http://www.taswaterandseweragereform.com.au/index.htmlSubmission to the Review of the Code of Practice for Aerial Spraying in Tasmania

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Accessibility of fresh water is one of the most pressing problems affecting the future of this country and its inhabitants. I argue in this submission that voluntary codes to protect water quality have not served the interests of communities or the environment.

Access to clean and safe drinking water, as designated by the UN, is a fundamental human right. Accordingly, as in other developed countries, effective legislation should be introduced immediately to enforce this right.

EXECUTIVE SUMMARY

- The active and other ingredients of agricultural chemical formulations have been proven to be harmful to humans.[1] Chemicals can be harmful either as a single agent or in combinations and often at lower concentrations than recommended as being safe.[2]
  Currently our water systems have been and continue to be degraded because of lack of control over pollution from chemicals and the practices of the timber and agriculture industries. Inadequate administrative measures such as those used by the Spray and Referral Unit have contributed to this.[3]

- Chemical pollution of waterways can emanate from ground and aerial spraying. Chemicals can be carried into waterways and leach into groundwater, ultimately contaminating the water. It is difficult to ascertain

[1] Crinnion W.J: Environmental Medicine, Part 1 – The Human Burden of Environmental Toxins and their Common Health Effects. Alt. Medical Review 5:52-63, January 2000.
[2] Pollak J: A Short Review of the Problems Posed by Xenobiotics in chemical mixtures and the role of mixed function oxidases. International Journal of Environmental Health Research 8. 157-163,1998.
[3] Discussion Paper – Review of the Code of Practice for Aerial spraying. Agricultural, Silvicultural and Veterinary Chemicals Council, Tasmania. April 2005.

what pesticides have contaminated water if methods of analysis and testing are inadequate.[4]

- The practice of aerial spraying of toxic chemicals produces diffuse pollution. As it is impossible to adequately predict or monitor the effects of the spray, contamination of non-target areas is therefore extremely probable. [5]

- There is increasing scientific evidence of the adverse effects of chemical formulations even at very low concentrations **and even at below currently detectable levels.**[6]**,** [7]

- No amount of regulation can completely protect Tasmanian waterways and water sources from contamination by aerial spraying. The current code of practice for aerial spraying therefore becomes a redundant document.

- **Therefore, due to the potential for adverse health effects on humans and the environment, aerial spraying should immediately be banned in water catchments.**

1 ISSUES EMANATING FROM DISCUSSION PAPERS

1.1 Department of Primary Industries, Water & Environment (DPIWE)
"Issues for comment" as outlined in the discussion paper have relevance only to a slightly modified variant to the present "system" and therefore are irrelevant to the argument of this submission which stresses a total ban on aerial spraying as the only current solution.[8]

1.2 Australian Pesticides &Veterinary Medicines Authority (APVMA)
Following the 1990 Senate Select Committee Report,[9] the APVMA produced a draft document in July 2003 entitled "Operating Principles and Proposed

[4] Further analysis on presence of residues and impact of plant protection products in the EU: Project summary and report. Soil Survey and Land Research Centre (SSLRC), Derby 1997.
[5] Operating and Proposed Registration Requirements in relation to Spray Drift Risk. Australian Pesticides and Veterinary Medicines Authority-Draft Document-July 2003.
[6] Pollak J: The Toxicity of Chemical Mixtures, Sydney: Centre for Human Aspects of Science and Technology (1993).
[7] Mueller-Beilschmidt D, Toxicology and Environmental Fate of Synthetic Pyrethroids. Journal of Pesticides Reform V10, No. 3, Fall 1990.
[8] Discussion Paper-Review of the Code of Practice for Aerial Spraying. Agricultural, Silvicultural and Veterinary Chemicals Council, Tasmania April 2005.
[9] Report of the Senate Select Committee on Agricultural and Veterinary Chemicals in Australia – July 1990, see point 3.2

Registration Requirements in relation to Spray Drift Risk". Following this, nothing further on the subject has been released.[10]

1.2.1 The definition of "spray drift" in the above document is attempted but does not include movement of chemicals to non-target areas due to volatility, erosion, surface or groundwater transport, or windblown soil particles that may occur after application of chemicals.
This definition is contradicted in the subsequent paragraph and makes for the regulation of chemical movement after spraying a very difficult task.

1.2.2 The use of an aerial release height of 3 metres in plantation spraying could seldom be achieved, despite this figure being used as an achievable standard in its risk assessment for individual chemicals.

1.2.3The information used in APVMA's risk assessment of potential off-target pollution by agricultural chemicals is not comprehensive. This brings into question the validity of the process.

2. BACKGROUND ISSUES - AUSTRALIA/TASMANIA

2.1 The current management systems, controls, and regulations of aerial spraying in Tasmania can be best described as complacent and indifferent to the well-being of any person who may be affected by an advertent or inadvertent spray event.[11],[12]
At worst they are negligent in their approach.
Spray drift is essentially chemical trespass and should be treated like any other trespass on one's property.*[13]*

2.2 In 1990, the *Senate Select Committee on Agricultural and Veterinary Chemicals in Australia* made many recommendations regarding aerial spraying. These recommendations remain as relevant today as they were 15 years ago. Unfortunately, many of the recommendations of the Select Committee have not been implemented. For instance, there is no uniform national approach to the regulation of aerial spraying and there has been no prospective research on the long-term effects of exposure to agricultural and veterinary chemicals on Australian communities. Since this report was published the volume and the number of chemicals used have both increased significantly.
Rec. 39 (page xxx) concludes that ***"if its recommendations regarding the development of a uniform national approach to the regulation of aerial***

[10] Operating and Proposed Registration Requirements in relation to Spray Drift Risk. Australian Pesticides and Veterinary Medicines Authority-Draft Document July 2003.
[11] Upper Catchment Issues – Tasmania – Are We and Our Catchments at Risk? Journal of Tasmania Community Resource , Auditors Inc. Vol 2, No. 3, August 2004.
[12] Scammell Report – Environmental Problems, Georges Bay, Tasmania – collated by Dr. Marcus Scammell – July 2004.
[13] Clearing the Air; Pesticide Spray Drift Kit. Total Environment Centre Inc. 1999.

spraying of agricultural chemicals, was not implemented fully, calls for the banning or phasing out of aerial spraying of agricultural chemicals should be supported".

2.3 The *Australian Medical Association* (Tasmanian Branch) called for an immediate halt to the use of aerial spraying in Tasmania's water catchments in July 2004, and called for the adoption of the precautionary principle to protect human health.[14]

2.4 There is documented evidence of chemical contamination affecting non-target areas in Tasmania:

1988	Tamar valley vineyards affected by drift 20kms away from source[15]
1992	Lorinna drinking water - atrazine
1994	Derby drinking water - atrazine.
1994	Hellyer river - simazine[16]
	Cattley river - atrazine
	Little Henty river - hexazinone
	Lisle creek - hexazinone
	Rubicon river - atrazine
	Great Forester river - simazine
	South George river - simazine
1995	Great Forester catchment - simazine[17]
6/2003	Tuson creek - terbacil
5/2003	Mt Leslie treated water - simazine
	West Tamar untreated and treated water - simazine
7/2004	West Tamar untreated water - simazine
4/2004	Helicopter crash site-aerial spraying - South George catchment - alphacypermethrin, atrazine, simazine, chlorothalonil, and terbacil.[18]
9/2004	Wyena-Carpenter family, groundwater and drinking water contamination - atrazine
1/2004	DH aerial overspray - Polyram[19],[20]
10/2004	DH ground spraydrift contamination - Eucmix[21] and Roundup[22]
1/2005	Prosser river - simazine

[14] Australian Medical Association-Tasmanian Branch-Media Release-July 2004.
[15] Report of the Senate Select Committee on Agricultural and Veterinary Chemicals in Australia – July 1990.
[16] Review of the Scammell Report – Aerial Spraying in Georges River Catchment – Tasmania. Department of Primary Industry, Water and Environment, August 2004.
[17] Ibid
[18] Ibid
[19] personal communication
[20] "Polyram" contains of metiram and spraymate
[21] "Eucmix" contains terbacil, sulfometuron methyl and additives
[22] "Roundup" contains glyphosate and tallowamine surfactant

2.5 Between approximately 1997 and 2005 there were no results for pesticide monitoring of most water catchments in Tasmania available to the general public.

2.6 There are no risk assessments for most catchments, and when pollution / contamination is identified then the action taken is mostly retrospective, if at all.

2.7The Australian Drinking Water Guidelines of 1996 have not been fully implemented,[23] and there is only one water management plan for a catchment in place.

The precautionary principle with regard to drinking water and pesticides has not been upheld. *"When an activity raises threat of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically".* [24]

3. BACKGROUND ISSUES - OVERSEAS/GENERAL

3.1 It is impossible to assess adverse impacts when the overall combined toxicity of chemical contamination events are not being evaluated and no proactive environmental or human health assessments are being implemented. However environmental impacts are being demonstrated.[25],[26] Science is increasingly demonstrating the long term damage caused by many chemicals in low concentrations over long time frames e.g. endocrine disruption, immune suppression, carcinogenicity and carcinogen potentiation, reproductive effects and chemical sensitisation.[27],[28],[29],[30]
The true extent of the many health problems that pesticides cause remains unknown. Some health outcomes from pesticide poisoning are not easily recognised, especially when there is a time lag between exposure and outcomes. Scientific methods for studying pesticide effects are more suitable for dealing with the effects of a single agent.[31]

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[23] Australian Drinking Water Guidelines (ADWG) NHMRC and Agriculture Resource Management Council, Australia and New Zealand, 1996.
[24] Wingspread Statement on the Precautionary Principle, 1998.
[25] Scammell Report – Environmental Problems, Georges Bay, Tasmania – collated by Dr. Marcus Scammell – July 2004.
[26] The Pesticide Detox. Ed Jules Pretty, Earthscan 2005.
[27] Birnbaum LS, Fenton SE, Cancer and Developmental Exposure to Endocrine Disruptors. Environmental Health Perspectives, Vol. 111, No. 4, April 2003.
[28] Monitoring of Pesticides in the Environment. Pesticides in the Environment. Working Group. Environment Agency, Bristol, 2000.
[29] Pall M.L. – NMDA Sensitization and Stimulation by peroxynitrite, nitric oxide and organic solvents as the mechanism of chemical sensitivity in multiple chemical sensitivity. FASEB Journal, 16:1407-1417; 2002.
[30] The Pesticide Detox Ed by Jules Pretty. Earthscan 2005.
[31] Kreiger R. (ed) Handbook of Pesticide Toxicology. Academic Press. 2001.

3.2 The Ontario College of Family Physicians in 2004 called for a reduction in pesticide use, stating that exposure to all the commonly used pesticides has shown positive associations with adverse health effects. Children, pregnant women, the immune suppressed, and the elderly are at increased risk to the toxicity of chemicals. The factor by which their risk is increased is difficult to determine as humans all assimilate a large variety of chemicals during their life.

3.3 Cancer, increased miscarriage, infertility, intra-uterine growth retardation, birth defects, dermatitis, psychiatric effects, chromosome aberrations, Parkinson's Disease, amyotrophic lateral sclerosis and Alzheimer's disease have all been related to long-term pesticide exposure.[32],[33] These diseases are all difficult to treat and costly both for the individual and society. This highlights the importance of prevention by reducing lifetime pesticide exposure.[34]

3.4 The Department of Health Committee on Carcinogenicity in the UK has recently published its finding on prostate cancer with an increase in the incidence of prostate cancer in farmers, farm workers and pesticide applicators, whether they actually applied pesticides or not.[35] A study in Canada indicated that farm workers were 2.23 times more likely than others to develop prostate cancer, particularly farmers spraying pesticides over an area greater than 250 acres.[36]

3.5 Pesticides have effects on wildlife, both direct and indirect. They also affect animals' food chain and habitats. Ecosystems are complex entities and dependent on interactions between many animal species. Alterations that do not directly affect animals but do affect its habitat or metabolism may alter survival, population density, species diversity and reproduction.[37] There is particular concern about endocrine disrupting pesticides that are fat-soluble and able to concentrate up the food chain.[38]

3.6 Given the present uncertainty about which substances might be exerting damaging effects, *The Environmental Agency (UK)* proposes pollution reduction programs for these endocrine disruptions listed in Table 1:

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[32] Ontario College of Family Physicians – Pesticide Literature Review 1992 to 2004.
[33] De Roos AJ, Blair A, Rusiecki JA, Hoppin JA, Svec M, Dosemeci M, Sandler DP and Alavanja MC, Cancer incidence among glyphosate – exposed pesticide applicators in the Agricultural Health Study: 113 (1) 49-54; 2005.
[34] Schmitt H: PAN Europe demands pesticide reduction measures. Pesticide News 46:10,1999.
[35] Potti A and Sehgal I: Exposure to pesticides increases levels of UPA and UPAR in pre-malignant human prostate cells. Environmental Toxicology and Pharmacology 19:215-219; 2005.
[36] Pesticide News No 67 pg13 March 2005.
[37] Relyea R: The impact of insecticides and herbicides on the biodiversity and productivity of aquatic communities. Ecological Applications; 15(2) 618-627; 2005.
[38] Endocrine disrupting substances in the environment. The EA's strategy. Environment Agency, 2000.

Table 1: Pesticides for which endocrine disrupting effects have been reported and are subject to statutory control		
Substance	Relevant statutory designation of control (if any)	Current Environmental Quality Standard status
DDT, Aldrin, Dieldrin, Endrin (the 'drins) & Lindane	EC dangerous Substances Directive 76/464/EEC List 1 substances; IPC prescribed substance	Statutory EQSs in place
Tributyltin	IPC prescribed substance; List II dangerous substance	Statutory EQS in place
Atrazine, Dichlorvos, Endosulfan, Simazine, Trifluralin, Demeton-S-methy.	Identified List II dangerous substances and IPC prescribed substances	Statutory EQSs in place

Source: Endocrine-disrupting substances in the environment. The EA's strategy. Environment Agency, 2000.

3.7 *The Dangerous Substances Directive* in the UK created a framework for the elimination or reduction of pollution by substances considered dangerous in terms of persistence, toxicity and bio-accumulation. [39],[40] See Table2:

Table 2: Pesticides included in the Dangerous Substances EC directive 76/464/EC	
List I (substances to be eliminated)	List II (substances to be reduced)
Aldrin DDT Dieldrin Endrin Isodrin Hexachlorobenzene Hexachlorocyclohexane(HCH) Pentachlorophenol	Cyfluthrin PCSDs (polychlorinated chloromethyl sulfonamido diphenylethers) Permethrin Sulcofuron Tributyltin Triphenyltin

Source: Pesticides included in the Dangerous Substances EC directive 6/464/EC

3.8 The spread of chemicals to non-targeted areas is dependent on many factors. Water pollution by chemicals through the general application of diluted compounds (via aerial spraying) is influenced by the chemical structure of the pesticide, its application rate and method of application. Equally important are the weather conditions (particularly the next rainfall event), the type of soil, the

[39] ENDS: Proposed EC priority list for hazardous substances in water. ENDS Report 297,1999.
[40] Eke KR: Pesticides in the Aquatic environment in England and Wales. Pesticide Outlook: 15-20: 1996.

topography of the land, the amount of organic matter and the depth to the water table.

3.9 Pesticides may be washed into ditches and rivers by rainfall and they frequently volatilize into the air. Depending on their stability they can be taken up into the atmosphere and transported long distances, returning to the ground through precipitation. For example rainwater has been documented to contain Lindane and 2, 4-D in Spain, and 2,4-D in Italy.[41] For most pesticides in current use the atmospheric lifetime is not known. A compilation of minimum travelling distances suggests that distances between sampling sites and the nearest possible source can range between 10 and 1,000 km. Greater distance atmospheric transport can also occur.[42]

3.10 A study in 1998-99 in the UK highlighted the significance of minute spills of pesticide concentrate, and contamination of the interior and exterior surface of sprayers as a cause for point source of pollution into waterways.[43]

3.11 Leaching of pesticide occurs when the substance is moved through the solution, (usually with rain water) and percolates down to the water table. Differences in soil and pesticide properties influence this movement e.g. pesticides break down more slowly in cool, dry soil. Heavy rainfall, particularly after a recent pesticide application, can drive the pesticide deep into the soil, where breakdown tends to be slower.[44]

3.12 Water volume plays a significant part in herbicide removal, with relatively small volumes of water removing a large proportion of applied herbicide.[45] Pesticides can be transported great distances in water[46] and pollution can be traced for hundreds of kilometres in rivers.[47]

4. PESTICIDES- FACTORS INFLUENCING TOXICITY

[41] Pearce F & MacKenzie D: It's raining pesticides. New Scientist 162(2180): 23,1999.
[42] van Dijk HFG, van Pul WAJ, & de Voogt P – eds. Fate of Pesticides in the Atmosphere. Implications for Environmental Risk Assessment. Kluwer Academic Publishers, London, 1999.
[43] Shepherd, AI & Heather, AIJ: Factors affecting the loss of six herbicides from hard surfaces. In the 1999 British Crop Protection Council Conference – Weeds, Brighton, Sussex, UK, 1999.
[44] RIZA: 1996 Aquatic Outlook – An analysis of issues pertaining to aquatic environments (Pesticides). Netherlands Ministry of Environment (RIZA) Policy Document 97.038, Amsterdam, 1997.
[45] Shepherd AI & Heather AIJ: Factors affecting the loss of six herbicides from hard surfaces. In The 1999 British Crop Protection Council Conference – Weeds, Brighton, Sussex, UK, 1999.
[46] AMAP: AMAP Assessment Report: Pollution Issues. Arctic Monitoring and Assessment Programme, 1998.
[47] Canton, L & Grimily, IO: Distributions of river transported halogenated biphenyls and terphenyls in coastal environments. Chemosphere 23 (3): 327-341,1991

4.1 Present toxicity testing of potential pesticides does not consider compounding influences. For example, even if a pesticide appears relatively environmentally benign, its breakdown products can exhibit toxicity many orders of magnitude greater than the parent compound.[48]

4.2 Pesticides can be degraded and modified by light, hydrolysis and oxidising microorganisms. The persistence of the chemical in water will depend on the *p*H of the water and the amount of light and oxygen. The most soluble chemicals are carried in solution or attached to particulates (plankton, clay particles etc.)[49] Pollutants can also be deposited in sediments where they can be taken up by bottom dwelling species. Aquatic organisms can absorb some pesticides, particularly fat-soluble chemicals through the process of bio-concentration. Filter feeders can take in particle-bound pesticides. Mussels used as bio-indicators of coastal pollution can sustain high concentrations of persistent pollutants that are passed on to animal or human predators.[50]

4.3 In ground water there is a limited quantity of organic matter to which pesticides may become bound, leaving a large proportion of pesticide pollutants to remain in solution. These pesticides are readily available to produce a direct toxic effect. As degradation tends to be slow, adverse effects can continue for a long period of time.

4.4 Water treatment can be effective in removing pesticides from drinking water but it is expensive. Ground water <u>cannot</u> be remediated. Pollution is long term.

4.5 Chemicals are tested in their generic form. Labels for chemical products are produced after toxicity tests have been conducted. Evidence shows that the toxicity is not only that of the generic chemical. Adjuvants and wetting agents etc. that are not listed on the label, not only have toxicity in their own right but also produce an unpredictable toxicity by mixing with the generic chemical detailed on the label e.g. Roundup and Glyphosate.[51],[52],[53],[54] Labelling should be

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[48] Pesticides: Making the Right choice for the Protection of Health and the Environment. Report of the Standing Committee on Environment and Sustainable Development. P18 – May 2000.
[49] RIZA: 1996 Aquatic Outlook: An analysis of issues pertaining to aquatic environments, 1997 (Pesticides). Netherlands Ministry of Environment (RIZA) Policy Document 97.038, Amsterdam.
[50] Walker CH, Hopkins SP, Sibly RM, & Peakall DB: Principles of Toxicology, Taylor & Frances, 1996.
[51] Cox C: Glyphosate – Journal of Pesticide Reform, Vol 24, No. 4, winter 2004.
[52] De Roos AJ, Blair A, Rusiecki JA, Hoppin JA, Svec M, Dosemeci M, Sandler DP and Alavanja MC: Cancer incidence among glyphosate – exposed pesticide applicators in the Agricultural Health Study: 113 (1) 49-54, 2005.
[53] Potti A and Sehgal I: Exposure to pesticides increases levels of UPA and UPAR in pre-malignant human prostate cells. Environmental Toxicology and Pharmacology 19:215-219, 2005.

[53]Richard S, Moslemi S, Sipahutar H, Benachour N and Seralini G: Differential effects of

comprehensive and 'commercial confidentiality' should not be used as an excuse for restriction of information.

4.6 The mixing of multiple chemicals before spraying (ground or aerial) produces a new mixture that produces unpredictable toxicity. **There is no evidence to suggest that these large numbers of various mixtures are being evaluated and therefore adverse effects are unknown.** As stated previously the adverse impacts on humans and the environment become very difficult to link back to a chemical, mixture of chemicals or range of chemical exposures. The variables in combinations of mixtures becomes almost infinite, and testing of these an impossible task.

5 CONCLUSION

There is substantial evidence that the aerial spraying of toxic chemicals is harmful to human health. It should therefore be immediately banned in water catchments and a programme of phasing it out implemented elsewhere.
There is an urgent need for water management plans that encompass all activities in water catchments. These should include community consultation as described in ADWG. These measures need to be framed as legally enforceable rules rather than as guidelines.

"With the exception of antipersonnel chemicals such as war gasses, pesticides are the only toxic chemicals that we deliberately release into the environment, which, by definition, are intended to cause harm to some living thing." **(Keifer, 1997)**

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glyphosate and Roundup on human placental cells and aromatase; National Institute of Environmental Health Service, 1-29,2005.