

Ngā Matitapu o te Hākinō
People Poisoned Daily



CHEMICAL CRIMES
on our Genetic
Fingerprint

GREENPEACE

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This report is dedicated to Kees Bon who died in a house fire during the height of his ground breaking research on 24-D

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People Poisoned Daily

**How Ivon Watkins Dow
Contaminated Aotearoa**



Mt Taranaki

**Mere Takoko
Greenpeace Toxics Campaigner**

**Key Contributor
Andrew Gibbs - Dioxin Investigation Network**

Tii



Kereru (Wood Pigeon)



Kokako



Tuatara



© Eve Manning

Te manu kā kai i te miro, nōna te ngāhere. Te manu kā kai i te mātauranga, nōna te Ao.

Tākua, te tapuwa o te ata hāpara hei kukume mai i nga kawekawe o uru, o ngāngana. Ko nga karere whakaari tera i a Tamanui-Te-Rā i tōna whare muramura, i a Rori-Wha-Te-Ao. Na Tane i kimi, nāna i rapu, nāna i rangahau te māramatanga i rukuhia ai i te kore, i te pō-te-kitea.

Ka wehe i reira a Ranginui-e-tū nei, a Papa-tua-nuku e takoto nei hei mātutua i a rāua tahi. Ka tupu ko te Kā hui Atua, ko te Kāhui Tangata, ki te whāiao, ki te ao mārama. Kōkiri! Taia te mahi a te tangata kia rere whakawaho ki te āteatanga! Hui e!

Taiki e!

E nga mana e nga reo e nga mata waka
O Aotearoa nei

Tae atu ra ki nga manuhiri tuārangi

Mai i nga kokonga o te Ao Whānui nei

Tēna koutou, tēna koutou, tēna koutou katoa

Chemical Crimes on our Genetic Fingerprint

Introduction

This Greenpeace report presents a telling story of one of the biggest environmental and health issues impacting Aotearoa.

It describes how the whakapapa or genealogy of human life, te ira tangata, has been damaged by the manufacture, disposal and use of the herbicide defoliants, 245-T and 24-D.

Over 20 million litres of these chemicals were imported and manufactured in New Plymouth by Ivon Watkins Dow from 1946 to 1987.

The organochlorine weed killers were contaminated with TCDD and possibly PeCDD - colourless, odourless toxic chemicals called dioxins now targeted for elimination by a UN agreement called the Stockholm Convention.

245-T and 24-D were sprayed so extensively on farmlands and plantation forestry throughout the country that their chemical fingerprints, TCDD and PeCDD, are still found in our bodies.

They are found at particularly alarming rates in Maori women and people over fifty years old.

The report supplements a growing body of evidence that indicates that use of 245-T and possibly 24-D can be linked to nationwide birth defects, hormonal and endocrine disruption, cancers and decreasing rates of fertility.

It paints a contrasting picture of statistical information previously presented by successive governments that has contributed to a decadent culture of apathy among medical professionals who continue to ignore that dioxin poisoning has a direct impact on people's health.

Finally, the report calls for immediate action by the Government who must acknowledge and respond to this research by funding an independent epidemiological study to analyse the long-term effects of our collective exposure to TCDD, PeCDD and other dioxins.

GREENPEACE DEMANDS:

1. That the Government acknowledge dioxin poisoning by developing specialist health care centres and social services for people poisoned by dioxins and that this process should occur in cooperation and consultation with stakeholder communities, organisations and Iwi.
2. That the Dow Chemical Company set up a national fund to compensate workers, individuals and families poisoned by 245-T and 24-D and that it discontinue its distribution of 24-D and other products which manufacture dioxins including its high temperature waste incinerator.

Our Deadly Chemical Legacy

Face the Face of Dioxins

Greenpeace Aotearoa has worked for a number of decades to highlight the deadly legacy of toxic contamination left by past agricultural and forestry chemical treatment practices across the country.

This report adds to the pioneering work of campaigners such as Dr. Meriel Watts, Michael Szabo and particularly Gordon Jackman who authored the report, 'The Deadly Legacy' and brought the issue of Pentachlorophenol (PCP) contamination to national attention.

Historically our forestry and agricultural industries have developed production systems that have shown little regard for the environment and human health. As a consequence, many of the long-term impacts of the indiscriminate use of chemicals such as PCP and DDT are only now beginning to surface.

This report focuses on two chemicals: 245-T (2,4,5-Trichlorophenoxyacetic acid) and 24-D (2,4-Dichlorophenoxyacetic acid). Both herbicide defoliants have received a groundswell of attention in the media recently due to their role in poisoning the community of Paritutu, in New Plymouth. They are also associated with the poisoning of South Vietnam and military personnel that fought during the Vietnam War.

As the research presented in this report illustrates, what has yet to receive nationwide attention is the story of how the use of these chemicals caused national public exposure and polluted our soils, air and water including our rivers, groundwater and sea.

Toxic Tinkering

Aotearoa is in the middle of a toxic crisis. The use of heavily contaminated 245-T and 24-D on farms, forests and railways from the 1950s to 1970s was so extreme that tests conducted across the country have detected levels of dioxins associated with these products that are second-highest worldwide to South Vietnam areas sprayed with Agent Orange.

For decades, successive Governments have undertaken a number of different studies in the area. In almost all of these occasions, key pieces of data have been omitted or studies have been done too late. Local residents were simply ignored. The 1986 Committee of Inquiry, for example, failed to consider key soil samples containing levels of dioxins comparable to South Vietnam, data which would have surely changed the outcome of the Inquiry.

In failing to put the pieces of key information together we are forced to face a dark conclusion: Perhaps the Government didn't want to acknowledge the data or the subsequent action it would have to take.



Dow Agrosciences Ltd: Pictured above is the corporation that not only placed the residents of Paritutu, New Plymouth at risk to dangerous levels of dioxins, but has also compromised the health of all people in Aotearoa, particularly Maori and people over fifty years old. The effects are known to be intergenerational.

A Scandal of National Proportions

Greenpeace wrote this report in consultation with campaigners from Paritutu and scientists who have filled in a number of data gaps not currently presented in government literature which all lead to the same conclusion. That the widespread use of 245-T and 24-D can be linked to elevated levels of birth defects, cancers and reproductive problems.

This phenomenon has never been fully investigated or rectified by the Government who subsidised a good portion of Dow's chemical production.

When local and national data presented in this report is compared with international data that Government has had access to for a number of decades, questions must be raised as to why this information has not been presented to the public.

The report does not presume to present all data relevant to this topic but provides a snapshot of key information to illustrate that people were exposed to very significant levels of cancer causing chemicals from the 1950s to the 1970s.

Today, our bodies still carry the dioxins that contaminated 245-T and possibly 24-D – testimony to the toxic legacy of a nation whose people are still exposed daily to the effects of these chemicals.

Key points:

Food Chain Modification of our Genetics

What started in Aotearoa with the use of 245-T and possibly 24-D and other historic chemicals such as DDT and PCP was essentially a food chain driven modification of our genes. Epidemiological research is urgently needed to analyse the long-term effects of our collective exposure to their associated dioxins. Testing of pre-1972 batches of 245-T and 24-D are also needed to confirm their true levels of TCDD and PeCDD.

Resolution and Justice for the Residents of Paritutu

Despite almost two decades of Government investigations into the effects of dioxin poisoning in Paritutu, residents are still waiting for the Government to take action against Dow. During this long wait for justice, many people exposed to these chemicals have died and families continue to suffer emotionally and financially from related health problems. The report presents a number of reasons why Government action against the company must also include pressure on Dow to set up a national fund to compensate workers, individuals and families poisoned by 245-T and 24-D.

Recognition Among Medical Professionals

The Government can no longer pursue a nonchalant 'business-as-usual' approach to dioxins or dioxin polluters like Dow. Public education should not minimize public concern but accurately portray data that illustrates how dioxin poisoning has a direct impact on people's health. This education should also target public health institutions and medical professionals who continue to disavow knowledge related to the links between people's health and their exposure to dioxins.

Health Clinics and Specialist Health Care

This report presents a case for the need to set up health clinics and specialist health care services for Paritutu residents and other groups who also identify that their health problems are related to dioxin poisoning. The link between cancer and dioxin is an established fact and is recognised by the Ministry of Health who have publicly stated that there is no safe level of dioxin exposure. Public health officials have assured the community that "recompense would be sought from Dow Agrosiences if it was proven that there was a problem".

Implementing the Stockholm Convention

The dioxins identified in this report, TCDD and PeCDD, as well as those that contaminated PCP, are now targeted for elimination by a United Nations agreement ratified by the New Zealand Government called the Stockholm Convention. The Ministry for the Environment is now obligated to implement a national plan that eliminates dioxins from use and addresses the growing issue of lingering contamination. The development of frameworks and content for national plans aimed at implementing the Stockholm Convention present an opportune time to raise public awareness about dioxin poisoning through public education and should occur in consultation with stakeholder communities, organisations and Iwi.



Dioxin is Deadly. It is one of the most lethal synthetic chemicals known.*

According to World Health Organisation figures:
*A piece of dioxin the size of a small grain of rice, if distributed equally and directly to people, is equivalent to the "allowable" yearly dose for one million people.

This report questions previous Government studies on the effects of 245-T and 24-D. As the study notes, medical and scientific personnel have failed to recognise the nationwide food chain exposure that also contaminated the general New Zealand population. The report notes that previous Government studies have assumed that the only exposure that occurred in people in Aotearoa was through direct contact such as occupational and spray drift events.

In this report:

We are presented with a contrasting image of our clean green country.

Of people, fish and wildlife poisoned by chemicals called ‘dioxin’.

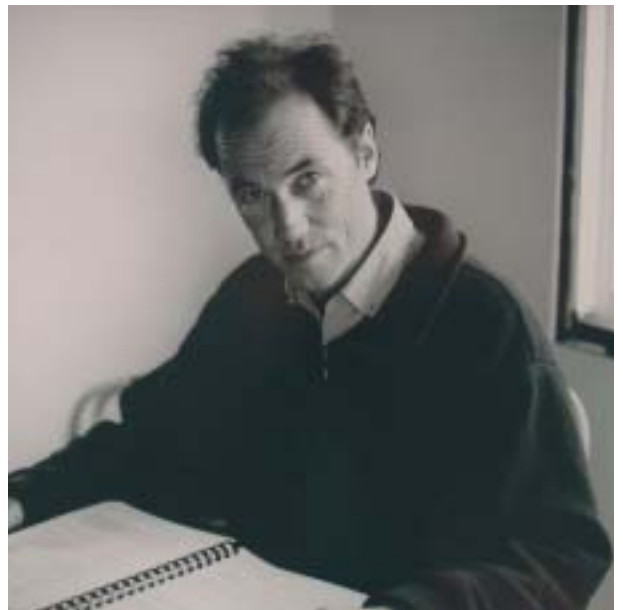


© Steve Dawson, New Zealand Whale and Dolphin Trust

*Te Aihe a Maui, kaitiaki or guardian of our seas
is on the brink of extinction*

We spend time with local people...

**To hear the stories that have inspired
a thirty year struggle for justice.**



*Andrew Gibbs – campaigner for the
struggle for residents from Paritutu
poisoned by Dow Agrosciences Ltd*



A growing body of evidence indicates that we are exposed daily to chemicals.

We face the face of dioxins...

And the nationwide toxic legacy that still impacts on our health



Dow: Poisoning people daily.

**We discover the chemical fingerprints of 245-T and 24-D,
the herbicide defoliants that contaminated our bodies with dioxins.**

People Poisoned Daily by Dow

Toxic Legacy

The pesticides 24-D (2,4-Dichlorophenoxyacetic acid) and 245-T (2,4,5-Trichloro-phenoxyacetic acid) were invented by US chemists in 1937 and 1938.¹ By the 1950s, they were widely accepted by our agricultural and forestry industries as part of the ‘green revolution’.

The equal mixture of 245-T and 24-D is more commonly known as ‘Agent Orange’, an agent of chemical warfare. During the Vietnam War, ‘Agent’ Orange was used systematically for forest defoliation and crop destruction by the United States Defence Force.²

44 million litres of 245-T and 24-D were sprayed by US Defence Forces on Vietnam as a forest defoliant and crop destroyer.³ In comparison, an estimated 20 million litres of 245-T⁴ and 24-D⁵ were used, here at home, across Aotearoa.



Per capita, we enjoyed the dubious legacy as the highest consumers of 24-D and 245-T along with their chemical fingerprints or ‘congeners’ called TCDD and PeCDD. The chemicals were also imported and marketed to a lesser extent by other companies such as Timberol, Yates, Shell and ICI.⁶

Dow Manufactures Agent Orange

In New Plymouth, Dow Agro-sciences, (previously Ivon Watkins-Dow) a subsidiary of the American based Dow Chemical Company, began importing 24-D in 1946 and 245-T in 1948.⁷

In 1969, Dow was able to start its own local production of 245-T (TCP) in Paritutu by building a tailor made TCP plant. TCDD is a dioxin formed during the TCP manufacture and is one of the most toxic chemicals known to humanity, along with PeCDD.⁸

By 1987, Dow was forced to stop production of 245-T after intense campaigning by local residents who experienced congenital deformities, cancers and illnesses they believe are linked to toxic releases from the plant.

Chemical Fingerprints of Agent Orange

The two dioxin congeners 2378-TCDD and 12378-PeCDD have been detected in soil samples taken from around the New Plymouth Dow plant. TCDD is acknowledged as the chemical fingerprint of 245-T and Agent Orange. PeCDD appears to be associated with 24-D.

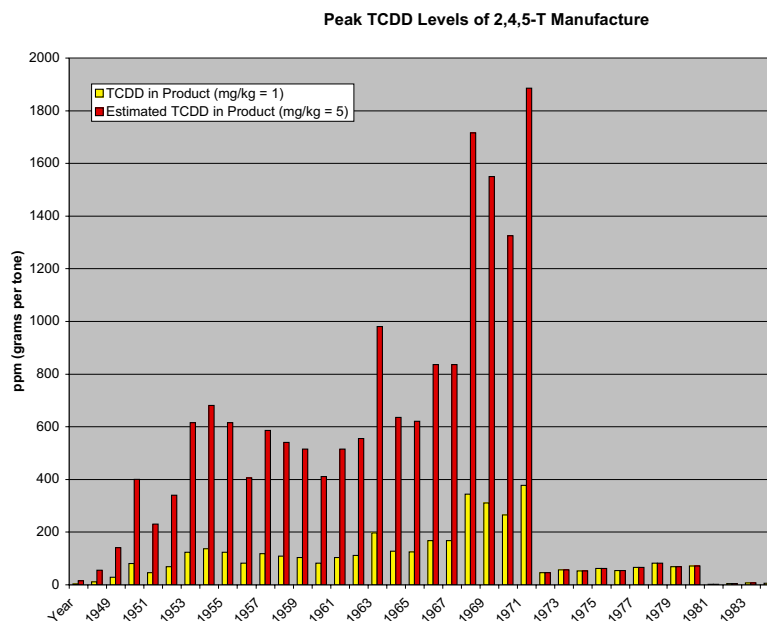
From 1948 to 1972, an estimated 3,400⁹ tonnes of 245-T contaminated with approximately 17 kilograms of TCDD was imported and manufactured by Dow.¹⁰ The amount in kilograms of PeCDD in 24-D can not be determined as this information has not been released by Dow.

Thousands of tonnes of toxic gases were spewed into the sky at Paritutu. These gases carried dioxins, the most potent of which was 2,3,7,8-tetrachlorodibenzo-p-dioxin, or 2378-TCDD or simply TCDD.



In 1985, the Environmental Protection Agency in the U.S., described chlorophenols (such as 245-T, 24-D and pentachlorophenol) as the principal sources of dioxins in the environment.¹¹

The quantities of TCDD produced annually in 245-T product are shown in the graph (yellow bars) and are based on figures presented during a Ministerial Committee of Enquiry in 1986 which stated that each tonne of 245-T produced was contaminated with 1 gram of TCDD (pre 1972). However, testimonies from a former Dow manager indicate that quantities of TCDD in 245-T are much higher than what was stated during the Enquiry. A more accurate estimate of quantities of TCDD in 245-T based on a figure of 5ppm (5000ppb) of dioxin in 245-T produced (5 grams per tonne). By 1985, TCDD levels in 245-T product were significantly reduced to 4.7ppb.¹²



While Dow and the government assert that the total quantity of TCDD produced from 1948 to 1972 was 3.4 kilograms of TCDD dioxin¹³, testimonies from the former Dow manager indicate that the real figure is more likely to have been around 17 kilograms. TCDD, the contaminant dioxin of 245-T, is also known to have contaminated some batches of 24-D. Dow has yet to release a dioxin analysis of pre-1972 batches of 245-T or 24-D¹⁴. This is still a fundamental data gap and contradicts Dow's policy of supporting "an informed community".

A Growing Body of Evidence

While it is widely known that 245-T is the most significant source of 2378-TCDD, the source of 12378-PeCDD, the predominant congener in our bodies has not been identified by the Ministry for the Environment (MfE).¹⁵

The congener, however has only been detected in soils around Dow's plant in Paritutu and one Northland farm.¹⁶ This would seem to suggest that the fingerprint originates from Dow and is confirmed by overseas research that has detected elevated levels of 12378-PeCDD in 24-D products¹⁷ and 24-D workers.¹⁸

Greenpeace and independent researchers re-evaluation of MfE data indicates that pre-1972 24-D is a likely source of 12378-PeCDD. This product is still widely used which possibly answers why people in Aotearoa have particularly high levels of this dioxin in our bodies, an estimated 30 to 36%.¹⁹ Although 24-D has been used for 58 years in Aotearoa, no testing for the dioxin levels in this product has been conducted.

Chemical Crimes on our Genetic Fingerprint

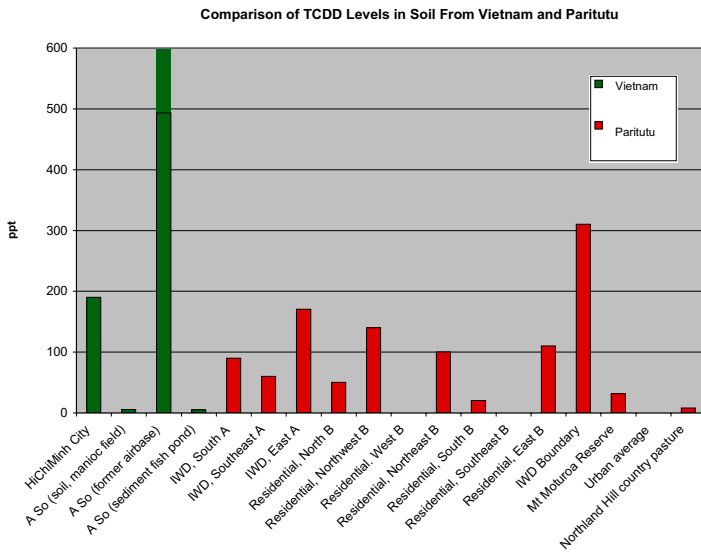
The precursor chemicals used to make 245-T and 24-D also contain dioxins as unintentional by-products. While some of the dioxin was in the process wastes, the 245-T and 24-D was contaminated with two congeners or what this report describes as 'chemical fingerprints'.

The congener linked to 245-T is '2,3,7,8-TCDD.' This is widely accepted by scientists. The source of 1,2,3,7,8-PeCDD is shrouded in mystery. This report asserts that this congener is linked to 24-D. Thus, a 'chemical fingerprint' refers to one or two congeners. These fingerprints can now be found at substantial levels in New Zealanders and have contaminated the human genetic fingerprint. This is a chemical crime against our whakapapa, our genealogy and the seed of life.

Diaries from Toxic Lands

"In December of 1969, my seventh form at Spotswood College had a farewell barbeque on the beach below the Ivon Watkins Dow plant. It was very dark but a small group of us decided to walk up to the car park because this was the quickest route. As we walked up, my legs sank up to my knee in what I could only describe as quick sand. Later, I found out that Dow had pumped tonnes of waste on to the sand. This was the start of thirty years of bad health. I still suffer from chronic fatigue (ME), fibro myalgia, hay fever and asthma. I have also had three miscarriages and had to remove my cervix because of aggressive cancer cells that formed there"—Anonymous resident of Paritutu

We Were the Second Vietnam



With the exception of a former U.S. military airbase, the TCDD levels recorded in Paritutu are in the same range as areas in Vietnam sprayed by Agent Orange.²⁰ Three residential areas show TCDD levels 100ppt and over.



Likened to a plumed serpent by locals, emissions from Dow's incinerator contributed to resident exposure from the mid 1970's onwards.²⁵ Other exposure could have occurred as early as 1962 – the year that Dow moved to its current premises on Paritutu Road. In 1972, Dow was forced to reduce the levels of TCDD in 245-T by the NZ Agricultural Chemical Board. The TCDD and removed waste was buried, pumped into the sea and burned at various sites around New Plymouth.²⁶

Valley of the Shadow of Death

Paritutu is a residential area that rests on the fringes of the urban settlement of New Plymouth. As an ecosystem, it once boasted a spectacular coastline and prime fishing grounds. It also has a long history of indigenous settlement, as it was here that the tohunga or medicine people taught the natural sciences of local Iwi (tribal nation) at the school of learning, Taunatapu.²¹

Today, this ancient past represents an intriguing contrast to what now stands in its place – the US owned chemical plant, Dow Agrosiences Ltd. As a symbol of quite a different error of New Zealand's questing scientific age, the plant has manufactured the kind of devastation that most people associate with Vietnam.

The emissions that were produced from the manufacture of TCP, 245-T and 24-D contaminated the valley. The airborne toxins moved through the atmosphere marking the beginnings of what locals dubbed the "shadow of death".

Soil samples from residential properties in Paritutu have tested positive for TCDD and are found at levels comparable to soils in Vietnam.²² Blood serum samples have also tested positive for TCDD with levels similar to Vietnamese people exposed to Agent Orange.²³

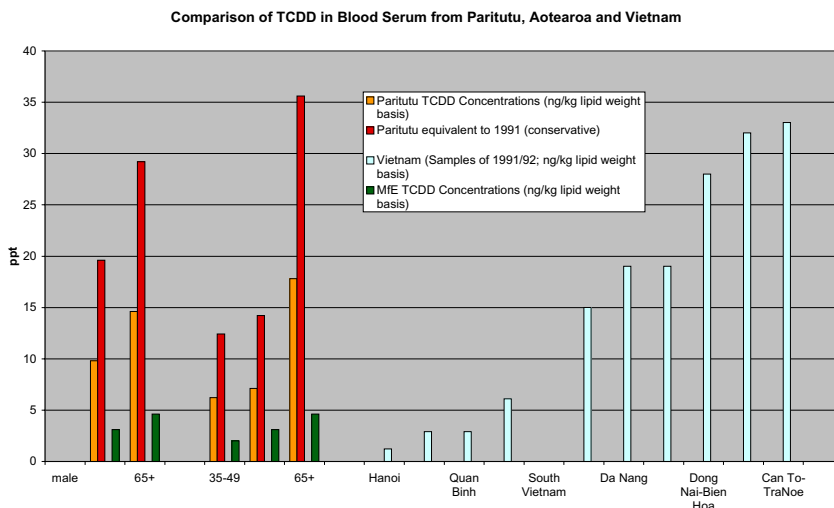
These levels were found to be two to eleven times higher than the national average. This means that people in Paritutu who have lived in the area for more than twenty years carry dioxins in their blood at levels two to eleven times higher than the average New Zealander.²



The people of Paritutu were placed at great risk to the carcinogenic effects of chemicals produced by Ivon Watkins Dow. Using figures presented in a 2001 Cabinet paper, we can reasonably estimate that 3 to 21 extra cancers would be caused per 1000 residents.²⁷

Vietnamese Sue Dow: The Vietnam Association of Agent Orange/Dioxin Victims estimate that 1,000,000 people have suffered from health effects caused by exposure to 245-T and 24-D. The organization is currently suing Dow and other American chemical companies on behalf of affected Vietnamese. A preliminary ruling on the case will be issued on January 17th of 2005²⁸

TCDD levels found in the blood serum from Paritutu residents in 2004 are compared here with nationwide levels detected in blood serum samples collected by the Ministry for the Environment in 1997.²⁹ In this chart the levels of TCDD in the blood serum of Paritutu residents are backdated to 1997, the same year that blood serum samples were tested by MfE. This estimation is represented by the orange bar. Dioxins are thought to have a “half-life” in people of about seven years.³⁰ This means that, if a person ingests, inhales or otherwise takes in a certain amount of dioxins, he or she will still retain about half of that amount after seven years have passed. By using this dioxin half-life in the human body, we can come to conclusions of a more accurate level of TCDD in residents who have lived in the area for more than 20 years.



How were the residents exposed to Vietnam War levels?

TCDD residues detected in the blood serum of residents from Paritutu who have lived in the area for more than twenty years came from a number of sources including Dow’s trichlorophenol (TCP) plant that operated from 1969 until 1987.

Historically, health officials believed that peak exposure to TCDD occurred from 1964 to 1969.³² Many toxic chemicals which were discharged at varying levels throughout the plants operation, were reduced in 1987 when the TCP plant was closed.

An explosion at the plant in 1972 compounded this exposure. Tonnes of dioxin-enriched process wastes were burnt almost continuously in Dow’s incinerator from 1975 to 1979.¹⁸ An estimated 566,000 litres containing 6 kg of dioxin was burnt, representing a very significant source of dioxin. Dow’s incinerator still operates today.

Dairies from Toxic Lands...

“I noticed the strange pungent odour in the sea air from time to time which disturbed my senses, and then I discovered an effluent outlet – 8-10 inch pipe from which an enormous quantity of coloured fluid was being poured out onto the beach below. The smell from it was intolerable. I was very suspicious about this outflow and so after awhile I stopped going to back beach. However, I noted at the time that people swam in the sea below and adjacent to this outflow. The air was full of the pungent odour most of the time.” – Anonymous resident of Paritutu

Daily Dose of Lethal Dioxins

An expert medical panel on 245-T sprayers in Kimberley, Australia, stated “that the half life of dioxins in human tissues is about 7 years, therefore up to a 16-fold reduction in tissue residues will have occurred since the first possible exposures in 1975.” This information supports residents claims that levels of TCDD detected in the blood serum of residents from Paritutu who lived in the area in the peak exposure period, would represent a mere fraction of levels twenty to forty years ago.³⁴



New Plymouth: Old Elliot Street outflow pipe.

People are also thought to have been exposed to dangerous levels of dioxin by eating local kaimoana or seafood. In 1986, Dow was discharging up to 50,000 litres of dioxin contaminated waste water each day.

Poisoned Oceans

In Paritutu, TCDD levels detected in shellfish are higher than levels of all dioxins found in the St Lawrence River shellfish in Canada which is fed by one of the most contaminated lakes in the world, Lake Michigan.

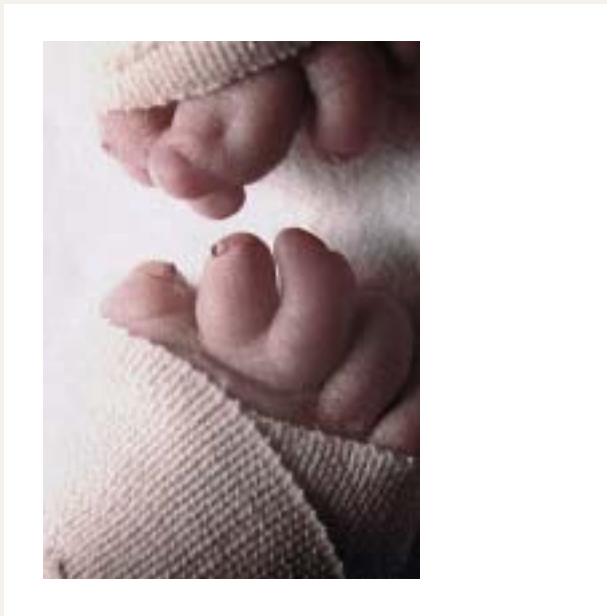
Fingerprints of the Teratogen

Human Health Effects

In Paritutu, non-cancerous symptoms of chemical exposure observed include skin conditions such as chloracne (skin eruptions resembling acne) as well as headaches, dizziness, digestive disorders, aches and pains.³⁵

Other symptoms include disturbances of the nervous system, such as muscular weakness, depression, paralysis and coma, as well as loss of appetite, loss of weight and vomiting.³⁶

Birth defects were also recorded at alarming rates from 1965 to 1972.³⁷ When these trends are compared with peaks in the production of 245-T, the results indicate that trends correlate with quantities of 245-T and possibly 24-D due to their exposure to the quantities of dioxin generated.³⁸



Birth Defects in Paritutu

The increased rates of birth defects in Paritutu were recorded by Westown Maternity Hospital matron, Hyacinth Henderson. She did not observe some of these defects in the previous twenty nine years of her career. Despite raising concerns to the Health Department, the study was not followed with further investigations and has received little acknowledgement.³⁹

This case study of 5,392 live and still births records 167 cases of babies born with major birth defects. Similar defects are seen in babies born to Vietnamese women exposed to Agent Orange.⁴⁰

In Seveso Italy, elevated rates of cardio serebo vascular disorder were noted after a chemical accident in the 1970's. These have also been observed in Paritutu.

Definition of Teratogen:

[Greek, monster-former] external agent such as various chemicals, hyperthermia, radiation, or viruses that causes abnormalities (birth defects) during development.



Dow knew...

In 1965 Bionetics Research Laboratory in the US reported that 245-T and possibly 24-D were teratogens or toxins that caused congenital deformities.⁴¹ This report was suppressed until 1969.

In a 1965, a memo from Ivon Watkins Dow's parent company, the Dow Chemical Company, states in reference to dioxin: "This material is exceptionally toxic. It has tremendous potential for producing chloracne and systemic injury."⁴²

That same year another Dow document dated March 10, 1965 states: "This material presents a definite hazard which would require all the precautions...to prevent injury..." and "In my opinion their products should not be sold until animal tests show these products to be free of a significant hazard from the [dioxin] related materials."⁴³

Diaries from Toxic Lands...

In February 1975 four children and myself shifted into Marama Crescent, Paritutu until August 1985. Our house and section was only 50 metres from the Dow Chemical boundary. Prior to shifting there, myself and children were in the very best of health. Over the period of time we had to put up with a permanent smell plus smoke pollution coming from the plant. After a couple of years, I gave up gardening as nothing seemed to grow properly in the soil. Over a period of years we have all suffered a lot of sickness.

Daughter 1 – now aged 40: Has ME, anaemia and chronic fatigue. She has been very unwell for the past 15 years and still under treatment.

Son 1 – 38: Had persistent migraine headaches, which only subsided when we left Paritutu. He is on the urgent waiting list for a face and nose operation.

Daughter 2 – 36: In 1994 had a cervical cancer operation in Auckland Hospital. The past 7 years being treated for arrhythmic heart condition, plus bad anaemia.

Daughter 3 – 34: Had bone cancer operations in both feet, 6 years ago had cervical cancer operation. She used to run around their backyard barefoot all the time.

Myself 64: I have serious arrhythmic heart condition, glaucoma in both eyes, chronic asthma, anaemia and had an operation to remove cancer from my face. I also worked less than 1 kilometre from the Dow Plant from 1954 to 1989 until my health was so bad I was forced on to an invalid's benefit.

I feel devastated about myself and family's health and I will feel bitter and angry if it is proved that it was the chemical plant that has been the cause of our health problems.

- Anonymous resident of Paritutu

Birth Defects in Vietnam

Babies born to Vietnamese women exposed to 245-T and 24-D have recorded the same kinds of birth defects as those seen in Paritutu.⁴⁴ Recent reports estimate that some 174,000 Vietnamese children suffer from the intergenerational effects of Agent Orange.⁴⁵

Other reports on the use and effects of Agent Orange in Vietnam cite increases in birth defects, miscarriages, still births and premature births.⁴⁶

Vietnamese women have experienced significant increases in cases of anencephaly (no brain), hydrocephaly (water on the brain), cleft palate, club foot and spina bifida. To this day, one million people live with the horrific reality of what can only be described as a chemical holocaust.⁴⁷

Playing around with the software of Life

Some dioxins, notably TCDD, may cause damage by mimicking or blocking steroid hormones that affect growth and sex, in particular, the female sex hormone oestrogen and the male sex hormone testosterone.

Dioxin attaches or binds to cell proteins called the AH receptor, a kind of cellular doorway found virtually in all cells in the body. The receptors and the hormone have an intricate and precise fit, like a lock and key. If a dioxin which can mimic hormones binds onto the cell receptor, it can have devastating effects on the developing reproductive system of the foetus.⁴⁸



Diaries from Toxic Lands...

"I was born in 1954 and lived in Simons Street in Paritutu until August 1971 when I left at age 17. I have often wondered about IWD and the effect it may have had on us as a family of seven. I remember vividly the foam that we thought came from the effluent pipe at Back Beach, how it floated over our house and landed on the lawn and killed it off in patches that upset my father. He would say, "The wind's turned westerly. Shut the windows!" This was to try to keep the stench out of the house.

The fight became personal when I learned that it wasn't only the number of Multiple Sclerosis cases in the neighbourhood that was a concern, but also cervical cancer. In 1993, when the youngest of my five children was only three months old, I was diagnosed with CIN3, which is the last stage of abnormal cervical cells before cancer. I had breast lumps removed at the age of 23.

My sister who also lived on Simon Street until she married, died of liver cancer at the age of 36. She didn't have a drinking problem. They also found cancer in her pancreas. She had given birth to her first baby, a girl, in 1969 who was so deformed the doctors refused to show her the baby. My mother died of kidney cancer in 1991, aged 69."-Anonymous resident of Paritutu

The Stolen Generation

The arrival of Dow to Paritutu has followed with one of the longest toxic chemical related campaigns for environmental justice and human rights in Aotearoa's history. For over 30 years, local people have stoically campaigned to gain recognition that this American company and their products poisoned the people of Paritutu.

In 1972, the NZ Agricultural Chemical Boards ordered Dow to reduce the level of dioxins in their products, and according to testimonies from a former Dow manager, that level was reduced up to twenty times its original level.⁴⁹ By 1985, it had reduced another 200 times lower than 1972 levels.

The intervention however would prove too little to late for the people of Aotearoa who were already exposed to Vietnam levels of dioxins.

Diaries from Toxic Lands...

"In 1966, I miscarried twins at 4 months. The foetuses of which were malformed. At the age of 40 years my son (husband and father with three small children), was diagnosed with leukemia. He has had to undergo chemotherapy and other associated treatment under the care of the hospital"—Anonymous resident of Paritutu.

Food Chain Contamination

During and before the Vietnam War period, Dow was also marketing highly contaminated 245-T and 24-D to farmers, New Zealand Railways, gardeners and foresters throughout Aotearoa under various brands such as the lethal Scrub Desiccant TD.⁵⁰

‘When you spray your pastures with Weedone 57... you get rid of wasteful weeds, increase carrying capacity, and give stock more feed per acre,’ ran one of Dow’s advertisements at the time.⁵¹



© Dioxin Investigation Network

Popular products used for spraying gorse and other weeds included Weedone 245-T, Tordon 520 Brushkiller. Sprayers using backpacks were contaminated due to the lack of protective gear and spillage from backpacks was common.⁵²



In 1970-1, New Zealand taxpayers spent \$4,022,000 on herbicide and pesticides in government subsidies.⁵³ In 1970 alone we sprayed 21,661,033 litres of herbicides and pesticides were sprayed from aeroplanes and helicopters. In 1971, 29,145,280 litres were applied using the same methods.⁵⁴ By 1985, use had increased up to 53,795,834 litres. With the removal of government subsidies in 1986, use fell to 29,044,437 litres.⁵⁵

The New Zealand Government subsidised 116 products that included varying mixes of 245-T and 24-D. Production and use boomed under this scheme.⁵⁶

The herbicides were sprayed from horses, trucks, tractors, backpack sprayers, helicopters and planes. In fact, they were sprayed so extensively that their use led to the widespread dispersal of dioxins in the environment, and subsequently, our food chain.

The result was the poisoning of the people of Aotearoa.

Cancer Causing Agents found in our Bodies

The chemical fingerprints associated with the use of 245-T and possibly 24-D not only dominate the dioxin residues found in the blood serum of historical residents who lived in Paritutu but they also dominate the blood serum of people nationwide.

In 1997, the Ministry for Environment collected blood serum samples from people throughout the country. The samples were analysed to determine the levels of different kinds of dioxins found in New Zealanders.⁵⁷

The results illustrated that the dioxins 2378-TCDD and 12378-PeCDD, (fingerprints of 245-T and probably 24-D) are detected at significant levels compared to other dioxins nationally.

How were we exposed to food chain contamination?

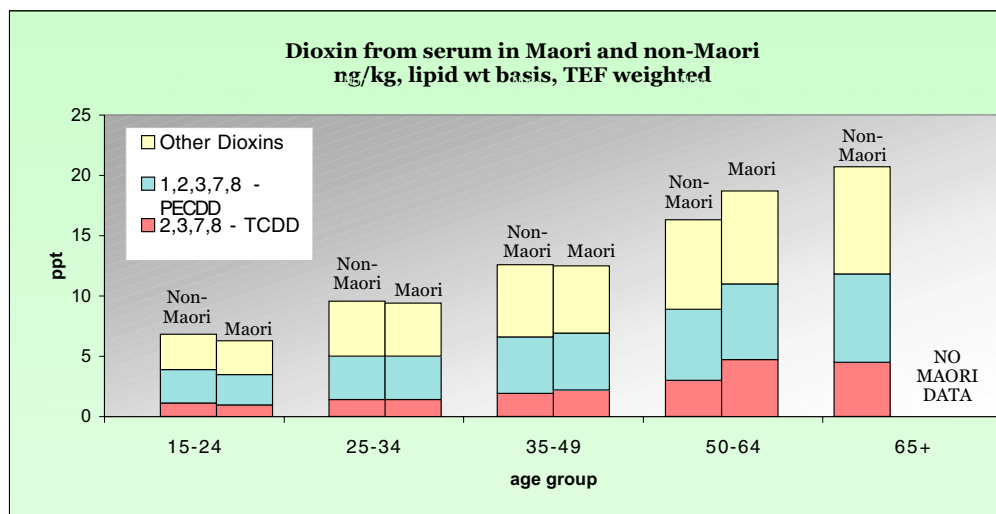
People were exposed to the chemicals through dietary means. For instance, cattle and sheep ate grass that was contaminated with dioxins. People ate the meat, milk, cheese and cooked with the animal fat.

The more a person consumed foods contaminated by Dow’s dioxins, the larger the amount of dioxin built up in their body. For the general population (not the residents of Paritutu) the Ministry for the Environment estimate that 90% of dioxins that accumulate in our bodies originate from the foods we eat.⁵⁸

Our ‘War on Weeds’

Company literature from Dow features an all-conquering ‘Colonel Grenade’ vowing to fight weed invasion. Colonel Grenade leaps into action, launching a spray assault of deadly 24-D pesticide to aid our war on weeds.

245-T and 24-D were sprayed to clear native trees, scrub and introduced weeds to hasten productivity on agricultural farmland. As defoliants, they were used in much the same way by the Forest Service New Zealand to bolster our emerging pine industry.



Although a nationwide survey was proposed in 1986, tests were not carried out until 1997. These charts illustrate that the congeners 2378 TCDD and 12378 PeCDD account for over 50% of the chemical residues found in our bodies (TEF).⁵⁹



During the 1950s, '60s, and '70s, the New Zealand diet was high in dairy and meats fats produced on pastures contaminated by 245-T and 24-D. Dioxins track through fats and silts until they are up-taken by humans and other mammals like the Hector's Dolphin who are at the top of the food chain.

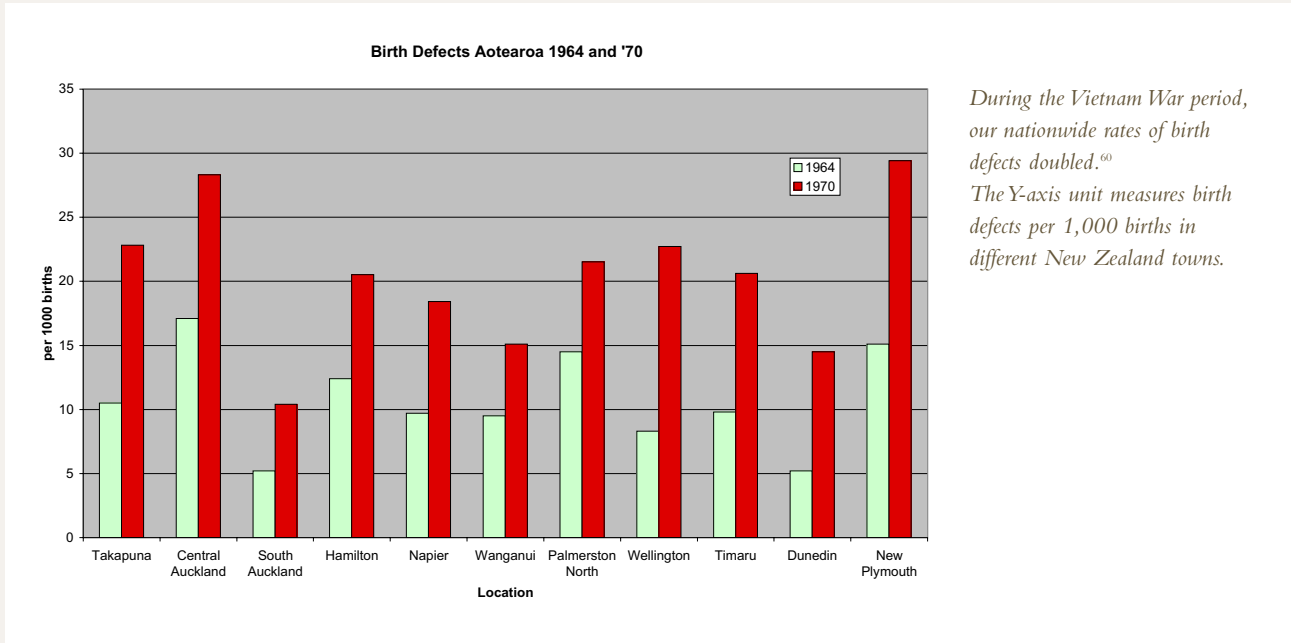


Widespread land and pasture contamination was compounded by the heavy spraying of pre-forestry blocks to clear vegetation. The subsequent burn offs prior to planting would have produced an additional burden of dioxin which went into the environment and tracked its way through the food chain. Some of the smoke trains from these burn offs in the 1950s were recorded up to 30,000 feet. Fly ash from the forestry block burn offs could travel on the winds over vast tracks of land and nearby waterways.

Another area not closely looked at is the contamination of railway ballast lines that pass through pastoral land, cities and towns. Literally thousands of tonnes of defoliants/weedkillers were sprayed from railway tankers over decades to kill blackberry, gorse, woolly nightshade and other weeds that commonly grow on railway lines. The spraying tankers were not turned off each time they went across a bridge crossing streams and rivers and would have polluted life downstream including kaimoana.



The Killing Fields of Dioxin



*During the Vietnam War period, our nationwide rates of birth defects doubled.⁶⁰
The Y-axis unit measures birth defects per 1,000 births in different New Zealand towns.*

Food Chain Exposure to Dioxins

In 1988, tests conducted as part of a global study by the World Health Organization confirmed that women from Aotearoa had TCDD levels second only to South Vietnam, and double the TCDD levels of Australian mothers.⁶¹

The levels of TCDD and PeCDD found in this nationwide study contribute to a growing body of evidence that indicates that we have underestimated the impacts of 245-T and 24-D exposure on children born in the 1950s and 1960s and adults also exposed during this period.⁶²

The data indicates that food chain contamination resulting from the use of the dioxins in 245-T and 24-D may have contributed to the doubling of birth defects recorded from 1964 to 1970.

While tests for levels of dioxins were not conducted on infants in Aotearoa during this time period, scientific research shows that levels in breast fed babies may be ten to a hundred times greater than their mothers.⁶³

Contamination of Breast-fed Children

The spraying of Agent Orange in Vietnam presents a very interesting comparison for Aotearoa, namely because both countries were exposed to heavily contaminated 245-T and 24-D during a comparable time period.⁶⁶

In both countries, levels of TCDD in breast milk have decreased since the 1970s. This 'drop-off' is due to dioxins passing from mother to child and reduced exposure.

When spraying of Agent Orange ceased in 1972, a dramatic decline was seen in TCDD residues found in the breast milk of South Vietnamese women. A similar decrease is likely to have occurred in women from Aotearoa where at least 85% of TCDD in 245-T sprayed on pastures was produced prior to 1972.⁶⁷

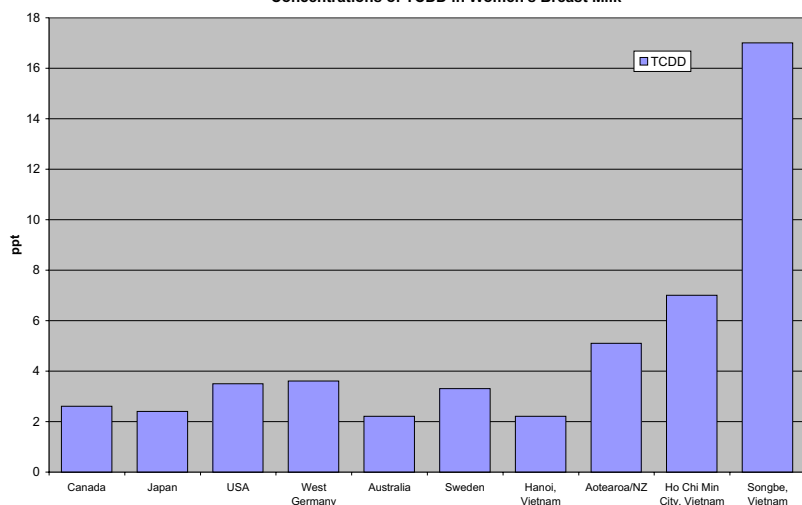


A study of 200 babies born to women in Holland with high levels of dioxins in their breast milk and umbilical cord found a variety of dysfunctions in the babies' muscles, reflex and thyroids.⁶⁴

Thus, by using the Vietnam model, TCDD levels detected in nationwide breast milk tests in 1988 and 1998 do not represent peak exposure that had occurred decades earlier.

The unanswered question remains, "What were the levels of dioxin that breast fed children were exposed to in the 1950s, '60s and '70s."

Concentrations of TCDD in Women's Breast Milk



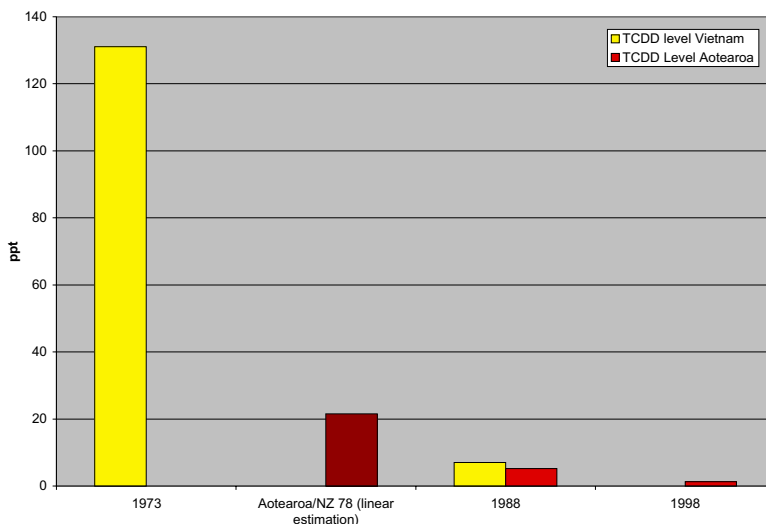
Residents from Paritutu and IWD workers are not the only ones who have had children born with defects. Evidence is now emerging from ex-employees of Forestry Corp NZ and Iwi such as Ngati Manawa who were exposed to 245-T and 24-D spraying that occurred throughout the Kaingaroa Ranges. A Ngati Manawa papakainga, or village, is reported to have also experienced incidences in miscarriages and birth defects similar to those observed in Paritutu and Vietnam such as cleft palate and club foot.

Diaries from Toxic Lands...

I lived in the Paritutu area of New Plymouth from 1974 to 1993, on Marama Crescent very close to the edge of IWD. In 1979 I was diagnosed with multiple sclerosis (MS) and have been in a wheel chair for seven years. I also developed cancer of the thymus, which is very rare in New Zealand. While I lived around IWD there was always a terrible smell and on these days I would try not to hang my laundry outside or else my clean bedding would smell. There was a very definite taint in the air. I spent the majority of my time at home looking after my family and children. My daughter was three years old when we moved to Paritutu. We lived there through all of her adolescence. Recently, my daughter has had half of her uterus removed due to cancer which came on very suddenly. There are a lot of other people in the area who have MS and no one knows how they have gotten it. You just need to look around out there, if there is something there, I want them to find it. I want them to do something about it, clean up their act and acknowledge that the people who were there have suffered and are still suffering.
- Anonymous resident of Paritutu

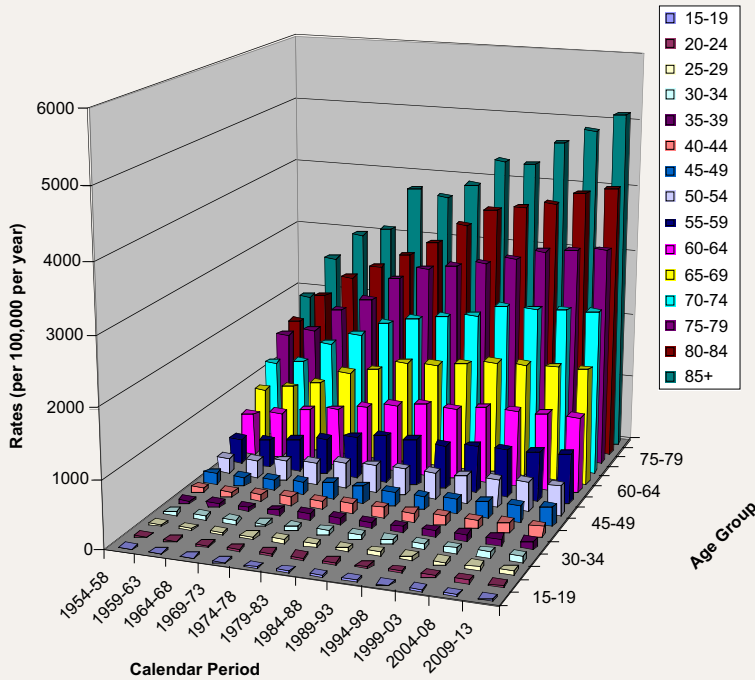
Drop off in TCDD Level in Breast Milk in Aotearoa and Vietnam

This chart shows that by 1998, the levels of TCDD in breast milk from women in Aotearoa had fallen to less than one quarter of the amounts found in 1988. A report to the Health Department in 1990, notes that mothers born in 1958 had much higher levels of TCDD than mothers born in 1968. This is attributed to the sharp decline of quantities of TCDD in 245-T product after 1972. The same decrease occurred in 12378-PeCDD which was not in 245-T but could well be explained by its presence in 24-D. Given that at least 85% of TCDD was produced before 1972, residues detected in 1988 do not represent peak levels.



Life for Future Generations

**Registered Cases of All NZ Adult Cancer
(1954-1998; predicted 1999-2013)**



Thirty to forty years since the worst recorded birth defects recorded in Paritutu and nationwide, there is a national upward trend in cancers among adults who are fifty years and older. While adults under fifty are experiencing a downward trend, adults over fifty are experiencing an upward trend in cases of cancer.⁷⁸

People Poisoned Daily

In Aotearoa, dioxins from the Dow Chemical Company have polluted the tissues of virtually every man, women, child and animal throughout the country. While the levels of TCDD have significantly decreased since their reduction in 245-T, dioxins from 24-D continue to dominate the fingerprint chemicals found in humans.

A growing body of evidence suggests that we may have underestimated the long-term effects of food chain exposure to dioxins.

Dioxins can disrupt the internal workings of our bodies by altering hormone levels, causing birth defects and infertility, impairing mental function in children, causing cancer and decreasing resistance to diseases by suppressing the immune system.

Independent epidemiological research is needed in Aotearoa in order to analyse the long-term effects and intergenerational gene damage caused by of our collective exposure to dioxins. This research should occur in consultation and cooperation with key stakeholder groups including those directly exposed to highly contaminated 245-T and 24-D in the 1950s to 1970s.⁶⁸

Common Cancers Connected to Dioxin Exposure?
Epidemiological studies indicate that exposure to larger amounts of dioxin can result in four types of cancer: chronic lymphocytic leukemia, soft tissue sarcoma, non-Hodgkin's lymphoma and Hodgkin's disease. Chloracne (a skin eruption resembling acne) can result from exposure to as little as one-billionth of an ounce of dioxin.⁷⁰

Cancer

Overall, current Government figures estimate that the 'upper-bound lifetime risk for background intakes of dioxin-like compounds for the New Zealand population may exceed 1 to 7 additional cancers per 1000 individuals.'

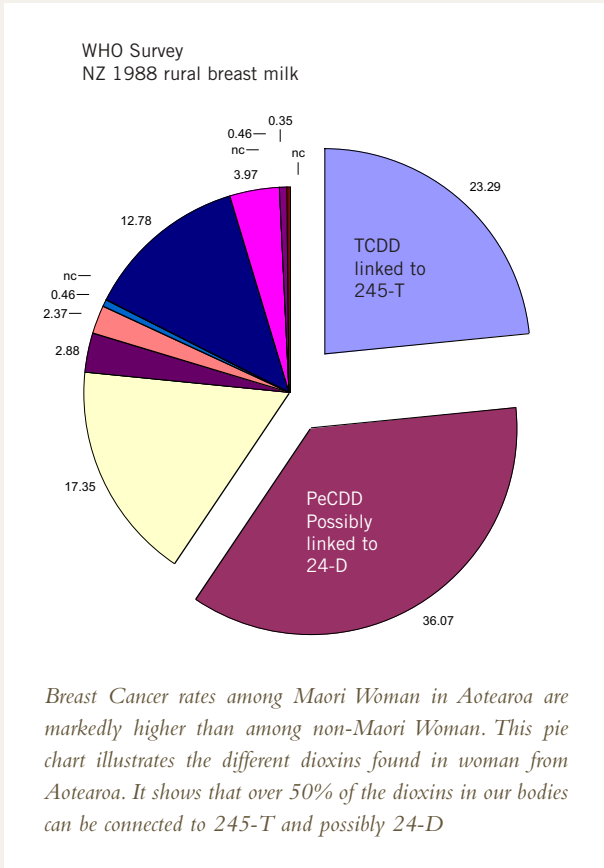
This cancer risk estimate is 100 times higher than the value of 1 in 100,000 often used in New Zealand to regulate carcinogenic exposure from environmental sources. However, cancer estimates are not based on peak exposure at the time period when the risk caused by dioxin exposure was plausibly ten times higher than today.⁶⁹

Only recently have researchers shown that populations exposed to dioxin spewed into the air and onto the land and waters from industrial releases are likely to suffer from a variety of cancers. Like other clinical symptoms, cancer caused from exposure to these chemicals can take up to thirty years to surface.



Breast Cancer

Women in Aotearoa die from breast cancer at a rate that is second highest among women in OECD countries.⁷¹ Breast cancer accounts for around 25% of all cancer registrations and 20% of all cancer related deaths in Aotearoa.⁷² Maori women suffer from particularly higher rates than non-Maori women.⁷³



Epidemiological Research

Endometriosis

Evidence from animal and human studies indicate that dioxin causes endometriosis due to its ability to disrupt immune and endocrine system function. Dioxin body burdens among women from the 1950s to the 1970s in Aotearoa were 2 to 20 times higher than the levels associated with endometriosis in laboratory tests.⁷⁵

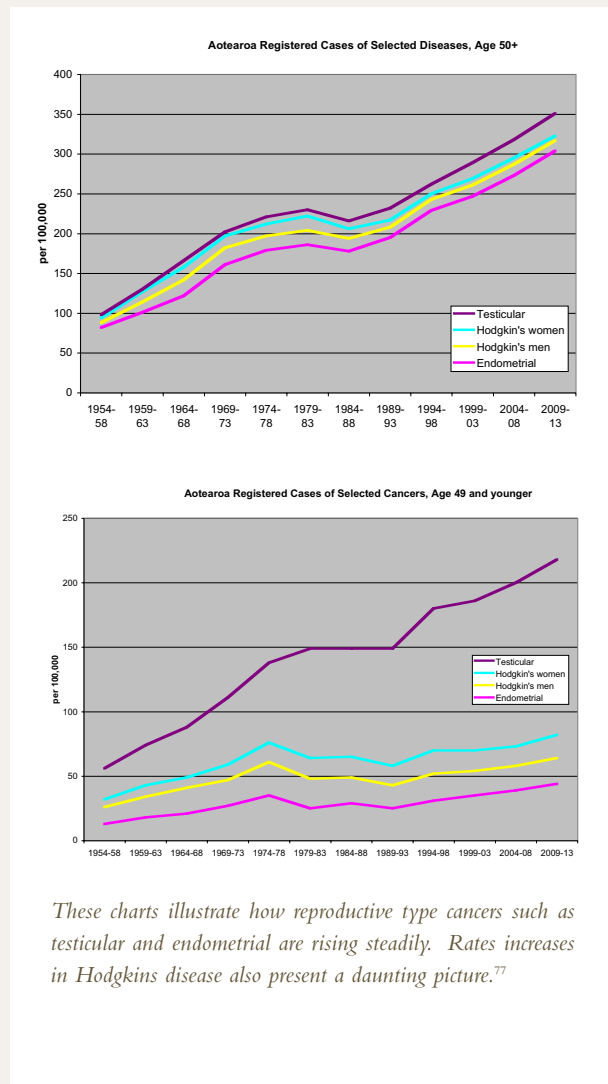
Endometriosis is one of the leading causes of infertility in women over the age of 25, and it is believed that approximately 30-40% of infertile women have some degrees of endometriosis.

Endometriosis is a chronic condition, the origin of which currently remains obscure. It is a common gynaecological condition affecting as many as 10% of women of reproductive age. 3% of women diagnosed with endometriosis experience marked pain.

Infertility

Over the past 30 to 50 years, disorders of the male and female reproductive organs have become increasingly common, and infertility appears to be on the rise.

International studies have shown that infertile women were 27 times more likely to have mixed or applied herbicides in the two years prior to attempting conception than women who were fertile.⁷⁶



Abbreviations & Glossary

Aldrin	An organochlorine pesticide.
Aotearoa	New Zealand.
Body burden	The amount of a contaminant stored in a person's body.
Chlordane	An organochlorine pesticide.
Chlorophenols	A family of chlorinated phenolic compounds that includes trichlorophenols, tetrachlorophenols and PCP.
DDT	Dichlorodiphenyltrichloroethane. An organochlorine pesticide.
Daily intake	The amount of a contaminant taken in by a person each day.
DSIR	Department of Scientific and Industrial Research
Dieldrin	An organochlorine pesticide.
Dioxins	A family of closely related chemicals that includes the polychlorinated dipenzo-p-dioxins and the polychlorinated dibenzofurans.
Food chain	The food web of living organisms.
Heptachlor	An organochlorine pesticide.
IARC	International Agency for Research on Cancer.
IWD	Ivon Watkins Dow
Lindane	An organochlorine pesticide.
Organochlorine	A chemical that contains carbon and chlorine atoms.
Organochlorine Pesticides	A family of chlorinated chemicals used for killing insects and weeds. This family includes Aldrin, chlordane, DDT, dieldrin, HCB, heptachlor, lindane, pentachlorophenol, trichlorophenol and dichlorophenol.
PCBs	A family of chemicals known as the polychlorinated biphenyls.
PCDD	Polychlorinated dibenzodioxin
PCP	Pentachlorophenol. An organochlorine pesticide that belongs to the family of chlorophenol chemicals.
PeCDD	Pentachlorodibenzodioxin.
POPs	Persistent organic pollutants. Chemicals that take a long time to break down, can be transported long distances in the atmosphere, and accumulate and concentrate through the food chain.
Serum	A component of blood that separates from coagulated blood.
TEF	Toxic Equivalency Factor.
TEQ	Toxic equivalents. Used to report levels of dioxins and PCBs.
TCDD	Tetrachlorodibenzodioxin.
Whakapapa	Family tree. Genealogy.
2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
ug kg-1	Micrograms per kilogram. Equivalent to 1X10 ⁻⁹ of a kilogram. Also known as parts-per-billion (ppb).
Ng kg-1	Nanograms per kilogram. Equivalent to 1X10 ⁻¹² of a kilogram. Also known as parts-per-trillion (ppt).

Footnotes

- 1 Le Cao Dai, 1999
- 2 Ibid
- 3 Ibid
- 4 Coster et al, 1986
- 5 Ministry for the Environment, 2001
- 6 Gibbs, Andrew, 2004
- 7 Ivon Watkins Dow, 1984
- 8 Ministry for the Environment, 2001
- 9 Coster et al, 1986 p. 26
- 10 Ibid; Wratislav A, 2001 p.2. Arnold Wratislav was a chemist (now deceased) and former Division Manager for Dow
- 11 1985 EPA statement Greenpeace
- 12 Coster et al, 1986; Wratislav A, 2001
- 13 Ibid
- 14 Pre 1972 batches of 2,4-D or 2,4,5-T have yet to be tested by the government for TCDD, PeCDD or other dioxins.
- 15 Ministry for the Environment, 2001.
- 16 Ibid.
- 17 Schecter A, Papke O, Pawuk M et al, 2003;
- 18 Ibid.
- 19 Buckland SJ, Bates MN, Garrett N, et al. 2001
- 20 Le Cao Dai, 1999.
- 21 Ivon Watkins Dow, Life and Times of Paritutu, 1967
- 22 Pilgrim, RC. 1986.
- 23 Baker V, Fowles J, Phillips D, Garret N, et al. 2004.
- 24 Ibid. The highest level of TCDD detected in this blood serum study was 33ppt.
- 25 O'Connor P 2001.
- 26 Taranaki Regional Council. 2001.
- 27 Cabinet paper, 2001.
- 28 Earth Crash, 2004
- 29 Buckland SJ, Bates MN, Garrett N, et al. 2001
- 30 Ministry for the Environment, 2001.
- 31 Baker, Fowles et al, 2004; Ministry for the Environment, 2001.
- 32 Pilgrim RC, 1986.
- 33 Pilgrim RC, 1986.
- 35 Greenpeace Aotearoa, 2001.
- 36 Ibid
- 37 O'Connor P 2001.
- 38 Severe birth defects recorded included anencephaly, hydrocephaly, cleft palate and spina bifida.
- 39 Hyacinth Henderson presented the findings of her study to the Health Department but was ignored.
- 40 Le Cao Dai, 1999.
- 41 Dow Chemical Company, Internal Memo, 1965. This document emerged during a 1984 lawsuit filed by the Vietnam Veterans of America.
- 42 Ibid
- 43 Dow Chemical Company, Internal Memo, March 10 1965. This document emerged during a 1984 lawsuit filed by the Vietnam Veterans of America.
- 44 Le Cao Dai 1999.
- 45 Ibid.
- 46 Ibid.
- 47 This figure is quoted in numerous media literature. See Vietnam Association for Agent Orange/Dioxin Victims Fund.
- 48 Greenpeace International. 1995.
- 49 Wratislav A, 2001
- 50 Ivon Watkins Dow, Technical Bulletin, no. 220 p1975
- 51 Mathews LJ, 1975
- 52 Ibid
- 53 New Zealand Official Yearbook 1972, p.390
- 54 Ibid, p.327
- 55 New Zealand Official Yearbook 1988-89, p.656
- 56 Ivon Watkins Dow, 1969.
- 57 Buckland SJ, Bates MN, Garrett N, et al. 2001
- 58 Ibid.
- 59 Ibid
- 60 Health Department. Press release quoted in the Evening Post/Dominion, 11 January, 1973. Presented by Dioxin Investigation Network.
- 61 Le Cao Dai, 1999, p.17-18
- 62 Ministry for the Environment, 2001.
- 63 World Health Organization, 1998
- 64 Greenpeace International, 1995.
- 65 Anderson R, Telephone Conversation with Greenpeace.
- 66 US Defense Forces sprayed Vietnam with Agent Orange from 1961 to 1972. This compares with peak levels of 245-T manufacture in Aotearoa. Le Cao Dai, 1999; Coster et al, 1986.
- 67 This statement is based on figures presented in Coster et al, 1986
- 68 This research is yet to be conducted in Aotearoa. Previous studies have failed to address nationwide exposure that occurred due to the use of heavily contaminated 245-T and 24-D.
- 69 Ministry for the Environment, 2001.
- 70 Ferguson, L., 2002 in Mutation Research 506-407: 215-224.
- 71 Szeto, K., Devlin, K., 1996 in Health Policy 38: 101-115.
- 72 Ferguson, L., 2002 in Mutation Research 506-407: 215-224.
- 75 Rier, S and WG Foster. 2002 in Toxicological Sciences 70:161-170
- 76 Greenlee, AR, TE Arbuckle and P-H Chyou, 2003 in Epidemiology 14:429-436.
- 77 Ministry of Health, 2002.

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www.greenpeace.org.nz/report

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Greenpeace New Zealand Aotearoa
Private Bag 92507, Wellesley Street, Auckland, New Zealand.