

Before the New Plymouth District Council

Independent Hearing Commissioners

PPC18/00048

Under the Resource Management Act 1991 (**RMA**)

In the matter of an application by Oakura Farm Park Limited to vary or cancel Condition 4 of Consent Notice Instrument No. 9696907.4 on Lot 29 DP 497629

And

In the matter of Proposed Private Plan Change 48 to the New Plymouth District Plan requested by Oakura Farm Park Limited for the proposed rezoning of land at Wairau Road, Oākura

Statement of Evidence of Richard Martin Rollins

(Pesticides in Water and Potential Health Effects on Children)

on behalf of:

Richard Rollins, Matthew Peacock; Richard Shearer; Steven Looney; and
Wayne Looker

25 June 2019

- 1) Introduction – My name is Richard Martin Rollins. I am a consultant environmental engineer. This environmental engineering evidence is filed in support of my original submission and in support of submissions by Matthew Peacock, Richard Shearer, Steven Looney, Wayne Looker and other submitter's supporting them (Submitters). I have the following qualifications and experience which are relevant to this matter.
- 2) Qualifications-
 - a) New Zealand Chartered Professional Engineer (CPEng no. 1017824, specialising in wastewater, storm water, and water quality) since 2018.
 - b) Registered Professional Civil Engineer in California, USA (PE no. C 44162) since 1989.
 - c) Board Certified Water Quality Engineer, American Academy of Environmental Engineers and Scientists (AAEES Certificate 91-10004, Water Supply and Wastewater Specialty) since 1991.
 - d) M.S., Civil Environmental Engineering, Stanford University, Palo Alto, California, USA, 1982.
 - e) B.A., Biology, Colorado College, Colorado Springs, Colorado, USA, 1978.
- 3) Applicable Experience
 - a) WSP Opus, New Plymouth, 2014 to present – Complete water quality projects ranging from sampling runoff at an illegal dumpsite and submitting evidence to the Environment Court, to consulting with and secondment to Councils as Acting Trade Waste Officer.
 - b) Worley Parsons, New Plymouth, 2012 to 2014 – Designed stormwater treatment devices to minimize water and ground contamination while meeting maintenance requirements of a hydrocarbon production wellsite and Regional Council Consent.
 - c) WaterCare Services, Auckland, 2009 to 2012 – Provided guidance for Watercare Compliance Advisors in Auckland on enforcement issues such as setting discharge

limits for toxic pollutants in consents for industrial dischargers including pesticide manufacturers.

- d) HOH Corporation, Menlo Park, California, 1995 to 2009 – Audited pharmaceutical, chemical, and port facilities to determine compliance with California State and US Federal environmental, health, and safety requirements. Testified in US Federal District Court (San Diego) on water quality issues.
 - e) Syntex (USA) Inc., Palo Alto, California, 1987 to 1995 – Designed or consulted on storm drainage modifications and wastewater treatment facilities for pharmaceutical and chemical facilities in the US, Puerto Rico, Mexico, Bahamas, Canada, and Ireland. Worked in the environmental health and safety group responsible for cleaning up widespread dioxin contamination in Missouri and defending the company against lawsuits.
- 2) Expert Witness Code of Conduct – I confirm that I have read the Code of Conduct for expert witnesses contained in the 2014 Environment Court Practice Note and that I agree to comply with it. I confirm I have considered all the material facts that I am aware of that might alter or detract from the opinions I express. In particular, unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.
- 3) Definitions
- a) Pesticides – Pesticide is a term which covers a wide variety of different chemicals which are intended to prevent harm from, control, or destroy pest organisms. As a class of compounds, pesticides include herbicides, insecticides, rodenticides, fungicides, and molluscicides (snail bait). All of these classes of chemicals have different properties but many have toxic effects on humans as noted in **Table 2** below.
 - b) Wairau Catchment – The Wairau Catchment is the area of land (558 hectares) that drains toward the Wairau Stream. The source of the Wairau Stream lies in the

Kaitake Range approximately 3.5 km inside the Egmont National Park boundary. The distance along the main stream from the source to the Tasman Sea is roughly 6.9 km. Several tributaries contribute flow from the various parts of the catchment. The Wairau Stream and catchment may be unique in Taranaki because such a large fraction of it lies within the boundaries of Egmont National Park.

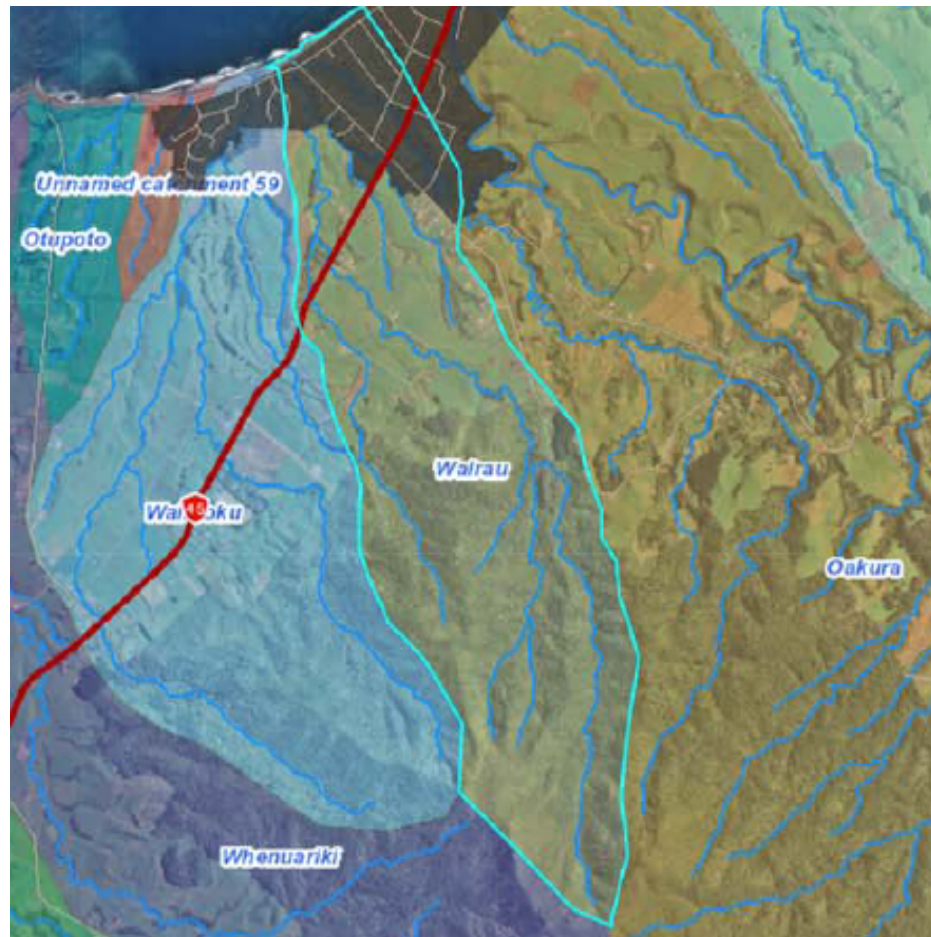


Figure 1: Wairau Catchment south of Oakura Beach (Source: TRC LocalMaps web page <https://maps.trc.govt.nz/LocalMapsViewer>, 12 June 2019)

- c) Wairau Lagoon – Pond, meander, lagoon, or channel are some of the many possible terms for the body of water formed by the Wairau Stream flowing across Oakura Beach into the Tasman Sea. At the mouth of the Wairau, the outlet changes shape throughout the year depending on the forces of wind, currents, waves, and tides on the sandy beach in the vicinity of the stream. NPDC channelises the stream across

the beach from time to time to minimize the potential under-cutting of roads or property near the beach.

To avoid confusion, this evidence will use the term “Wairau Lagoon” to refer to the outlet of Wairau Stream across Oakura Beach without regard to the changing morphology. The increasing concentrations of pesticides in the stream water would have the same impact on children in a free flowing channel, a pond, or a meandering lagoon.



Figure 2 – Wairau Lagoon Meandering across Oakura Beach (Google Map image 2019)

4) This evidence is particularly focused on the potential harm from pesticides in the water to children using the Wairau Lagoon for swimming, wading, or sitting in the relatively calm fresh water. It should be noted that a whole suite of other pollutants such as nutrients from fertiliser, suspended sediment from soil disturbed by construction and domestic gardening activities, and hydrocarbons from motor vehicles and motorised gardening tools would also be expected to cause adverse water quality effects on the stream. These effects would be expected to include excessive algal growth from increased nutrients, die-offs of aquatic insects (food for fish) from exposure to hydrocarbons, or oxygen depletion which is toxic to fish and eels. Since this evidence is focused on pesticides, I leave it for others to further elaborate the likely adverse effects of these pollutants on the aquatic ecosystem of Wairau Stream.

5) Children and Wairau Lagoon

a) Children and their parents have been using the lagoon formed by the Wairau Stream on Oakura Beach for decades. Rather than being evenly distributed along the entire length of Oakura beach, I have noticed that families often congregate in the area near the swim zone (between the flags), usually in front of the local surf life saving club. The Wairau Stream channel is less than 50 metres away from the surf life saving club. Children often swim in the Wairau Stream because, for example, the waves at the shore are too turbulent for the children or because the sea is too cold. The ability of children to enjoy water at the beach while being sheltered from surf would also be one of the many reasons that Oakura Beach is a tourist destination. (Thanks to the parents who permitted these photos to be used in this evidence.)



Figure 1 – Sediment Sampling in Wairau Lagoon at Oakura Beach



Figure 2 – Child Playing in Wairau Lagoon



Figure 3 – Child playing in Wairau Lagoon



Figure 4 – Children and Adults Wading in Wairau Lagoon



Figure 5 – Child Playing in Wairau Lagoon



Figure 6 – Children and Adults Wading and Crawling in Wairau Lagoon

b) Children are known to be much more susceptible to toxic effects of pesticides than adults. In the interest of brevity, I have not listed all the reasons within the scope of this evidence, but most water quality limits are based on exposure calculations for adults.

Table 1:
Pesticides &
Childhood Health
Harms

		Childhood Health Harms*					
		Brain & nervous system impacts	Childhood cancers	Birth defects	Reproductive & developmental harms	Metabolic effects (e.g., obesity, diabetes)	Immune disorders, asthma
Pesticides	Herbicides 442 million lbs [†] e.g., atrazine, glyphosate, 2,4-D	✓	✓	✓	✓		✓
	Insecticides 65 million lbs e.g., chlorpyrifos, malathion, permethrin	✓	✓		✓	✓	✓
	Fungicides 44 million lbs e.g., mancozeb, chlorothalonil	✓	✓	✓	✓		✓
	Fumigants 108 million lbs e.g., metam sodium, methyl bromide, chloropicrin	✓	✓		✓		

Researchers have linked exposure to various pesticides with a range of childhood health harms. A ✓ indicates that links to the health harm are particularly well supported by scientific evidence.

* See Appendix A and www.pesticideinfo.org

† 2007 use estimates, refers to "active ingredient." From *Pesticide Industry Sales & Usage, 2006 and 2007 Market Estimates*, U.S. EPA, Washington, DC, Feb 2011. See www.epa.gov/opp00001/pestsales/07pestsales/market_estimates2007.pdf. Table 3.4.

Table 1 – Pesticides and Childhood Health Harms from Kristin S. Schafer, MA, Emily C. Marquez, PhD, A Generation in Jeopardy, Pesticide Action Network North America, October 2012.

Table 1 illustrates some of the established associations between different health harms and exposure to pesticides in children. Specific conditions associated with low level chronic pesticide exposure in children are leukemia, brain tumors, attention deficit – hyperactivity disorders, limb and neural tube birth defects, endocrine disruption, and increased respiratory health issues such as asthma. (Pesticide Exposure in Children, James R. Roberts, MD, MPH, Catherine J. Karr, MD, PhD, and COUNCIL ON ENVIRONMENTAL HEALTH, *Pediatrics*, 2012 December ; 130(6): e1765–e1788).

- 6) Currently, the Wairau Stream catchment starts well within the National Park boundary, then flows through relatively undeveloped grazing land. Proposed rezoning would allow urbanisation of the catchment which is likely to raise concentration of pesticides in the stream as indicated in **Figure 7** below.

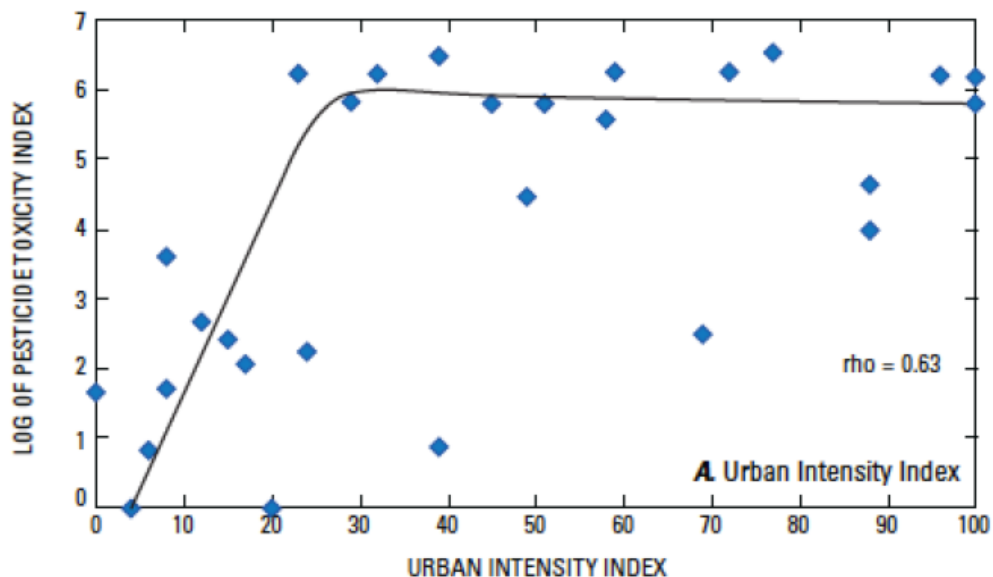


Figure 7 – Relation of Urbanisation to Stream Pesticide Toxicity in Willamette Valley Oregon (Source: Waite, I.R., Sobieszczyk, Steven, Carpenter, K.D., Arnsberg, A.J., Johnson, H.M., Hughes, C.A., Sarantou,

M.J., and Rinella, F.A., 2008, Effects of urbanization on stream ecosystems in the Willamette River basin and surrounding area, Oregon and Washington: U.S. Geological Survey Scientific Investigations Report 2006-5101-D, 62 p.)

This graph is from the United States Geological Survey study of the Willamette Valley in Oregon, an area not unlike Taranaki. There are no comparable studies from Taranaki streams because the Taranaki Regional Council does little, or no, pesticide monitoring in surface waters. Many of the pesticides sold in hardware stores in New Zealand are the same as they would be in the United States.

While the USGS authors did not discuss the sources of pesticides in urban area surface waters, one can surmise that high application rates to roadsides, reserves, and home gardens would contribute to the high concentrations in urbanised surface waters compared to more rural areas. From **Figure 7**, one can observe that the toxicity index climbs rapidly, so that a small amount of urbanisation will translate to a significant increase in toxicity. (Note that the toxicity index is a logarithmic scale, so a toxicity index of 6 is 100,000 times a toxicity of 1, not just 6 times greater.)

- 7) The wide range of pesticides available to retail customers in Taranaki present a number of toxic risks to susceptible people as indicated in **Table 2** below.

Item	Pesticide	Active Ingredient	Application	Acute Toxicity	Carcinogen	Endocrine Disruptor (ED), Developmental or Reproductive Toxin	Effects on Bees
1	Yates Turfix Gun	MCPA	prickle control	Yes	possible		
2	Yates Weed n Feed	DICAMBA	herbicide			developmental	
3	Tui Products Roundup	Glyphosate	herbicide	slight	probable		
4	Kiwicare No Bugs Super Fumigator	Cyphenothrin	roach			Possible ED	
5	Insect Spray (brand?)	tetramethrin	roach	slight	possible	endocrine disruptor	highly toxic
6	Kiwicare No Borer	permethrin	wood borer		likely		toxic
7	BASF Ripcord Plus	alpha cypermethrin	insecticide	moderate	possible	suspect ED	
8	Yates Insect Gun	pyrethrins	insecticide	moderate	likely		highly toxic
9	RatSak Throw Packs	brodifacoum	rodenticide	highly			
10	Scotts Lawn Builder Grub and Insect Control	bifenthrin	insecticide	moderate	possible	yes + susp ED	highly toxic
11	Yates Fungus Gun	Myclobutanil	fungicide	slight		yes + susp ED	
12	Yates Snail and Slug Bait	Methiocarb	snail and slug			cholinesterase inhibitor	highly toxic

Table 2: An Incomplete List of Retail Pesticide Active Ingredients and Their Hazards (Compiled from package labels for sale at a retail outlet in New Plymouth, Cawthorn Institute Ecotoxicity Review of 26 Pesticides, 2013, and the pesticideinfo.org PAN Pesticides Database)

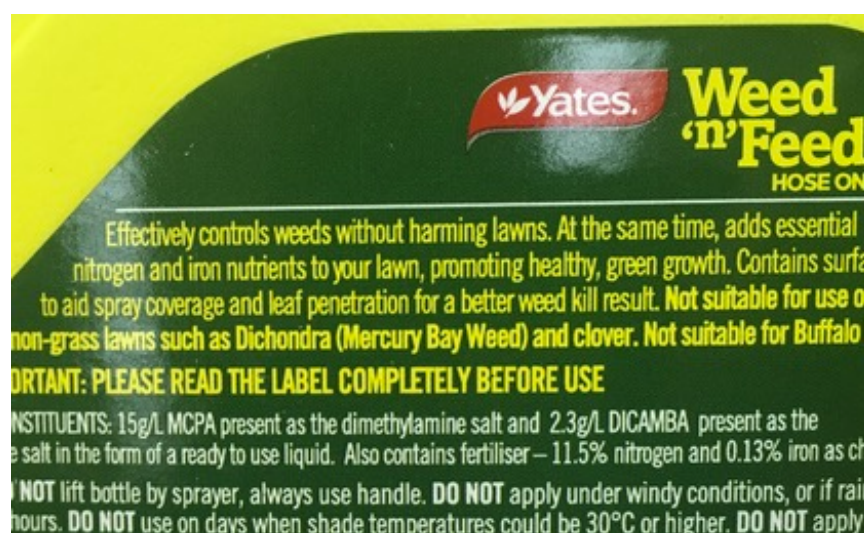


Figure 8 – Label from Retail Product with 15 g/L MCPA. Other example labels shown in **Appendix 1**.

New Zealand only has regulatory limits for 2 of the active ingredients listed in **Table 2** (MCPA and Permethrin). While the Canadian guideline limit for MCPA in irrigation water is 0.025 micrograms/L (approx. 25 parts per trillion), the NZ MCPA limit for drinking water is 2 micrograms/L (approx. 2 parts per billion), or 80 times greater. In 1988, the World Health Organisation proposed a guideline value for drinking water of 0.5 micrograms/L (approx 0.5 parts per billion) for MCPA. (Regulatory Limits for Pesticide Residues in Water, IUPAC Technical Report, 2003, Pure and Applied Chemistry 75, 1123-1155).

In order for the 15 grams of MCPA in one litre of the product in **Figure 8** to meet the NZ drinking water limit of 2 micrograms per litre it would have to be diluted by 7.5 million litres of clean water or approximately the volume of 3 Olympic swimming pools (2.5 million L each, https://en.wikipedia.org/wiki/Olympic-size_swimming_pool). To meet the WHO guideline value, 12 swimming pools would be necessary, and to meet the Canadian limit, 240 swimming pools of dilution (600 million litres).

When determining the acceptable pesticide concentrations for the stream, what level is appropriately protective of children? It should also be pointed out that toxicity from mixtures of pesticides can be greater than the expected effects of each pesticide added together. Degradation products of the pesticides which can have their own effects, sometimes greater than the parent compound. Determining the relevant limits for these toxic pollutants in the absence of clear guidance from the TRC or other government authority will be a challenge.

In my opinion, it doesn't make sense to unleash the largely uncontrolled application of pesticides onto a significant fraction of the Wairau Catchment until these risks are evaluated and safe exposure levels can be determined.

Many people assume that currently available pesticides in retail packages are “safe”. Over time, however, they are often shown to be excessively toxic and are subsequently removed from the retail market. New Zealand has historically banned 27 pesticides previously believed to be safe including chlordane, DDT, endosulfan, hexachlorobenzene, lindane, and PCP (PAN List of Banned Pesticides, Mar 2019). The most recent example of a pesticide moving into the unsafe category is Glyphosate, the active ingredient in Roundup and other herbicides.

Over Monsanto’s (now part of Bayer) strenuous objections, the International Agency for Research on Cancer (IARC,2015) and the State of California (2017) have determined glyphosate to be a probable carcinogen (source: <https://en.wikipedia.org/wiki/Glyphosate> 18 June 2019) . Monsanto has recently lost three separate jury trials in California, USA where Roundup (glyphosate) exposure has been implicated as the cause of cancer suffered by the people who brought the suits. Total damages awarded by the juries in these cases is over USD\$2 billion and there are likely to be thousands of additional lawsuits. So, the risk represented by a given pesticide is a moving target over time and the “safe” level for water such as Wairau Stream is not certain.

- 8) The following summarizes the foregoing elements for further consideration.
 - a) The Wairau Stream has its source well inside the National Park boundary, flows through relatively undeveloped pastoral land, makes a short run past suburban residences, and forms a lagoon on the Oakura Beach before flowing into the Tasman Sea. Based on casual observation, the water quality is generally good, if not pristine.
 - b) Oakura Beach is one of the most popular beaches in Taranaki. Recreational users, including children and their parents, currently enjoy swimming and wading in the lagoon and have for decades.

- c) The applicant proposes to rezone and develop the Wairau catchment with hundreds of newly built houses.
 - d) Taranaki residents have a large selection of pesticides with toxic properties available to them at local retail outlets to use in their gardens.
 - e) Studies from USGS have shown that pesticide toxicity in the stream will likely increase substantially as a result of urbanisation of the catchment.
 - f) This evidence suggests that there is a significant likelihood of children being exposed to increasing levels of pesticides should the proposed development proceed upstream in the catchment.
 - g) Children are much more susceptible to pesticide toxicity than adults and the consequence of pesticide exposure can be quite harmful including death.
 - h) If the construction of hundreds of houses in the proposed newly re-zoned and developed area is allowed by the consent authority, children, their parents, and other people may be exposed to potentially much higher risk of harm without their knowledge or consent.
- 9) Section 5 of the 1991 New Zealand Resource Management Act states, inter alia, that the purpose of the act is to promote sustainable management of natural and physical resources while sustaining the potential to meet reasonably foreseeable needs for future generations. If the rezoning and development proceeds now, there is significant risk that the Wairau Stream's capability to meet the needs of future generations for safe, clean water for swimming and wading will be irreparably harmed.
- 10) It should be clearly understood that the absence of valid scientific data does not mean there is no risk. Which is another way of saying that good public policy demands that we do not use children as guinea pigs in an experimental release of toxic chemicals to the environment.

- 11) To manage a resource there has to be statistically valid information on the condition of the resource. In this case, management would be based on water quality samples for pesticides and an acceptable maximum limit for those pesticides to not pose a risk to the affected population (infants and children) who are using the stream for swimming and wading. Neither the sampling data nor the maximum acceptable limit exists for all the pesticides that may be present in the stream due to this development.
- 12) With the health of children at risk, the prudent course is to not introduce new sources of toxic pesticide exposure into Wairau Stream. Approval of the rezoning and development of the Wairau catchment would be an unnecessary endangerment of the health and wellbeing of the children swimming and playing in the lagoon and would be contrary to the purpose of the RMA.

These children, their children, and their grandchildren thank you for your consideration. I thank you for your time and attention.

Richard Martin Rollins

25 June 2019



Figure 9 – Children in Wairau Lagoon at Oakura Beach

Appendix 1 – Package Labels

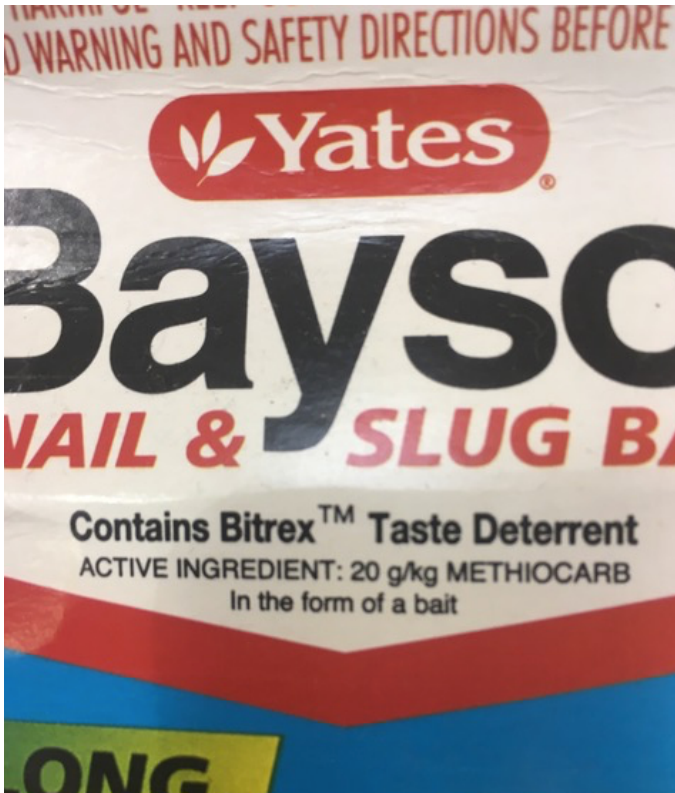


Figure 1 – Item 12 from Table 2



Figure 2 – Item 8 from Table 2

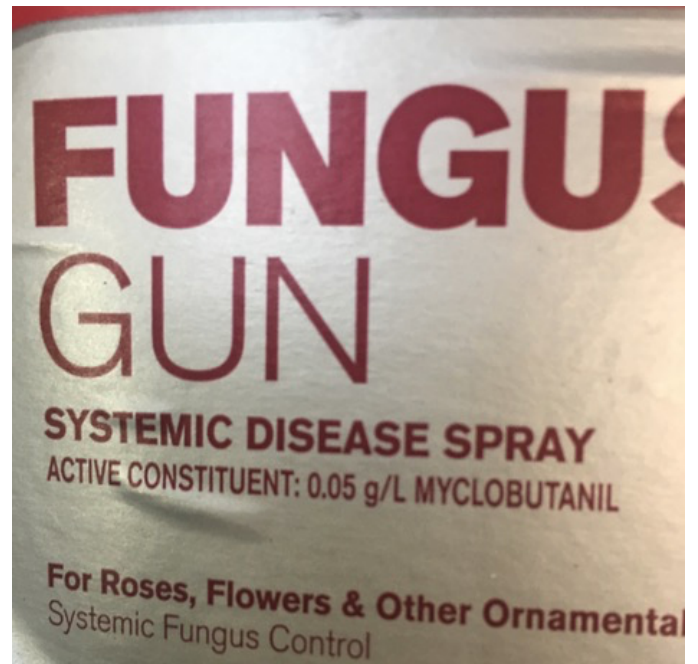


Figure 3 – Item 11 from Table 2



Figure 4 – Item 10 from Table 2

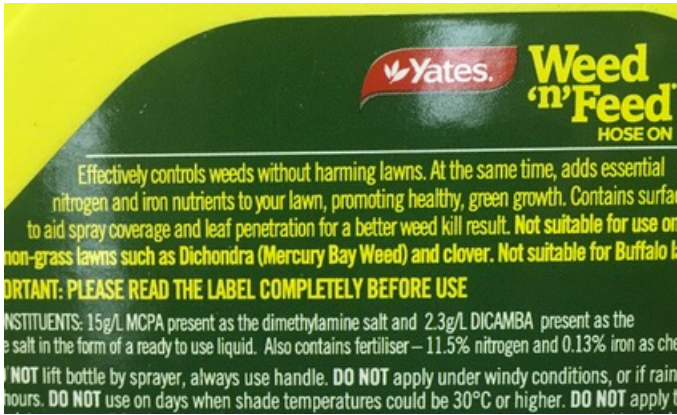


Figure 5 – Item 2 from Table 2

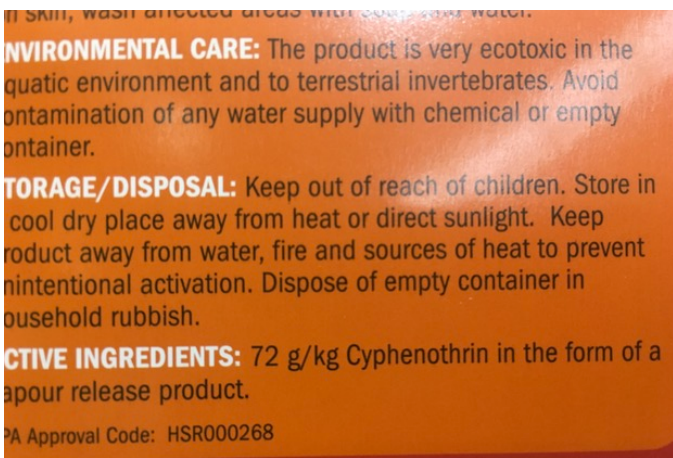


Figure 6 – Item 4 from Table 2

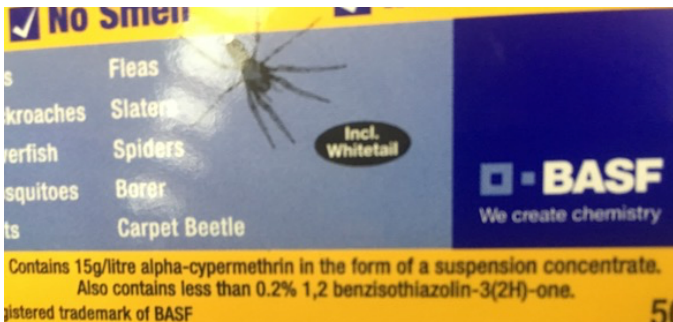


Figure 7 – Item 7 from Table 2

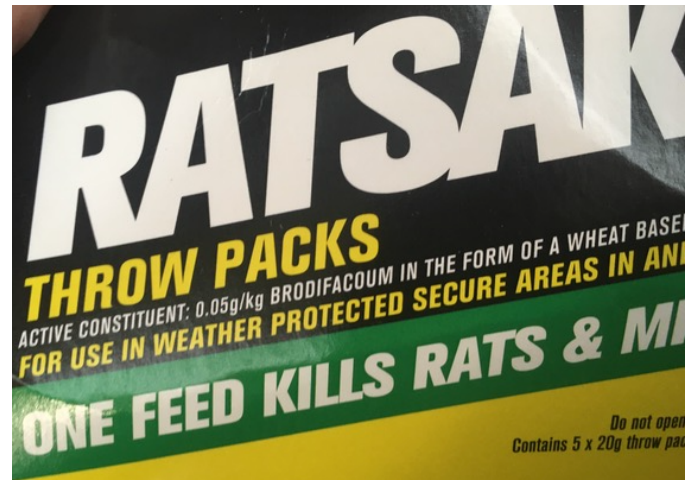


Figure 8 – Item 9 from Table 2

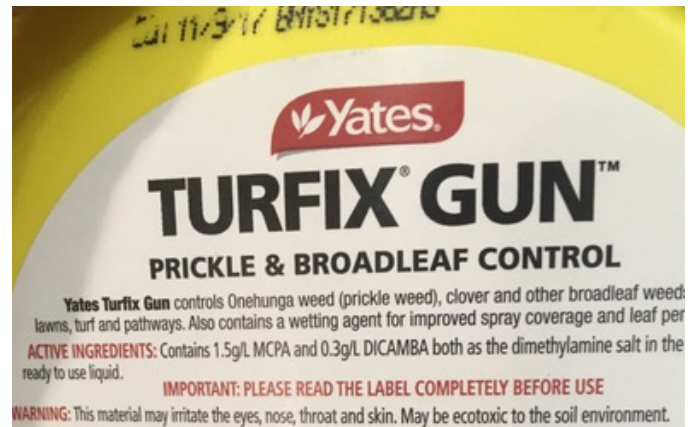


Figure 9 – Item 1 from Table 2

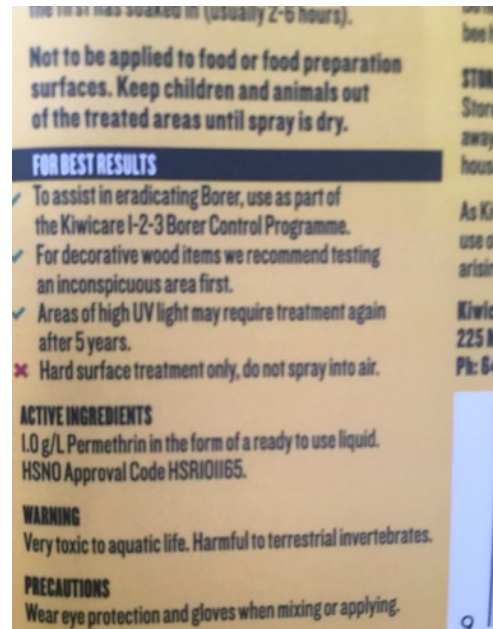


Figure 10 – Item 6 from Table 2



Figure 11 – Item 5 from Table 2

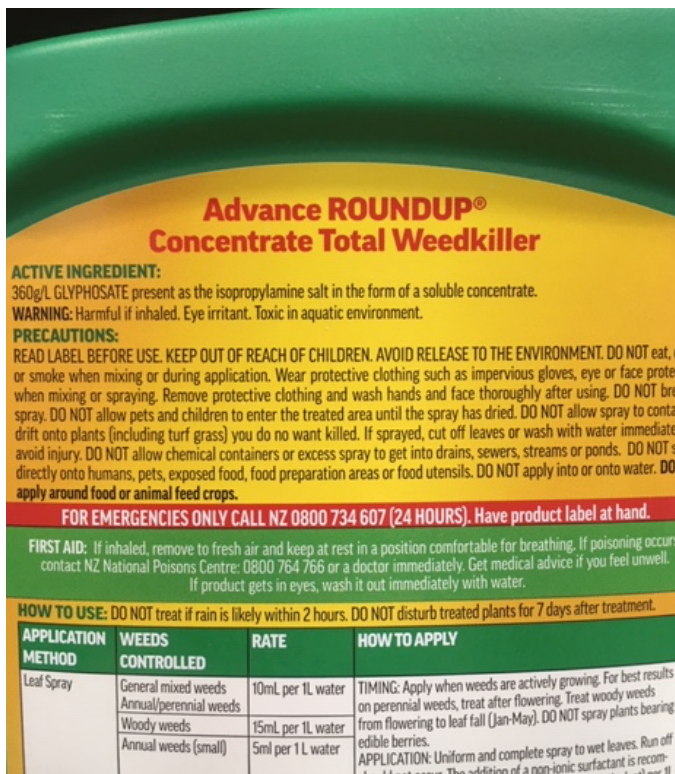


Figure 12 – Item 3 from Table 2