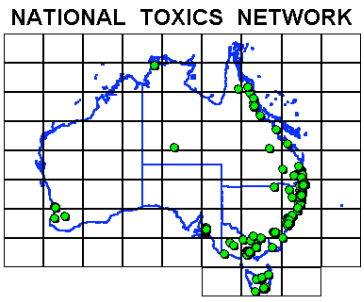

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NATIONAL TOXIC NETWORK SUBMISSION 25th February 2005
ON BEHALF OF NATIONAL TOXIC NETWORK, FRIENDS OF THE EARTH, TOTAL ENVIRONMENT CENTRE, PUBLIC HEALTH ASSOCIATION, ORGANIC FARMERS ASSOCIATION, GREENPEACE AUSTRALIA PACIFIC AND THE ALLERGY, SENSITIVITY AND ENVIRONMENTAL HEALTH ASSOCIATION QLD INC.

Australian Pesticides and Veterinary Medicines Authority Reconsideration of approvals of the active constituent atrazine, registrations of products containing atrazine, and their associated labels. Second Draft Final Review Report

National Toxics Network

NTN is a community-based network with the objectives of pollution reduction, protection of environmental health and environmental justice for all. NTN was first formed in 1993 and since then has grown as a national network to support community and environmental organisations across Australia, New Zealand and the South Pacific.

NTN has interests in all aspects of toxic chemical pollution including regulatory and assessment issues and is involved in a wide range of national and international campaigns including pesticide reduction, toxic waste and environmental health. NTN is vocal advocate of community-right-to-know and the precautionary principle and its application in legislation and policy. NTN is the Australian Focal Point for the International Persistent Organic Pollutants (POPs) Elimination Network and represents Australian NGOs at many international forums on toxic chemicals.

In summary :
NTN opposes the continuing registration of atrazine on the basis of its proven ability to contaminate surface and groundwater, its adverse impacts on fauna including amphibians and the growing evidence of atrazine impacts on human health.

International Activities

'In late 2003, the European Union Standing Committee on the Food Chain and Animal Health withdrew approval of atrazine and simazine due to groundwater contamination. The manufacturer, Syngenta is already offering alternatives to the herbicide in Germany and Italy and would extend them to the rest of the EU.'[1]

In 2002, atrazine was included in the global program, Regionally Based Assessment of Persistent Toxic Substances. Because atrazine residues were detected in many sectors of the environment meant it was listed as a globally important persistent toxic substance (PTS) with the potential for regional transport.[2]

Environmental Assessments

The Australian Pesticides and Veterinary Medicines Authority (APVMA) Environmental Assessment concludes that it is "*unlikely that Atrazine, when used in accordance with the label recommendations, will contaminate waterways to any extent likely to present a hazard to the environment, or to human beings through the consumption of contaminated drinking water."* However, it acknowledges that in storm events levels of atrazine in water will increase and may temporarily exceed the Australian and New Zealand Environment and Conservation Council (ANZECC) guidelines. While it is claimed that long-term contamination at levels above the ANZECC guideline is unlikely, it is also acknowledged that safety margins are narrow. With increasing likelihood of extreme storm events associated with climate change and the acknowledged narrow safety margins this requires a far more considered response.

The narrow safety margins are of considerable concern with the potential increase in environmental exposures associated with the more recently introduced use of atrazine on triazine tolerant canola. The will substantially increase the amount of atrazine used in Australia, especially in very wet areas where raised bed cropping practices are used.

By the mid 1990s, atrazine had already been recognised as one of the most commonly detected pesticides in surface and groundwater around Australia (eg, central and north west Tasmania, South Australia). In 1995, the NSW Department of Land and Water Conservation identified atrazine as the most commonly detected pesticide in the valleys of the central and north-west regions of NSW.[3] The chemical had also been identified as the most frequently

[1] EU withdraws approval for potentially harmful herbicide atrazine (Press Release AFP/ EUbusiness Ltd 05/10/2003)
[2] United Nations Environment Programme Chemicals. Regionally Based Assessment of Persistent Toxic Substances, South East Asia and South Pacific Regional Report December 2002, Global Environment Facility
[3] B. Cooper. *Central and North West Regions Water Quality Program. 1994-95 Report on Pesticide Monitoring.* Department of Land and Water Conservation. Paramatta, June 1995.; also see Department of Land and Water Conservation's 1998-99

detected herbicide in the US National Surface Water Monitoring Program. Atrazine or its metabolite was also detected in 80% of samples in a Canadian study of agricultural watersheds,[4] as well as being measured in rain and fog.[5]

In Tasmania in 1994, 20% of water samples were contaminated with atrazine and simazine at concentrations reported to cause sub-lethal impacts on biota (20 –100 ppb) and 28% of samples had concentrations within the range reported to cause mortality (20 - 500 ppb).[6] At that time approximately 27,000 hectares were under hardwood plantation in Tasmania using 40 tonnes of atrazine and 5.5 tonnes of simazine per annum. According to the Australian Bureau of Statistics, in 2003, 208,000 hectares were under plantation of which 129,000 hectare were hardwood. Compounding the issue is atrazine's extensive use by the potato industry in Tasmania

In 1997, the APVMA review acknowledged that contamination of surface waters and groundwater with atrazine and its metabolite, desethylatrazine was widespread across Australia.[7] The review accepted that the safety margins for aquatic organisms are, in some circumstances, quite narrow. They concluded that "*Although precise mechanisms are not fully understood, it is evident that the endurance of atrazine in the environment, together with its limited attachment to soil, significant water solubility and widespread use, are disadvantageous from the environmental perspective as they lead to long-term, low level contamination of surface and groundwater.*"[8]

Yet, in this current review, the APVMA reports that leaching studies at forestry sites and groundwater monitoring results indicate a low likelihood of groundwater contamination from atrazine use, even in areas of sandy soils. New protocols were introduced to restrict mixing of atrazine, loading or use within 20 metres of waterways, or within 60 metres of a lake or dam and no use is allowed in channels or drains and in industrial or non-agricultural situations. These protocols do not address the issue of the topography of sloping areas in upper catchments used predominantly in forestry industry, as is the case in Tasmania. Compounded by rainfall patterns which see dry spells followed by short dumps of rain, the topography results in rapid surface run off into waterways. Many waterways 'appear' only in the rain event and as the water table rises. The springs, rivulets and streams continue to flow until the water table falls as it dries up.

The APVMA defines drainage lines as being 30 cm deep in forest plantation areas. However, even on mild slopes with drainage lines less than 30cm deep, these can easily become engorged with pesticides and water in the event of heavy rainfall. The areas can also be pockmarked with wombat or erosion holes etc which provide easy conduits for herbicide tainted water to flow off site. Similarly, logging tracks, which in Victoria do not come under the code of forest practice, provide for easy movement of contaminated water if sprayed prior to rain. Many older forestry plantations were established without adequate buffer zones to

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Central and North west Region's Water Quality Program Reports on Pesticides and Nutrients art sites in Macquarie, Namoi, Gwyder, Darling and Border Rivers as reported in the Inland Rivers Network News, August 2000, Volume 5, Number 2 at 5

[4] Jeanette and Arthur Conacher, Herbicides in Agriculture, Minimum Tillage, Science and Society. GEOWEST Dept. of Geography, West Australian University, Sept 1986

[5] Atrazine contamination of water occurs as part of the natural evaporation /precipitation cycle. See Pearce, F and Mackenzie, D. (1999) It's raining pesticides in Europe - Rainwater undrinkable. *New Scientist. 31 March 1999.*

[6] Davies, P. E., L. S. J. Cook and J. L Barton (1994). Aust. J. Mar. Freshwater Res., 1994, ***45***, 209-26
Report of the Senate Select Committee on Agricultural and Veterinary Chemicals in Australia, July 1990, ISBN 0644 11869 5

[7] Review Summary on The NRA review of ATRAZINE, November 1997, Existing Chemicals Review Program National Registration Authority for Agricultural and Veterinary Chemicals, Canberra, Australia at 37.

[8] id at 41

protect the water from pesticide contamination. When these plantations are clearfelled 30 years after planting, they are often cleared close to the river banks and replanted and resprayed again.

Hence, contamination of waterways including groundwater with atrazine is in many cases unavoidable. The APVMA review also makes no mention of people living directly downstream of forestry plantations, who are forced to draw their water from contaminated streams.

On the 15th of December, 2003 a helicopter involved in aerial forestry spraying in Tasmanian water catchments crashed. At the time of the crash, the helicopter was spraying alpha-cypermethrin. The investigation of the crash site identified the following soil contaminants; 254 mg/kg of simazine, 75mg.kg of atrazine, and 1.25mg/kg chlorothalonil. While some atrazine residues were found in the helicopter spray tank (even though it had been refilled many times prior to the crash) there was considerably more atrazine found at the crash site than could have emanated from the helicopter spray tank residual. The fact soil that tests were not taken until 16 weeks after the crash, and the fact that the highest rainfall in recorded history and severe flooding occurred in the catchment 11 weeks after the crash make the detection of such high levels of atrazine in the soil of major concern.

The APVMA protocols have clearly failed to prevent atrazine contamination of water, as is evident in the Tasmanian case of the Carpenters who lived adjacent to forestry plantations. Michelle and Howard Carpenter had their bore water tested in March 2004, before aerial spraying began, and the water was clean. Six weeks after the spraying on August 18, the herbicide atrazine was detected at a level of 0.72 parts per billion (ppb) in the bore supplying their drinking water.[9] The NH&MRC Australian Drinking Water Guideline value for atrazine is 0.1 ppb and the health value is 40 ppb. The US health standard is 3 ppb, the World Health Organisation's standard is 2 ppb, and Europe's is 0.5 ppb. The level detected in the Carpenter's bore exceeds the Australian Drinking Water Guideline of 0.1 ppb atrazine and is above the EU health standard.

In regards to ecological impacts of water contamination with atrazine, APVMA statements that no permanent damage will be caused to aquatic ecosystems at concentrations up to 20ppb based on 1993 studies are unsupportable in the light of the recent studies on impacts on amphibians. This also applies to the freshwater moderate reliability trigger value for atrazine of 13 ppb (compared to the more appropriate trigger value of 0.5 ppb in the 1999 draft guidelines). The lack of caution of these standards is compounded by the fact that values apply only to surrounding water quality and not to the point of discharge or mixing zone.

The APVMA cite USEPA's assessment that the potential adverse effects on sensitive aquatic plants and other non-target aquatic organisms, as well as their populations and their communities, were likely to be greatest where atrazine concentrations in water equalled or exceeded approximately 10 to 20 ppb on a recurrent basis or over a prolonged time period. Yet it is acknowledged (p 47) that stream monitoring data from agricultural areas in the US exceed this threshold at 11-35% of sites sampled. This and the experience of water

[9] ' Life's not what it seems in these parts' (Claire Miller, The Age, February 6, 2005) Further evidence of aerial application of atrazine in water catchments is evident in its detection in soil sampling (5 April 2004) at the helicopter crash site in the Georges River catchment (254 mg/kg of Simazine, 75mg.kg of Atrazine, 1.25mg/kg Chlorothalonil,)

contamination in Australia demonstrate atrazine cannot be used without risking impacts on aquatic and estuarine life.

Amphibian Studies

The AVPMA conclude that risk assessment of the effects of atrazine in amphibians is not possible due to:

- *the inconsistencies between studies,*
- *an absence of a dose-response relationship,*
- *difficulty in independently replicating the low dose effects of atrazine in amphibians,*
- *likely influence of other stressors; and*
- *occurrence of healthy amphibian populations at sites where atrazine is present.*

Based on these points, the APVMA concludes that it is unlikely that atrazine is adversely impacting upon populations of Australian amphibians at current levels of exposure (peak concentrations typically 1-10 µg/L in Australian surface waters). Yet, the US EPA has concluded that sufficient data is available to establish the hypothesis that atrazine interferes with normal gonadal development with a threshold concentration between 0.1 and 25 µg/L. It also acknowledges that a number of recent studies have reported effects of atrazine on sexual differentiation. Polygonadism (single sex and intersex), reduced laryngeal size, and gonadal differentiation have all been reported with a threshold of 0.1 µg/L. Similar abnormalities are also reported in field-caught specimens and the induction of the enzyme aromatase by atrazine is suggested as the cause of these feminising effects.

The AVPMA's conclusion regarding these amphibian studies appears to be heavily based on opinions expressed in the industry public relations campaign. Little attempt has been made to go beyond this, either to test the hypothesis or to consider the most recent papers in the published literature supporting the findings of adverse impacts. [10]

While, attempts by the manufacturer Syngenta to reproduce these amphibian findings have been reported to be unsuccessful, in fact, it appears all of the studies unable to reproduce the effects on amphibians are Syngenta-sponsored studies. The USEPA Data Evaluation Reports of these particular studies note significant failings including:

- contamination with atrazine of control groups both in laboratory and field tests, sometimes exceeding levels in the exposed group;
- lack of adequate husbandry allowing frogs to 'hop between treatments'; and
- very high mortality rates of test animals, in some cases leaving as few as 14% of the population on which to base study conclusions. [11]

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[10] See Miyahara M, Oka T,Mitsui N, Sagoe C,Kashiwagi A, Shinkai T, Sone K,Tooi O, Iguchi T 2003. Evaluation of atrazine on *Xenopus laevis* in a partial life test. Paper prepared for the Sixth Annual Meeting of the Japan Society of Endocrine Disrupters Research; 2–3 December 2003, Sendai, Japan. Abstract #PB-57; Tyrone B. Hayes (2004) There Is No Denying This: Defusing the Confusion about Atrazine, *BioScience*, December Vol. 54 No. 12, pp 1138- 1149; Reeder A, et al. 1998. Forms and prevalence of intersexuality and effects of environmental contaminants on sexuality in cricket frogs (*Acris crepitans*). Environmental Health Perspectives 106: 261–266.

[11] Steeger TM, Tietge JE, Irene S, Frankenberry MJ. 2003a. Data Evaluation Report on a Pilot Study of Larval *R. clamitans* Response to Atrazine Exposure in Terms of Metamorphosis, Gonadal and Laryngeal Morphology and Selected Hormonal and Enzymatic Activities. EPA MRID no. 458677-03. (10 November 2004; *www.epa.gov/oscpmont/sap/2003/june/dataevaluationreports.htm*)

———. 2003b. Data Evaluation Report on Field Exposure of *Xenopus laevis* to Atrazine and Other Triazines in South Africa: Feasibility Study for Site Characterization and Assessment of Laryngeal and Gonadal Responses.EPA MRID no. 458677-09. (10 November 2004; *www.epa.gov/oscpmont/sap/2003/june/dataevaluationreports.htm*)

These criticisms render the negative findings of the industry-sponsored studies unusable. The USEPA appears to acknowledge this in their comment that '*the occurrence or higher incidence of abnormalities in atrazin- exposed replicates compared with unexposed controls should NOT be disregarded simply because of difficulties in reproducing the results.'*

The USEPA reported adverse effects on immune function (at 3 and 30 µg/L) and the inhibition of the neuroendocrine stress response in frogs add to the weight of evidence which clearly demonstrates potential adverse impacts on frogs. Other recent field studies [12] reported that male frogs in areas where atrazine was used displayed coloration typical of females and had high plasma vitellogenin levels. They also noted gonadal abnormalities further supporting the work of both Hayes and other researchers.[13]

Arguments that apparently healthy populations of frogs were found at sites said to be contaminated by atrazine are inconsequential given that the majority of frog species are mobile and the proposed endocrine impacts are mostly limited to development stage.

APVMA must review the more recent literature on the amphibian impacts of atrazine and seriously consider the published responses to industry criticism of the amphibian studies. Tyrone Hayes' 2004 paper answering his critics is essential reading. Following is an extract.

' Recent studies from my laboratory, showing the chemical castration (demasculinization) and feminization of amphibians by low but ecologicall- relevant concentrations of atrazine in the laboratory and in the wild, prompted a critical response from atrazine's manufacturer, Syngenta Crop Protection, and Syngenta-funded scientists. A careful analysis of the published data funded by Syngenta, and of several studies submitted to the US Environmental Protection Agency (EPA) by the Syngenta-funded panel for data evaluation, indicates that the data presented in these studies are not in disagreement with my laboratory's peer-reviewed, published data. Further, the published and unpublished data presented to the EPA by the Syngenta-funded panel (and touted in the popular press) suffer from contaminated laboratory controls; high mortality; inappropriate measurements of hormone levels in stressed, sexually- immature animals during nonreproductive seasons; and contaminated reference sites. The confounding factors in the industry-funded studies severely limit any conclusions about the adverse effects of atrazine on amphibians and prevent meaningful comparisons with my laboratory's published data. '[14]

Amphibian declines are well documented for Australia, particularly Queensland, New South Wales and Victoria and according to the IUCN 1997 report up to 27 species of Australian

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———. 2003c. Data Evaluation Report on Gonadal and Laryngeal Responses to Field Exposure of *Xenopus laevis* to Atrazine in Areas of Corn Production in South Africa. EPA MRID no. 458677-10. (10 November 2004; w*ww.epa.gov/oscpmont/sap/2003/june/dataevaluationreports.htm*)

———. 2003d. Data Evaluation Report on the Reconnaissance Survey of South Florida Amphibians for the Assessment of Potential Atrazine Effects. EPA MRID no. 458677-06. (10 November 2004; *www.epa.gov/oscpmont/sap/2003/june/dataevaluationreports.htm*)

———. 2003e. Data Evaluation Report on Response of *Xenopus laevis* to Atrazine Exposure:Assessment ofMechanism of Action of Atrazine. EPA MRID no. 458677-04. (10 November 2004; *www.epa.gov/oscpmont/sap/2003/june/dataevaluationreports.htm*) Also see Tyrone B. Hayes (2004) There Is No Denying This: Defusing the Confusion about Atrazine, *BioScience*, December Vol. 54 No. 12, pp 1138- 1149

[12] McCoy KA, Sepulveda MS, Gross TS. 2002. Atrazine exposure and reproductive system abnormalities in field collected *Bufo marinus.* Paper presented at the 23rd Annual Meeting in North America, Society of Environmental Toxicology and Chemistry; 16–20 November 2002, Salt Lake City, Utah.

[13] Renner R. 2002. More evidence that herbicides feminize amphibians. *Environmental Science and Technology* 37: 46A

[14] Tyrone B. Hayes (2004) There Is No Denying This: Defusing the Confusion about Atrazine, BioScience, December Vol. 54 No. 12, pp 1138- 1149

frog are currently listed as endangered or vulnerable, and several are presumed extinct. In a recent survey of the western division of NSW, 8 amphibians were listed as endangered, rare or vulnerable as a result of population declines.[15] Similarly, studies in Victoria show species have disappeared from 10 of the sites that were previously occupied in significant numbers.[16] Queensland and NSW have seen at least 14 species virtually disappear.[17]

The requirement for continued registration in Australia is that the APVMA be satisfied that use of atrazine products in accordance with their recommendations for use "would not be likely to have an unintended effect that is harmful to animals, plants or things or to the environment." While currently available data may be inadequate to support a conclusive risk assessment of the effects of atrazine in amphibians, it is clearly sufficient to form the basis of urgent regulatory action to ban atrazine and promote alternatives.

Human Health Toxicological Assessment

NTN acknowledges that the APVMA interim report in November 1997 concluded that there were no major toxicological concerns regarding atrazine and that it posed no undue hazard to most users. However, we believe this to be an incorrect conclusion which needs to be addressed in the current review of atrazine.

According to the WHO, [18] atrazine has been subjected to extensive long-term toxicity testing on rats, mice and dogs. Significant toxicity was observed in dogs after long-term oral administration at doses of 5 mg/kg b.w./day and above. In rats and mice, reduced food intake, decreased body weight, muscle and retinal degeneration, hepatotoxicity and haematological disturbances were observed. An increase in mammary tumours (mainly benign) was observed in male rats but not in mice following long-term oral administration. In the females, the incidence of uterine adenocarcinomas and of tumours of the haematopoietic system were increased.[19]

In 2000, after a five year review of industry and government data the US EPA found atrazine to be a potent carcinogen. They concluded that short-term exposure to atrazine had the potential to cause a range of reproductive effects and developmental defects, including miscarriage, and delayed vaginal opening and penis development during puberty (EPA, 2000). Chronic symptoms could include weight loss, cardiovascular damage and muscle degeneration. (USEPA 2002).

Atrazine's ability to disrupt endocrine function in laboratory animals is well-known.[20] Pregnant and nursing rats exposed to atrazine and one of its metabolites resulted in slow

[15] Sadlier, R.A. and Pressey, R.L. (1994) Reptiles and amphibians of particular conservation concern in the western division of New South Wales: a preliminary review. Biological Conservation, 69: 41-51.
[16] Gillespie, G.R. and Hollis, G.J. (1996) Distribution and habitat of the spotted tree frog, Litoria spenceri Dubois (Anura:Hylidae), and an assessment of potential causes of population declines. Wildlife Research, 23: 49-75.
[17] Laurance, W.F., McDonald, K.R. and Speare, R. (1996) Epidemic disease and the catastrophic decline of Australian rain forest frogs. Conservation Biology, 10(2): 406-413.
[18] WHO/FAO Data Sheets On Pesticides, No. 82 ATRAZINE, July 1996, WHO/PCS/DS/96.82 Available at <www.inchem.org>
[19] Pintér, A. et al. 1990. Long-term carcinogenicity bioassay of the herbicide atrazine. *Neoplasma* 37: 533-544.
[20] See Danzo, B.J. 1997. Environmental xenobiotics may disrupt normal endocrine function by interfering with the binding of physiological ligands to steroid receptors and binding proteins. *Environ. Health Persp.* 105:294-301; Kniewald, J. et al. 1987. Indirect influence of triazines on rat gonadotropic mechanism at early post natal period. *J. Ster. Biochem*. 27: 10095-1100; 31. Stoker, T.E., C.L. Robinette, and R.L. Cooper.1999. Maternal exposure to atrazine during lactation suppresses suckling-induced prolactin release and results in prostatitis in the adult offspring. *Toxicol. Sci*. 52:68-79; Cooper, R.L. et al. 2000. Atrazine disrupts the hypothalamic control of pituitary-ovarian function. *Toxicol. Sci.* 53:297-307 ;Cooper, R.L. et al. 1996. Effect

maturation of the offspring's sexual organs. Offspring of both sexes showed modified pituitary activity with strong inhibition of certain hormone receptors and a reduction in weight. The atrazine breakdown product diaminochlorotriazine also reduces successful reproduction. Rats fed diaminochlorotriazine during pregnancy had offspring that weighed less than offspring of unexposed mothers and their bone development was also altered.[21] A survey of 856 Iowa municipal water supplies found levels of the herbicides atrazine, metolachlor, and cyanazine were each significant predictors of intrauterine growth retardation in Iowa communities. The average atrazine contamination level in this reservoir was 2.2 ppb, just below the US drinking water standard of 3 ppb. Researchers found that the incidence of intrauterine growth retardation (IUGR), babies with low birth weight for their gestational age, was about double the incidence of IUGR in towns with less contaminated water. [22]

The USEPA Human Health Risk Assessment found that atrazine's impacts on the hypothalamic-pituitary function *"can potentially broadly affect an individual's functional status and lead to a variety of health consequences".*[23]

The US EPA's proposed to reclassify atrazine from "category C" to "likely human carcinogen" in accordance with terminology from proposed cancer guidelines. This was rejected during peer review by the Scientific Advisory Panel (SAP). In June 2000, the SAP determined that the mechanism that produced tumours in the rats was not relevant to humans and that the scientific evidence did not support classifying atrazine as a "likely human carcinogen." Instead they recommended that EPA classify atrazine as "not a likely human carcinogen, "which it did (USEPA, 2004b)

More recent studies [24] have shown both that Atrazine exposure in utero can prolong the period of sensitivity to carcinogens and that it alters the pattern of mammary gland development around puberty. There is growing evidence of the association between atrazine and breast cancer [25] and the incidence of prostate cancer in workers at the Syngenta plant in Louisiana is being investigated.

Industry Influence

The recent US assessment of atrazine cannot be seen as totally independent. The chairman of the EPA Scientific Advisory Panel is a former employee of the manufacturer of atrazine, Syngenta. An industry petition under the new US Data Quality Act that requires all information disseminated by the federal government to be reliable has meant that the EPA

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of atrazine on ovarian function in the rat. *Repro. Toxicol*. 10: 257-264.; Cooper, R.L., J.M. Goldman, and T.E. Stoker. 1999. Neuroendocrine and reproductive effects of contemporary-use pesticides. *Toxicol. Indust. Health* 15:26-36; Stoker, T.E. et al. 2000. The effect of atrazine on puberty in male Wistar rats: An evaluation in the protocol for the assessment of pubertal development and thyroid function. *Toxicol. Sci.* 58:50-59.; 49. Laws, S.C. et al. 2000. The effects of atrazine on female Wistar rats: an evaluation of the protocol for assessing pubertal development and thyroid function. *Toxicol. Sci*. 58:366-376

[21] U.S. EPA. Office of Prevention, Pesticides and Toxic Substances. Office of Pesticide Programs. Health Effects Division. 2001. Atrazine PC Code 080803: Toxicology disciplinary chapter for the reregistration eligibility decision document. Washington, D.C. Available at <www.epa.gov/oppsrrd1/reregistration/atrazine/index.htm>.

[22] Munger, R., et al, "Intrauterine Growth Retardation in Iowa Communities with Herbicide-contaminated Drinking Water," Dept. of Preventative Medicine & Env. Health, Univ. of Iowa, 12/02/97.

[23] USEPA Human Health Risk Assessment, p. 16 bAvailable at < http://www.epa.gov/oppsrrd1/reregistration/atrazine/>

[24] Sasco, AJ. 2001. Epidemiology of breast cancer: an environmental disease**?** *APMIS* 109:321-32.; Birnbaum, L.S., Fenton, S.E. Cancer and developmental exposure to endocrine disruptors. *Environ. Health Perspect*. 111(4):389-294, 2003.

[25] ibid

cannot use hormone disruption as a legitimate regulatory endpoint on which to restrict a chemical's use. Another petition has been directed against the National Toxicology Program which reviews chemicals for carcinogenicity. The petition argues that the program should be barred from reviewing the cancer-causing potential of any chemicals, and notes in particular, atrazine.

In response, the US Natural Resources Defense Council (NRDC) has petitioned the EPA to reconsider its conclusion and to ban atrazine. We support the moves to have the cancer assessment reconsidered. NRDC has also filed a lawsuit in the Federal Court in Washington, D.C.(February 17, 2005) citing the USEPA has illegally negotiated secret agreements with industry lobbyists over pesticide regulations concerning atrazine and dichlorvos.

Health Conclusions

The Office of Chemical Safety concluded that:

1. Published epidemiological data provides support for the absence of carcinogenicity potential for atrazine.

We challenge this finding due to :
- the reported incidence of prostate cancer in Syngenta's workforce at its manufacturing plant in Louisiana (reported to be nine times that of the general public). This is currently being investigated by the USEPA.

- The Cancer Registry of Central California correlations between atrazine use in California (by county) and the incidence of six types of cancer. The study found that for Hispanic males, the incidence of leukemia was associated with the use of atrazine. For black men, the incidence of brain and testicular cancer was associated with the use of atrazine. [26]

- University of Prince Edward Island and the University of Guelph study demonstrating associations between atrazine contamination of wells and drinking water and the incidence of six types of cancer in Ontario, Canada. The incidence of stomach cancer in both males and females increased with increasing atrazine water contamination. [27]

- the reported increase in cancers of reproductive organs in areas of NE Tasmania since the expansion of forestry plantations with the associated atrazine use and contamination.[28]

This epidemiological data requires review and investigation prior to any decision on atrazine's continued use.

2. Effects on frog development should be considered as equivocal until such times as validated test methods can reliably reproduce recent findings. While these findings may impact on the environmental assessment of atrazine, any findings are unlikely to have a direct relevance to human health.

[26] Mills, P. K. 1998. Correlation analysis of pesticide use data and cancer incidence rates in California counties. *Arch. Environ. Health*. 53:410-413.
[27] Van Leeuwen, J.A. et al. 1999. Associations between stomach cancer incidence and drinking water contamination with atrazine and nitrate in Ontario (Canada) agroecosystems. Intern. *Epidemio*l. Assoc. 28: 836-840.
[28] Briefing Paper St Helens, Human Health Observations for The Tasmanian AMA, January 2005)

As has been argued, the adverse impacts on frog development have been demonstrated with a sufficient weight of evidence to support immediate action. It appears that all non supporting evidence was generated by atrazine's manufacturer and these studies have been heavily criticised by the USEPA for poor laboratory practices.

There has been little if any research on adverse impacts of atrazine on amphibians in the Australian environment. The endocrine impacts of atrazine have not been investigated in other native Australian fauna; for example, in the marsupial, the Tasmanian Devil.[29] The Devil Disease Project is embarking on a pilot program to find whether chemical use is linked with the disease. The team will test devils for the existence of atrazine and other pesticides. The Office of Chemical Safety dismissal of the relevance to human health of endocrine disruption is premature when there has been no investigation into health incidences in areas of atrazine use in Australia.

3. Atrazine causes neuroendocrine disruption in SD rats, but does not bind to the oestrogen receptor or have any oestrogenic activity. It is unlikely that atrazine is an endocrine disruptor in humans based on the known mechanism of action in SD rats.

The USEPA Human Health Risk Assessment found that atrazine's impacts on the hypothalamic-pituitary function have the potential to affect an individual's functional status and lead to a variety of health consequences. As has been argued atrazine has been linked to endocrine disruption in humans, even if these impacts are not oestrogen receptor-mediated, but rather explained by their ability to induce aromatase in vitro.[30] This requires far more comprehensive investigation than this simple dismissal.

CONCLUSION

We the undersigned oppose the continued registration of atrazine due to its water contamination potential, its ability to cause developmental/endocrine impacts on amphibian species at low levels and its association with adverse impacts on human health. There are alternatives available as is evident in Syngenta's offer to the farmers of the EU where atrazine is now banned.

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[29] An association between the Tasmania Devil'S Facial Tumour Syndrome and forestry pesticide use has been suggested. See Environmental Problems Georges Bay, Tasmania, Collated by Dr Marcus Scammell from information gathered, in particular, between February 2004 to June 2004. Information gathered by: St Helen's Marine Farmers; Dr Alison Bleaney (Area Medical Officer); Dr Marcus Scammell (Marine Ecologist)

[30] J. Thomas Sanderson, Robert J. Letcher, Marjoke Heneweer, J. P.Giesy and Martin van den Berg (2001) Effects of Chloro-s-Triazine Herbicides and Metabolites on Aromatase Activity in Various Human Cell Lines and on Vitellogenin Production in Male Carp Hepatocytes , *Environmental Health Perspectives Volume* 109, Number 10; also see Sanderson, J.T. et al. 2000. 2-chloro-s-triazine herbicides induce aromatase (CYP19) activity in H295R human adrenocortical carcinoma cells: A novel mechanism for estrogenicity? *Toxicol.Sci*. 54: 121-127.

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