

Potential Health Effects on Children from Pesticides in Water

Statement of Evidence of Richard Martin Rollins 23 July 2019

Slide 1

1. The Commission is considering an interesting environmental question of whether to knowingly subject children to increasing risk of pesticide exposure.
2. That may seem like a far fetched assertion, but I think you may agree by the end of the presentation.
3. Once I have outlined a few facts, we can bring the pesticide picture into clearer focus.
4. With reference to the purpose of the Resource Management Act, we can consider whether zoning should be changed and houses built

Slide 2

- 1) My name is Richard Rollins. I am a consulting environmental engineer. This environmental engineering evidence is filed in support of my original submission and in support of submissions by Matthew Peacock, Richard Shearer and other submitters. I have the following qualifications and experience which are relevant to this matter.
- 2) Qualifications-
 - a) New Zealand Chartered Professional Engineer since 2018.
 - b) Registered Professional Civil Engineer in California, since 1989.
 - c) Board Certified Water Quality Engineer, American Academy of Environmental Engineers and Scientists specialising in Water Supply and Wastewater) 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.

Slide 3 – Applicable Experience

- 1) 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.
- 2) Worley Parsons, New Plymouth, 2012 to 2014 – Designed stormwater treatment devices to minimize water and ground contamination while meeting the consent conditions and maintenance requirements of a hydrocarbon production wellsite.
- 3) 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 wastewater consents for industrial dischargers including pesticide manufacturers.
- 4) In the US, I was an Environmental Engineer with companies in semiconductor and pharmaceutical industries including working in the environmental health and safety group responsible for cleaning up widespread dioxin contamination in Missouri and defending the company against lawsuits.

Slide 4 – Definitions

- 1) 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** below.
- 2) 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. The Wairau Stream and catchment may be unique in Taranaki because such a large fraction of it lies within the boundaries of the National Park.

Slide 5 – Wairau Lagoon –

- 1) The outlet to Wairau Stream assumes several forms as it crosses the beach on the way to the Tasman Sea. It can be a pond, lagoon, or meandering channel.
- 2) NPDC channelises the stream across the beach from time to time to minimize the potential undercutting of roads or property near the beach.
- 3) To avoid confusion, this evidence will use the term “Wairau Lagoon” to refer to the outlet of Wairau Stream across Oakura Beach.

Slide 6 – Children and Wairau Lagoon

- 1) Children and their parents have been using the lagoon formed by the Wairau Stream on Oakura Beach for decades.

- 2) 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.
- 3) The Wairau Stream channel is less than 50 metres away from the surf life saving club.
- 4) 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.
- 5) 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.
- 6) **(Thanks to the parents who submitted photos to be used in this evidence.)**

Slide 7 – 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.

- 1) **The Table above** illustrates some of the established associations between different health harms and exposure to pesticides in children.
- 2) Specific conditions associated with low level chronic pesticide exposure in children are leukemia, brain tumors, attention deficit – hyperactivity disorders, 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).
- 3) Children are known to be much more susceptible to toxic effects of pesticides than adults.
- 4) Most water quality limits are based on exposure calculations for 60 kg adults rather than children.

Slide 8 – 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.)

- 1) 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 above
- 2) 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.
- 3) 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 and home gardens would contribute to the high concentrations in more urbanised surface waters compared to more rural areas. From the Figure above, one can observe that the toxicity index climbs rapidly, so that a small amount of urbanisation will translate to a substantial 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.)

Slide 9 – Table: An Incomplete List of Retail Pesticide Active Ingredients and Their Hazards

(Compiled from package labels for sale at a retail outlet in New Plymouth, toxicity information from Cawthorn Institute Ecotoxicity Review of 26 Pesticides, 2013, and the pesticideinfo.org PAN Pesticides Database)

- 1) The pesticides in the table present a number of toxic risks to susceptible people as indicated in Table. (broadleaf weeds similar to coumarin or warafin (blood thinner, death from internal bleeding, several carcinogens, several EDs or reproductive toxins, toxic to bees)
- 2) New Zealand only has water quality limits for 3 of the 12 active ingredients listed in Table (MCPA, Permethrin, Bifenthrin).

Slide 10 – Retail Product with 15 g/L MCPA

- 1) The simplest example to explore is MCPA, an herbicide that inhibits growth of broadleaf weeds while not affecting grains.
- 2) 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.

- 3) 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).
- 4) In order for the 15 grams of MCPA in one litre of the product in Figure 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).
- 5) 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).
- 6) When determining the acceptable pesticide concentrations for the stream, what level is appropriately protective of children?
- 7) It should also be pointed out that toxicity from mixtures of pesticides can be greater than the expected effects of each pesticide added together.
- 8) Degradation products of the pesticides which can have their own effects, sometimes greater than the parent compound.
- 9) Determining the relevant limits for these toxic pollutants in the absence of clear guidance from the TRC or other government authority will be a substantial challenge.
- 10) Until these risks are evaluated and safe exposure levels can be determined, unleashing the largely uncontrolled application of pesticides in the Catchment makes no sense
- 11) The NZEPA has set the environmental exposure limit for Bifenthrin at 0.05 ng/L (approx 50 parts per quadrillion, Guidelines For Drinking-Water Quality Management For New Zealand: Volume 3 Datasheets – Chemical And Physical Determinands: Part 2.3 Pesticides, 2019) or about 1 500th the Canadian MCPA limit.
- 12) For reference, the NZ Ministry of Health Guideline for Maximum Acceptable Value (provisional) for 1080 in drinking-water should not exceed 0.0035 mg/L (3.5 parts per billion, higher than MCPA).

Slide 11 – The following summarizes the foregoing facts for further consideration.

- 1) 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.
- 2) 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.
- 3) The applicant proposes to rezone and develop the Wairau catchment with hundreds of newly built houses.
- 4) Taranaki residents have a large selection of pesticides with toxic properties available to them at local retail outlets to use in their gardens.
- 5) Studies from USGS have shown that pesticide toxicity in the stream will likely increase substantially as a result of urbanisation of the catchment.
- 6) 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.
- 7) Children are much more susceptible to pesticide toxicity than adults and the consequence of pesticide exposure can be quite harmful including death.
- 8) If the construction of hundreds of houses in the proposed development area is allowed by the consent authority, children, their parents, and others may be exposed to potentially much higher risk of harm without their knowledge or consent.
- 9) There is too much uncertainty about the likely effects of pesticides on the children in the Wairau Lagoon for approval of this development.
- 10) Future harm would be directly attributable to such a decision.

Slide 13 – RMA Purpose – Summary of foregoing facts for further consideration.

- 1) Section 5 of the Resource Management Act states, among other things, that the purpose of the Act is to manage resources to meet foreseeable needs of future generations.
- 2) It should be clearly understood that the absence of valid scientific data does not mean there is no risk.

- 3) 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.
- 4) Modern civil society discourages the use of children as guinea pigs in an experimental release of toxic chemicals to the environment.

Slide 13 – Resource Management

- 1) To manage a resource there has to be statistically valid information on the condition of the resource.
- 2) In this case, management would be based on water quality samples for pesticides and a maximum acceptable limit for those pesticides to not pose a risk to susceptible people (infants and children) who are using the stream for swimming and wading.
- 3) 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.
- 4) With the health of children at risk, the prudent course is to not introduce new sources of toxic pesticide exposure into Wairau Stream.
- 5) 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.

Slide 14 – Consideration of Future Generations

- 1) These children, their children, and their grandchildren thank you for your consideration in protecting their health and safety.
- 2) I thank you for your time and attention.