012 were produced by several fuel-use categories. This is primarily determined by the large numbers of these sources; for example, New Zealand has about 500 coal-fired boilers, and more than 175 power plants are fired on biomass, while releases from household heating and cooking come from over 540,000 homes. By comparison, releases from medical waste incineration are produced by only two facilities. Releases from structure fires and fires at rubbish dumps are the two next most significant sources, but the numbers of incidents for both of these have been steadily decreasing over time. The next 10 sources are associated with industrial fuel use, transport, secondary metal production, waste disposal and uncontrolled burning.

Solid waste disposal is the most significant contributor to releases to land, but other notable contributions come from structure fires, coal-fired electricity generation and iron and steel production. The most significant sources of releases in residues are wastewater treatment plants, secondary metal production and industrial and commercial fuel use. In New Zealand, most residues are ultimately disposed to landfill. As a result, an element of double counting may occur between these releases and the total estimated releases to landfills and waste dumps. However, the detail in the UNEP Toolkit release factors is insufficient to allow estimates to be adjusted for this effect.

Global and national perspectives

An indication of the relative global significance of the New Zealand dioxin releases is presented in the 2012 inventory. This presents the per-capita annual releases for 68 countries, with reference years ranging from 1999 to 2009, and New Zealand is ranked in the third-lowest category of 21 grams to 29 grams toxic equivalency per million people. This ranking is based on the previous 2008 release estimates (as reported to the Stockholm Convention in 2010) but is unlikely to change significantly for inventories based on the latest edition of the UNEP Toolkit, because the changes in release factors will also apply to other countries' inventories.⁴¹

No official recommendations are available for 'acceptable' levels of national dioxin releases, and it is also not possible to relate the release estimates directly to any potential health effects. The more relevant information is provided by national surveys of dioxin body burdens, of which several studies have been undertaken in New Zealand.

The levels of dioxins in mothers' milk have been measured on three occasions in New Zealand: in 1988, 1998 and 2008 (see also chapter 7). These studies showed that the dioxin concentrations in New Zealand mothers are relatively low by comparison with many other countries. Also, the levels have been steadily dropping, with a reduction of 70 per cent (for dioxins, furans and organochloride pesticides) observed from 1988 to 1998, and a further reduction of 40 per cent (for dioxins and furans) from 1998 to 2008.⁴²

The levels of dioxins in blood serum have been monitored on two occasions in New Zealand: in 1997 and 2012 (see also chapter 7). Once again, the studies showed the dioxin concentrations in New Zealanders are relatively low by comparison with many other countries, and the levels have dropped over time.⁴³

The improvements shown in these studies are much more marked than the reductions shown in the dioxin release inventories, but this is partly because they also reflect changes that had occurred before 1998. The half-life for dioxins in the environment is typically around 15 years to 25 years, and the half-life in humans is about 8 years to 10 years. Therefore, significant lags can occur between reductions in releases and the resulting changes in people.

⁴¹ Ministry for the Environment. 2014a. *Update of the New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources*. Retrieved from www.mfe.govt.nz/publications/hazards/2014-update-of-new-zealand-inventory-of-dioxin-emissions-air-land-and-water-and (11 December 2018).

⁴² 't Mannelje A, Douwes J, Duckett H, Brogan S, Emmerton L, Harding E, Brooks C, Harrad S, Ellison-Loschmann L, Smith A, Pearce N. 2010. *Concentrations of persistent organic pollutants in the milk of New Zealand women*. Report prepared as part of a Ministry of Health contract for scientific services. CPHR Technical Report No. 32. Wellington: Centre for Public Health Research.

⁴³ 't Mannelje A, Coakley J, Borman B, Douwes J, Bates M. 2013. *Concentrations of Selected Persistent Organic Pollutants (POPs) in the Serum of New Zealanders*. Report prepared as part of a Ministry of Health contract for scientific services. CPHR Technical Report No. 34. Wellington: Centre for Public Health Research.

Chapter 6: Stockpiles, waste disposal and contaminated sites

This chapter outlines measures on stockpiles and wastes relating to persistent organic pollutants (POPs). In the New Zealand context, these measures are addressed under three categories: stockpiles, waste disposal, and contaminated sites.

6.1 Convention obligations

Article 6 of the Stockholm Convention on Persistent Organic Pollutants (the Convention) has measures to reduce or eliminate releases from stockpiles and wastes.

Clear regulations and guidelines are in place for how to store, handle and dispose of POPs safely in the few situations where they are still present in New Zealand. The regulations and guidelines are set out in the Hazardous Substances (Storage and Disposal of POPs) Notice 2004. In February 2018, the Environmental Protection Authority (EPA) published a consolidated version of this Notice,⁴⁴ to provide easy access to all obligations and responsibilities for affected persons.

6.2 Stockpiles

6.2.1 Legacy chemicals

Once POPs are banned (or restricted) under the Hazardous Substances and New Organisms (HSNO) Act 1996, it can take time to reduce or eliminate releases from stockpiles. These POPs become known as 'legacy chemicals'. Significant efforts have been made to ensure all remaining POPs and POP-containing products are identified and disposed of appropriately.

Successful activities to remove legacy POPs from New Zealand have included a phase-out programme and destruction of polychlorinated biphenyls (PCBs) (see chapter 3), and government-funded national collection programmes for POPs used in the past (especially in agriculture).

Removal and disposal of remaining stockpiles relies largely on individuals identifying POPs on their properties and taking the necessary action to dispose of these chemicals safely. This makes it difficult to accurately ascertain the levels of POPs still likely to be present in New Zealand. New Zealand's large farming industry means that POPs are often found on farming properties where the landowners have not realised they are present, do not know what to do with them or have been unwilling to pay for collection to ensure correct disposal. However, the high uptake of free collection services, such as the 'DDT Muster' described in chapter 3, indicates that individuals are willing to remove POPs from their property provided removal services are readily offered.

⁴⁴ See www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Policies/Hazardous-Substances-Storage-and-Disposal-of-Persistent-Organic-Pollutants-Notice-2004.pdf for the full Notice.

Agrichemicals that are persistent organic pollutants

Storage, handling and disposal of agrichemicals that are considered POPs must comply with the Hazardous Substances (Storage and Disposal of POPs) Notice 2004.⁴⁵

The Ministry for the Environment (MfE), together with local government, has undertaken national collection of agricultural chemicals in rural New Zealand. The first stage involved removing as much as possible of the historical legacy of agrichemicals stored in rural sheds across the country, particularly POP pesticides (see the 2006 National Implementation Plan).⁴⁶ Between 2003 and 2006, MfE and 13 regional councils (out of 16) worked together to collect over 290 tonnes of unwanted agricultural chemicals, mainly from rural properties. Most chemicals collected were POPs. During this period, New Zealand safely disposed of 225 tonnes of old and unwanted agricultural chemicals. Councils (to varying degrees) continue to clear their regions of any further agrichemical stockpiles.

The second stage involves implementing a longer-term industry-led extended producer responsibility solution to manage and dispose of future unwanted chemicals. For example, funding of Agrecovery schemes, a nationwide rural recycling programme for the recovery of agrichemicals, are partially contributed to by chemical producers. Agrecovery is a not-for-profit charitable trust, established in 2006 to address persistent 'on farm' waste issues. Agrecovery provides New Zealand farmers and growers with nationwide programmes for container recycling, drum recovery and the collection of unwanted or expired chemicals. Agrecovery Containers and Chemicals are accredited Product Stewardship Schemes under the Waste Minimisation Act 2008.⁴⁷

EPA and MfE are also focusing on strengthening the broader hazardous substances compliance system. This partially aims to better manage chemical stockpiles and clean up.⁴⁸ EPA and MfE are also undertaking work to modernise New Zealand's chemical management system.⁴⁹

⁴⁵ See www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Policies/Hazardous-Substances-Storage-and-Disposal-of-Persistent-Organic-Pollutants-Notice-2004.pdf for the full Notice.

⁴⁶ Ministry for the Environment. 2006b. *New Zealand's National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

⁴⁷ Agrecovery Rural Recycling Programme. 2018. *Agrecovery Foundation*. Retrieved from www.agrecovery.co.nz/foundation/agrecovery-foundation for further information (11 December 2018).

⁴⁸ Environmental Protection Authority. No date(a). *Evaluation of hazardous substances compliance system*. Retrieved from epa.govt.nz/industry-areas/hazardous-substances/evaluation-of-hazardous-substances-compliance-system for further information (11 December 2018).

⁴⁹ Environmental Protection Authority. No date(d). *Modern chemical management system key to New Zealand's environment*. Retrieved from epa.govt.nz/news-and-alerts/latest-news/modern-chemical-management-system-key-to-new-zealands-environment for further information (11 December 2018).

6.3 Waste

6.3.1 How persistent organic pollutant wastes are handled in New Zealand

POP wastes must be exported for destruction. The disposal of POPs must comply with the Hazardous Substances (Storage and Disposal of POPs) Notice 2004⁵⁰ under the HSNO Act 1996.

New Zealand must also comply with the requirements for the environmentally sound management of POP wastes set out in the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Basel Convention has been implemented into domestic legislation primarily through the Imports and Exports (Restrictions) Prohibition Order (No 2) 2004 (I&E Order 2004). This Order requires permits from the EPA to import or export waste containing POPs.

New Zealand also implements its obligations under the Waigani Convention (a regional agreement under the Basel Convention that ensures hazardous waste cannot travel from New Zealand and Australia to another Pacific country or Antarctica)⁵¹ and the Organisation for Economic Co-operation and Development Hazardous Waste Decision.⁵²

The Hazardous Substances (Storage and Disposal of POPs) Notice 2004 states that POP wastes cannot be disposed of to a landfill. Increasingly, with waste containing POPs such as flame retarded plastic waste and hexabromocyclododecane- (HBCD-) containing polystyrene, the management of POP disposal is much more problematic (see 6.3.3 Electronic waste).

6.3.2 Per- and poly-fluoroalkyl substances waste

Firefighting foams contaminated with per- and poly-fluoroalkyl substances (PFAS) identified as a result of the All of Government National PFAS Programme's investigations are being exported for destruction by high temperature incineration in accordance with the Basel Convention.

6.3.3 Electronic waste

The volume of electronic waste (e-waste) in New Zealand is increasing, with around 80,000 tonnes disposed of in 2015. E-waste is likely to contain brominated flame retardants (BFR). While many different types of BFRs exist, several are specifically named under the Convention. These are HBCD and the BDEs: tetrabromodiphenyl ether (tetraBDE), pentabromodiphenyl ether (pentaBDE), hexabromodiphenyl ether (hexaBDE), heptabromodiphenyl ether (heptaBDE) and decabromodiphenyl ether (decaBDE).

On 20 December 2016, New Zealand issued notification of articles in use under the Convention for tetraBDE, pentaBDE, hexaBDE, heptaBDE and HBCD. The notification of articles in use states that, while manufacture, import and use of these POPs have been prohibited since

⁵⁰ See www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Policies/Hazardous-Substances-Storage-and-Disposal-of-Persistent-Organic-Pollutants-Notice-2004.pdf for the full notice.

⁵¹ See www.mfe.govt.nz/more/international-environmental-agreements/multilateral-environmental-agreements/waigani-convention for more information.

⁵² See www.mfe.govt.nz/more/international-environmental-agreements/multilateral-environmental-agreements/key-multilateral-0 for more information.

August 2011, it is likely some articles containing the POPs remain in use. New Zealand made a similar articles in use notification for decaBDE in December 2018.

While not a Convention requirement, all e-waste is considered hazardous waste (and therefore subject to the Basel Convention), unless it is verified otherwise. EPA produced guidance on exporting e-waste in 2014.⁵³ The guidance outlines an expectation that exporters of e-waste must obtain an export permit for hazardous waste, unless evidence shows it is not hazardous waste. This guidance includes advice on e-waste items containing BFR. Plastic e-waste containing BFRs is classed as hazardous waste under the Basel Convention.

MfE sets out guidance on its website for managing waste and end-of-life products that may contain BFR.⁵⁴ This guidance is intended to be read in conjunction with the I&E Order 2004. The guidance sets out that if a product contains a BFR likely to be a POP listed under the Convention then it cannot be recycled or exported for recycling. Any export for disposal must have a Basel Convention export permit from the EPA. Any end-of-life product or waste stream from products containing BFRs must be managed in a way that minimises the potential impact on human health and the environment. A permit will only be issued if the waste material will be processed in an environmentally sound manner at the destination facility.

MfE commissioned the following studies on BFRs in New Zealand:

- *Brominated flame retardant research: A cost-benefit analysis of sorting options for e-waste plastics* (2013)⁵⁵ (a summary of this study is given in Box 2)
- *Brominated flame retardant research: A pilot study of e-waste plastic sorting in New Zealand* (2013)⁵⁶
- *Pilot study of brominated flame retardants in waste electrical and electronic equipment* (2012)⁵⁷
- *Investigation of brominated flame retardants present in articles being used, recycled and disposed of in New Zealand* (2010)⁵⁸ (a summary of this study is given in Box 3).

⁵³ Environmental Protection Authority. 2014. *Export of electronic waste (e-waste)*. Wellington: Environmental Protection Authority. Retrieved from epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/Guidance/Export-electronic-waste.pdf (11 December 2018).

⁵⁴ Ministry for the Environment. No date(c). *Managing waste that may contain brominated flame retardants*. Retrieved from www.mfe.govt.nz/publications/waste/managing-waste-may-contain-brominated-flame-retardants/managing-waste-may-contain (11 December 2018).

⁵⁵ Ministry for the Environment. 2013. Retrieved from www.mfe.govt.nz/publications/waste-hazards/brominated-flame-retardant-research-cost-benefit-analysis-sorting-options (11 December 2018).

⁵⁶ ENVIRON Australia PTY Ltd. 2013. Retrieved from www.mfe.govt.nz/publications/waste-hazards/brominated-flame-retardant-research-pilot-study-e-waste-plastic-sorting (11 December 2018).

⁵⁷ Ministry for the Environment. 2012a. Retrieved from www.mfe.govt.nz/publications/waste-hazards/pilot-study-brominated-flame-retardants (11 December 2018).

⁵⁸ Keet B, Giera N, Gillett R, Verschuere K. 2010. Retrieved from www.mfe.govt.nz/publications/waste-hazards/investigation-brominated-flame-retardants (11 December 2018).

Box 2: Investigation of brominated flame retardants present in articles being used, recycled and disposed of in New Zealand

The study's purpose was to help the Ministry for the Environment determine whether it was feasible and practicable to meet Article 6 obligations under the Stockholm Convention in respect of the disposal of waste containing pentabromodiphenyl ether (pentaBDE) and octabromodiphenyl ether (octaBDE).

Interviews with industry indicated that New Zealand was likely to have significantly lower levels of pentaBDE and octaBDE in existing, imported and exported products than the European Union and North America. This is due to the historical absence of regulations requiring household goods to contain flame retardants in New Zealand manufactured goods.

Discussions with industry suggested the main source of pentaBDE and octaBDE in existing products has come from imported finished consumer products, from polymer resin used in the manufacture of New Zealand products, and in chemical compounds from production of polymer products for specific applications.

Testing showed that only very low levels of BDEs were present in the leachate of three landfills tested. Landfilling in secure landfills is therefore considered as a potential option to dispose of BDE-containing polymers and plastics in an environmentally sound way. However, this will be subject to further research and investigation.

Box 3: Brominated flame retardant research: A cost-benefit analysis of sorting options for e-waste plastics

This report provides validation for the Ministry for the Environment's (MfE's) guidance on managing waste that may contain brominated flame retardant (BFR).

The analysis concluded that handheld scanning options to sort BFR-containing products from other recycling is expensive, lacks sufficiently compelling benefits and has operational and practical complexities that cast doubt on its feasibility.

A visual persistent organic pollutant (POP)–Bromodiphenyl ether (BDE) detection and visual BFR option were also considered. The POP–BDE option was considered likely to recover more items for recycling; however, the BFR option would give MfE more certainty that current and future domestic and international obligations would be met for ensuring safe disposal of BFRs.

The MfE-issued guidance reflects the need for certainty and ensures no item can be sent for recycling unless there is certainty it does not contain BFR.

6.4 Contaminated land management

Managing land contaminated by POPs is part of the general issue of managing land contaminated as a result of chemicals use. Past use of hazardous substances in industry, agriculture and horticulture has left a legacy of soil contamination in New Zealand. Contaminated sites are commonly associated with past activities such as:

- manufacture and use of pesticides – this has resulted in contamination at locations where pesticides were manufactured as well as the wider contamination associated with use of the chemicals (eg, agrichemical sprays)

- timber treatment – pentachlorophenol (PCP) is a POP listed under the Convention that was used routinely at most sawmills and timber treatment plants from the 1950s until 1988, when its use ceased
- sheep dipping – from use of 1,1,1-trichloro-2, 2-bis (4-chlorophenyl) ethane (DDT), dieldrin, arsenic and other chemicals to treat parasites on sheep
- limited use of firefighting foams containing perfluorooctane sulfonic acid (PFOS)
- landfills.

6.4.1 Responsibility for managing contaminated land

MfE provides national direction on land contamination across central and local government. This leadership includes developing the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS 2011) and guidelines to help manage contaminated land for local government.

Regional councils and territorial authorities have functions under the Resource Management Act 1991 (RMA) (sections 30 and 31) for the day-to-day management of contaminated land. Regional councils are responsible for investigating land for the purposes of identifying and monitoring contamination. They are the first point of contact for anyone who suspects their land may be contaminated.⁵⁹ Territorial authorities are responsible for preventing or mitigating any adverse effects of the development, subdivision or use of contaminated land. One role of the territorial authorities is to give effect to the NESCS 2011 and ensure compliance with it.

6.4.2 Contaminated land regulatory framework

To help local government fulfil its functions, a broad framework is in place for managing land contamination that includes a mix of legislation, regulation, guidelines and funding arrangements. These include:

- RMA
- Health and Safety at Work Act 2015 (HSWA)
- NESCS 2011⁶⁰
- contaminated land management guidelines⁶¹

⁵⁹ Ministry for the Environment. 2015b. *How to find out and what to do if land is contaminated*. Retrieved from www.mfe.govt.nz/land/risks-contaminated-land/my-land-contaminated/how-find-out-and-what-do-if-land-contaminated (11 December 2018).

⁶⁰ Ministry for the Environment. 2016a. *About the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*. Retrieved from www.mfe.govt.nz/land/nescs-assessing-and-managing-contaminants-soil-protect-human-health/about-nescs (11 December 2018).

⁶¹ Ministry for the Environment. 2018c. *Contaminated land management guidelines*. Retrieved from www.mfe.govt.nz/land/risks-contaminated-land/managing-contaminated-land/contaminated-land-management-guidelines (11 December 2018).

- guidelines that address contaminants from specific industries or activities⁶²
- Contaminated Sites Remediation Fund (CSRF)⁶³
- guidance for councils to identify, assess and investigate land where PFAS was manufactured, used or disposed.⁶⁴

MfE has also compiled a list of activities and industries, the Hazardous Activities and Industries List (HAIL), commonly associated with contaminated land, to help identify potentially contaminated land.⁶⁵

Resource Management Act 1991

The RMA is the core legislation for controlling the effects of contaminated land on the environment and people. It defines contaminated land as land that has a hazardous substance in or on it that has significant adverse effects on the environment or is reasonably likely to have significant adverse effects on the environment. Environmental Guideline Values apply to a range of contaminants in soil, based on the intended land use. These contaminant guideline values are selected in line with a hierarchy, which can be found in MfE's contaminated land management guidance No 2: Hierarchy and application in New Zealand of environmental guideline values (revised 2011).⁶⁶

Under the RMA, regional councils and territorial authorities have overlapping functions for controlling land use (eg, preventing or mitigating any adverse effects of the storage, use, disposal or transportation of hazardous substances). The regional councils are required to allocate these functions under their regional policy statements. In most cases, the function is allocated to the territorial authority, along with their other land-use control functions.

⁶² Ministry for the Environment. 2015a. *Guidelines that address contaminants from specific industries or activities*. Retrieved from www.mfe.govt.nz/land/risks-contaminated-land/managing-contaminated-land/guidelines-address-contaminants-specific (11 December 2018).

⁶³ Ministry for the Environment. No date(a). *Contaminated Sites Remediation Fund*. Retrieved from www.mfe.govt.nz/more/funding/contaminated-sites-remediation-fund (11 December 2018).

⁶⁴ Ministry for the Environment. No date(e). *PFAS (per- and poly-fluoroalkyl substances)*. Retrieved from www.mfe.govt.nz/land/pfas-and-poly-fluoroalkyl-substances?utm_medium=email&utm_campaign=Environment%20Update%20-%20November%202018%20formerly%20resource%20management%20update&utm_content=Environment%20Update%20-%20November%202018%20formerly%20resource%20management%20update+CID_8e00eb15db8a6f5301745f0ba5c97256&utm_source=Email%20marketing%20software&utm_term=guidance (11 December 2018).

⁶⁵ Ministry for the Environment. 2016(b). *Hazardous Activities and Industries List (HAIL)*. Retrieved from www.mfe.govt.nz/land/hazardous-activities-and-industries-list-hail (11 December 2018).

⁶⁶ Ministry for the Environment. 2003. *Contaminated land management guidelines No. 2: Hierarchy and application in New Zealand of environmental guideline values (revised 2011)*. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-2-hierarchy-and-application-new (11 December 2018).

Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011

The NESCS 2011 is a set of nationally consistent planning controls and soil contaminant values. Guidance for users of the NESCS is available on the MfE website.⁶⁷

The NESCS 2011 ensures that land affected by contaminants in soil is appropriately identified and assessed before it is developed and, if necessary, is remediated or the contaminants contained to make the land safe for human use. The NESCS came into effect on 1 January 2012. The standard ensures all councils follow the same planning and decision-making framework for consistency purposes.

The NESCS 2011 provides:

- a nationwide set of planning controls that direct the requirement for consent or otherwise for activities on contaminated or potentially contaminated land
- a mandated method for determining applicable standards for contaminants in soil, including a national set of soil contaminant standards for 12 priority contaminants and five common land uses
- a nationwide approach to site investigations and reporting, by mandating the use of best practice guidelines for investigating and reporting on contaminated or potentially contaminated land.

Hazardous Activities and Industries List

Under the NESCS 2011, land is considered to be actually or potentially contaminated if an activity or industry on the HAIL has been, is or is more likely than not to have been, undertaken on the land. The HAIL is a compilation of activities and industries known to have caused land contamination resulting from hazardous substance use, storage or disposal. The HAIL's purpose is to help regional councils identify contaminated or potentially contaminated sites for inclusion on local government land-use registers.

Contaminated land management guidelines

Guidelines are available to enable contaminated land to be assessed and managed consistently throughout New Zealand. They have been developed in partnership with regional councils. Five guidelines have been published, each covering a different aspect of contaminated land management (table 25).

⁶⁷ Ministry for the Environment. 2012b. *Users' Guide: National environmental standard for assessing and managing contaminants in soil to protect human health*. Retrieved from www.mfe.govt.nz/sites/default/files/guide-nes-for-assessing-managing-contaminants-in-soil.pdf (11 December 2018).

Table 25: Contaminated land management guidelines and description

Guidance title	Description
No. 1 – Reporting on contaminated sites in New Zealand ⁶⁸	Details the type and amount of information required in a contaminated site report
No. 2 – Hierarchy and application in New Zealand of environmental guideline values ⁶⁹	Ensures the consistent selection and application of environmental guideline values
Environmental guideline value database ⁷⁰	Contains the guideline values discussed in the guidelines No. 2 document
No. 3 – Risk screening system ⁷¹	Describes the risk-screening system that provides a nationally consistent way to rank sites that are, or are suspected of being, contaminated. The purpose of ranking a site is usually so it may be prioritised for further investigation
No. 4 – Classification and information management protocols ⁷²	Suggests a nationally consistent way to classify, manage and release contaminated site information held on council registers or databases
No. 5 – Site investigation and analysis of soils ⁷³	Provides best practice for sampling and analysing soils on sites where hazardous substances are present or suspected, and guidance on the principles for interpreting the data obtained.

As well as the specific contaminated land management guidelines, industry specific guidance is also available on timber treatments, petroleum, gasworks and sheep dips.⁷⁴

⁶⁸ Ministry for the Environment. 2011a. *Contaminated land management guidelines No. 1: Reporting on contaminated sites in New Zealand (revised 2011)*. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-1-reporting-contaminated-sites (11 December 2018).

⁶⁹ Ministry for the Environment. 2003. *Contaminated land management guidelines No. 2: Hierarchy and application in New Zealand of environmental guideline values (revised 2011)*. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-2-hierarchy-and-application-new (11 December 2018).

⁷⁰ Ministry for the Environment. 2003. *Contaminated land management guidelines No. 2: Hierarchy and application in New Zealand of environmental guideline values (revised 2011)*. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-2-hierarchy-and-application-new (11 December 2018).

⁷¹ Ministry for the Environment. 2004a. *Contaminated land management guidelines No. 3: Risk Screening System*. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-3-risk-screening-system (11 December 2018).

⁷² Ministry for the Environment. 2006a. *Contaminated land management guidelines No. 4: Classification and information management protocols*. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-4-classification-and (11 December 2018).

⁷³ Ministry for the Environment. 2004b. *Contaminated land management guidelines No. 5: Site investigation and analysis of soils (revised 2011)*. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-5-site-investigation-and (11 December 2018).

⁷⁴ Ministry for the Environment. 2015a. Guidelines that address contaminants from specific industries or activities. Retrieved from www.mfe.govt.nz/land/risks-contaminated-land/managing-contaminated-land/guidelines-address-contaminants-specific (11 December 2018).

In addition to contaminated land management guidelines No. 1 and No. 5, the All of Government National PFAS Programme developed guidance on communication, engagement and information sharing,⁷⁵ and disposal of PFAS-containing wastewater to trade waste⁷⁶ for councils to identify, assess and investigate land where PFAS was manufactured, used or disposed.

Health and Safety at Work Act 2015

WorkSafe New Zealand is the agency responsible for the enforcement of hazardous substances rules in workplaces. The Health and Safety at Work (Hazardous Substances) Regulations 2017⁷⁷ (HSWA HS Regulations) under the HSWA apply when workers are on a contaminated site or are handling soil contaminated with hazardous substances.

WorkSafe has clarified the relationship between the HSWA HS Regulations and other pieces of legislation for the governing of contaminated land. This clarification sets out that the HSWA HS Regulations do apply to hazardous waste, however, soil contaminated with hazardous substances by past work activities does not need to be managed as hazardous substance waste under the HSWA HS Regulations because an established framework is already in place for the management of contaminated land under the RMA.⁷⁸

Contaminated Sites Remediation Fund

The CSRF provides NZ\$2.63 million in annual funding to local government for the investigation and remediation of contaminated sites that pose a risk to human health and the environment. The fund is available only to local government and helps councils to fulfil their obligations for contaminated land management under the RMA. The CSRF recognises the importance of responsibly cleaning up historic contaminated sites across New Zealand, this includes a recognition of sites potentially contaminated by POPs.

MfE administers the CSRF, and assesses each application for the risks they pose to human health and the environment using a prioritisation tool. The top 10 sites determined as posing the greatest risks are placed on a CSRF priority list. This list provides transparency on which sites are priorities for government funding. One of the ten priority sites is Kopeopeo Canal, which is receiving CSRF funding after elevated levels of PCP and dioxins were found in the sediment and eels.

The Kopeopeo Canal was contaminated by stormwater discharges between the 1950s and 1980s from a former sawmill which treated timber using PCP. While unknown at the time, PCP

⁷⁵ Ministry for the Environment. No date(f). *PFAS Communication, Engagement and Information Sharing Guidelines*. Retrieved from www.mfe.govt.nz/sites/default/files/media/Land/engagement-communication-information-sharing-guidance.pdf (11 December 2018).

⁷⁶ Ministry for the Environment. No date(b). *Disposal of PFAS containing wastewater to trade waste*. Retrieved from www.mfe.govt.nz/sites/default/files/media/Land/PFOS-disposal-to-trade-waste-guidance.pdf (11 December 2018).

⁷⁷ See www.legislation.govt.nz/regulation/public/2017/0131/25.0/DLM7309401.html for the full regulations.

⁷⁸ WorkSafe. 2018. *Policy clarification: Contaminated land and the Health and Safety at Work (Hazardous Substances) Regulations 2017*. Retrieved from <https://worksafe.govt.nz/laws-and-regulations/operational-policy-framework/operational-policies/contaminated-land-and-the-health/#if-doc-45078> (11 December 2018).

imported into New Zealand for use in the timber processing industry also included a percentage of impurities that contained dioxins.

This case study recognises the efforts of the late Mr Joe Harawira,⁷⁹ advocating on behalf of Sawmill Workers Against Poisons (SWAP), and Te Rūnanga o Ngāti Awa tribal authority, who brought the contamination of Kopeopeo Canal to public attention and highlighted the effects on human health and the community resulting from dioxin contamination. As kaitiaki (environmental guardians), Mr Harawira and Te Rūnanga o Ngāti Awa were instrumental in achieving central and local government support to remediate the dioxin contamination and restore the ecological health of the canal.

The Kopeopeo Canal Remediation Project was established as a collaborative initiative and project partners include MfE, the Bay of Plenty Regional Council, Ngāti Awa, SWAP, and the community.

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⁷⁹ Mr Harawira affiliated to the Ngāti Awa and Ngāi Te Rangi tribes. He was also a long-term member of Te Herenga, EPA's national network of Māori environmental practitioners.

CASE STUDY: KOPEOPEO CANAL

Kopeopeo Canal, Bay of Plenty, North Island

The Kopeopeo Canal is a persistent organic pollutant- (POP-) contaminated site undergoing remediation with partial funding from the Contaminated Sites Remediation Fund. It is an example of a contaminated site going through a remediation process using the mechanisms outlined above to help in the clean up.

The Kopeopeo Canal extends from the Rangitaiki Plains to the west of state highway 30. It runs east and joins the Orini Stream and then discharges into the Whakatane River. It was built during the 1920s to convey drainage and floodwaters from low-lying farmlands in the Rangitaiki Plains into the Whakatane Estuary.

Between the 1950s and late 1980s, the canal was contaminated as a result of stormwater discharges from a former sawmill. This sawmill treated timber using pentachlorophenol (PCP) resulting in the contamination.

The remediation project intends to safely remove and treat a legacy of industrial dioxin pollution. Investigations dating back to 2005 concluded that dioxin levels in the sediment at Kopeopeo Canal were elevated resulting in eel tissue concentrations of dioxin posing a risk to human health if consumed. A human health risk assessment concluded that a 5.1 kilometre section of the canal contained sediment that required remediation to ensure risks to human health could be eliminated. The sediment has now built up to the point where it affects the canal's ability to convey floodwater. Removal of the sediment is necessary, to ensure a flood would not result in the flood banks breaking and water flowing onto surrounding land.

Investigations between December 2014 and February 2015 also showed elevated concentrations of dioxins in surface soils on stop banks located around the canal. This is likely a result of previous dredging activities. Further investigations to determine the extent of this historical dredging are proposed.

- Exposure

While the contaminated sediment remains in the Kopeopeo Canal, the main exposure route is through the food chain. Accumulation increases with every step in the food chain. This means eels within the canal may be unsafe to eat. Further details on the level of dioxin exposure can be found on the Bay of Plenty Regional Council website.⁸⁰ PCP and its contaminant dioxin no longer flow into the canal, because PCP has not been used for timber treatment in decades and the old sawmill site that the contamination originated from was closed and decommissioned in the mid-1980s. The site has been redeveloped to commercial buildings with associated parking, and the storm water generated on it no longer contains dioxins.

- Remediation project

The Kopeopeo Canal Remediation Project is designed to be implemented in a staged approach to remove, safely store and bioremediate up to 40,000 cubic metres of sediment. It is estimated to take 12 years, with regular monitoring providing an indication of how the remediation is progressing.

⁸⁰ See Bay of Plenty Regional Council www.boprc.govt.nz/our-region-and-environment/pollution-prevention-and-compliance/kopeopeo-canal-contamination-remediation-project/faqs-kopeopeo-canal-remediation-project for further information.

CASE STUDY: KOPEOPEO CANAL

The project's vision is:

to safely remove and treat a legacy of industrial dioxin pollution, thereby restoring the mauri (life force, vital essence) of the Kopeopeo Canal and the Whakatāne River and developing their full potential to contribute to the well-being of tangata whenua (indigenous people), the community and visitors for generations to come.

The project intends to enhance the natural degradation process that breaks down contaminants. In this specific project, a combination of fungi, bacteria and plants will be used to help speed up the natural degradation of the dioxins.

Bioremediation was chosen as the treatment method because the concentration levels are lower than those commonly found on industrial or manufacturing sites and there are no time constraints requiring a faster process.

The decision to remove the sediment to undertake this process was necessary to address the issue of the build-up affecting the canal's ability to convey floodwater. The decision was made to bioremediate the sediment rather than take it to a landfill. This was due to the costs and potential travel effects. Because of the type of contaminant, the dewatered sediment would need to go to a specific landfill (only two options are available), both a considerable distance away. The long distances increased the risk of spilling the sediment as a result of an accident. Cultural beliefs have also been considered. One iwi strongly opposed the removal of the material from the rohe (tribal area) and prefers the process of 'healing the land' occurs locally.

During the process, sediment will be dredged from the canal. It will be placed into geotubes and kept within fully enclosed 'containment cells'. The cells are made using a high-density polyethylene (HDPE) liner that eliminates sediment-bound contaminants from moving into the surrounding soil or groundwater. Sediment will be left in place at the containment sites following treatment. The final land use for each site containing the sediment will be determined by the treatment level achieved and other site-specific controls put in place.

The sediment must be removed to ensure an extreme weather event, such as a flood, does not cause the canal to breach flood banks and affect surrounding land.

- Handling of the sediment

Nearly 5 kilometres of canal will be remediated. The sediment will be removed using cutter-suction dredging and geotube dewatering. The technique involves removing the sediment using a mechanical cutter head directly next to a suction intake. As the sediment is disturbed, the suction pump draws it into a pipeline and transfers it to the containment site. At the containment site, the water-sediment slurry is dosed with commonly used chemicals, called flocculants, which separate the solids from the water. The separation occurs in the pipeline before being pumped into geotubes. These tubes allow the water out but keep the sediment in. The discharged water (filtrate) collects in the base of the HDPE-lined containment site before it is tested. It then discharges back into the canal.

The cutter-suction dredge method eliminates most risks associated with potential spillages of contaminated material and dust generation. This is because sediment is transferred from the canal directly to the containment sites via a pipeline. While technical assessments carried out in support of the variation application indicate little to no risk of air-quality effects, the consent holder has kept air-quality monitoring in the consent, to provide peace of mind to surrounding residents and the general community during the works. This is a condition of the consent, and ongoing monitoring and reporting of air quality will ensure compliance.

6.4.3 Per- and poly-fluoroalkyl substances contaminated sites

New Zealand government agencies are investigating sites that have used specialist firefighting foams containing PFAS. These include the Ohakea, Whenuapai and Woodbourne Air Force bases and the Devonport Naval base.⁸¹ Local government is also leading investigations, with the support of central government, into soil and surface water contamination at non-Crown-owned sites including airports, petrochemical storage sites and a privately owned fire training area.

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⁸¹ Ministry for the Environment. 2018f. *PFAS Investigations*. Retrieved from www.mfe.govt.nz/land/pfas-and-poly-fluoroalkyl-substances/pfas-investigations (11 December 2018).

Chapter 7: Effectiveness of persistent organic pollutants management

7.1 Convention obligations

Article 11 of the Stockholm Convention on Persistent Organic Pollutants (the Convention) requires parties to encourage research, development and monitoring of persistent organic pollutants (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 available to the public
- encourage and/or undertake cooperation with regard to the storage and maintenance of this generated information.

This chapter outlines a range of government POP-related research and monitoring. Studies undertaken before 2006 are covered from page 28 onwards of New Zealand's first National Implementation Plan (NIP1) and the results have not been repeated here.⁸²

7.2 Biomonitoring

7.2.1 Concentrations of persistent organic pollutants in serum of adult New Zealanders

Background

The Centre for Public Health Research (CPHR) at Massey University completed a two-year study in 2013 for the Ministry of Health (MOH), which measured concentrations of selected

⁸² Ministry for the Environment. 2006b. *New Zealand's National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

POPs in serum from a cross-section of adult New Zealanders.⁸³ Serum samples were collected from 747 randomly selected participants across a range of age groups, ethnicity, gender and geographic regions.

POPs determined in this study include polychlorinated dibenzo-p-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF), polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), brominated flame retardants (BFRs) and perfluorinated compounds (PFCs).

The study was designed so the association between demographic factors and serum concentration of POPs could be assessed, and to provide a direct comparison with the New Zealand serum concentrations of POPs determined 15 years earlier.

Conclusion

The study's results show serum concentrations for chlorinated POPs (dioxins and furans, PCBs and organochlorine pesticides such as 1,1,1-trichloro-2, 2-bis (4-chlorophenyl) ethane (DDT) halved between 1997 and 2012.

New Zealanders' body burdens of PCDDs, PCDFs and PCBs are low by international comparison, while for OCPs they are similar or lower, compared with those reported for other developed countries. National and international action to reduce environmental contamination with PCDDs, PCDFs, PCBs and OCPs has resulted in a substantial reduction of chlorinated POPs in the New Zealand body burdens.

The study provided baseline data for serum concentrations of brominated and fluorinated POPs. These were detected in all samples in an order of magnitude of nanogram per gram lipid (ng/g lipid) and nanogram per millilitre serum (ng/mL) respectively, comparable to, or less than, concentrations reported for other developed countries.

Link for full details: <http://publichealth.massey.ac.nz/assets/ProjectsPDF/Concentrations-of-Selected-POPs-4-October-2013-FINAL.pdf>.

7.2.2 Concentrations of persistent organic pollutants in the milk of New Zealand women

Background

MOH undertook three consecutive breast milk surveys in 1988, 1998 and 2008 that aimed to measure individual breast milk levels of POPs in New Zealand first-time mothers aged 20 to 30 years.

The last survey (2008) was conducted by CPHR at Massey University.⁸⁴ The survey was designed to provide time trend data for dioxins and furans, PCBs and OCPs and their

⁸³ 't Mannelje A, Coakley J, Borman B, Douwes J, Bates M. 2013. *Concentrations of Selected Persistent Organic Pollutants (POPs) in the Serum of New Zealanders*. Report prepared as part of a Ministry of Health contract for scientific services. CPHR Technical Report No. 34. Wellington: Centre for Public Health Research.

⁸⁴ 't Mannelje A, Douwes J, Duckett H, Brogan S, Emmerton L, Harding E, Brooks C, Harrad S, Ellison-Loschmann L, Smith A, Pearce N. 2010. *Concentrations of persistent organic pollutants in the milk of New Zealand women*. Report prepared as part of a Ministry of Health contract for scientific services. CPHR Technical Report No. 32. Wellington: Centre for Public Health Research.

metabolites, and provide baseline data for BFRs. The study followed the guidelines of the fourth World Health Organization Coordinated Survey of human milk for POPs.⁸⁵

Four study areas were included, to have representation of urban and rural areas of both the North Island and South Island. Thirty-nine women aged 20 to 30 years each provided around 200 millimetres of hand expressed breast milk and completed a questionnaire. The individual breast milk samples were analysed for 7 dioxins, 10 furans, 45 PCBs, 23 OCPs and metabolites, 36 brominated diphenyl ethers (BDEs) and 4 additional BFRs, including hexabrominated biphenyl, by high-resolution gas chromatography–high-resolution mass spectrometry. Levels were expressed in picograms per gram milk lipid.

Conclusions

Over the past decade, the background levels of the three classes of POPs (dioxins, furans, PCBs and OCPs) in breast-feeding women aged 20 to 30 years have continued to substantially decline. This survey reconfirms that the New Zealand levels of these three classes of POPs in breast milk are low by international standards.

The baseline data for BFRs shows that the BDEs most abundantly present in the New Zealand breast milk samples are similar to those reported for other countries, and that the levels are comparable to or higher than those measured in Europe, while being substantially lower than those reported for the United States of America and Australia.

Link for full details: <http://publichealth.massey.ac.nz/home/research/research-projects/the-investigation-of-breast-milk-for-persistent-organic-pollutants>.

7.3 Persistent organic pollutants in the New Zealand environment

7.3.1 Persistent organic pollutants in the food chain

New Zealand Total Diet Study

The Ministry for Primary Industries (MPI) has undertaken various studies that have included the collection of data on POPs in raw and final foods, some date back as far as 1982.

Organochlorine insecticides such as aldrin, chlordane, dieldrin, lindane, endrin, hexachlorobenzene (HCB), alpha and beta hexachlorocyclohexane, heptachlor, DDT and endosulfan have all been covered in New Zealand's total diet studies.

The New Zealand Total Diet Study (NZTDS) surveys a range of common foods eaten in a typical diet, to assess New Zealanders' exposure to certain chemicals, such as agricultural compounds, contaminants and nutrients. The study is carried out, on average, every five years.

⁸⁵ World Health Organization. 2007. *Fourth WHO-Coordinated Survey of Human Milk for Persistent Organic Pollutants in Cooperation with UNEP: Guidelines for Developing a National Protocol*. Geneva, Switzerland: World Health Organization.

New Zealand Food Safety (a unit of MPI) published results for the most recent study on 24 May 2018 from 2016 data.⁸⁶ The results show the food New Zealanders eat has a high level of safety in regard to chemical hazards that might be present in the food supply. Exposure to agricultural chemicals and contaminants from food remains low.

The 2016 survey tested for aldrin, chlordane, DDT, endrin, heptachlor, HCB and endosulfan. All, except for two, of these POPs were not detected at all during testing. DDT and dieldrin were detected during data collection. Analysis for organochlorine insecticides has been an important component for the NZTDS. The presence of DDT and dieldrin in the environment, despite being banned in New Zealand, is persistent so residues are still found occasionally in food samples.

Health-based guidance values (HBGVs) have been established for both DDT and dieldrin that enable the dietary exposures to be characterised. The HBGVs are 0.1 micrograms per kilogram body weight per day for dieldrin and 10 micrograms per kilogram body weight per day for DDT.

DDT

Dietary exposure to DDT has shown a consistent downward trend over time, and this continued in the 2016 data. The ongoing trend in the decrease in DDT exposure suggests any dietary risk will also continue to decrease as the compounds in the environment gradually degrade. The dietary exposure for 19- to 24-year-old males has decreased from 0.38 milligrams per kilogram body weight per day in 1974/75 to 0.0008 milligrams per kilogram body weight per day in 2016. Testing showed that only three samples contained DDT residue (table 26).

Table 26: DDT contained residue in samples (milligrams per kilogram)

Sample	Mean (mg/kg)
Beef, mince	0.002
Butter	0.003
Lamb – mutton	0.003

Source: Ministry for Primary Industries, 2018b

The DDT detections are all within animal products, and this is consistent with the pattern of occurrence observed in the 2009 NZTDS and other NZTDSs. The detections likely represent the accumulation in fatty animal tissues of DDT that still persists in New Zealand soils decades after its use was banned.

Dieldrin

Dieldrin was detected in one sample each of courgettes and pumpkins. A consistent pattern of dieldrin in cucurbit crops was also reported in previous NZTDSs. The result of 0.04 milligrams per kilogram in the pumpkin sample, however, is higher than in 2009 or 2003/04. Estimated dietary exposure to dieldrin increased in 2016, compared with the 2009 NZTDS. For infants, the estimated dietary exposure was 32 times higher in 2016 than in 2009. However, the single result in one pumpkin accounts for most of the exposure and is the reason for the large increase in dietary dieldrin exposure since the previous NZTDS.

⁸⁶ Ministry for Primary Industries. 2018b. *2016 New Zealand Total Diet Study*. Wellington: Ministry for Primary Industries. Retrieved from www.mpi.govt.nz/food-safety/food-monitoring-and-surveillance/new-zealand-total-diet-study (11 December 2018).

Link for full details: www.mpi.govt.nz/food-safety/food-monitoring-and-surveillance/new-zealand-total-diet-study.

Per- and poly-fluoroalkyl substances survey

As a follow-on activity to the 2016 NZTDS, 12 food groups (96 samples) were analysed for 29 per- and poly-fluoroalkyl substances (PFAS).⁸⁷ No detections were reported for perfluorooctane sulfonic acid (PFOS) or perfluorooctanoic acid (PFOA) in any of the foods analysed. Only a single detection of any PFAS compound (perfluorohexanoic acid) was reported in the analysed foods samples. Exposure estimates for PFOS and PFOA, assuming presence up to the analytical limit of quantification, fell below the Australian and New Zealand health-based guidance values.

Link for full details: www.mpi.govt.nz/dmsdocument/31077-per-and-poly-fluorinated-alkyl-substances-pfas-in-selected-new-zealand-foods-survey-report.

Ministry for Primary Industries: Report on the targeted surveillance of milk from animals potentially exposed to petrochemical mining wastes

In 2014, MPI conducted targeted surveillance of milk from 20 dairy farms, to assess the safety of milk from animals potentially exposed to farm land used for the bioremediation of solid wastes from petrochemical mining.⁸⁸ This included testing for polybrominated diphenyl ethers (PBDEs), the most prevalent of which is decabromodiphenyl ether (commercial mixture, c-decaBDE), which was listed under the Convention in 2017. Only two samples tested positive for trace levels of PBDEs (one from a farm with a landfill and one from a farm that has had disposal of wastes using the 'mix-bury-cover' method). One milk sample contained 2.34 nanograms per kilogram of BDE#99 and the other contained 2.04 nanograms per kilogram of BDE#99, 3.73 nanograms per kilogram of BDE#47 and 0.466 nanograms per kilogram of BDE#100. The levels reported from the land farm sites are within the ranges reported in other countries.

The report concluded only very low levels of some of the chemical compounds that were tested for were found, and these did not present a risk to consumers.

Link for full details: www.mpi.govt.nz/dmsdocument/4391/send.

National Chemical Contaminants Programme – dairy products and raw milk

The National Chemical Contaminants Programme (NCCP)⁸⁹ monitors milk and dairy products to confirm that residue or contaminant levels do not exceed acceptable limits for New Zealand and export markets. The programme is authorised under New Zealand legislation in the Dairy Industry (National Residue Monitoring Programme) Regulations 2002.⁹⁰ The NCCP verifies the contaminant control system and enables MPI to assess the effectiveness of the New Zealand

⁸⁷ Andrew P. 2018. *Per- and poly- fluorinated alkyl substances (PFAS) in selected New Zealand foods*. New Zealand Food Safety Technical Report No: 2018/07. Wellington: Ministry for Primary Industries.

⁸⁸ Ministry for Primary Industries. 2014. *Report on the targeted surveillance of milk from animals potentially exposed to petrochemical mining wastes*. Wellington: Ministry for Primary Industries.

⁸⁹ Ministry for Primary Industries. 2018a. *National chemical contaminants programme*. Retrieved from www.mpi.govt.nz/food-safety/food-monitoring-and-surveillance/monitoring-programmes-under-the-animal-products-act/national-chemical-contaminants-programme (11 December 2018).

⁹⁰ See legislation.govt.nz/regulation/public/2002/0139/latest/DLM127837.html?search=ts_act%40bill%40regulation%40deemedreg_dairy+industry_resel_25_a&p=1 for the full regulations.

regulatory programme in preventing the risk of contamination (amongst other objectives). Monitoring under the programme dates back to 1997. The NCCP in its current form was moved under MPI's full administrative control in 2002.

The 2017 NCCP report provides results for dioxins, dioxin-like PCBs and some non-dioxin like PCBs (indicator PCBs) in a range of dairy products and milk, sampled over the 2014, 2015 and 2016 dairy seasons.⁹¹ The samples came from a range of dairy products manufactured in New Zealand, including anhydrous milk fat, butter, cheese and cream. The results support the conclusion that chemical levels in New Zealand dairy products are well below any levels of concern.

New Zealand is an isolated country and not heavily industrialised. This means the risk of dioxins or PCBs entering the milk supply is low. Although historical surveys have shown this, dairy products and milk are still surveyed on a periodic basis. The NCCP monitoring programme ensures a high level of confidence can be maintained in the safety and suitability of New Zealand's dairy products. Results do not exceed the most appropriate science-based overseas standards for dioxins and PCBs.

Test results were compared to the European Union (EU) limits for dioxins and PCBs in food. These limits are outlined in the 2017 report document.⁹² None of the samples recorded detections exceeding either the EU action levels (early warning system) or EU regulatory maximum levels threshold.

This link contains all the annual reporting on raw milk and dairy products for organochlorines: www.mpi.govt.nz/processing/dairy-products/monitoring-and-testing-dairy-products/national-chemical-contaminants-programme-nccp/nccp-sampling-plans-and-summary-reports.

7.3.2 Persistent organic pollutants in fresh water

In 2014, the Institute of Environmental Science and Research (ESR), a Crown research institute, coordinated the seventh survey of pesticides in groundwater throughout New Zealand.⁹³ This survey has been completed every four years, since 1990. In total, 165 well samples were taken. Only 1 POP was detected – dieldrin – in one well at a concentration of 0.043 milligrams per cubic metres. This slightly exceeded the maximum acceptable value for drinking water (0.04 milligrams per cubic metres).

Dieldrin was widely used on New Zealand farms during the 1960s to control ectoparasites. Most farms would have had a sheep or cattle dip site during this time. Although dieldrin has not been used in New Zealand since the 1960s, its persistent nature means it can be detected in the soil where dip-site wastewater was disposed of and occasionally in the underlying groundwater. Testing will continue through the ESR survey every four years.

⁹¹ Ministry for Primary Industries. 2017. *National Chemical Contaminants Programme Dairy Products and Raw Milk Dioxin, Dioxin-like PCB, and Indicator PCB Results (2014, 2015, and 2016): MPI Technical – Paper No: 2017/67*. Wellington: Ministry for Primary Industries. Retrieved from www.mpi.govt.nz/dmsdocument/26428/loggedIn (11 December 2018).

⁹² See Ministry for Primary Industries, 2017 (www.mpi.govt.nz/dmsdocument/26428/loggedIn).

⁹³ Humphries B, Close M. 2014. *National Survey of Pesticides in Groundwater 2014*. Retrieved from www.marlborough.govt.nz/repository/libraries/id:1w1mps0ir17q9sgxanf9/hierarchy/Documents/Environment/Groundwater/Groundwater%20Reports%202015%20List/National_Survey_of_Pesticides_in_Groundwater_Report_final.pdf (11 December 2018).

Link for full details: www.marlborough.govt.nz/repository/libraries/id:1w1mps0ir17q9sgxanf9/hierarchy/Documents/Environment/Groundwater/Groundwater%20Reports%202015%20List/National_Survey_of_Pesticides_in_Groundwater_Report_final.pdf.

7.3.3 Persistent organic pollutants in land

The Our land 2018 report, published by Ministry for the Environment and Statistics New Zealand, states that we know what kind of land contamination can happen in New Zealand and how chemicals may affect human and environmental health. However, it is not possible to report on the overall extent of land contamination.⁹⁴

POPs commonly found in contaminated land are persistent pesticides historically used for animal and timber treatments, such as DDT, dieldrin and pentachlorophenol (PCP). In 2017, PFAS and the compounds PFOS, PFOA and perfluorohexane sulfonate (PFHxS), in particular, emerged as contaminants of concern for New Zealand. More information about contaminated land and PFAS contamination is given in chapter 6.

7.3.4 Persistent organic pollutants in air

New Zealand is the only Organisation for Economic Co-operation and Development country without a pollutant release and tracking register. The 2018 Our Air report,⁹⁵ published by MfE and Statistics New Zealand, notes that having such a register would increase the accuracy of reporting industry emissions, particularly for hazardous air pollutants (including POPs). However, the particular requirement to estimate releases of unintentional POPs (addressed under Article 5) is being undertaken at a national level. Records are kept of the quantities of the intentional POPs being collected and disposed of. In addition, New Zealand has implemented the Resource Management (National Environmental Standards for Air Quality) Regulations 2004, which ban activities that discharge significant quantities of dioxin and other toxins into the air (see more in chapters 1 and 5).

7.4 Health support services

NIP1 referenced research on the health significance to workers and former workers of past occupational exposures to dioxin. Since 2007, MOH has funded two health support services for chemically exposed populations.⁹⁶ One service is provided for residents of Paritutu, New Plymouth, who were exposed to dioxins during the 1960s to 1980s as a result of an agrichemical plant operating in the area (see Box 4). The second service is provided to former sawmill workers across New Zealand who handled PCP during the 1950s to 1980s (see Box 5).

⁹⁴ Ministry for the Environment & Statistics New Zealand. 2018a. *New Zealand's Environmental Reporting Series: Our land 2018*. Retrieved from www.mfe.govt.nz and www.stats.govt.nz.

⁹⁵ Ministry for the Environment & Stats NZ. 2018b. *New Zealand's Environmental Reporting Series: Our air 2018*. Retrieved from www.mfe.govt.nz/sites/default/files/media/Air/our-air-2018.pdf (11 December 2018).

⁹⁶ Allen + Clarke. No date. *The design and implementation of health support services for chemically-exposed populations*. Retrieved from www.allenandclarke.co.nz/project/the-design-and-implementation-of-health-support-services-for-chemically-exposed-populations (11 December 2018).

Box 4: Support service for people exposed to dioxin

- The Ministry of Health launched this service on 1 July 2008 for people exposed to dioxin.
- Services include:
 - information and advice for residents, health practitioners and members of the public about dioxins, dioxin exposures in New Zealand, and potential health risks
 - an annual health check-up
 - other health services: smoking cessation, physical activity and nutrition support, primary mental health care, or genetic counselling
 - serum dioxin testing in some circumstances.

People are eligible if they:

- lived or worked or went to school near the former Ivon Watkins-Dow factory in Paritutu, New Plymouth, between 1962 and 1987
- are entitled to use publicly funded health services in New Zealand (eg, New Zealand citizens).

Link for more details: www.health.govt.nz/our-work/environmental-health/dioxins/dioxins-health-support-services/support-service-dioxin-exposed-people.

Box 5: Special support service for former sawmill workers exposed to pentachlorophenol

The Special Support Service for Former Sawmill Workers Exposed to Pentachlorophenol (PCP) is designed to assess the health needs of workers who were exposed to PCP and other toxic chemicals at sawmills during 1950s to 1980s, and to help them access services to support wellness.

- The sawmill workers service was announced on 23 June 2010.
- Services include:
 - information and advice for doctors, other health practitioners, and former sawmill workers and their families about historical exposure to PCP and subsequent health risks
 - a free annual health check provided by a doctor
 - access to health promotion initiatives, like programmes to reduce cancer risk
 - counselling and other primary mental health services
 - help to access other social services that they are entitled to.

People are eligible if they:

- worked in a sawmill where PCP was used
- worked in jobs that used PCP chemicals or came into contact with PCP baths/tanks or if they worked with timber that was still wet from the PCP treatment process
- worked in these jobs for at least one year
- are entitled to use publicly funded health services in New Zealand (eg, New Zealand citizens).

Link for more details: www.health.govt.nz/our-work/environmental-health/dioxins/dioxins-health-support-services/special-support-service-former-sawmill-workers-exposed-pcp.

Chapter 8: Other Stockholm Convention obligations

8.1 Convention obligations

Previous chapters have covered New Zealand's activities to meet its obligations under Articles 3 to 8 and 11 of the Stockholm Convention on Persistent Organic Pollutants (the Convention). This chapter covers New Zealand's activities for Articles 9, 10, 12 and 13.

The remaining articles concern the international administration of the Convention and are not considered relevant to this national implementation plan.

8.2 Information exchange

Article 9 of the Convention requires parties to facilitate or undertake information exchange relevant to:

- the reduction or elimination of the production, use and release of persistent organic pollutants (POPs)
- alternatives to POPs, including information relating to their risks and socio-economic costs.

The Ministry for the Environment (MfE) is New Zealand's designated focal point for the Convention and provides and exchanges information with parties to the Convention either directly or via the Convention Secretariat.

8.3 Public and stakeholder information and awareness

New Zealand's government agencies consider the requirements of Article 10 when implementing the measures of the Convention. 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.

Information on POPs in New Zealand and implementation of the Convention is covered on the MfE website.⁹⁷ This includes links to research undertaken on POPs, such as recent studies on brominated flame retardants (BFRs) and hexabromocyclododecane (HBCD) (see chapter 6).

⁹⁷ Ministry for the Environment. 2016c. *Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/more/international-environmental-agreements/multilateral-environmental-agreements/stockholm (11 December 2018).

The Environmental Protection Authority (EPA) website also contains information on POPs.⁹⁸ Reports relating to the monitoring of POPs in New Zealand are generally placed on the website of the agency that undertook the work.

In line with New Zealand's practice to consult with stakeholders on environmental decision-making, EPA undertakes regular consultation with the public when implementing new chemical listings, for example, the June 2018 consultation on updating New Zealand's implementation of the Stockholm and Rotterdam conventions.⁹⁹

An all of government national per- and poly-fluoroalkyl substances (PFAS) programme has been established, in response to the presence of PFAS chemicals at Ohakea, Whenuapai and Woodbourne Air Force bases and the Devonport Naval base. An overview of the national programme is available on the MfE website,¹⁰⁰ which is updated when new information is available.¹⁰¹ The All of Government National PFAS Programme is taking an open approach and proactively releasing information to the public. This includes copies of briefing notes and cabinet papers¹⁰² provided to the Government, to ensure a high level of transparency is given to the process.

8.4 Technical and financial assistance

New Zealand has not provided or received technical assistance, in accordance with Article 12. However, New Zealand (MfE and EPA) undertakes environmental cooperation on POPs with other countries in several ways. This includes regular study exchanges with China since 2010 on chemicals, POPs and contaminated site management. In addition, MfE and EPA have hosted a study tour from Malaysia to help with its ratification of the Stockholm Convention. This environmental cooperation on POPs has been useful for an exchange of ideas, information and approaches to implementing the Convention.

In December 2016, MfE attended the biennial conference on Remediation for Soil and Groundwater Pollution of Asian and Pacific Region in Taiwan to share its experiences of managing POP-contaminated sites and to keep up to date with advances in knowledge and technologies in the field.

⁹⁸ Environmental Protection Authority. No date(e). *Polychlorinated Biphenyls (PCBs)*. Retrieved from www.epa.govt.nz/industry-areas/hazardous-substances/rules-for-hazardous-substances/polychlorinated-biphenyls-pcbs/ (11 December 2018). See also Environmental Protection Authority. No date(c). *Managing fire-fighting foams manufactured with PFAS chemicals*. Retrieved from www.epa.govt.nz/news-and-alerts/alerts/managing-fire-fighting-foams-manufactured-with-pfas-chemicals/?accordion-anchor=691 (11 December 2018).

⁹⁹ Environmental Protection Authority. No date(b). *Feedback sought on new Stockholm and Rotterdam convention chemicals*. Retrieved from www.epa.govt.nz/public-consultations/decided/feedback-sought-on-new-stockholm-and-rotterdam-convention-chemicals (11 December 2018).

¹⁰⁰ Ministry for the Environment. No date(d). *PFAS national programme overview*. Retrieved from www.mfe.govt.nz/sites/default/files/media/Land/national-PFAS-programme-overview.pdf (11 December 2018).

¹⁰¹ Ministry for the Environment. 2018d. *Latest Updates*. Retrieved from www.mfe.govt.nz/node/23892 (11 December 2018).

¹⁰² Ministry for the Environment. 2018e. *PFAS – Documents released proactively and under OIA*. Retrieved from www.mfe.govt.nz/land/pfas-and-poly-fluoroalkyl-substances/latest-updates/pfas-and-pfoa-documents-released-under-oia (11 December 2018).

New Zealand meets its obligations to provide financial assistance under Article 13 of the Convention via regular contributions to the Global Environment Facility (GEF) for the implementation of multilateral environmental agreements, including the Convention.

New Zealand contributed NZ\$7.47 million to the sixth replenishment of the GEF Trust Fund (2014–18) and has pledged NZ\$12 million for GEF-7 (2018–22).

New Zealand also contributes to the administration of the Secretariat of the Pacific Regional Environment Programme, in accordance with its funding priorities. For 2014/15 to 2017/18, New Zealand contributed nearly NZ\$6.1 million. The Secretariat of the Pacific Regional Environment Programme provides, among other things, assistance to Pacific Island developing states on implementing waste management programmes. New Zealand also contributes to the United Nations Environment Programme; for 2013/14 to 2017/18 New Zealand contributed around USD\$2.3 million.

8.5 Reporting

New Zealand has submitted four national reports, in line with Article 15 of the Convention; links are listed in table 27.

Table 27: New Zealand’s National Reports

Report	Link to full details
National Report 1	Submission date: 19/04/2007 http://chm.pops.int/Countries/NationalReports/FirstRoundofPartyReports/tabid/254/Default.aspx
National Report 2	Submission date: 4/11/2010 http://chm.pops.int/Countries/NationalReports/SecondRoundofPartyReports/tabid/1315/Default.aspx
National Report 3	Submission date: 29/08/2014 http://chm.pops.int/Countries/NationalReports/ThirdRoundPartyReports/tabid/4470/Default.aspx
National Report 4	Submission date: 31/08/2018 http://chm.pops.int/Countries/NationalReports/FourthRoundPartyReports/tabid/6346/Default.aspx

Glossary

ACVM	Agricultural Compounds and Veterinary Medicines
Alpha-HCH	Alpha hexachlorocyclohexane
Basel Convention	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
BAT/BEP	Best available techniques/best environmental practices
BDE	Bromodiphenyl ether
Beta-HCH	Beta hexachlorocyclohexane
BFRs	Brominated flame retardants
c-decaBDE	Commercial mixture decabromodiphenyl ether
c-octaBDE	Commercial octaBDE
c-pentaBDE	Commercial pentabromodiphenyl ether
Convention	Stockholm Convention on Persistent Organic Pollutants
CPHR	Centre for Public Health Research
CSRF	Contaminated Sites Remediation Fund
Customs	New Zealand Customs Service
DDT	1,1,1-trichloro-2, 2-bis (4-chlorophenyl) ethane
DecaBDE	Decabromodiphenyl ether
EPA	Environmental Protection Authority
EPS	Expanded polystyrene
ESR	Institute of Environmental Science and Research
EU	European Union
HAIL	Hazardous Activities and Industries List
HBCD	Hexabromocyclododecane
HBGVs	Health-based guidance values
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HCH	Hexachlorocyclohexane
HDPE	high-density polyethylene
HeptaBDE	Heptabromdiphenyl ether
HexaBDE	Hexabromodiphenyl ether
HSNO	Hazardous Substances and New Organisms
HSWA	Health and Safety at Work Act 2015
HSWA HS Regulations	Health and Safety at Work (Hazardous Substances) Regulations 2017

I&E Order	Imports and Exports (Restrictions) Prohibition Order (No 2) 2004
MBIE	Ministry of Business, Innovation and Employment
MfE	Ministry for the Environment
MOH	Ministry of Health
MPI	Ministry for Primary Industries
MFAT	Ministry of Foreign Affairs and Trade
NESCS	Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
NCCP	National Chemical Contaminants Programme
NIP	National Implementation Plan
NIP1	National Implementation Plan 2006
NIP2	National Implementation Plan 2018
NZTDS	New Zealand Total Diet Study
OCPs	Organochlorine pesticides
PBDEs	Polybrominated diphenyl ethers
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzo-p-dioxins
PCDFs	Polychlorinated dibenzofurans
PCNs	Polychlorinated naphthalenes
PCP	Pentachlorophenol
PeCB	Pentachlorobenzene
PentaBDE	Pentabromodiphenyl ether
POPs	Persistent organic pollutants
PFAS	Per- and poly-fluoroalkyl substances
PFCs	Perfluorinated compounds
PFOA	Perfluorooctanoic acid
PFHxS	Perfluorohexane sulfonate
PFOS	Perfluorooctane sulfonic acid
PFOS-F	Perfluorooctane sulfonyl fluoride
PVC	Polyvinylchloride
RMA	Resource Management Act 1991
SCCPs	Short-chain chlorinated paraffins
SWAP	Sawmill Workers Against Poisons
TetraBDE	Tetrabromodiphenyl ether
UNEP	United Nations Environment Programme

WMA

Waste Minimisation Act 2008

XPS

Extruded polystyrene

SUPERSEDED

References

- Agrecovery Rural Recycling Programme. 2018. *Agrecovery Foundation*. Retrieved from www.agrecovery.co.nz/foundation/agrecovery-foundation for further information (11 December 2018).
- Allen + Clarke. No date. *The design and implementation of health support services for chemically-exposed populations*. Retrieved from www.allenandclarke.co.nz/project/the-design-and-implementation-of-health-support-services-for-chemically-exposed-populations (11 December 2018).
- Andrew P. 2018. *Per- and Poly- Fluorinated Alkyl Substances (PFAS) in selected New Zealand foods*. New Zealand Food Safety Technical report No: 2018/07. Wellington: Ministry for Primary Industries.
- Basel Convention. 2018. *Revised draft technical guidelines*. Retrieved from [basel.int/Implementation/POPsWastes/TechnicalGuidelines/TechnicalGuidelines\(versionMarch2018\)/tabid/6303/Default.aspx](http://basel.int/Implementation/POPsWastes/TechnicalGuidelines/TechnicalGuidelines(versionMarch2018)/tabid/6303/Default.aspx) (13 December 2018)
- ENVIRON Australia PTY Ltd. 2013. *Brominated Flame Retardant Research: A pilot study of e-waste plastic sorting in New Zealand*. Wellington: Ministry for the Environment.
- Environmental Protection Authority. No date(a). *Evaluation of hazardous substances compliance system*. Retrieved from epa.govt.nz/industry-areas/hazardous-substances/evaluation-of-hazardous-substances-compliance-system for further information (11 December 2018).
- Environmental Protection Authority. No date(b). *Feedback sought on new Stockholm and Rotterdam convention chemicals*. Retrieved from www.epa.govt.nz/public-consultations/decided/feedback-sought-on-new-stockholm-and-rotterdam-convention-chemicals (11 December 2018).
- Environmental Protection Authority. No date(c). *Managing fire-fighting foams manufactured with PFAS chemicals*. Retrieved from www.epa.govt.nz/news-and-alerts/alerts/managing-fire-fighting-foams-manufactured-with-pfas-chemicals/?accordion-anchor=691 (11 December 2018).
- Environmental Protection Authority. No date(d). *Modern chemical management system key to New Zealand's environment*. Retrieved from epa.govt.nz/news-and-alerts/latest-news/modern-chemical-management-system-key-to-new-zealands-environment for further information (11 December 2018).
- Environmental Protection Authority. No date(e). *Polychlorinated Biphenyls (PCBs)*. Retrieved from www.epa.govt.nz/industry-areas/hazardous-substances/rules-for-hazardous-substances/polychlorinated-biphenyls-pcbs/ (11 December 2018).
- Environmental Protection Authority. 2014. *Export of electronic waste (e-waste)*. Wellington: Environmental Protection Authority.
- Environmental Protection Authority. 2017. *Safe Management of PCBs: Code of Practice*. Wellington: Environmental Protection Authority.
- Graham B. 2013. *Lifecycle analysis of the brominated flame retardant hexabromocyclododecane (HBCD) in New Zealand*. Wellington: Environmental Protection Authority.
- Humphries B, Close M. 2014. *National Survey of Pesticides in Groundwater*. Retrieved from www.marlborough.govt.nz/repository/libraries/id:1w1mps0ir17q9sgxanf9/hierarchy/Documents/Environment/Groundwater/Groundwater%20Reports%202015%20List/National_Survey_of_Pesticides_in_Groundwater_Report_final.pdf (11 December 2018).
- Keet B, Giera N, Gillett R, Verschueren K. 2010. *Investigation of brominated flame retardants present in articles being used, recycled and disposed of in New Zealand*. Wellington: Ministry for the Environment. Retrieved from www.mfe.govt.nz/publications/waste-hazards/investigation-brominated-flame-retardants (11 December 2018).
- Ministry for Primary Industries. 2014. *Report on the targeted surveillance of milk from animals potentially exposed to petrochemical mining wastes*. Wellington: Ministry for Primary Industries.

Ministry for Primary Industries. 2017. *National Chemical Contaminants Programme Dairy Products and Raw Milk Dioxin, Dioxin-like PCB, and Indicator PCB Results (2014, 2015, and 2016)*: MPI Technical – Paper No: 2017/67. Wellington: Ministry for Primary Industries.

Ministry for Primary Industries. 2018a. *National Chemical Contaminants Programme*. Retrieved from www.mpi.govt.nz/food-safety/food-monitoring-and-surveillance/monitoring-programmes-under-the-animal-products-act/national-chemical-contaminants-programme (11 December 2018).

Ministry for Primary Industries. 2018b. *2016 New Zealand Total Diet Study*. Wellington: Ministry for Primary Industries. Retrieved from www.mpi.govt.nz/food-safety/food-monitoring-and-surveillance/new-zealand-total-diet-study/ (11 December 2018).

Ministry for the Environment. No date(a). *Contaminated Sites Remediation Fund*. Retrieved from www.mfe.govt.nz/more/funding/contaminated-sites-remediation-fund for further information (11 December 2018).

Ministry for the Environment. No date(b). *Disposal of PFAS containing wastewater to trade waste*. Retrieved from www.mfe.govt.nz/sites/default/files/media/Land/PFOS-disposal-to-trade-waste-guidance.pdf (11 December 2018).

Ministry for the Environment. No date(c). *Managing waste that may contain brominated flame retardants*. Retrieved from www.mfe.govt.nz/publications/waste/managing-waste-may-contain-brominated-flame-retardants/managing-waste-may-contain (11 December 2018).

Ministry for the Environment. No date(d). *PFAS national programme overview*. Retrieved from www.mfe.govt.nz/sites/default/files/media/Land/national-PFAS-programme-overview.pdf (11 December 2018).

Ministry for the Environment. No date(e). *PFAS (per- and poly-fluoroalkyl substances)*. Retrieved from www.mfe.govt.nz/land/pfas-and-poly-fluoroalkyl-substances?utm_medium=email&utm_campaign=Environment%20Update%20-%20November%202018%20formerly%20resource%20management%20update&utm_content=Environment%20Update%20-%20November%202018%20formerly%20resource%20management%20update+CID_8e00eb15db8a6f5301745f0ba5c97256&utm_source=Email%20marketing%20software&utm_term=guidance (11 December 2018).

Ministry for the Environment. No date(f). *PFAS Communication, Engagement and Information Sharing Guidelines*. Retrieved from www.mfe.govt.nz/sites/default/files/media/Land/engagement-communication-information-sharing-guidance.pdf (11 December 2018).

Ministry for the Environment. 2000. *New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources: 2000*. Retrieved from www.mfe.govt.nz/sites/default/files/dioxin-emissions-inventory-mar00.pdf (13 December 2018).

Ministry for the Environment. 2003. *Contaminated land management guidelines No. 2: Hierarchy and application in New Zealand of environmental guideline values (revised 2011)*. Wellington: Ministry for the Environment. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-2-hierarchy-and-application-new (11 December 2018).

Ministry for the Environment. 2004a. *Contaminated land management guidelines No. 3: Risk Screening System*. Wellington: Ministry for the Environment. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-3-risk-screening-system (11 December 2018).

Ministry for the Environment. 2004b. *Contaminated land management guidelines No. 5: Site investigation and analysis of soils (revised 2011)*. Wellington: Ministry for the Environment. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-5-site-investigation-and (11 December 2018).

Ministry for the Environment. 2006a. *Contaminated land management guidelines No. 4: Classification and information management protocols*. Wellington: Ministry for the Environment. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-4-classification-and (11 December 2018).

Ministry for the Environment. 2006b. *New Zealand's National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/publications/hazards/stockholm-convention-pops-dec06 (11 December 2018).

Ministry for the Environment. 2011a. *Contaminated land management guidelines No. 1: Reporting on contaminated sites in New Zealand (revised 2011)*. Retrieved from www.mfe.govt.nz/publications/land-hazards/contaminated-land-management-guidelines-no-1-reporting-contaminated-sites (11 December 2018).

Ministry for the Environment. 2011b. *New Zealand inventory of dioxin emissions to air, land and water, and reservoir sources: 2011*. Wellington: Ministry for the Environment.

Ministry for the Environment. 2012a. *Pilot study of brominated flame retardants in waste electrical and electronic equipment*. Wellington: Ministry for the Environment.

Ministry for the Environment. 2012b. *Users' Guide: National environmental standard for assessing and managing contaminants in soil to protect human health*. Wellington: Ministry for the Environment.

Ministry for the Environment. 2013. *Brominated flame retardant research: Cost-benefit analysis of sorting options for e-waste plastics*. Wellington: Ministry for the Environment. Retrieved from www.mfe.govt.nz/publications/waste-hazards/brominated-flame-retardant-research-cost-benefit-analysis-sorting-options (11 December 2018).

Ministry for the Environment. 2014a. *Update of the New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources*. Wellington: Ministry for the Environment.

Ministry for the Environment. 2015a. *Guidelines that address contaminants from specific industries or activities*. Retrieved from www.mfe.govt.nz/land/risks-contaminated-land/managing-contaminated-land/guidelines-address-contaminants-specific (11 December 2018).

Ministry for the Environment. 2015b. *How to find out and what to do if land is contaminated*. Retrieved from www.mfe.govt.nz/land/risks-contaminated-land/my-land-contaminated/how-find-out-and-what-do-if-land-contaminated (11 December 2018).

Ministry for the Environment. 2016a. *About the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*. Retrieved from www.mfe.govt.nz/land/nes-assessing-and-managing-contaminants-soil-protect-human-health/about-nes (11 December 2018).

Ministry for the Environment. 2016b. *Hazardous Activities and Industries List (HAIL)*. Retrieved from <http://www.mfe.govt.nz/land/hazardous-activities-and-industries-list-hail> (11 December 2018).

Ministry for the Environment. 2016c. *Stockholm Convention on Persistent Organic Pollutants*. Retrieved from www.mfe.govt.nz/more/international-environmental-agreements/multilateral-environmental-agreements/stockholm (11 December 2018).

Ministry for the Environment. 2018a. *About product stewardship in New Zealand*. Retrieved from www.mfe.govt.nz/waste/we-all-have-role-play/responsible-product-management/about-product-stewardship for further information (11 December 2018).

Ministry for the Environment. 2018b. *About the Waste Minimisation Fund*. Retrieved from www.mfe.govt.nz/more/funding/waste-minimisation-fund/about-waste-minimisation-fund for further information (11 December 2018).

Ministry for the Environment. 2018c. *Contaminated land management guidelines*. Retrieved from www.mfe.govt.nz/land/risks-contaminated-land/managing-contaminated-land/contaminated-land-management-guidelines (11 December 2018).

Ministry for the Environment. 2018d. *Latest Updates*. Retrieved from www.mfe.govt.nz/node/23892 (11 December 2018).

Ministry for the Environment. 2018e. *PFAS – Documents released proactively and under OIA*. Retrieved from www.mfe.govt.nz/land/pfas-and-poly-fluoroalkyl-substances/latest-updates/pfas-and-pfoa-documents-released-under-oia (11 December 2018).

Ministry for the Environment. 2018f. *PFAS Investigations*. Retrieved from www.mfe.govt.nz/land/pfas-and-poly-fluoroalkyl-substances/pfas-investigations (11 December 2018).

Ministry for the Environment & Stats NZ. 2017. *New Zealand's Environmental Reporting Series: Our freshwater 2017*. Retrieved from www.mfe.govt.nz and www.stats.govt.nz.

Ministry for the Environment & Stats NZ. 2018a. *New Zealand's Environmental Reporting Series: Our land 2018*. Retrieved from www.mfe.govt.nz and www.stats.govt.nz.

Ministry for the Environment & Stats NZ. 2018b. *New Zealand's Environmental Reporting Series: Our air 2018*. Retrieved from www.mfe.govt.nz and www.stats.govt.nz.

Stockholm Convention. 2008. *National Implementation Plans*. Retrieved from <http://chm.pops.int/Implementation/NationalImplementationPlans/NIPTransmission/tabid/253/Default.aspx> (11 December 2018).

Stockholm Convention. 2017. *Guidance on developing and updating National Implementation Plans (NIPs)*. Retrieved from chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx (13 December 2018).

The Great DDT Muster. 2017. *Great DDT Muster FAQ's – Ridding NZ of POPs*. Retrieved from thegreatddtmuster.co.nz/the-great-ddt-muster-faqs for further information (11 December 2018).

't Mannelje A, Coakley J, Borman B, Douwes J, Bates M. 2013. *Concentrations of Selected Persistent Organic Pollutants (POPs) in the Serum of New Zealanders*. Report prepared as part of a Ministry of Health contract for scientific services. CPHR Technical Report No. 34. Wellington: Centre for Public Health Research.

't Mannelje A, Douwes J, Duckett H, Brogan S, Emmerton L, Harding E, Brooks C, Harrad S, Ellison-Loschmann L, Smith A, Pearce N. 2010. *Concentrations of persistent organic pollutants in the milk of New Zealand women*. Report prepared as part of a Ministry of Health contract for scientific services. CPHR Technical Report No. 32. Wellington: Centre for Public Health Research.

Tonkin and Taylor Ltd and SPHERE. 2008. *Assessment of Dioxin Contamination at Sawmill Sites. Report for Ministry for the Environment*. Wellington: Ministry for the Environment.

WorkSafe. 2017. *Laws and Regulations: Julian's Electrical and Energy Conservation Limited*. Retrieved from worksafe.govt.nz/laws-and-regulations/prosecutions/court-summaries/julians-electrical-and-energy-conservation-limited (11 December 2018).

WorkSafe. 2018. *Policy clarification: Contaminated land and the Health and Safety at Work (Hazardous Substances) Regulations 2017*. Retrieved from <https://worksafe.govt.nz/laws-and-regulations/operational-policy-framework/operational-policies/contaminated-land-and-the-health/#If-doc-45078> (11 December 2018).

World Health Organization. 2007. *Fourth WHO-Coordinated Survey of Human Milk for Persistent Organic Pollutants in Cooperation with UNEP: Guidelines for Developing a National Protocol*. Geneva, Switzerland: World Health Organization.