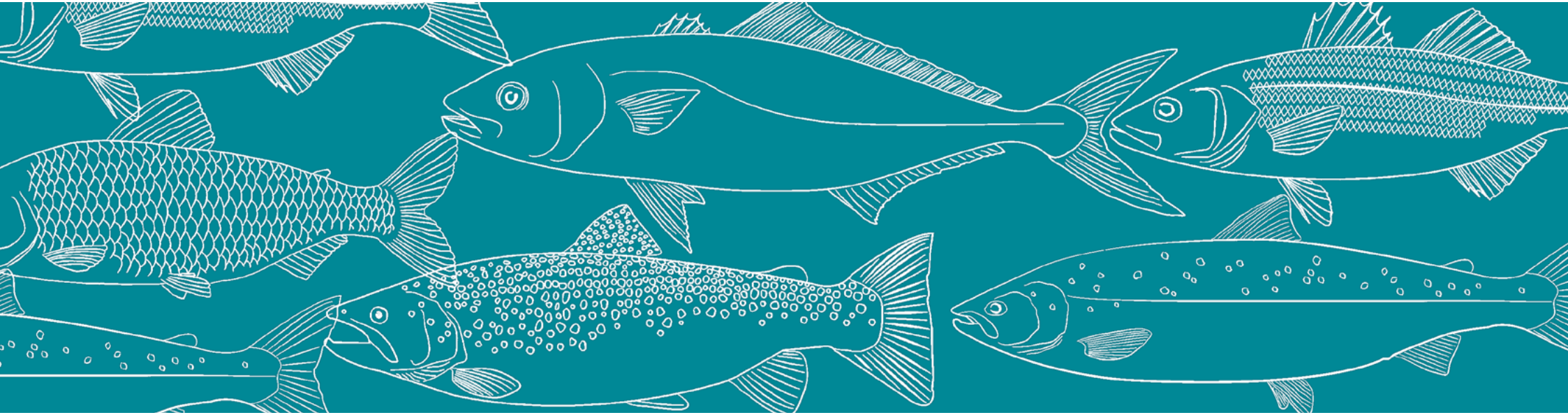
nutrace



2016 Residue Monitoring Report

SKRETTING
a Nutreco company

Skretting Australia

Summary of Results 2012-2016
Issued March 2017

About Skretting

Skretting is the world leader in the manufacture and supply of aquaculture feeds, making it an essential link in the feed-to-food chain. We apply our knowledge of ingredients and the nutritional needs of fish and shrimp to develop innovations that achieve optimum nutritional value, sustainable production and economic performance as we seek to fulfil our company-wide mission of 'Feeding the Future'.

Read more at www.skretting.com.au

Nutreco is a global leader in animal nutrition and fish and shrimp feed.

Experience across 100 years brings Nutreco a rich heritage of knowledge. Nutreco employs approximately 11,000 people in 35 countries, with sales in 80 countries.

Read more at www.nutreco.com

Our mission

feeding the future

Quick Links

About residue testing

About this report

Nutrace

PCBs & Dioxins

Pesticides

Heavy Metals

Feed to food quality & safety

Nutrace is Skretting's unique, global feed-to-food quality and safety system. It ensures consistency throughout the production process, from raw materials to final feed solutions.

Nutrace is built on five strong pillars:

- Certified Quality & Food Safety
- Ingredient and Supplier Assessment & Management
- Monitoring & Control
- Risk Management
- Tracking & Tracing

Nutrace ensures that our customers and end consumers can have full confidence with regard to feeds in the farmed fish value chain.

Skretting Australia has been a Nutrace compliant company since 2013.

Click here to read more about Nutrace

Quick Links

About residue testing
About this report
Nutrace
PCBs & Dioxins
Pesticides
Heavy Metals

About residue testing

Skretting conduct regular testing of our feeds for undesirable substances.

This is part of Skretting's Nutrace, Feed-to-Food Quality and Safety System, which acts to validate the quality controls performed throughout the year. These controls include frequent analysis of raw materials, supplier assessments and systems to control the pellet manufacturing process.

Skretting's Food Safety Team regularly review potential residues based on a risk assessment considering the scale of use, toxicity and persistence of each compound.

A global testing program for these residues is set annually. Testing is conducted by Skretting-approved, accredited laboratories that have demonstrated the highest level of competency and repeatability.

Skretting Australia undertakes residue testing on raw materials and finished feeds to ensure their quality.

Results reported here relate to complete fish feeds produced by Skretting Australia. Samples chosen best represent production since publishing the previous annual Residue Monitoring Report in 2016.

> Skretting Australia undertakes residue testing on raw materials and finished feeds to ensure their quality

About this report

This Residue Monitoring Report summarises the level of undesirable substances in Skretting Australia feeds from 2012 to 2016.

All results for Skretting Australia feeds were within the Australian and European limits.

Australian residue limits [maximum residue limit (MRL) and the extraneous residue limit (ERL)] are set by the Australian Pesticides and Veterinary Medicines Authority (APVMA).

If an Australian limit does not exist for a parameter, the relevant EU statutory limits has been used. EU statutory limits are equivalent to MRL standards.

We provide this report to keep Skretting customers informed of the status of our monitoring results.

To view previous reports, please click here.

Definitions & Terminology

Maximum residue limit (MRL) means the maximum concentration of a residue resulting from the registered use of an agricultural or veterinary chemical which is legally permitted or recognised as acceptable to be present in or on a food, agricultural commodity or animal feed;

Extraneous residue limit (ERL) refers to a pesticide residue arising from environmental sources (including former agricultural uses) other than the use of the chemical directly or indirectly on the food, agricultural commodity or animal feed. ERL means the maximum concentration of the pesticide residue that is recommended to be legally permitted or recognised as acceptable in or on a food, agricultural commodity or animal feed;

EU limit refers to the MRL according to European Union (EU) legislation

Primary feed commodity means a pasture, grain, forage or fodder in, or nearly in, its natural state intended for use by:

(a) Farmers as stockfeed for use without further processing for livestock animals, or after silaging or similar farm processes; or

(b) Stockfood manufacturers as a raw material for preparing compound feeds;

Compound feed is a nutritionally adequate feed for animals: by specific formula is compounded to be fed as the sole ration and is capable of maintaining life and/or promoting production without any additional substance being consumed;

Limit of quantification (LOQ) is the lower limit for a reliable quantitative measurement. Levels that are so low that they cannot be quantified with acceptable reliability will be reported as “below detection limit”;

TEF and TEQ: The World Health Organisation (WHO) has established two lists of toxicity factors for dioxin and PCB congeners. These are called TEF values, toxic equivalent factors. When a concentration is weighted with its corresponding TEF factor it is no longer called a concentration, but a toxic equivalent, a TEQ. The TEQ values have the same unit of measurement as a concentration, in this case ng/kg wet weight.

Definitions sourced from FAO, APVMA and NIFES websites

PCBs & Dioxins

BACKGROUND

Polychlorinated biphenyls (PCBs) are extremely persistent organic pollutants historically used as coolants, plasticisers, lubricants etc. The term “dioxins” includes polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). These are listed on laboratory reports as PCDD/F and are the main focus in terms of food safety. PCDD/Fs are unwanted by-products of chemical manufacture, bleaching processes and all combustion processes.

HEALTH ISSUES

PCBs and dioxins are toxic molecules, which in small quantities may cause problems with reproduction and cancer. PCB exposures, particularly before birth, have been linked in humans with lower IQ, hyperactivity, shortened attention span and delayed acquisition of reading skills.

LIMITS

Substance	Unit	Australia[1]	EU/ Norway[2]
Dioxins (Dioxins & furans)	TEQ (WHO) ng/kg	No limit	1.75
Sum of Dioxin & Dioxin-like PCBs	TEQ (WHO) ng/kg	No limit	5.5

ng = nanogram

kg = kilogram

TEQ = Toxic Equivalent (the amount of toxin or other poison per kilogram of body weight necessary to kill an animal)

WHO = World Health Organisation (Standard)

1. The MRL Standard: Maximum residue limits in food and animal feedstuff. APVMA December, 2012 32pp

2. OJ L 91, 29.3.2012, p.18-20. Commission Regulation (EU) No 277/2012

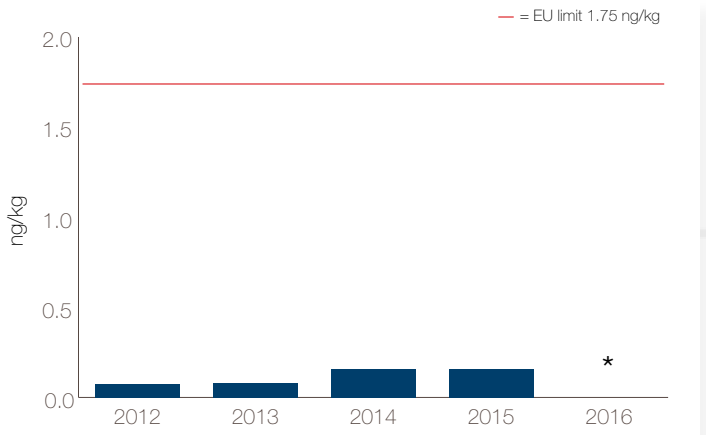
PCBs & Dioxins

Polychlorinated biphenyls (PCBs) are released into the environment and eventually enter the food chain and can build up in fish and other marine animals. Manufacturing of PCBs has been banned in most countries since the 1980s. Australia banned the importation of PCBs in 1975.

Dioxins have been shown to bioaccumulate in humans and animals due to their lipophilic (fat-liking) properties. Dioxins enter the general population almost exclusively from ingestion of food, specifically through the consumption of meat and dairy products.

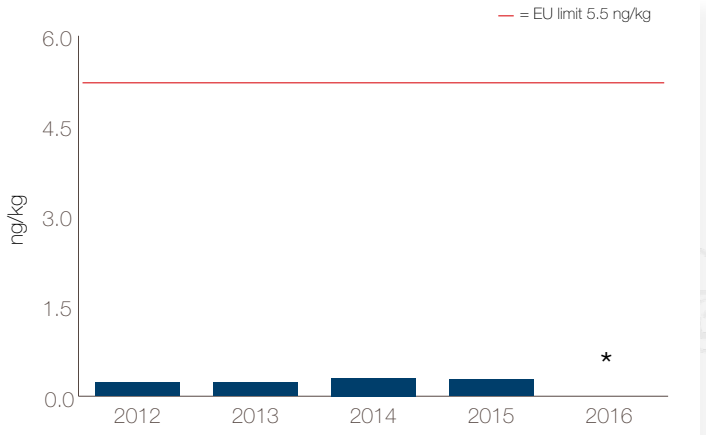
PCBs and dioxins (and furans) have a similar structure and they therefore have a similar toxic effect. The PCBs are usually present in much higher quantities than dioxins, but are less toxic. The most toxic PCBs are classed as 'dioxin-like' by the World Health Organisation (WHO). It is these 12 'dioxin-like' PCBs which the EU has set limits for in combination with dioxin residues.

PCDD & PCDF



* Below report limit <0.240 ng/kg

SUM DIOXINS & DIOXIN-LIKE PCBs



* Below report limit <0.679 ng/kg

Pesticides

BACKGROUND

Pesticides have been widely and commonly used to protect crops, livestock, buildings and households from pests. Although the widespread use of pesticides posing significant health risks has been banned in many countries, several pesticides are still produced in developing countries. Many pesticides continue to be detected in precipitation, soil, sediment, biota, aquatic ecosystems and food.

HEALTH ISSUES

The health effects of pesticides depend on the type of pesticide. Some, such as the organophosphates and carbamates, affect the nervous system. Others may irritate the skin or eyes. Some pesticides may be carcinogic. Others may affect the hormone or endocrine system in the body.

LIMITS

Pesticide	Unit	Australia[1]	EU/Norway[2]
Aldrin & Dieldrin (sum of HHDN & HEOD)	mg/kg	E 0.01	0.02
Chlordane (sum of cis- trans- & oxy-chordane isomers)	mg/kg	E 0.01	0.02
DDT (sum of o,p'-DDT; p,p'-DDE; p,p'-DDT & p,p'TDE)	mg/kg	E 0.05	0.05
Endosulfan (sum of alpha- & beta-endosulfan & endosulfan sulphate)	mg/kg	No limit	0.005
Endrin (sum of endrin & delta-keto endrin)	mg/kg	E 0.03	0.01
Heptachlor (sum of heptachlor & heptachlor epoxide)	mg/kg	E 0.02	0.01
Hexachlorobenzene (HCB)	mg/kg	E 0.01	0.01
alpha-Hexachlorocyclohexane (alpha-HCH)	mg/kg	No limit	0.02
beta-Hexachlorocyclohexane (beta-HCH)	mg/kg	No limit	0.01

mg = milligram
kg = kilogram

1. The MRL Standard: Maximum residue limits in food and animal feedstuff. APVMA December, 2012 32pp. 'E' denotes an Extraneous Residue Limit (ERL) All Australian ERLs are based on the value for a primary feed commodity as there is no specific MRL/ERL for compound fish feed.

2. OJ L140, 30.5.2002, p.10. Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed

In previous years, samples were screened for total pesticides, but from 2013 onwards each pesticide is analysed individually. The Residue Report will now show actual level, not just whether the sample was under the threshold.

Quick Links

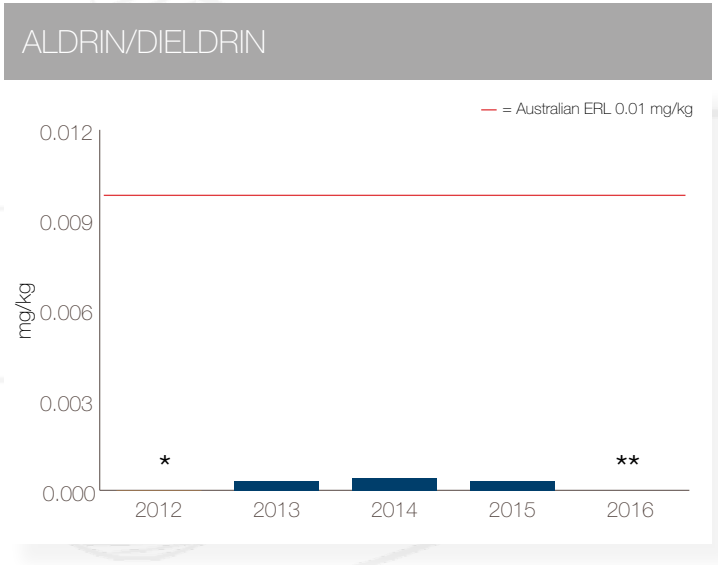
About residue testing | About this report | Nutrace | PCBs & Dioxins | Pesticides | Heavy Metals

Pesticides

Aldrin and dieldrin (a metabolite of aldrin as well as a marketed pesticide) are both fat soluble, persistent and bio-accumulating organochlorine insecticides.

Widely used as insecticides in agriculture, the registration of the last aldrin and dieldren products in Australia were cancelled in 1994 and 1988 respectively. Both compounds are classified as Schedule 6 ('Poison') in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

Worldwide, the use of both compounds is severely restricted or banned in many countries. In the environment, aldrin is rapidly converted to dieldrin.



** Below detection limit <0.005 mg/kg

* Below detection limit <0.002 mg/kg

Pesticides

Chlordane is a non-systemic (ie not taken up in the plant) insecticide of agricultural crops. It is a restricted chemical product and is classified as Schedule 6 (“Poison”) in the SUSDP.

Chlordane is not used in Australia - the last registered Chlordane product was withdrawn in 1997. Chlordane is banned in Europe (1981) and the USA (1978) and currently in most other countries worldwide.

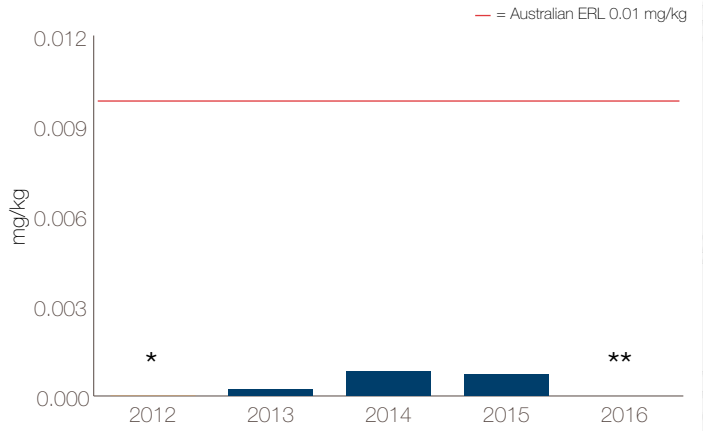
Chlordane is highly insoluble in water, persistent, bio-accumulating and highly lipophilic. In accordance with the Australian residue limit (ERL) standard, Chlordane is reported as the sum of cis-, trans- and oxy-Chlordane isomers.

Dichlorodiphenyltrichloroethane (DDT) is an insecticide that was widely applied in agriculture and forestry. DDT products were classified as Schedule 5 (‘Caution’) or Schedule 6 (‘Poison’) in the SUSDP.

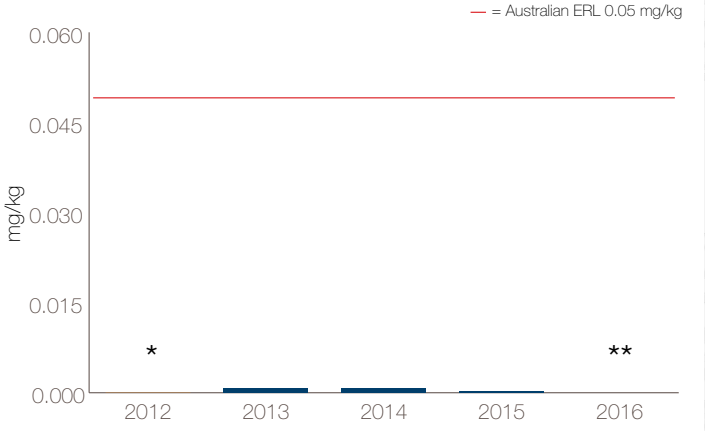
Since the early 1970s severe restrictions and bans on its use have been introduced in many countries (eg. Banned in the USA in 1972 and Europe since 1986). In Australia, registrations of all DDT products had been cancelled by the late 1990’s (the majority of products had not been used since the mid-1980’s).

DDT is highly insoluble in water, lipophilic and persistent in the environment. Because of the lipophillic properties and persistence in the environment, DDT and related compounds are bio-accumulating and biomagnified along the food chain. Although it is banned in most countries worldwide, DDT is still used for vector control (eg mosquitoes), especially in areas with endemic malaria.

CHLORDANE



DDT



** Below detection limit <0.005 mg/kg

* Below detection limit <0.002 mg/kg

Pesticides

Endosulfan is a non-systemic organochlorine pesticide used in agricultural and horticultural crops for control of insects and mites.

Registration of endosulfan in Australia was cancelled in October 2010. Endosulfan is banned in Europe (2006) and currently restricted or banned in most other countries worldwide.

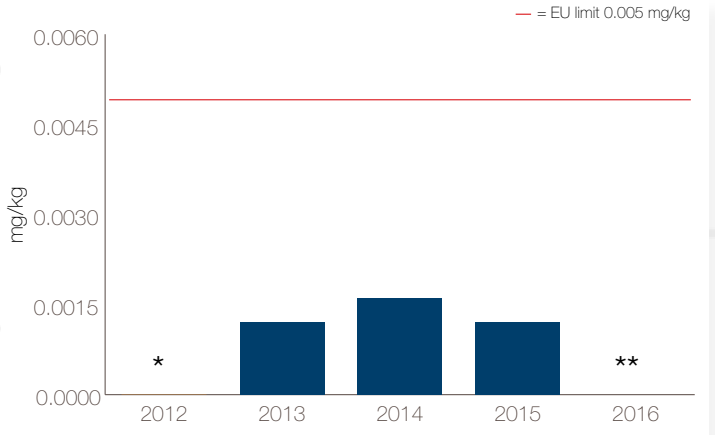
In contrast to the majority of organochlorine pesticides, endosulfan is less lipophillic – consequently, biomagnification and bio-accumulation along the food chain is less likely to occur.

Endrin is a fat soluble organochlorine insecticide - at one time registered in Australia as an insecticide, miticide and aviancide.

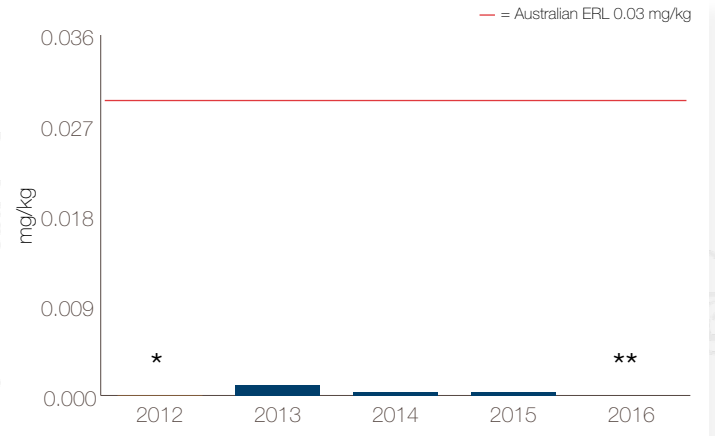
Classified as Schedule 7 ('Dangerous Poison') in the SUSDP, the last Australian-registered endrin product was cancelled in 1990. Endrin has been banned in most countries worldwide during the last 25 years.

Endrin is partly transformed in the environment into delta-keto endrin.

ENDOSULFAN



ENDRIN



** Below detection limit <0.005 mg/kg

* Below detection limit <0.002 mg/kg

Pesticides

Heptachlor is a non-systemic contact insecticide – at one time registered in Australia as a termaticide and insecticide. Classified as Schedule 6 ('Poison') in the SUSDP, the last Australian-registered heptachlor product was cancelled in 1997 (the majority of heptachlor products were cancelled by the end of 1990). Heptachlor is banned in Europe (1984) and most other countries worldwide.

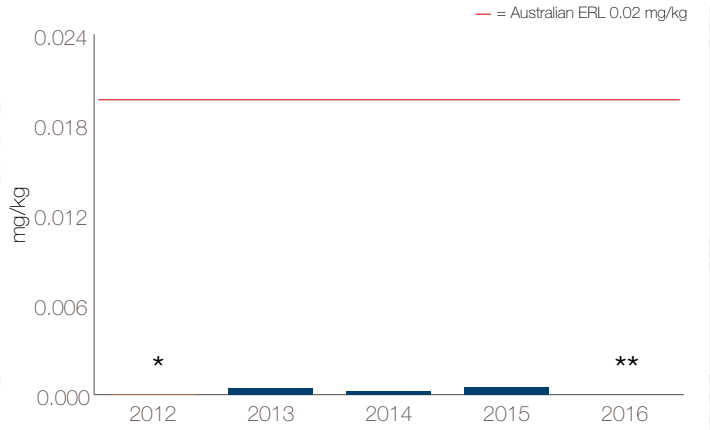
In the environment, heptachlor breaks down to heptachlor epoxide and photoheptachlor. All these compounds are lipophilic, persistent and bio-accumulate in the food chain.

In accordance with the Australian residue limit (ERL) standard, heptachlor is reported as the the sum of heptachlor and heptachlor epoxide.

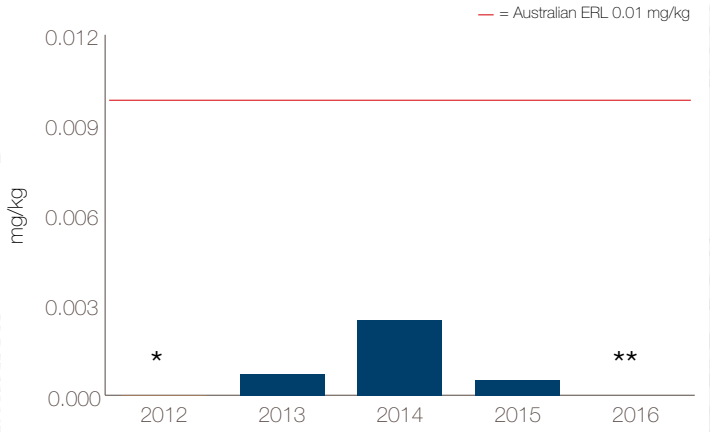
Hexachlorobenzene (HCB) is an agricultural pesticide used as a fungicide (seed disinfectant). The last Australian-registered HCB product was banned in 1987. HCB is banned in Europe (1981) and most other countries worldwide.

HCB is highly insoluble in water, lipophilic, persistent and bio-accumulates in the food chain.

HEPTACHLOR



HEXACHLOROBENZENE (HCB)



** Below detection limit <0.005 mg/kg

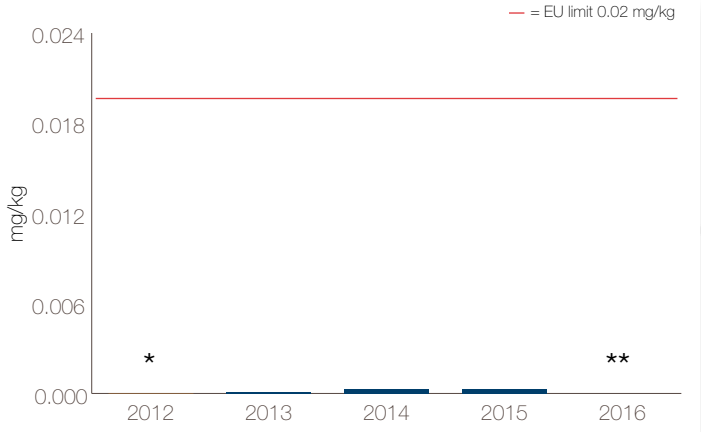
* Below detection limit <0.002 mg/kg

Pesticides

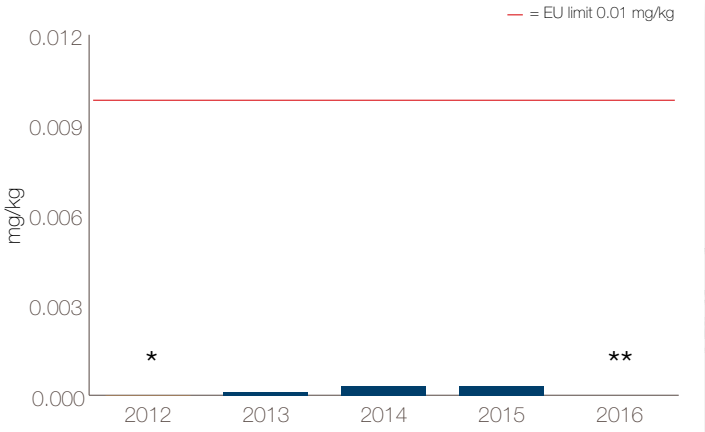
Technical Hexachlorocyclohexane (HCH) was used as an insecticide worldwide. It is a mixture of isomers – the four predominant are alpha-, beta-, delta- and gamma-HCH (also known as lindane).

Technical HCH is banned in Europe (1978) and most other countries worldwide. Alpha- & beta-HCH are lipophilic, persistent in the environment, bio-accumulating and biomagnified along the food chain.

ALPHA-HCH



BETA-HCH



** Below detection limit <0.005 mg/kg

* Below detection limit <0.002 mg/kg

Heavy Metals

BACKGROUND

Heavy metal pollution commonly arises from the purification of metals and unlike organic pollutants, heavy metals do not decay. Emissions of heavy metals such as mercury, lead, cadmium and arsenic into the environment occur via a wide range of processes and pathways including the air, surface water, and soil.

HEALTH ISSUES

One of the largest problems with the persistence of heavy metals in the environment is the potential for bioaccumulation and biomagnification causing heavier exposure for some organisms than is present in the environment alone. If the human body is exposed to heavy metals of a specific concentration for an interval of time then this can cause serious illness.

LIMITS

Substance	Unit	Australia[1]	EU/Norway[2]
Arsenic	mg/kg	No limit	10.0
Cadmium	mg/kg	No limit	1.0
Lead	mg/kg	No limit	5.0
Mercury	mg/kg	No limit	0.2

mg = milligram

kg = kilogram

1. The MRL Standard: Maximum residue limits in food and animal feedstuff. APVMA December, 2012 32pp

2. OJ L140, 30.5.2002, p. 10. Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed

Heavy Metals

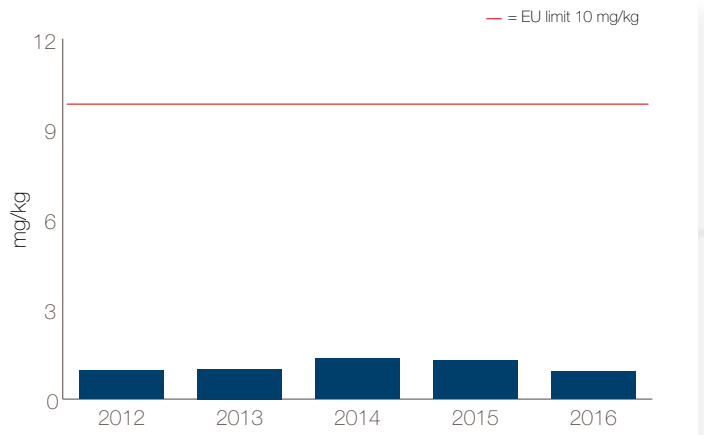
Arsenic and its compounds are used as pesticides and in various alloys. The toxicity of arsenic is strongly dependent on its chemical form. Although inorganic arsenic is highly toxic, organic arsenic is not.

Accumulated arsenic in fish and shellfish is predominantly in organic form, and aquatic animals show a wide range of sensitivities to different arsenic compounds.

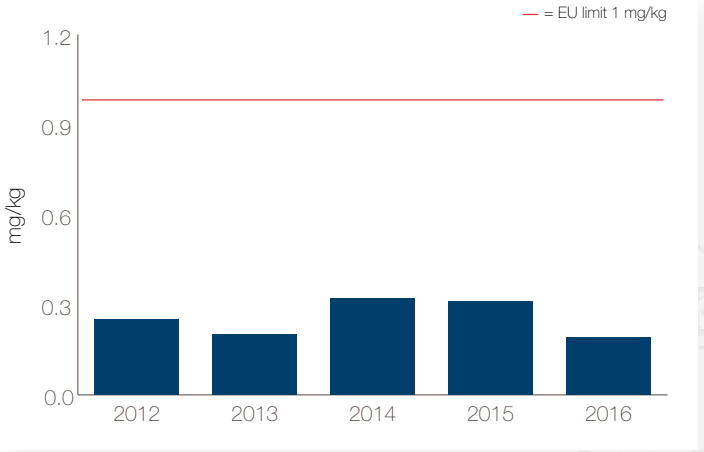
Arsenic in fish feed is also predominately in the organic form, which is much less toxic than the inorganic form.

Cadmium is commonly found in its metallic form and as sulfides and sulfates. Globally, about three-quarters of cadmium is used in batteries and most of the remaining quarter is used mainly for pigments, coatings and plating, and as stabilisers for plastics.

ARSENIC



CADMIUM

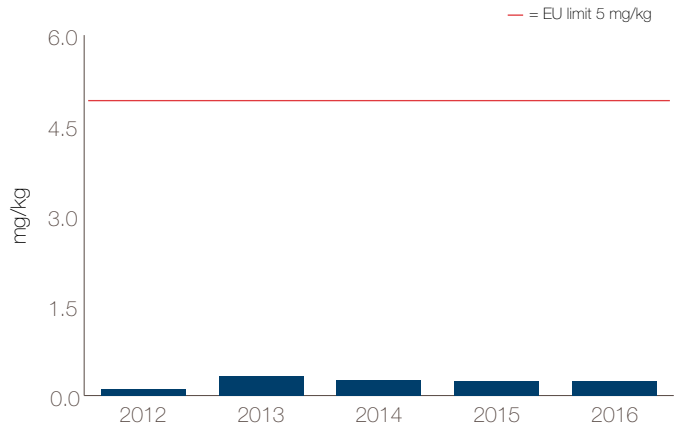


Heavy Metals

Sources of lead found in the environment are multiple, and the metal is truly ubiquitous, being commonly found in food, water, and air. Evidence exists that lead in the environment has increased during the past 200 years, and it is not surprising that it can be found as a contaminant of aquatic animals.

Mercury is much more harmful to living organisms as an organic metal compound than as the element. The most toxic form of mercury is methylmercury, which damages the central nervous system. It is found in fish because industrial effluents containing mercury are discharged into rivers or seas where the mercury is converted into methylmercury by bacteria. It then moves up the food chain and accumulates in the bodies of some large wild fish, such as shark, marlin and swordfish. In farmed salmon the levels of mercury are very low, almost not detectable.

LEAD



MERCURY