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Inquiry into Agricultural and Veterinary Chemicals Legislation Amendment Bill 2012

Submission From Friends of the Earth Australia

Friends of the Earth (FoE) believe that the Agricultural and Veterinary Chemicals Legislation Amendment Bill 2012 is a positive, but small step concerning legislation regarding Agricultural and Veterinary Chemicals in Australia. There remain a number of concerns regarding the legislation that remain unresolved at this time and it is apparent that the proposed changes will in no way alleviate all of our concerns regarding current pesticide regulation in this country. These concerns include the fact that unless the amendments are based on a system that has the Precautionary Principle at its core and that there are corresponding amendments to environmental and health legislation, then a truly wide-ranging opportunity will be lost.

In terms of the slight improvements to the existing legislation, FoE support the legislative initiatives regarding continuation of approvals and registrations. We think that it is a positive step for existing agricultural and veterinary chemicals to be regularly reviewed and that registrants will have to apply for the continuation of active constituent approvals and product registration on a regular basis. This goes some way in alleviating our concerns regarding the continued use of hazardous pesticides and allows for new information to be incorporated on a more regular basis. However we do have concerns that at the Consultation Meeting regarding this process, held on February 9 2012 at The Hotel Holiday Inn Tullamarine, it was admitted that *the time spent on chemical reviews will not necessarily speed up*. Friends of the Earth is of the opinion that the current chemical review process often takes far too long.

FoE also shares concerns with National Toxics Network and WWF Australia that far too many dangerous pesticides continue to be registered in Australia and that the Agricultural and Veterinary Chemicals Legislation Amendment Bill 2012 will do little to improve this situation. The list of pesticides of most concern can be downloaded from this link: http://www.ntn.org.au/clean-food/toxic-hit-list-shows-australians-exposed-to-dangerous-pesticides

The revised Agricultural and Veterinary Chemicals Legislation fails to define what is a highly hazardous pesticide and also fails to explain how these pesticides are to be prioritised and removed from use in Australia. Highly hazardous should be defined in the legislation and should include words such as persistent, bio-accumulative and endocrine disrupting. The re-registration process for example has no criteria in it for the removal of high risk pesticides. The revised legislation cannot promise a more speedy review process nor have time limits imposed for reviews of highly hazardous pesticides. Restrictions on dangerous pesticides could potentially take decades to eventuate in some examples. (eg atrazine).

FoE supports the legislative initiatives concerning continuation of approvals and registrations. FoE has some concerns regarding principles such as *"reasonable grounds, founded in evidence"*. It would be helpful if these phrases such as these were defined in the legislation, as one of FoE's key concerns with the existing regulatory environment, is that evidence can be construed to provide a particular outcome, whilst at the same time ignoring new scientific outcomes. Evidence also can be withheld by chemical companies or partially acknowledged.

FoE supports improving the quality and efficiency of assessments which do not currently take into account the total time elapsed for considering an application and FoE also supports the *"shut the gate"* provisions of the Agricultural and Veterinary Chemicals Legislation Amendment Bill 2012.

FoE supports the new enforcement provisions, however our organisation still has a number of concerns regarding lack of data in relation to quantities and types of pesticides sold and where these pesticides are being used. It seems bizarre that claims made by the Government that *"Although many chemicals have had a history of safe use, the community expects the regulator to actively monitor any issues that may impact their health or the environment"* (Feb 2012 DAFF? Handout called Frequently Asked Questions – draft Agricultural and Veterinary Chemicals Legislation Amendment Bill 2011). It is currently impossible to determine by any regulator, what chemicals are being used where and when in Australia as no government agency in Australia keeps tabs on actual volumes of biocide use across Australia. This is a massive weakness of the entire system and grants chemical companies too much leeway to keep regulators in the dark under the guise of *"commercial confidentiality."* The current control of use provisions where responsibility for pesticides lies with the various State Governments is essentially a disjointed arrangement, that is a barrier to understanding exact volumes of pesticides being delivered to the Australian environment. It appears that it has been deliberately set up this way to avoid close regulatory scrutiny.

Another issue is, how does the regulator properly assess a chemical where science is continually evolving, so that the regulator adequately takes into account the new information which can be published in scientific journals on a regular basis. Further to this, how does the regulator determine "weight of evidence" and how does the regulator remain independent when it is fully funded through the sale of chemicals? If for example, there are 100 scientific publications showing an negative effect of a particular registered pesticide and 30 not showing the effect, how does the regulator properly determine what studies it will consider are more important than others in determining whether a chemical will remain registered? If a popularly used pesticide, which contributes large amounts of levies to the regulator is threatened by emerging science, highlighting for instance environmental concerns, how can the Australian public assume that their interests are being best looked after? Do economic considerations outweigh ecological concerns both at the farm gate and at the regulatory body funding level and how are these considerations measured in a method that does justice to human health and the environment?

The ongoing controversy with Atrazine is a case in point. In 2002 it was publicly announced in the United States that Atrazine at levels as low as 0.1ug/L (part per billion) could cause

hermaphroditism in frogs. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241446/ Yet ten years later Atrazine remains one of Australia's most used pesticides, despite a host of other studies showing it interfering with hormones in a wide range of animals.

"The new review is compiled by 22 scientists studying atrazine in North and South America, Europe and Japan. An international team of researchers has reviewed the evidence linking exposure to atrazine – an herbicide widely used in the U.S. and more than 60 other nations – to reproductive problems in animals. The new review describes the disruptions of hormone function and sexual development reported in studies of mammals, frogs, fish, reptiles and human cells exposed to the herbicide" http://thewatchers.adorraeli.com/2011/12/02/atrazine-herbicide-reproductive-dysfunction-cortisol/. (December 2 2011).

"...In last week's issue of the Journal of Experimental Biology, Hayes and colleagues published a review of the possible causes of a worldwide decline in amphibian populations, concluding that atrazine and other hormone-disrupting pollutants are a likely contributor because they affect recruitment of new individuals and make amphibians more susceptible to disease.

"These kinds of problems, like sex-reversing animals skewing sex ratios, are much more dangerous than any chemical that would kill off a population of frogs," he said. "In exposed populations, it looks like there are frogs breeding but, in fact, the population is being very slowly degraded by the introduction of these altered animals...

More and more research, however, is showing that atrazine interferes with endocrine hormones, such as estrogen and testosterone – in fish, amphibians, birds, reptiles, laboratory rodents and even human cell lines at levels of parts per billion. Recent studies also found a possible link between human birth defects and low birth weight and atrazine exposure in the womb." http://newscenter.berkeley.edu/2010/03/01/frogs/ (March 1 2010).

"... Atrazine was detected by SA Water at Barossa Reservoir last September [1997], but it was only made public through a press release issued after 11pm on Tuesday [15 Sep 1998]. The notification followed an EPA investigation which found the contamination had travelled down creek beds from the SA Forestry plantation to the Warren, South Para and Barossa Reservoirs..." The Advertiser Sep 17 1998.

A State Government department was ordered to stop using potentially carcinogenic herbicides after its operations contaminated drinking water supplies. The Environment Protection Authority issued the edict to Forestry SA in August 1998 after herbicides were traced to new pine plantations near the Barossa Valley..." The Advertiser January 24 2001.

Because of a lack of proper definitions, issues surrounding relatively new concepts in science are not captured by the new legislation. Endocrine disrupting chemicals such as atrazine for example, which are increasingly being observed to have negative effects at levels lower than what were assumed to be safe levels, are given the same weight in the legislation as pesticides that do not have endocrine disrupting properties. Developments in nanotechnology are likewise not properly dealt with by the legislation. Pesticides which have non-monotonic properties potentially impacting on endocrine function are only one of the more recent scientific concerns relating to pesticides and industrial chemicals.

Scientists have found that some chemicals react differently at low doses than they do to high doses. The lower doses can cause more problematic toxicological effects than the same chemical at a higher dose. These findings are counter to those of traditional toxicology *"All substances are poisons, there is none which is not a poison. The right dose differentiates a poison..."* Paracelsus (1493-1541). This is of particular concern in regards to chemicals that mimic hormones for

example. These chemicals also known as endocrine disruptors, can disrupt crucial life functions particularly in young children and foetuses. Hormones regulate body functions such as digestion, growth and sexual function, so any disruption of proper hormonal function can create health problems. The body uses very low dose effects for hormones to carry out their normal functions. It has been argued in terms of endocrine disruption that *"no dose is low enough"*.

With 'dose makes the poison' thinking dominating toxicology, traditional toxicologists didn't pursue the possibility that there might be effects at levels far beneath those used in standard experiments. No health standards incorporated the possibility. Over the past 15 years, however, as scientists began to explore the impacts of endocrine disrupting compounds - compounds that behave like hormones or interfere with hormone actions - many examples of non-monotonic dose response began to be published in scientific journals.
(http://www.environmentalhealthnews.org/sciencebackground/2007/2007-0415nmdrc.html)

A list of endocrine disrupting chemicals (including pesticides) can be found at this link. http://www.ourstolenfuture.org/basics/chemlist.htm Most worrying is that many of the endocrine disrupting substances on this list are commonly detected on foodstuffs in Australia including some of the most commonly detected pesticides. Commonly detected pesticides on Australian foodstuffs such as; Iprodione, Procymidone, Fenithrothion, Endosulfan, Permethrin, Pyrimethanil, Dicofol, Carbaryl, Cypermethrin, Fenvalerate, Vinclozolin, Fipronil, Dieldrin, Malathion all are regarded as suspected Endocrine Disruptors by the Pesticide Action Network. http://www.panna.org/

"We recommend that procedures to establish acceptable exposure levels for endocrine-disrupting compounds incorporate the inability for high-dose tests to predict low-dose results. Setting acceptable levels of exposure must include testing for health consequences at prevalent levels of human exposure, not extrapolations from the effects observed in high-dose experiments. Scientists trained in endocrinology must be engaged systematically in standard setting for endocrine-disrupting compounds." (A Clash of Old and New Scientific Concepts in Toxicity, with Important Implications for Public Health. http://ehp03.niehs.nih.gov/article/info%3Adoi%2F10.1289%2Fehp.0900887)

"We illustrate that nonmonotonic responses and low-dose effects are remarkably common in studies of natural hormones and EDCs. Whether low doses of EDCs influence certain human disorders is no longer conjecture, because epidemiological studies show that environmental exposures to EDCs are associated with human diseases and disabilities. We conclude that when nonmonotonic dose-response curves occur, the effects of low doses cannot be predicted by the effects observed at high doses. Thus, fundamental changes in chemical testing and safety determination are needed to protect human health." http://edrv.endojournals.org/content/33/3/378.short (June 2012)

In the United States there is also pressure building to alter the current assessment of chemicals, which emphasises toxicity, whilst not thoroughly taking into account more subtle issues, such as endocrine disruption.

"Groups representing 40,000 researchers and clinicians are urging federal agencies responsible for the safety of chemicals to examine the subtle impact a chemical might have on the human body rather than simply ask whether it is toxic. In an open letter to the Food and Drug Administration and the Environmental Protection Agency to be published Friday in the journal, Science, the scientists say the regulatory agencies need to tap into genetics, developmental biology, endocrinology and other disciplines when they analyze the safety of chemicals used in everyday products. "Although chemical testing and risk assessment have long been the domain of

toxicologists, it is clear that the development of improved testing guidelines and better methods of assessing risks posed by common chemicals to which all Americans are exposed requires the expertise of a broad range of scientific and clinical disciplines," said the letter, which was signed by eight scientific societies. (http://www.washingtonpost.com/wp-dyn/content/article/2011/03/03/AR2011030306639.html (March 4 2011)

Strawberry spraying near Woori Yallock east of Melbourne.

The APVMA have inherited a system that has allowed the registration of a host of pesticides that could in the past and into the future be a cause for untold health and environmental problems. The difficulty of bringing in the precautionary principle to the existing system is that a host of currently registered pesticides would not be allowed to be used if the precautionary principle was applied.

FoE supports the establishment of a Scientific Panel. However we believe that panel should also include relevant experts in endrocrinology, developmental biology, genetics and other disciplines as well as the traditional experts that may have sat on similar panels in the past. Experts with associations to pesticide companies and pesticide lobby groups should not have any place on the Scientific or Advisory Boards of the APVMA.

It is not presumptuous to assume that the new legislation will continue allowing the use of pesticides which are impacting negatively in environmental or health regards but whose impacts are not not fully understood or comprehended at this present time. The recent bans on Dimethoate and Fenthion are a case in point. Both insecticides have been used against fruit fly for the past 40 years, yet both have now come under restrictions due to their cholinesterase inhibition properties and possibility of breaching the Acute Reference Dose, particularly in children in the 2 to 6 year age bracket. How many Australian's have been exposed to unsafe levels of Dimethoate or Fenthion over the past 40 years as children and how many have suffered health implications from this exposure? Why did it take 40 years to realise these problems? Recent science is now telling us that exposure to organophosphorus pesticides at a young age can impact on a child's behaviour and even lower IQ by 7 points. These are life changing impacts whose true impacts are not properly costed! Who would want to deny a child the right to grow to their full potential?

New research indicates that children cannot produce a detoxifying enzyme that helps adult bodies get rid of organophosphate chemicals *"children have low levels of paraoxonase 1 – one third or less of their mothers – far longer into childhood than previously thought. Whereas it was thought the levels of enzyme approached adult levels by age 2, the new research suggests children remain uniquely susceptible until age 7... Current EPA standards of exposure for some pesticides assume children are three to five times more susceptible than adults, and for other pesticides the standards assume no difference... Our study is the first to show quantitatively that young children may be more susceptible to certain organophosphate pesticides up to age seven."*
http://www.thedailygreen.com/environmental-news/latest/pesticide-childrens-health-47062503 (June 25 2009)

Toddlers whose mothers breathed more of a chemical often present in insecticides during pregnancy had slower brain development according to a study from New York City. On average, women breathing the highest amounts of piperonyl butoxide, or PBO, had babies who scored 3.9 points lower on a mental development test at age three...It means these kids might not do as well in school...Baby brains are extra vulnerable to toxic chemicals, because they are not fully formed...If you alter the blueprint, there may be lasting long-term consequences".
http://www.reuters.com/article/2011/02/11/us-insecticide-idUSTRE71A0G120110211 (Feb 10 2011)

According to FoE research, Piperonyl Butoxide (a pesticide synergist) is the third most commonly detected chemical on Australian food.
www.foe.org.au/sites/default/files/TheDoseMakesThePoisonFeb2012_0.pdf

A glimpse of some of the more worrying effects of pesticides can be shown by studies published in 2010 which show that children with higher levels of organophosphate metabolites, were more likely to be diagnosed with ADHD. *"...the risk of having ADHD increases in children who have higher concentrations of diakyl phosphate metabolites. The metabolites indicate exposure to organophosphates, pesticides that affect the nervous system...Researchers found that 93.8% of the children in the study had at least one detectable metabolite..."*
http://www.pediatricsdigest.mobi/content/125/6/e1270.full (February 2010)

Three studies published in April 2011, showed that prenatal exposure to organophosphate pesticides, sprayed on agricultural crops in the Salinas Valley in California and used as cockroach controls in New York environments of Harlem and the South Bronx, can lead to a reduction of a child's IQ by up to seven points. *"While this may not sound like a lot, it is more than enough to affect a child's reading and math skills and cause behavioural problems with potentially long-lasting impacts, according to the studies. Such a reduction can cause behavioural problems in the child and also affect reading and maths skills."*
http://e360.yale.edu/feature/from_the_fields_to_inner_city_pesticides_affect_childrens_iq/2404/ (16 May 2011).

Organophosphorus insecticides represent 28% of pesticide detections on Australian food produce www.foe.org.au/sites/default/files/TheDoseMakesThePoisonFeb2012_0.pdf.

Still, children may benefit from organic produce because it isn't grown with synthetic pesticides. The paediatricians cited several studies linking pesticide exposure to, for example, memory problems and cancer in adult farm workers and an increased risk of attention deficit hyperactivity disorder in children.

They also noted one study that showed that switching to organic produce for just five days dramatically reduced the levels of pesticide residue in the urine of children who usually ate conventional produce.

"Kids' nervous systems are developing. Exposure to toxins can have different and much more profound effects on children," said Joel Forman, an associate professor at the Mount Sinai School of Medicine in New York and a co-author of the study."
http://online.wsj.com/article/SB10001424052970203630604578072643615348434.html (October 22 2012).

Has DAFF or The Department of Health and Ageing determined what is the true cost of pesticides in relation to impacts on the Australian health system? Recent science is also uncovering links with pesticide exposure to impacts on the human endocrine system, Attention Deficit Hyperactivity Disorder, Learning and Behavioural Problems, Lower IQ, increases in some cancers, Parkinsons disease, hypothyroidism and autism. Some researchers are also linking pesticides to excessive weight gain and impairment of the body's ability to regulate blood sugar. The link to type 2 diabetes is with pesticides, including organochlorines which parents and grandparents may have been exposed to. With a range of health issues, including intergenerational impacts, linked to even low levels of pesticide exposure, why aren't pesticides being looked at in the same way that now cigarettes are? Will the new Amendment Bill lead to a reduction in pesticide usage?

Likewise, long term exposure to pesticides can lead to development of diseases such as Parkinson's Disease. The cost to the Australian health system of dealing with the consequences of the costs of Parkinsons Disease caused through exposure to pesticides has not been quantified in Australia but the costs of the disease as a whole have.

"Parkinson's cost the Australian economy approximately $775 million in 2011-12, including approximately $480 million in health system costs and $110 million in lost productivity. In addition, the estimated burden of disease in 2011-12 is valued at $7.6 billion, in terms of lost quality of life and premature mortality for people with Parkinson'," *Daryl Smeaton said.*

http://www.shakeitup.org.au/living-with-parkinsons-latest-access-economics-report-2011/

Health professionals say the Goulburn Valley needs a trained neurological nurse to cope with higher than average cases of Parkinson's disease.

Goulburn Valley Health's Dr Arup Bhattacharya, a geriatrician and physician who specialises in movement and other neurological disorders, said a neuro nurse was critical to service sufferers, families and carers in the community.

He said environmental factors contributed to the high number of sufferers in the Goulburn Valley. He said Mildura — a town prominent in citrus and grape growing — had similar numbers.

"More recently studies done have seen a link between Parkinson's disease and the usage of herbicides and pesticides, but not fungicides," Dr Bhattacharya said.

http://www.mmg.com.au/local-news/shepparton/goulburn-valley-needs-parkinson-s-support-nurse-1.15518

Until recently, there was only hearsay evidence that the north-west Mallee region and nearby NSW had a significantly higher rate of Parkinson's disease than most other areas of Australia.

Dr Senior went hunting for figures, across an area of 65,000 square kilometres, to establish how many people suffering from Parkinson's or other movement disorders had consulted their local GPs within the preceding 65 working days.

Her trip took her as far as Balranald, Sea Lake, and Ouyen, and the final tally came to 160 consultations.

Based on the frequency of visits, Lower Murray Medicare Local estimates that there are at least 400 Parkinson's patients in the region, plus individuals with other, rare movement disorders like

motor neuron disease, Huntington's Disease, progressive supranuclear palsy, Friedrich's Ataxia and spinocerebellar ataxias.

Victor McConvey, a clinical nurse consultant with Parkinson's Victoria, said the incidence of Parkinson's disease had not been formally assessed, but was likely due to the high level of pesticide use in the district – particularly rotenone which was banned last decade, and the herbicide paraquat (Sprayseed), which is still widely used.

Rotenone, or derris dust, was widely used as an organic insecticide until Scandinavian research in the early 2000s implicated it as a cause of Parkinson's disease.

Mr McConvey said it was likely that exposure to these pesticides combined with a genetic predisposition to Parkinson's, to produce high rates of Parkinson's disease.

The region's ageing population was probably also a factor.

http://www.sunraysiadaily.com.au/story/197751/parkinson-boost-group-gets-funding-for-movement-disorder-nurse/ (July 6 2012)

Will the new changes to the Act make the APVMA act any quicker on restricting certain pesticides with bad reputations? Paraquat for example.

STEVE CANNANE, PRESENTER: There are calls to ban a pesticide with links to Parkinson's disease. Paraquat is under review by the pesticides authority but scientists warn many more people could get sick while's decision is being made.

Kirrin McKechnie has the story.

KIRRIN MCKECHNIE, REPORTER: It is a herbicide used extensively in agriculture. But the move is on to try to ban Paraquat.

DARYL SMEATON, PARKINSON'S AUSTRALIA: The use of chemicals is important in agriculture, we know that. But we've got to make sure those that have a bad reputation aren't used.

KIRRIN MCKECHNIE: Paraquat has such a bad reputation it is banned in 32 countries, including across Europe and parts of south-east Asia. Scientists say the chemical has known links to Parkinson's disease.

JOHN POWER, FLINDERS UNIVERSITY: Once you've got Parkinson's you've lost a certain number of brain cells in the particular area of the brain related to movement. A number of chemicals, Paraquat, Maneb, Rotonome, all target those cells. And destroy them.

KIRRIN MCKECHNIE: Parkinson's Australia is now planning a national campaign to force the Commonwealth to act. It is warning the Federal Government it could face compensation claims if it doesn't.

DARYL SMEATON: That's certainly part of the questions that we have to raise with government. Where there's smoke there's fire.

KIRRIN MCKECHNIE: The Australian Pesticides and Veterinary Medicines Authority admits Paraquat has been under review since 1997, but visit investigations are still ongoing. As it makes up its mind, scientists are urging better education about the dangers.

http://www.abc.net.au/news/2012-07-13/pesticide-linked-to-parkinsons-disease/4130368 (July 13 2012)

What about costing the price the cost of allergies?

"People who are exposed to higher amounts of chemicals used to chlorinate water and kill crop pests are also more likely to suffer from food allergies.

The new finding doesn't prove or even suggest that pesticides or water chlorination cause food allergies. But it's possible that a class of chemicals called dichlorophenols could alter the population of microbes in the human body, in turn influencing the immune system's reaction to food triggers." http://www.foxnews.com/health/2012/12/04/are-pesticides-and-food-allergies-linked/#ixzz2EiLI4fhT (December 4 2012)

Dichlorophenols are found in herbicides such as Dicamba and 2,4-D regularly applied to cropping, turf and pastoral areas across Australia.

Contaminants in manufacture of pesticides do occur. In recent times it has become apparent that a number of pesticides, including 2,4-D contain traces of dioxin. Is this being factored into the new legislation? How are dioxins being tested for? At CCC meeting it was made clear that to do adequate testing on all pesticides at risk of being contaminated a quarter of the APVMA's entire budget would have to be spent.

"The study analysed 23 different pesticide formulations, containing 15 different active ingredients currently used in Australia (plus four formulations that are no longer registered for use in Australia), including insecticides, herbicides and fungicides. Dioxins were detected in all samples, including some commonly used products. Researchers estimate approximately 200 pesticides have the potential to contain dioxin". http://www.uq.edu.au/news/?article=22347 (6 Dec 2010).

The legislation does not guarantee or allow government regulators (at a state or national level) to know what quantities of pesticides are being applied in what specific locations across the country. How can regulators do their job when there is no data provided to them concerning quantities of pesticides being used in different regions across Australia?

This could have dire impacts on water quality for example – particularly in domestic water supply catchments – where water authorities for example may not know what substances to test for and when. If Government's are kept in the dark about the volumes of pesticides sprayed across Australia, what hope does the community have? It is not good enough for chemical manufacturers to be allowed to hide this information from regulators through legislation that allows too much leeway for the pesticide companies. The pesticide companies fully know what volumes are being sprayed where – why should this information hide behind commercial confidence?

Concerns regarding this lack of information was expressed in May 2006 in Gippsland Water's submission to the Review of the Agriculture and Veterinary Chemicals (Control of Use) Regulation 1996; *"Records are kept for the application of restricted chemical products, but not for the other commonly used products that have environmental or health implications. Gippsland Water has had difficulty in obtaining information on the chemicals in use within a catchment area upstream of a Water Treatment plant and town water supply...Currently there is no common record of chemical products that are likely to be applied in agricultural areas within potable water catchments."*

There also remain huge issues regarding lack of protection for the ecological attributes of waterways suffering from pollution, including pesticide pollution. Recent science is now showing that pesticides are impacting at much lower levels than previously realised – yet Australia's ANZECC (Australian and New Zealand Guidelines for Fresh and Marine Water Quality) Guidelines have not been updated since 2000 and there remains a paucity of information in the guidelines that relate to pesticides, with only 28 pesticides having freshwater guideline levels and 4 having marine guideline levels. The ANZECC guidelines are important because they underpin State Environment Protection Policies for toxicant levels in waterways in Victoria for instance. This is clearly a case where the regulatory environment remains far behind the *"eightball"* in regards to getting the environment properly safeguarded.

"The results of an international study, using data from globally available field research, indicate that current pesticide approval procedures do not adequately protect the environment... Professor Ralf Schäfer from the University of Koblenz-Landau said, "Substance authorisation procedures only consider individual pesticides, yet substances never occur in isolation. Instead, organisms are subject to mixtures of pesticides, multiple stressors and repeated exposure such as flooding."... However the meta-analysis showed that the effect thresholds were between 10 and 100 times lower than those assumed in the standard pesticide approval process calculated from earlier mesocosm studies. This means that concentrations of pesticides believed to be environmentally safe are in the field resulting in significant damage to ecological communities and ecosystem functions."
http://newsroom.uts.edu.au/news/2012/06/study-reveals-pesticide-approval-processes-dont-protect-river-biodiversity (1 June 2012).

A recent article published in The Weekly Times February 22 2012 p 92 perhaps shows how the new system could impact on some pesticides in Australia if new registration regulations are enacted with new environmental directives.

"A British agricultural biology specialist has warned of the loss of more insecticides, such as cypermethrin, for agricultural use, but said the herbicide glyphosate should remain available to farmers...He said pesticide regulations in the European Union had become tougher since 1991, with chemicals having to be reviewed every 10 years after it was registered. He said since then, 70 per cent of active substances that had been available in the early 1990s had been lost from agricultural use... He said the chemical manufacturers withdrew most of them from market because of the low demand or because re-registration was revoked by regulatory authorities. Mr Orson said in 2009, the EU introduced the Thematic Strategy for Pesticides, which governed pesticide use and monitoring for the first time, plus registration of chemicals...Mr Orson said the EU established a list of priority substances deemed to be harmful to water ecosystems under the Water Framework Directive... Gone are trifluralin, isoproturon, simazine, atrazine, alachlor, chlorfenvinphos and endosulfan...".

Why isn't the Federal Government introducing legislation in Australia similar to the Thematic Strategy for Pesticides or the Water Framework Directive which have been introduced in Europe?

The new legislation also does not guarantee further safeguards by communities and individuals suffering from the impacts of spray drift. Victims of such exposures are still likely to have to face costly civil action if they want retribution from overspraying, while the perpetrators of the drift remain in most circumstances immune from prosecution. State legislation concerning pesticides offers protection for property in some instances from the impacts of spray drift, but human or ecological concerns are usually 'swept under the carpet'. The legislation therefore appears to be more sympathetic to large broadscale applicators in isolated regions, whereas many of the health impacts are faced by communities living at the interface between agriculture and residential areas. Local planning schemes barely deal with these complexities and will be looking at the new legislation and control of use monitoring by states for guidance on these matters. A case in point was the influx a couple of years ago of MIS funded berry farms in the Silvan area into nearby residential areas and the accompanying spray regimes which occurred at many times during the week and included spraying on windy days in close proximity to neighbours. A naïve Federal regulator expressed to me the view that planning laws should be enough to deal with these problems.

Plantation Spraying 2010, south of Broadford. Farm dam just downstream of plantation was contaminated with simazine and farmer exposed to spray drift. No legal recourse for victims except expensive civil action.

Some of these issues are supposed to by picked up by the COAG reforms, but it is evident from the current COAG process that agreement between the States and Federal Government has not been forthcoming.

Monitoring or responsibility for off-site impacts is also not adequately dealt with in the legislation. The Yarra River is a case in point. 1.5 million people rely on the Yarra River for drinking water in Melbourne's northern and western suburbs, yet current testing by Melbourne Water leaves alot to be desired. A recent study ['Effects of Pesticides Monitored with Three Sampling Methods in 24 Sites on Macroinvertebrates and Microorganisms' http://pubs.acs.org/doi/abs/10.1021/es103227q published in January 2011], found 43 pesticides in water and sediments in the upper Yarra, most of which are not tested for by Melbourne Water. How many other water supplies across Australia suffer similar problems? Ecological quality is supposed to be measured by the ANZECC Guidelines, yet as mentioned earlier, these guidelines are now hopelessly outdated, with the latest volume produced in 2000. In regards to the recent Yarra study, the first in the catchment for almost 30 years, for 86% [37/43] of the pesticides detected, there is no current ANZECC guideline. There are also no guideline levels under 2011 National Health and Medical Research Council (NHMRC) Australian Drinking Water Guidelines for 53.49% of the pesticides detected [23 of the 43 pesticides detected in surface water] in the study. Why are pesticides allowed to be used in water supplies when there are no guideline limits for these pesticides in Australia?

Pesticide monitoring is not being enforced legally. How many prosecutions have occurred in Victoria due to pesticide residues in drinking water? The Australian Drinking Water Guidelines are guidelines only with no legislative effect. Most water authorities do not actually monitor tap water for pesticides. If a large enough pollution event occurs in a reservoir, tap water testing may only then be implemented. Most smaller communities have limited pesticide sampling only a few times in the year. Standard water treatment plants are often not designed to specifically filter out pesticides. Friends of the Earth could locate only one Section 169(1) Water Act 1989: Notice of contravention for water supply protection over the past decade. Where Barwon Water served Hancock Victorian Plantations Pty Ltd with a notice to permanently discontinue the application of hexazinone in all Barwon Water water supply catchments. Yet there have been hundreds of water supply pesticide incidents over that time. See appendices.

Korweingboora Plantation, surrounding Korweingboora Reservoir (part of Geelong's water supply). The herbicide hexazinone leached from this site into the drinking water supply for four years.

Recent COAG discussions allude to more monitoring of food, but little or none for the environment. Almost all publicly available food monitoring for pesticide residues in Australia is done in Victoria, yet even so some of the sample sizes for fruit and vegetables remain embarrassingly small (eg a handful of samples for a number of food types over a two year period). These concerns were raised by Friends of the Earth in 'The Dose Makes The Poison?' published in February 2012. Why aren't Australian food consumers being told what is being sprayed on their food? Why did it take a small community group to highlight what are the most commonly detected pesticides? www.foe.org.au/sites/default/files/TheDoseMakesThePoisonFeb2012_0.pdf

Some of the main findings of this report are:

- Scientific research conducted over the past 3 years shows that pesticides, detected on Australian Food have been linked to ADHD, learning and behavioural problems in children, potentially lower IQ in children and possibly increases in Lymphoblastic Leukemia. Longer term exposure to pesticides, commonly detected on Australian food, has been linked with development of Parkinsons Disease and a number of other diseases.

- Exposure to the impacts of these diseases can be reduced by purchasing organic food.

- Of major concern is the possible impact of these pesticides on human endocrine function, development of the human foetus, cancer, hypothyroidism and autism.

- Of the 121 types of pesticides detected on Australian food produce surveys, 44.6% are suspected endocrine disruptors, with 62.2% of all detections relating to suspected endocrine disrupting pesticides.

- Testing of food for pesticide residues in Australia is haphazard and not properly co-ordinated between states and federal government authorities. Current testing does not extend to all pesticides sprayed on food and for all food types and across market types.

- Current pesticide regulation does not properly take into account impacts on the endocrine system, immunotoxicity and the synergistic impact of a cocktail of pesticides that people may be exposed to, nor does it properly take into account chronic exposure of pesticides over a long period of time.

- Current pesticide regulation appears blinded to pesticides that can be more problematic at lower doses than high doses. The *'dose makes the poison philosophy'* needs to be overhauled to include pesticides that impact on the endocrine system.

- Imported food of concern is mostly that imported from India and China. With the insecticide Chlorpyrifos and the sterilising gas Ethylene Chlorohydrin detected most commonly. (68% of positive detections).

- The most at risk foods in Australia due to pesticide exposure include: Strawberries, Apples, Grapes, Lettuce, Pears and Nectarines. Friends of the Earth recommends that consumers stay clear of these products. Also of concern is: Wheat, Peaches, Bread, Biscuits, Imported Tea, Tomatoes, Apricots, Carrots, Green Beans, Plums, breakfast cereal, celery, broccoli, white wine, mushrooms and capsicums.

- Insecticides accounted for 51.3% of all pesticide detections, followed by fungicides 30.8%, synergists 6% and herbicides 4%.

- According to recently published science:

- More than one quarter of food eaten by small children contains pesticides, meaning that food is the main source of chemical exposure to youngsters.

- Exposure to Organochlorine pesticides may be linked to autism. 6.3% of all pesticide detections on Australian produce were organochlorines.

- Pesticides interfering with hormones may lead to weight gains and development of Type 2 Diabetes.

- Exposure to a number of pesticides is increasingly being associated with Parkinson's Disease.

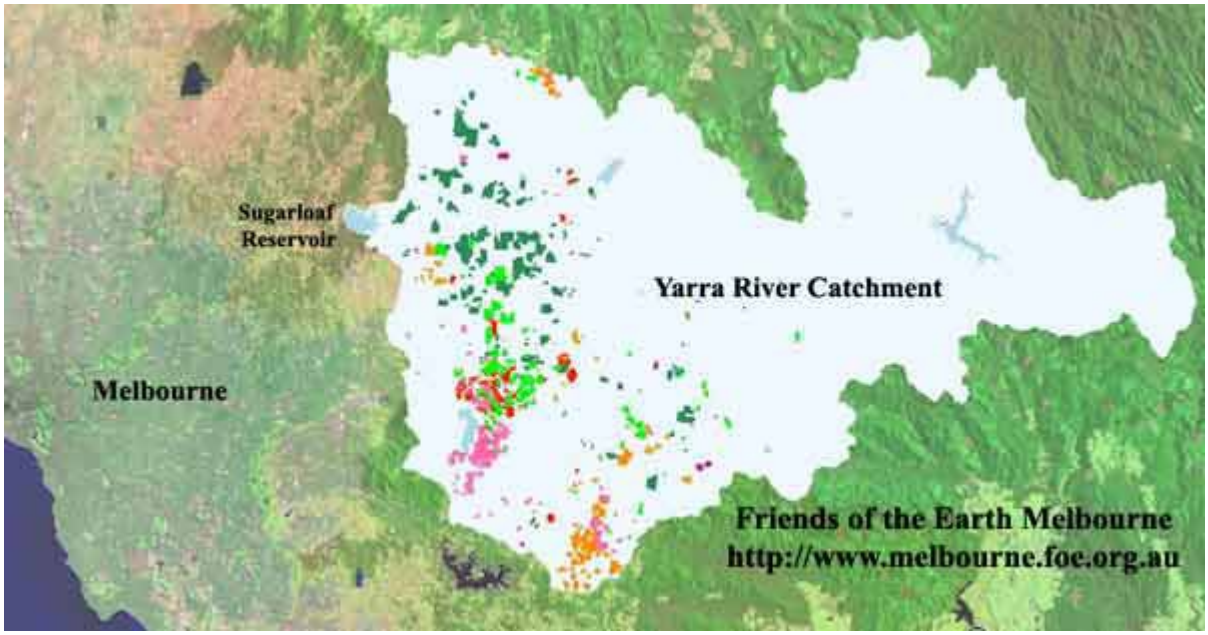
- Even pesticides regarded as less dangerous, Roundup/Glyphosate are now found to have serious environmental and health risks.

The proposed changes to pesticide regulation do not properly take into account impacts on the

endocrine system, immunotoxicity and the synergistic impact of a cocktail of pesticides that people may be exposed to, nor do they properly take into account chronic exposure of pesticides over an extended period of time. In 2009, The American Medical Association and The Endocrine Society both called for new policies to decrease public exposure to endocrine disrupting chemicals. Such calls have not occurred in Australia.

In June 2012, Friends of the Earth produced a report looking at pesticide detections in the Yarra River (above Sugarloaf Reservoir).
www.foe.org.au/sites/default/files/MelbourneWaterSupplyPesticidesJune2012.pdf
http://www.theage.com.au/victoria/pesticide-found-near-drinking-water-dam-20120616-20h3z.html

The report found that very little monitoring had been done in the catchment over the past 30 years, even though Sugarloaf Reservoir supplies 1.5 million Melbournians with drinking water. The report also highlight potential impacts to the ecology of the river through pesticide exposure. The report followed on from a 2008 report which assessed all available data concerning pesticide detections in Victorian Waterways between the years 1998-2008. With pesticides entering the Yarra on a frequent basis where are the regulatory authorities on this matter? Have any polluters ever been fined for allowing pesticides to pollute the Yarra and what steps have been undertaken by regulators to find the source of the pollution to make sure that it doesn't keep occurring.



Land use upstream of Melbourne's Sugarloaf Reservoir: Orange=potatoes. Pink=cut flowers. Red=Berry Farms. Light Green=Orchards. Dark Green=Vineyards.

Yarra Report Recommendations

1) Lack of adequate testing for the full range of pesticides by water authorities means that pesticide residues remain unreported.

2) There are no regulations in place in Australia that require biocide information to be reported and there are no government or private bodies who have responsibility for monitoring biocide application.

3) Under current regulations, The Victorian State Government (Department of Primary Industry) is responsible for Control of Use of pesticides – past point of sale – meaning that they should also be responsible for pesticide data collection information. The Federal Governmental regulator, the APVMA (Australian Pesticides Veterinary Medicines Authority) currently has no role past point of sale.

4) Without proper data information regarding use rates and quantities of pesticides used within water supply catchment, it is impossible for water authorities to know exactly what pesticides are being used where and in what quantities, making accurate testing impossible.

5) The current regulatory system does not properly take into account the potential low dose impacts from endocrine disrupting pesticides and it needs to adapt to new scientific developments in this area of expertise. The safe drinking water guideline in Australia for Atrazine is 20ug/L, yet hormonal impacts have been measured at 200 times less than this amount.

6) The European Union Drinking Water Standards have a limit for Atrazine 200 times less than the equivalent limit used in Australia. The European Standard has been breached 7 times at the Sugarloaf offtake during 2010-11.

7) There is little known about the ecological risk associated with detections of combinations of fungicides downstream from horticultural regions.

8) The Yarra River remains a non proclaimed water supply, even though it provides the largest number of Victorian's with drinking water. Almost every other community in Victoria has proclaimed water supplies, but not the Yarra. Proclamation could mean further land use controls in the catchment.

9) Agricultural Pesticide users should contribute to the costs of testing for pesticide residues by water authorities.

Yarra Summary

Virtually no testing for currently used pesticides was conducted by Melbourne Water or its predecessor, the Melbourne Metropolitan Board of Works between the commissioning of Sugarloaf reservoir in November 1980 and 2008, despite the Upper Yarra catchment being one of Australia's most intensively farmed and sprayed regions.

There is a very high likelihood that pesticides have been pumped from the Yarra River, into Sugarloaf reservoir consistently over the past 30 years.

Melbourne Water should immediately implement steps to remove the risk of pesticide pollution at Winneke Treatment Plant. Yarra source water should be treated with Ozone and Biologically Activated Carbon for best filtration of pesticides.

Atrazine has recently been detected in Yarra River source water at levels in breach of European Water protection standards and also at levels that have induced hermaphroditism in frogs. Simazine has also been detected at similar levels.

Sugarloaf provides drinking water to almost 40% of Melbourne's population [almost 7% of Australia's population].

The filtration process used at Sugarloaf, at Winneke Treatment Plant, was never designed to filter out pesticides.

Pesticide monitoring in the early 1980's revealed that pesticides were being detected upstream of Sugarloaf and downstream of Sugarloaf Reservoir.

Recent research has determined that 3 of the pesticides detected in the 1980 studies, DDE, Dieldrin and 2,4-D are suspected endocrine disruptors, meaning that low dose exposure could be more dangerous than previously acknowledged. It is highly likely that organochlorine insectides such as Dieldrin would entered the Melbourne Water supply system in the 1980's. Dieldrin has been reported to have a half life in water of 4 years.

Levels of DDT detected in 1980 would also be higher than future ANZECC (Australian and New Zealand Guidelines For Fresh Water Quality) Guidelines, meaning that the ecological status of the river would also likely to be impacted.

Government reports in the early 1980's acknowledged that Woori Yallock and Wandin Yallock creeks were suffering from ecological stress, with pesticides being the most likely reason. Few further ecological/pesticide studies in the waterways of the upper Yarra occurred for almost 30 years.

In 1988 a number of farms in the Gembrook area (45-50km upstream of Sugarloaf Reservoir) were quarantined due to unacceptably high levels of Dieldrin in soils. Prior to 1987 Dieldrin had been used extensively in the Gembrook region, to control pests including wireworm, a pest in potato crops. Australia stopped the use of Dieldrin in 1988. Residues of Dieldrin remain in sediment and surface water of the Upper Yarra River over 20 years since its use was discontinued.

From the mid 1990's vineyards expand significantly in the Yarra Valley. Vineyards are heavily reliant on pesticides, with over 100 types of pesticides allowed to be used.

Water quality risk assessments for the mid Yarra were not commissioned by Melbourne Water until 2003.

Pesticide testing by Melbourne Water concentrated only on organochlorines and 2,4-D until August 2005, when Atrazine was added. Atrazine has been consistently detected by Melbourne Water since July 2010.

MIS funded strawberry farms and their agricultural spray regimes raised controversy in the Woori Yallock Creek catchment during 2007 and 2008.

Melbourne Water admit in their December 2007 Catchment risk assessment that “The Sugarloaf catchment contains a significant area of high and very high biocide risk allotments”.

By August 2010, Melbourne Water increased testing to 136 pesticides and a number of pharmaceuticals. This had reduced back to 32 pesticides in June 2012.

Testing by Melbourne Water from July 2010 and August 2011, has found low levels of pesticides at the offtake to Sugarloaf Reservoir for 11 pesticides (31 detections). Testing has also detected low levels of pharmaceuticals. Most frequently detected pesticides include Simazine, DEET,

Metolachlor, Atrazine and MCPA.

Sugarloaf Reservoir water itself appears to be untested for pesticides.

The final summary points all refer to the recently published 'Effects of Pesticides Monitored with Three Sampling Methods in 24 Sites on Macroinvertebrates and Microorganisms' published in early 2011.

- This study revealed 43 pesticides detected in waterways in the Upper Yarra above the offtake to Sugarloaf Reservoir, with 26 detected in sediments.

- Fungicides are seen as a major problem (particularly Trifloxystrobin), as well as insecticides and herbicides.

- In terms of drinking water most concerns could be the relatively high levels of: Simazine, Fipronil, Pirimicarb and Methiocarb. Detected at much higher levels than the Melbourne Water tests conducted between July 2010 and April 2011.

- In terms of ANZECC guidelines there are serious considerations, with three pesticides, DDT, Chlorpyrifos and Simazine all breaching the ANZECC guidelines for both 99% and 95% trigger levels. Also of concern is that for 86% [37/43] of the pesticides detected, there is no current ANZECC guideline.

- The impacts of pesticides on macroinvertebrates include reductions in numbers at certain sites and deformities in Chironomid mouthparts.

- There are no guideline levels under 2011 Australian Drinking Water Guidelines for 53.49% of the pesticides detected [23 of the 43 pesticides detected in surface water] in the study.

- Melbourne Water Testing of 136 pesticides in August 2010, would still have missed 24 (55.8%) of pesticides detected in surface water in the 2011 study. Melbourne Water have now reduced this monitoring back to 32 pesticides.

- Melbourne Water Testing 1980-05 would miss 41 (95.3%) of pesticides detected in this study in surface water.

- Between November 1980 and November 2011, Melbourne Water would have missed at least 92% of pesticides detected in the 2011 study due to inappropriate and lax pesticide testing.

Even pesticides regarded as being 'safer' are coming under increasingly scrutinty. How does DAFF propose that the new system will deal will deal with recent concerns regarding Roundup?

...researchers have found that one of Roundup's inert ingredients can kill human cells, particularly embryonic, placental and umbilical cord cells... Nearly 4,000 inert ingredients are approved for use by the U.S. Environmental Protection Agency...But in the new study, scientists found that Roundup's inert ingredients amplified the toxic effect on human cells—even at concentrations much more diluted than those used on farms and lawns. One specific inert ingredient, polyethoxylated tallowamine, or POEA, was more deadly to human embryonic, placental and umbilical cord cells than the herbicide itself – a finding the researchers call "astonishing."... The research team suspects that Roundup might cause pregnancy problems by interfering with hormone production,

possibly leading to abnormal fetal development, low birth weights or miscarriages....Last month, an environmental group petitioned Argentina's Supreme Court, seeking a temporary ban on glyphosate use after an Argentine scientist and local activists reported a high incidence of birth defects and cancers in people living near crop-spraying areas. Scientists there also linked genetic malformations in amphibians to glysophate. In addition, last year in Sweden, a scientific team found that exposure is a risk factor for people developing non-Hodgkin lymphoma. Inert ingredients are often less scrutinized than active pest-killing ingredients..."
(http://www.environmentalhealthnews.org/ehs/news/roundup-weed-killer-is-toxic-to-human-cells.-study-intensifies-debate-over-inert-ingredients Web article links to report; Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental CellsNora Benachour and Gilles-Eric Séralini University of Caen, Laboratory Estrogens and Reproduction, UPRES EA 2608, Institute of Biology, Caen 14032, France *Chem. Res. Toxicol.*, 2009, 22 (1), pp 97–105 Publication Date (Web): December 23, 2008 Copyright © 2008 American Chemical Society. http://pubs.acs.org/doi/abs/10.1021/tx800218n)

In January, well-known plant pathologist and retired Purdue University professor Don Huber sent a letter to U.S. Agriculture Secretary Tom Vilsack warning of tests that indicated glyphosate could be contributing to spontaneous abortions and infertility in pigs, cattle and other livestock. Scientists in Argentina last year published a study saying glyphosate caused malformations in frog and chick embryos....Another study being looked at by the EPA cited detectable concentrations of glyphosate in the urine of farmers and their children in two U.S. states. Higher levels were found in farmers who did not wear protective clothing when they used glyphosate or who otherwise improperly handled it...The agency also said it is looking at a study partly sponsored by the EPA and the National Institutes of Health (NIH) that found some users of glyphosate were observed to have a higher risk of multiple myeloma, a cancer affecting bone marrow, than people who never used the chemical. (http://www.reuters.com/article/2011/04/08/us-glyphosate-epa-idUSTRE7374WX20110408)

Very low doses of some types of the herbicide Roundup can disrupt human liver cell function; the formulations' toxicity may be tied to their "inactive" ingredients rather than the active weed-killing ingredient glyphosate. French scientists report that a number of Roundup formulations tested at very dilute concentrations can alter hormone actions and cause human liver cells to die within 24 hours of treatment... In the study, exposure of a single gene regulated by either estrogen or androgen hormones demonstrated that all formulations disrupt hormone function more efficiently than purified glyphosate. The findings show that the formulations act against the hormones to produce anti-estrogenic and anti-androgenic effects.
(http://www.environmentalhealthnews.org/ehs/newscience/roundup-mix-more-toxic-to-liver-cells-than-glyphosate/ Web article links to report; Toxicology Volume 262, Issue 3, 21 August 2009, Pages 184–191 Glyphosate-based herbicides are toxic and endocrine disruptors in human cell lines. Céline Gasniera, Coralie Dumontb, Nora Benachoura, Emilie Claira, Marie-Christine Chagnonb, Gilles-Eric Séralini. http://www.sciencedirect.com/science/article/pii/S0300483X09003047)

"... the widely-used herbicide Roundup causes birth defects as well as "endocrine disruption, damage to DNA, reproductive and developmental toxicity, neurotoxicity, and cancer" at amounts similar to pesticide residue found on produce... Research dating back to 1980 showed that glyphosate, the active chemical in Roundup, caused birth defects in laboratory animals....More recently, a new pathogen that causes miscarriages in animals was discovered in genetically-modified crops treated with Roundup. Don Huber, professor emeritus at Purdue University, has written to US Secretary of Agriculture Tom Vilsack, asking for a moratorium on the deregulation of Roundup Ready crops. Dr. Huber also cited that glyphosate causes plant diseases and alters plants,

which can lead to animal disorders." (http://news.gather.com/viewArticle.action?articleId=281474979422521 Web article links to report; Roundup and birth defects: Is the public being kept in the dark? By Michael Antoniou, Mohamed Ezz El-Din Mostafa Habib, C. Vyvyan Howard, Richard C. Jennings, Carlo Leifert, Rubens Onofre Nodari, Claire Robinson, John Fagan. © Earth Open Source, 2011Corresponding author: Claire Robinson claire.robinson@earthopensource.org http://www.scribd.com/doc/57277946/RoundupandBirthDefectsv5)

"...the main active ingredient in Roundup causes malformations in frog and chicken embryos at doses far lower than those used in agricultural spraying and well below maximum residue levels in products presently approved in the European Union. The Carrasco group was led to research the embryonic effects of glyphosate by reports of high rates of birth defects in rural areas of Argentina where Monsanto's genetically modified "Roundup Ready" (RR) soybeans are grown in large monocultures sprayed from airplanes regularly." (http://www.globalresearch.ca/index.php?context=va&aid=21251 Web article links to report; Glyphosate-Based Herbicides Produce Teratogenic Effects on Vertebrates by Impairing Retinoic Acid Signaling. Alejandra Paganelli, Victoria Gnazzo, Helena Acosta, Silvia L. López, and Andrés E. Carrasco*Laboratorio de Embriología Molecular, CONICET-UBA, Facultad de Medicina, Universidad de Buenos Aires, Paraguay 2155, 3° piso (1121), Ciudad Autónoma de Buenos Aires, Argentina. Chem. Res. Toxicol., 2010, 23 (10), pp 1586–1595. DOI: 10.1021/tx1001749. Publication Date (Web): August 9, 2010. Copyright © 2010 American Chemical Society. http://pubs.acs.org/doi/abs/10.1021/tx1001749)

"...The conversion of US agriculture to monochemical herbicide practice has resulted in the extensive use of glyphosate herbicides. Coincidentally, farmers have been witnessing deterioration in the health of corn, soybean, wheat and other crops, and epidemics of diseases in small grain crops. All are associated with the extensive use of glyphosate, which has increased further since the introduction of glyphosate-tolerant, Roundup Ready (RR) crops.

Glyphosate immobilises nutrients required to maintain plant health and resistance to disease. This weakening of the plants defence could explain the infestation of GM crops with the new pathogen, which has now been observed in
horse, sheep, pigs, cows, chicken, multiple animal tissues including reproductive parts (semen, amniotic fluid), manure, soil, eggs, milk, as well as the common fungal pathogen that is currently infesting RR crops, Fusariumsolani fsp glycines mycelium. All are coming into contact with glyphosate either through direct exposure or consumption through animal feed. It is also highly abundant in crops suffering from plant Goss' wilt and sudden death syndrome..." (http://www.i-sis.org.uk/USDA_scientist_reveals_all.php)

Wurdee Boluc Aquaduct south west of Geelong.

Appendicies

Pesticides Detected in Victorian Domestic Water Supply Catchment 1998-2011.

A Question to Committee Members

Who is responsible for these common pollution events and how will amendments to the Agricultural and Veterinary Chemicals Legislation Amendment Bill 2012 stop this pollution from occurring? What authorities are responsible for tracking the source of the pollution? What consequences does the polluter face and how many of the polluters responsible for these pesticides entering drinking water supplies in Victoria faced legal consequences for their actions?

(ADWG refers to Australian Drinking Water Guidelines)

1. Oct 05 Goulburn Murray Water Kerang Channel 14/2 Esfenvalerate 65ug/L

2. 12/5//03 Barwon Water Wurdee Boluc Raw Water 2,4-D 34ug/l

3. 26/8/10 Mitchell Shire Council. Sunday Creek Catchment Simazine 20ug/l. Sample taken 50km upstream from nearest town off-take at Nagambie

4. 19/8/03 Barwon Water Wurdee Boluc Inlet Chan 2,4-D 27ug/l

5. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Simazine 15ug/L

6. 5/8/03 Barwon Water Stony Creek Res #3 2,4-D 20ug/l

7. 22/6/06 Goulburn Valley Water Broken Creek Numurkah 2,4-D 17ug/l

8. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Fipronil 0.22ug/L

9. Jan 94 Colac Water Board Olangolah DDT 2ug/l

10. Sheep Station Creek Upstream Sugarloaf Reservoir? 2008? Pirimicarb 1.4ug/L

11. 5/10/05 Goulburn Valley Water Sunday Creek Res Pentachlorophenol 2ug/L

12. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Methiocarb 1.2ug/L

13. 28/10/99 Barwon Water Highton PreDisinfection Dieldrin 0.03ug/l

14. 21/12/05 Goulburn Valley Water Broken Creek Numurkah Pentachlorophenol 1ug/L

15. 7/2/00 Melbourne Water Johns Hill Plant Aldrin 0.02ug/L

16. 18/10/00 Goulburn Valley Water Katamatite Heptachlor 0.02ug/L

17. 4/6/08 Barwon Water Moorabool WTP 2,4-D 1.9ug/L

18. 19/7/11 Barwon Water Matthews Creek MCPA 2.4ug/L

19. 7/2/00 Melbourne Water Kallista Heptachlor 0.013ug/l

20. Stringybark Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Simazine 0.67 ug/L

21. 2007/8 WQR Western Water Djerriwarrh Reservoir (Raw) Aldrin 0.01ug/l

22. Sheep Station Creek Upstream Sugarloaf Reservoir? 2008? Iprodione 3ug/L

23. 22/6/11 Barwon Water M6/3 Stony Creek Reservoir 3 Atrazine 0.5ug/L

24. 4/3/05 Barwon Water Koweinguboora Reservoir Hexazinone 9.4ug/L

25. Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Propargite 0.15 ug/L

26. 8/5/06 Goulburn Murray Water Broken Creek Glyphosate 160ug/l

27. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Atrazine 0.31ug/L

28. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Endosulfan 0.31ug/L

29. Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Propargite 0.1 ug/L

30. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Dimethoate 0.094ug/L

31. 27/10/96 Blair Tank (Horsham) Simazine 0.24ug/L. Investigation of Microbiological & Water Quality in Rainwater Tanks in Victoria. June 1977 Report No. 139/97, Water Ecoscience. R. Bannister

32. 10/9/10 Barwon Water Matthews Creek MCPA 0.48ug/L

33. Watts River Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Dieldrin 0.003 ug/L

34. 24/12/10 Barwon Water Moorabool WTP Combined Atrazine 0.2ug/L

35. 4/2/11 Barwon Water Moorabool WTP Combined Atrazine 0.2ug/L

36. 4/3/11 Barwon Water Moorabool WTP Combined Atrazine 0.2ug/L

37. 4/6/02 East Gippsland Water Rocky River (Orbost) Simazine 0.20ug/L

38. 9/11/11Wannon Water Warrnambool Headworks and Storages Atrazine 0.19ug/L

39. 11/8/11 Melbourne Water Yarra River Sugarloaf Offtake Atrazine 0.188ug/L

40. Jan 06 Goulburn Valley Water Katamatite Chlorpyrifos 0.089ug/L

41. 14/7/11 Melbourne Water Yarra River Sugarloaf Offtake Atrazine 0.173ug/L

42. 8/5/06 Goulburn Murray Water Broken Creek Glyphosate 85ug/l

43. 17/7/07 Barwon Water Inlet Channel Salt Creek Lane Glyphosate 80ug/l

44. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Dieldrin 0.022ug/L

45. 14/7/11 Melbourne Water Yarra River Sugarloaf Offtake Simazine 0.134ug/L

46. 14/3/07 Barwon Water Gellibrand Lardners Creek 2,4-D 0.2ug/L

47. 28/3/07 Barwon Water Aireys Inlet Painkalac Creek 2,4-D 0.2ug/L

48. Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Dieldrin 0.002 ug/L

49. 17/8/10 Barwon Water Matthews Creek MCPA 0.26ug/L

50. Woady Yallock Creek Upstream Sugarloaf Reservoir? 2008? Simazine 0.11 ug/L

51. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) 4,4-DDT 0.046ug/L

52. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Fenarimol 0.2ug/L

53. 17/4/11 Barwon Water M6/3 Stony Creek Reservoir 3 Atrazine 0.1ug/L
54. 22/6/11 Barwon Water M6/3 Stony Creek Reservoir 3 Atrazine 0.1ug/L
55. 8/9/10 Barwon Water Moorabool WTP Combined Atrazine 0.1ug/L
56. 7/12/10 Barwon Water Moorabool WTP Combined Atrazine 0.1ug/L
57. 7/6/11 Barwon Water Moorabool WTP Combined Atrazine 0.1ug/L
58. 22/6/11 Barwon Water Moorabool WTP Combined Atrazine 0.1ug/L
59. 2007/8 WQR Western Water Kerrie Reservoir (Raw) Chlordane 0.01ug/L
60. 3/11/10 Lower Murray Water Murray River Robinvale Simazine 0.09ug/L
61. Woady Yallock Creek Upstream Sugarloaf Reservoir? 2008? Atrazine 0.088 ug/L
62.Wandin Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Simazine 0.083 ug/L
63. 23/7/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Simazine 0.08ug/l
64. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Chlorpyrifos 0.04ug/L
65. Sheep Station Creek Upstream Sugarloaf Reservoir? 2008?Chlorpyrifos 0.04ug/L
66. 4/11/10 Lower Murray Water Murray River Kerang Simazine 0.07ug/L
67. 4/11/10 Lower Murray Water Murray River Koondrook Simazine 0.07ug/L
68. 10/11/11 Wannon Water Hamilton Atrazine 0.07ug/L
69. 31/1/05 Barwon Water Korweinguboora Outlet Hexazinone 1.3ug/L
70. 15/12/09 Barwon Water Wurdee Boluc Inlet Channel 2,4-D 0.09ug/L
71. 3/11/10 Lower Murray Water Murray River Swan Hill Simazine 0.06ug/L
72. 3/11/10 Lower Murray Water Piangil Simazine 0.06ug/L
73. Dec 05 Goulburn Murray Water Katamatite Channel 7/3 Atrazine 0.056ug/L
74. 18/5/11Melbourne Water Yarra River Sugarloaf Offtake Atrazine 0.056ug/L
75. Mar 06 Goulburn Murray Water Kerang Channel 14/2 Atrazine 0.050ug/L
76. Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Hexazinone 0.96ug/L
77. March 2006 Goulburn Murray Water Goulburn Weir/Nagambie Atrazine 0.048ug/L
78. Dec 05 Goulburn Murray Water Katamatite Channel 7/3 Atrazine 0.045ug/L
79. February 2006 Goulburn Murray Water Goulburn Weir/Nagambie Atrazine 0.044ug/L
80. 7/3/05 Barwon Water Korweinguboora Outlet Hexazinone 0.86ug/L
81. April 06 Goulburn Murray Water Tatura Channel 3/5 Atrazine 0.042ug/L
82. December 2005: Goulburn Murray Water Goulburn Weir/Nagambie atrazine 0.042ug/L
83. Feb 06 Goulburn Murray Water Tatura Channel 3/5 Atrazine 0.041ug/L
84. 7/2/00 Melbourne Water Johns Hill Plant Kallista Lindane 0.02ug/L
85. Jan 06 Goulburn Murray Water Tatura Channel 3/5 Atrazine 0.040ug/L
86. Mar 06 Goulburn Murray Water Tatura Channel 3/5 Atrazine 0.040ug/L
87. 3/11/10 Lower Murray Water Robinvale 0.04ug/L Atrazine
88. 4/11/10 Lower Murray Water Murray River Kerang 0.04ug/L Atrazine
89. 4/11/10 Lower Murray Water Murray River Koondrook 0.04ug/L Atrazine
90. 4/11/10 Lower Murray Water Murray River Mildura 0.04ug/L Simazine
91. 4/11/10 Lower Murray Water Murray River Red Cliffs Simazine 0.04ug/L
92. Mar 06 Goulburn Murray Water Corop Rochester Channel 1 Atrazine 0.039ug/L

93. Jan 06 Goulburn Murray Water Katamatite Channel 7/3 Atrazine 0.038ug/L

94. Jan 06 Goulburn Murray Water Kerang Town Channel 14/2 Atrazine 0.038ug/L

95. 11/8/11 Melbourne Water Yarra River Sugarloaf Offtake Simazine 0.038ug/L

96. April 06 Goulburn Murray Water Corop Rochester Channel 1 Atrazine 0.036ug/L

97. April 2006 Goulburn Murray Water Goulburn Weir/Nagambie Atrazine 0.036ug/L

98. Jan 06 Goulburn Murray Water Kerang Town Channel 14/2 Atrazine 0.035ug/L

99. 18/9/07 Barwon Water Matthews Creek MCPA 0.07ug/L

100. 15/12/09 Barwon Water Matthews Creek (Geelong) MCPA 0.07ug/L

11/8/11 Melbourne Water Yarra River Sugarloaf Offtake MCPA 0.07ug/L

7/3/05 Barwon Water Korweinguboora Outlet Hexazinone 0.67ug/L

15/12/09 Barwon Water Matthews Creek 2,4-D 0.05ug/L

April 04 Goulburn Murray Water West Boort Channel 5 Atrazine 0.033ug/L

January 2006 Goulburn Murray Water Goulburn Weir/Nagambie Atrazine 0.033ug/L

April 04 Goulburn Murray Water West Boort Channel 5 Atrazine 0.032ug/L

Oct 05 Goulburn Murray Water Katamatite Channel 7/3 Atrazine 0.031ug/L

Feb 06 Goulburn Murray Water Kerang Channel 14/2 Atrazine 0.031ug/L

May 06 Lower Murray Water Red Cliffs supply Atrazine 0.030ug/L

May 06 Lower Murray Water Mildura supply Atrazine 0.030ug/L

May 06 Lower Murray Water Piangil supply Atrazine 0.030ug/L

Nov 05 Goulburn Murray Water Katamatite Channel 7/3 Atrazine 0.030ug/L

Mar 05 Goulburn Murray Water Katamatite Channel 7/3 Atrazine 0.030ug/L

2/12/09 Barwon Water Forrest WTP MCPA 0.06ug/L

3/11/10 Lower Murray Water Murray River Red Cliffs 0.03ug/L

3/11/10 Lower Murray Water Murray River Swan Hill 0.03ug/L

3/11/10 Lower Murray Water Murrabit 0.03ug/L Simazine

4/11/10 Lower Murray Water Murrabit 0.03ug/L Atrazine

10/11/11 Wannon Water Hamilton Atrazine 0.03ug/L

10/11/11 Wannon Water Hamilton Atrazine 0.03ug/L

120+

8/11/11 Wannon Water Balmoral Atrazine 0.03ug/L

7/3/05 Barwon Water Bostok Outlet Hexazinone 0.58ug/L

7/3/05 Barwon Water Bostok Outlet Hexazinone 0.56ug/L

April 04 Goulburn Murray Water Kerang Channel 14/2 Atrazine 0.028ug/L

11/7/10 Barwon Water Lorne WTP 2,4-D 0.04ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Carbaryl 0.039ug/L

11/2/11 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Simazine 0.026ug/L

9/11/11 Wannon Water Warrnambool Headworks and Storages 2,4-D 0.04ug/L

Dec 05 Goulburn Murray Water Tatura Channel 3/5 Atrazine 0.025ug/L

Oct 05 Goulburn Murray Water Corop Rochester Channel 1 Atrazine 0.024ug/L

Yarra River Upstream Sugarloaf Reservoir? 2008? Site 2 Simazine 0.023ug/L

20/8/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Atrazine 0.023ug/l

7/3/05 Barwon Water Bostok Outlet Hexazinone 0.44ug/L

Oct 05 Goulburn Murray Water West Boort Channel 5 Atrazine 0.022ug/L

Nov 05 Goulburn Murray Water Kerang Channel 14/2 Atrazine 0.022ug/L

2007/8 WQR Pykes Creek Reservoir (Raw) 2,4-D 0.03ug/L

2/6/10 Barwon Water Meredith WTP 2,4-D 0.03ug/L

15/12/09 Barwon Water Wurdee Boluc Inlet Channel 2,4-D 0.03ug/L

Yarra River Upstream Sugarloaf Reservoir? 2008? Site 12 Simazine 0.02ug/L

Sheep Station Creek Upstream Sugarloaf Reservoir? 2008? Carbaryl 0.03ug/L

140+

April 05 Goulburn Murray Water Tatura Channel 3/5 Atrazine 0.02ug/L

Feb 06 Goulburn Murray Water Corop Rochester Channel 1 Atrazine 0.02ug/L

January 2005: Goulburn Murray Water Goulburn Weir/Nagambie Atrazine 0.02ug/L

April 2005 Goulburn Murray Water Goulburn Weir/Nagambie Atrazine 0.02ug/L

18/9/07 Barwon Water Wurdee Boluc Inlet Channel MCPA 0.04ug/L

3/11/10 Lower Murray Water Murray River Mildura Atrazine 0.02ug/L

3/5/10 Wannon Water East Zone Headworks and Storages MCPA 0.04ug/L

March 2005: Goulburn Murray Water Goulburn Weir/Nagambie Atrazine 0.019ug/L

Goulburn Murray Water Goulburn Weir/Nagambie November 2005 Endosulfan 0.0186ug/L

31/1/05 Barwon Water Korweinguboora Inlet Hexazinone 0.37ug/L

11/2/11 Melbourne Water Yarra River Sugarloaf Offtake Metolachlor 0.273ug/L

Mar 05 Goulburn Murray Water West Boort Channel 5 Atrazine 0.018ug/L

10/9/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Atrazine 0.018ug/l

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Triclorfon 0.006ug/L

Stringybark Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Pirimicarb 0.006 ug/L

Sep 05 Goulburn Murray Water Katatmatite Channel 7/3 Atrazine 0.017ug/L

Sep 05 Goulburn Murray Water West Boort Channel 5 Atrazine 0.016ug/L

10/9/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Simazine 0.016ug/l

1/12/04 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.32ug/L

10/9/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake MCPA 0.03ug/l

160+

3/5/10 Wannon Water East Zone Headworks and Storages MCPA 0.03ug/L

13/4/11Wannon Water Warrnambool Headworks and Storages MCPA 0.03ug/L

9/11/11 Wannon Water Warrnambool Headworks and Storages MCPA 0.03ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Pirimicarb 0.005 ug/L

5/2/07 Western Water Kerrie Reservoir 2,4-D 0.02ug/L

3/6/10 Barwon Water Apollo Bay WTP 2,4-D 0.02ug/L

2/6/10 Barwon Water Moorobool WTP 2,4-D 0.02ug/L

15/12/09 Barwon Water Pennyroyal Creek 2,4-D 0.02ug/L

4/2/11 Melbourne Water Yarra River Sugarloaf Reservoir Offtake 2,4-D 0.02ug/L

4/3/11 Barwon Water Meredith WTP 2,4-D 0.02ug/L

20/8/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Simazine 0.013ug/l

7/3/05 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.24ug/L

Olinda Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Simazine 0.012ug/L

(2007-08 Annual Report) Lower Murray Water Swan Hill Atrazine 0.012ug/L

5/8/09 Wannon Water Warrnambool Headworks and Storages 2,4-D 0.02ug/L

6/4/11 Wannon Water Cavendish 2,4-D 0.02ug/L

13/4/11 Wannon Water Warrnambool Headworks and Storages 2,4-D 0.02ug/L

5/5/11 Wannon Water Cavendish 2,4-D 0.02ug/L

18/5/11 Melbourne Water Yarra River Sugarloaf Offtake Simazine 0.012ug/L

Yarra River Upstream Sugarloaf Reservoir? 2008? Site 1 Pirimicarb 0.004ug/L

180+

Yarra River Upstream Sugarloaf Reservoir? 2008? Site 2 Pirimicarb 0.004ug/L

Woori Yallock Creek Upstream Sugarloaf Reservoir? 2008? Pirimicarb 0.004ug/L

31/1/05 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.22ug/L

7/3/05 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.22ug/L

Mar 05 Goulburn Murray Water Corop Rochester Channel 1 Atrazine 0.011ug/L

31/1/05 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.21ug/L

23/7/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Triclopyr 0.01ug/l

7/3/05 Barwon Water Korweinguboora Outlet Hexazinone 0.20ug/L

7/3/05 Barwon Water Korweinguboora Outlet Hexazinone 0.20ug/L

9/11/06 Barwon Water Moorabool Treatment Hexazinone 0.20ug/L

4/1/06 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.20ug/L

7/2/06 Barwon Water Stony Creek Reservoir#3 Hexazinone 0.20ug/L

21/3/11 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Glyphosate 0.5ug/L

Jan 05 Goulburn Murray Water Tatura Channel 3/5 Atrazine 0.01ug/L

Oct 04 Goulburn Murray Water West Boort Channel 5 Atrazine 0.01ug/L

Nov 04 Goulburn Murray Water West Boort Channel 5 Atrazine 0.01ug/L

Dec 04 Goulburn Murray Water West Boort Channel 5 Atrazine 0.01ug/L

Feb 05 Goulburn Murray Water West Boort Channel 5 Atrazine 0.01ug/L

Apr 05 Goulburn Murray Water West Boort Channel 5 Atrazine 0.01ug/L

Dec 04 Goulburn Murray Water Kerang Channel 14/2 Atrazine 0.01ug/L

February 2005: Goulburn Murray Water Goulburn Weir/Nagambie Atrazine 0.01ug/L

4/9/09 Barwon Water Birregurra WTP MCPA 0.02ug/L

21/9/10 Barwon Water Matthews Creek MCPA 0.02ug/L

23/7/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake MCPA 0.02ug/l

3/5/10 Wannon Water East Zone Headworks and Storages MCPA 0.02ug/L

15/11/11 Wannon Water Penshurst Atrazine 0.01ug/L

4/3/05 Barwon Water Bannockburn Basin Hexazinone 0.19ug/L

31/1/05 Barwon Water Upper Stony Creek Res #2 Hexazinone 0.18ug/L

5/4/06 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.18ug/L

October 2005 Goulburn Murray Water Goulburn Weir/Nagambie Endosulfan 0.0087ug/L

3/5/06 Barwon Water Moorabool Treatment Hexazinone 0.17ug/L

7/3/05 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.16ug/L

7/3/05 Barwon Water Upper Stony Creek Res #2 Hexazinone 0.15ug/L

7/3/05 Barwon Water Upper Stony Creek Res #2 Hexazinone 0.15ug/L

15/12/06 Barwon Water Moorabool Treatment Hexazinone 0.15ug/L

(2007-08 Annual Report) Lower Murray Water Koondrook Atrazine 0.007ug/L

(2007-08 Annual Report) Lower Murray Water Mildura Atrazine 0.007ug/L

9/12/09 Barwon Water Colac WTP 2,4-D 0.01ug/L

3/3/10 Barwon Water Moorabool WTP 2,4-D 0.01ug/L

7/1/11 Melbourne Water Yarra River Sugarloaf Offtake Metolachlor 0.1ug/L

220+

7/2/07 Barwon Water Moorabool Treatment Hexazinone 0.13ug/L

5/4/06 Barwon Water Moorabool Treatment Hexazinone 0.12ug/L

3/2/11 Wannon Water Glenthompson Dicamba 0.03ug/L

11/5/11 Wannon Water Terang 2,4-D 0.01ug/L

9/11/11 Wannon Water Casterton 2,4-D 0.01ug/L

7/11/11 Wannon Water Simpson 2,4-D 0.01ug/L

18/5/11 Wannon Water Cavendish 2,4-D 0.01ug/L

23/5/11 Wannon Water Terang 2,4-D 0.01ug/L

11/8/11 Melbourne Water Yarra River Sugarloaf Offtake Dicamba 0.03ug/L

7/6/06 Barwon Water Moorabool Treatment Hexazinone 0.11ug/L

8/8/06 Barwon Water Moorabool Treatment Hexazinone 0.11ug/L

7/3/07 Barwon Water Moorabool Treatment Hexazinone 0.11ug/L

3/5/07 Barwon Water Moorabool Treatment Hexazinone 0.11ug/L

4/3/05 Barwon Water Montpellier Basin #4 Hexazinone 0.10ug/L

18/9/07 Barwon Water Pennyroyal Creek MCPA 0.01ug/L

15/12/09 Barwon Water Pennyroyal Creek (Geelong) MCPA 0.01ug/L

13/9/10 Barwon Water Gellibrand MCPA 0.01ug/L

4/11/09 Wannon Water Balmoral MCPA 0.01ug/L

4/11/09 Wannon Water Warrambool Headworks and Storages MCPA 0.01ug/L

7/3/06 Barwon Water East Moorabool River Hexazinone 0.086ug/L

240+

7/6/06 Barwon Water Stony Creek Reservoir #3 Hexazinone 0.084ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Propiconazole 0.021ug/L

31/1/05 Barwon Water Bungal Creek Hexazinone 0.082ug/L

5/10/06 Barwon Water Moorabool Treatment Hexazinone 0.082ug/L

3/10/07 Barwon Water Moorabool WTP Hexazinone 0.074ug/L

4/1/06 Barwon Water Moorabool Treatment Hexazinone 0.071ug/L

6/8/07 Barwon Water Moorabool WTP Hexazinone 0.067ug/L

Wandin Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Carbaryl 0.005 ug/L

4/7/07 Barwon Water Moorabool Treatment Hexazinone 0.06ug/L

7/3/06 Barwon Water Moorabool Treatment Hexazinone 0.058ug/L

Dec 04 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0027ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Triadimefon 0.012ug/L

7/3/05 Barwon Water Korweinguboora Outlet Hexazinone 0.051ug/L

Woady Yallock Creek Upstream Sugarloaf Reservoir? 2008? Hexazinone 0.048 ug/L

Sep 05 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0024ug/L

7/3/05 Barwon Water Bungal Creek Hexazinone 0.047ug/L

Nov 05 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0023ug/L

December 2005 Goulburn Murray Water Goulburn Weir/Nagambie Endosulfan 0.0021ug/L

Nov 05 Goulburn Murray Water Tatura Channel 3/5 Endosulfan 0.0020ug/L

Jan 05 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0020ug/L

260+

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Pendimethalin 0.04ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Pendimethalin 0.04 ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Pendimethalin 0.04ug/L

17/10/07 Barwon Water Bostok Outlet Hexazinone 0.036 ug/L

Oct 04 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0017ug/L

Dec 05 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0017ug/L

Jan 05 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0017ug/L

15/12/06 Barwon Water Moorabool Treatment Hexazinone 0.032ug/L

Nov 04 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0015ug/L

Feb 05 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0015ug/L

Mar 05 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0015ug/L

Apr 05 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0015ug/L

Jan 06 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0015ug/L

Feb 06 Goulburn Murray Water Corop Rochester Channel 1 Endosulfan 0.0015ug/L

Oct 04 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Nov 04 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Dec 04 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Feb 05 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Mar 05 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Apr 05 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

280+

Sep 05 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Dec 05 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Jan 06 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Feb 06 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Feb 06 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

Sep 05 Goulburn Murray Water West Boort Channel 5 Endosulfan 0.0015ug/L

15/8/07 Barwon Water Bostok Outlet Hexazinone 0.029ug/L

*19/12/07 Barwon Water Barham River 200m u/s river Temephos 0.026ug/L

10/9/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Metolachlor 0.017ug/l

5/9/07 Barwon Water Moorabool WTP Hexazinone 0.02ug/L

4/6/08 Barwon Water Moorabool WTP Hexazinone 0.02ug/L

*18/12/07 Barwon Water Wurdee Boluc Inlet Salt Creek Lane Temephos 0.02ug/L

Shepherd Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Pendimethalin 0.02 ug/L

5/12/07 Barwon Water Moorabool WTP Hexazinone 0.019ug/L

6/2/08 Barwon Water Moorabool WTP Hexazinone 0.018ug/L

14/7/11 Melbourne Water Yarra River Sugarloaf Offtake Metolachlor 0.013ug/L

17/10/07 Barwon Water Korweinguboora Outlet Hexazinone 0.016ug/L

*18/12/07 Barwon Water Pennyroyal Creek Temephos 0.014ug/L

*19/12/07 Barwon Water Barham River @ Pumping Station Temephos 0.014ug/L

300+

9/10/08 Barwon Water Moorabool WTP Combined Raw Water Hexazinone 0.014ug/L

Oct 05 Goulburn Murray Water Katamatite Channel 7/3 Endosulfan 0.0007ug/L

23/7/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Metolachlor 0.01ug/l

*18/12/07 Barwon Water Callahans Creek Temephos 0.013ug/L

*19/12/07 Barwon Water Barham River Marengo Basin Temephos 0.012ug/L

4/9/07 Barwon Water Lorne Hexazinone 0.012ug/L

*18/12/07 Barwon Water Matthews Creek Temephos 0.011ug/L 0.0037%adwg

November 2004: Goulburn Murray Water Goulburn Weir/Nagambie Trace level Endosulfan

August 2005 Goulburn Murray Water Goulburn Weir/Nagambie atrazine trace

October 2005: Goulburn Murray Water Goulburn Weir/Nagambie atrazine trace

November 2005: Goulburn Murray Water Goulburn Weir/Nagambie atrazine trace

No Guidelines under the Australian Drinking Water Guidelines

Oct 05 Goulburn Murray Water Kerang Channel 14/2 Bifenthrin 100ug/L

Oct 05 Goulburn Murray Water Kerang Channel 14/2 Taufluvalinate 75ug/L.

Oct 98 Goulburn Valley Water Mooroopna Offtake ? Unidentifed Peaks

13/9/00 Goulburn Valley Water Violet Town Hexachlorobenzene 0.004ug/L

12/7/00 Goulburn Valley Water Picola Hexachlorobenzene 0.003ug/L

2/8/00 Goulburn Valley Water Katunga Hexachlorobenzene 0.003ug/L

9/2/05 Goulburn Valley Water Shepparton Hexachlorobenzene 0.002ug/L

18/9/07 Barwon Water Wurdee Boluc Channel @ 8 Mile 245TCP

9/12/09 Barwon Water Colac WTP 4, chlorophenoxy acetic acid 0.05ug/L

9/12/09 Barwon Water Gellibrand WTP 4, chlorphenoxy acetic acid 0.05ug/L

18/9/07 Barwon Water Wurdee Boluc @ Salt Creek Lane 4, chlorophenoxy acetic acid 0.04ug/L

18/9/07 Barwon Water Wurdee Boluc @ Brickmakers Rd 4, chlorophenoxy acetic acid 0.01ug/L

15/12/09 Barwon Water Wurdee Boluc @ Salt Creek Lane 4, chlorophenoxy acetic acid 0.01ug/L

Nov 02 Macalister River DEET 0.0207ug/L

23/7/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake Carbamazepine 0.02ug/l

10/9/10 Melbourne Water Yarra River Sugarloaf Reservoir Offtake DEET 0.01ug/l

7/1/11 Melbourne Water Yarra River Sugarloaf Reservoir Offtake DEET 0.04ug/L

11/2/11 Melbourne Water Yarra River Sugarloaf Reservoir Offtake DEET 0.022ug/L

21/3/11 Melbourne Water Yarra River Sugarloaf Reservoir Offtake DEET 0.05ug/L

7/4/11 Melbourne Water Yarra River Sugarloaf Reservoir Offtake DEET 0.05ug/L

4/5/11 Melbourne Water Yarra River Sugarloaf Offtake DEET 0.016ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) 4,4-DDD 0.022ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) 4,4-DDE 0.024ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Azoxystrobin 0.02ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Boscalid 0.02ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Cyproconazole 0.39ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) DIA 1.3ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Diflenoconazole 0.15ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Dimethomorph 0.01ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Fenoxycarb 0.034ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Imidacloprid 0.59ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Indoxacarb 0.33ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Linuron 0.6ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Metalaxyl 0.012ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Myclobutanil 2.9ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Oxadixyl 0.39ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Penconazole 0.05ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Prochloraz 0.06ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Procymidone 0.91ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Prometryn 21ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Pyraclostrobin 0.1ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Pyrimethanil 70ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Spinosad 0.03ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Tebuconazole 0.04ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Tebufenozide 0.045ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Tetraconazole 0.059ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Triadimenol 0.002ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Trifloxystrobin 0.73ug/L

Yarra River Upstream Sugarloaf Reservoir? 2008? Site 1 Metalaxyl 0.003ug/L

Yarra River Upstream Sugarloaf Reservoir? 2008? Site 1 Myclobutanil 0.009ug/L

Olinda Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Imidacloprid 0.045ug/L

Stringybark Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Myclobutanil 0.05 ug/L

Watts River Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Indoxacarb 0.05 ug/L

Watts River Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Difenconazole 0.02 ug/L

Wandin Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Imidacloprid 0.01 ug/L

Wandin Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Mycobutanil 0.03 ug/L

Wandin Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Tebuconazole 0.002 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Metalaxyl 0.003 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Imidacloprid 0.01 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Myclobutanil 0.02 ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Linuron 0.6ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Metalaxyl 0.012ug/L

Yarra River Upstream Sugarloaf Reservoir (Environment, Science & Technology 10/1/11) Myclobutanil 2.9ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Pyrimethanil 0.09 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Indoxacarb 0.33 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Metalaxyl 0.005 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Difenconazole 0.1 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Trifloxystrobin 0.16 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Pyraclostrobin 0.1 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Fenoxycarb 0.03 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Prochloraz 0.03 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Pyrimethanil 0.004 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Tebuconazole 0.03 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Penconazole 0.01 ug/L

Woori Yallock Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Tetraconzole 0.01 ug/L

McCrae Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Trifloxystrobin 0.006 ug/L

Shepherd Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Indoxacarb 0.04 ug/L

Shepherd Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Metalaxyl 0.002 ug/L

Shepherd Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Difenconazole 0.01 ug/L

Shepherd Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Trifloxystrobin 0.03 ug/L

Shepherd Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Pyraclostrobin 0.01 ug/L

Hoddles Creek Yarra River Catchment Upstream Sugarloaf Reservoir? 2008? Tebuconazole 0.004 ug/L

Yarra River Upstream Sugarloaf Reservoir? 2008? Site 12 Fenoxycarb 0.002ug/L

Little Yarra River Upstream Sugarloaf Reservoir? 2008? Metalaxyl 0.007ug/L

Sheep Station Creek Upstream Sugarloaf Reservoir? 2008? Metalaxyl 0.005ug/L

Sheep Station Creek Upstream Sugarloaf Reservoir? 2008? Trifloxystrobin 0.73ug/L

Sheep Station Creek Upstream Sugarloaf Reservoir? 2008? Myclobutanil 2.1ug/L

Sheep Station Creek Upstream Sugarloaf Reservoir? 2008? Pyrimethanil 70ug/L

Sheep Station Creek Upstream Sugarloaf Reservoir? 2008? Cyproconazole 0.39ug/L

Woori Yallock Creek Upstream Sugarloaf Reservoir? 2008? Metalaxyl 0.004ug/L

Woori Yallock Creek Upstream Sugarloaf Reservoir? 2008? Pyrimethanil 0.12ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Indoxacarb 0.27ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Difenconazole 0.08ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Trifloxystrobin 0.15ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Pyraclostrobin 0.08ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Fenoxycarb 0.016ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Prochloraz 0.02 ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Tebuconazole 0.006 ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Azoxystrobin 0.003 ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Penconazole 0.01 ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Cyprodinil 0.01 ug/L

Cockatoo Creek Upstream Sugarloaf Reservoir? 2008? Tebuconazole 0.01 ug/L

7/3/06 South Gippsland Water Dumbalk Tarwin River Methoxychlor 2ug/L