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To Whom It May Concern:

Re: Special Review of Atrazine: Proposed Decision for Consultation (REV2015-11)

This letter is in response to the invitation for public comment on Re-evaluation Note REV2015-11, posted on December 15, 2015. The David Suzuki Foundation and Équiterre, supported by the Canadian Association of Physicians for the Environment (CAPE) and Environmental Defence are pleased that on December 30, 2013, the Pest Management Regulatory Agency (PMRA) announced it would initiate a special review of pest control products containing the active ingredient atrazine, as required by s. 17(2) of the Pest Control Products Act (PCPA). However, we are disappointed by the lack of rigour and limited scope with which the PMRA appears to have conducted this special review. In our view, a special review conducted pursuant to s. 17(2) should consider new information or emerging issues related to health and environmental risks of the subject pest control product, in particular data and studies that may not have been available to, or previously considered by PMRA. Our assessment of PMRA's special review of atrazine products is that many important environment and human health issues have not be addressed.

Special Review fails to assess atrazine pest control products

Moreover, despite the fact that PMRA states in REV2015-11 that "The technical active ingredient, manufacturing concentrates and all end-use products containing atrazine are considered in this review", and lists products in the Appendix 1, the proposed special review decision of atrazine does not examine individual end-use pest control products containing atrazine as required by the Act.

Atrazine is found in some pest control products with other active ingredients such as dicamba, S-metolachor, mesotrione, bicyclopyrone, and Dimethenamid-P. In our view, the entire pest control product should be reviewed, including all the active ingredients, their potential cumulative effects and synergies, as well as the impacts of coformulants.

Among the co-formulation of atrazine in Canada, a preservative (1,2- benzisothiazolin- 3-one) is considered highly toxic for aquatic organisms, harmful for human if swallowed, severely irritating and even an allergen when in contact with skin, and could cause serious damage to eyes[1].

Co-exposures and mixtures containing atrazine are involved in the immune system weakening of fish and amphibians[2]. Atrazine also synergizes behavioural changes related to the insecticide chlorpyrifos in aquatic invertebrates and can multiply the toxicity of the insecticide diazinon up to 400% in midges and amphipods[3]. Combined with S-metolachlor, it induces delayed growth and development in frogs.[4] A simultaneous presence of atrazine and nitrate in drinking water could increase by 2.5 times the odds of developing non - Hodgkin's lymphoma in humans[5], and delay intra-uterine growth[6].

We ask the PMRA to conduct a more robust special review of registered use pest control products containing atrazine and then issue a revised proposed decision for consultation. In particular, we hope a revised proposed decision will address the following issues:

Evidence of widespread atrazine groundwater contamination in Canada

As reported in the proposed special review decision, atrazine was detected in 2,823 out of a total of 14,455 groundwater samples (20%) from Canada and the United States. Considering only Canadian data, atrazine was detected in 11% of groundwater samples (119 out of 1067), with a maximum concentration of 2.32 µg/L. The maximum concentration reported by the PMRA in the special review is well in excess of the 0.1 µg/L concentration used by the European Union ("EU") as a reason to ban Atrazine.

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[1] Key, P.; Chung, K.; Siewicki, T.; Fulton, M., Toxicity of three pesticides individually and in mixture to larval grass shrimp (Palaemonetes pugio). *Ecotoxicology and Environmental Safety* 2007, *68*, (2), 272-277.

[2] Rohr, J. R.; McCoy, K. A., A qualitative meta-analysis reveals consistent effects of atrazine on freshwater fish and amphibians. *Env Health Persp* 2010, *118*, (1), 20.

[3] illiom, R. J.; Barbash, J. E.; Crawford, C. G.; Hamilton, P. A.; Martin, J. D.; Nakagaki, N.; Nowell, L. H.; Scott, J. C.; Stackelberg, P. E.; Thelin, G. P.; Wolock, D. M. *The Quality of Our Nation's Waters - Pesticides in the Nation's Streams and Ground Water*; 2006; p 172.

[4] Hayes, T. B.; Case, P.; Chui, S.; Chung, D.; Haeffele, C.; Haston, K.; Lee, M.; Mai, V. P.; Marjuoa, Y.; Parker, J.; Tsui, M., Pesticide Mixtures, Endocrine Disruption, and Amphibian Declines: Are We Underestimating the Impact? *Env Health Persp* 2006, *114*, (S-1).

[5] Rhoades, M. G.; Meza, J. L.; Beseler, C. L.; Shea, P. J.; Kahle, A.; Vose, J. M.; Eskridge, K. M.; Spalding, R. F., Atrazine and nitrate in public Drinking Water supplies and non-Hodgkin Lymphoma in nebraska, UsA. *Env Health Insights* 2013, *7*, 15.

[6] Migeot, V.; Albouy-Llaty, M.; Carles, C.; Limousi, F.; Strezlec, S.; Dupuis, A.; Rabouan, S., Drinking-water exposure to a mixture of nitrate and low-dose atrazine metabolites and small-for-gestational age (SGA) babies: a historic cohort study. *Environmental research* 2013, *122*, 58-64.

The PMRA modelled potential residues of atrazine in groundwater to estimate contamination of drinking water sources. The highest estimated environmental concentration in groundwater was modelled at 164 µg/L. The Guideline for Canadian Drinking Water Quality ("drinking water guideline") set by Health Canada for Atrazine is 5 µg/L. The PMRA's estimated highest concentration of atrazine in groundwater is over 30 times the Canadian drinking water guideline.

However rather than comparing the highest estimated concentration of 164 µg/L to the drinking water guideline, the proposed special review uses a comparator called the Drinking Water Level of Comparison ("level of comparison") of 1300.5 µg/L for acute effects and 41.9 µg/L for chronic effects which are described in the special review as "the highest concentration of a pesticide in drinking water that would be acceptable considering the toxicity profile of the pesticide and the estimated exposure to that pesticide from all other sources." Using the much higher level of comparison values as a comparator rather than the drinking water guideline is less precautious and less protective of human health and the environment, and unjustifiable in our view. Given that the overarching purpose of the PCPA is to "protect human health and safety and the environment", the decision to use a less protective standard for evaluation cannot be justified and runs counter to the precautionary basis of the Act. A decision to allow for the continued registration and use of Atrazine products in Canada based on analysis that utilizes the level of comparison values rather than the drinking water guideline could result in exceedances of Health Canada's very own drinking water guideline for the protection of human health, as the modelling in the proposed special review decision demonstrates.

Moreover, it is worth noting that the US drinking water standard is 3 µg/L, 40% lower than Canada's. Researchers have reported human health impacts such as intrauterine growth retardation and small birth weight linked to atrazine levels below the USEPA standard[7], including a study in Iowa of 13 communities where the mean drinking water level was 2.2 µg/L[8] and Indiana where the mean levels were less than 1 µg/L.[9] In addition, congenital abdominal wall defects have been correlated to mean atrazine levels in surface water below the Canadian drinking water guideline.[10]

Special review fails to assess surface water contamination

While the special review modelled potential residues of atrazine in groundwater to estimate contamination of drinking water sources. Groundwater represents only a fraction of drinking water in Quebec. Of the total amount of people supplied by municipal drinking water systems in Quebec, 81 % are sourced from surface water. Given the number of people whose drinking water

[7] S. Lazorko-Cnnon and G. Achari Atrazine occurrence and treatment in water. Env Rev. 17 199-215 (2009). P. 208
[8] Ronald Munger, Peter lsacson, Song Hu, Trudy Burns, James Hanson, Charles F. Lynch, Keith Cherryholmes, Paul Van Dorpe, and William J. Hausler, Jr. Intrauterine Growth Retardation in Iowa Communities with Herbicide-contaminated Drinking Water Supplies. Environmental Health Perspectives. Volume 105, Number 3, March 1997
[9] Hugo Ochoa-Acuña, Jane Frankenberger, Leighanne Hahn, and Cristina Carbajo. 2009. Drinking-Water Herbicide Exposure in Indiana and Prevalenceof Small-for-Gestational-Age and Preterm Delivery. Environmental Health Perspectives. Volume 117 | number 10.
[10] Kelly D. Mattixa, Paul D. Winchesterb, L.R. Tres Scherera. 2007. Incidence of abdominal wall defects is related to surface water atrazine and nitrate levels. Journal of Pediatric Surgery (2007) 42, 947–949

comes from surface water sources, the special review of atrazine should take into account surface water as a source of drinking water.

Given the widespread contamination of groundwater in Canada with atrazine, it is concerning that the special review fails to assess the contamination of surface water in Canada with atrazine. Studies have found atrazine levels in surface water in Canada exceed the Canadian drinking water guideline as well as guidelines to protect aquatic life, as discussed further below.

Atrazine has been reported in surface water in Ontario and in Quebec in excess of the Canadian Water Quality Guideline for the protection of aquatic life of 1.8 µg/L (which incidentally is also lower than the drinking water guideline), and has been determine to pose a risk to aquatic organisms at and below this guideline.[11]

In 2007, researchers examined 739 surface water samples from 158 locations throughout Ontario that were analysed for atrazine from April to October 2007. Concentrations ranged from <0.1 to 3.91 µg/L for atrazine.[12] Atrazine was also one of the pesticides frequently detected in reservoirs in Saskatchewan and Manitoba and surface water and groundwater in British Columbia, and was the most frequently detected pesticide in surface water in Ontario (93% of samples) in 2003-04 study by Environment Canada.[13]

The most recent monitoring report from the Quebec Ministry of Environment, the ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), in rivers crossing rural areas where soy and corn are cultivated found that atrazine is among the most frequently detected pesticide, present in average in 97 % of the samples collected. This report showed that atrazine was one of the pesticides with the highest maximum concentrations, with 11 µg/l in 2011, 11 µg/l in 2012, 9,7 µg/l in 2011, and 13 µg/l in 2014 which exceeds both the Canadian drinking water guideline and the Canadian Water Quality Guideline for the protection of aquatic life, as well as the *Regulation respecting the quality of drinking water* in Quebec, which is 3.5 µg/l[14].

From 2011 to 2014, in Quebec, exceedances of water quality criteria for protection of aquatic life (chronic toxicity criterion) were observed for eleven pesticides, atrazine being one of them.

In our view, the failure of the special review to assess surface water contamination risks does not comply with the PCPA, including the requirement under s. 19(2) which apply to special reviews."[15]

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[11] Takas*, op. cit*., p. 47

[12] Jonathan D. Byer, John Struger, Ed Sverko, Paul Klawunn, Aaron Todd. Technical Note. Spatial and seasonal variations in atrazine and metolachlor surface water concentrations in Ontario (Canada) using ELISA. Chemisphere 82(2011)1155-1160.

[13]Environment Canada. PRESENCE AND LEVELS OF PRIORITY PESTICIDES IN SELECTED CANADIAN AQUATIC ECOSYSTEMS. Environment Canada. March 2011.

[14] MDDELCC, Règlement sur la qualité de l'eau potable: http://www.mddelcc.gouv.qc.ca/eau/potable/brochure/annexe.htm

[15] Pest Control Products Act: http://laws-lois.justice.gc.ca/eng/acts/P-9.01/page-1.html

PMRA needs to take into account that drinking water treatment systems do not remove Atrazine

Conventional drinking water treatment is not effective at removing atrazine from water. For example, atrazine is found in Toronto's drinking water. The most recent report (2014) shows 0.077 – 0.166 µg/L as the minimum and maximum atrazine levels. Furthermore, Toronto is not unusual: a review of Ontario's drinking water database shows that atrazine is frequently detected in both raw and treated drinking water in Ontario municipalities.[16]

An analysis of drinking and surface water samples of the region of Montreal published in 2009[17] reveals the presence of atrazine and of DEA, a byproduct of atrazine. The concentrations of DEA in the three samples of driking water reported and one sample of surface water (St._Lawrence river) exceeded the European standard of 100 ng/L (with values of respectively 278 ± 13 ng/L, 331 ± 9 ng/L, 317 ± 10 ng/L, and 479 ± 4 ng/L).

The PMRA must assess the risk for ecosystems and aquatic organisms

The PMRA didn't assess the risk from contamination for ecosystems and aquatic organisms. In aquatic ecosystems, animals are chronically exposed to atrazine. In Quebec, the animals exposed to the highest concentrations of atrazine are those living close to agricultural watersheds. In a study conducted by Dr. Monique Boily's team from University of Quebec in Montreal from 2003 to 2009 in the watershed of the Yamaska River in Quebec, Dr. Boily assessed the health of the bullfrog frog (*Lithobates catesbeianus*) in 6 rivers representing a gradient of contaminants, primarily of herbicides: atrazine, metolachlor – also present in some atrazine products - and glyphosate. In the most contaminated site by herbicides, frogs were found to have growth problems and negative effects were observed on the regulation of the immune, steroid (retinoids, vitamin A) and cholinergic systems[18].

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[16] See databases at < https://www.ontario.ca/data/drinking-water-surveillance-program>

[17] Araceli Garcia-Ac, Pedro A. Segura, Liza Viglino, Alexandra Fürtös , Christian Gagnon, Michèle Prévost, Sébastien Sauvé, 2009. « On-line solid-phase extraction of large-volume injections coupled to liquid chromatography-tandem mass spectrometry for the quantitation and confirmation of 14 selected trace organic contaminants in drinking and surface water ». *Journal of Chromatography A,* 1216 (2009) 8518–8527

[18] Bérubé, V., Boily, M., DeBlois, C., Dassylva, N. et P. Spear. 2005. «Plasma retinoid profile in bullfrogs (*Rana catesbeiana*) from agricultural area in the Yamaska River basin, Québec, Canada». *Aquatic Toxicology* 71: 109-120.

Boily, M., Bérubé, V., DeBlois, C., Dassylva, N. et P. Spear. 2005. «Hepatic retinoids in bullfrogs, *Rana catesbeiana* in relation to pesticide agricultural exposure». *Environ. Toxicol. Chem.* 24: 1099-1106.

Thibodeau, J., Filion, S., Spear, P., Paquin, J., Boily, M. 2012. Oxidation of retinoic acids in hepatic microsomes of wild bullfrogs *Lithobates catesbeianus* environmentally-exposed to a gradient of agricultural contamination. Ecotoxicology 21:1358–1370.

King, K.C., McLaughlin, J.D., Boily, M. et Marcogliese, D.J. 2010. Effects of agricultural landscape and pesticides on parasitism in native bullfrogs. Biol. Conserv. 143: 302-310.

Boily, M., Thibodeau, J. et Bisson, M. 2009. Retinoid metabolism (LRAT, REH) in the liver and plasma retinoids of bullfrog, *Rana catesbeiana*, in relation to agricultural contamination. Aquat. Toxicol. Special Issue, Amphibian toxicology 91: 118-125.

Spear, P.A., Boily, M., Giroux, I. DeBlois, C. Leclair, M.H., Levasseur, M. et Leclair, R. 2009. Study design, water quality, morphometrics and age of the bullfrog, *Rana catesbeiana*, in sub-watersheds of the Yamaska River drainage basin, Quebec, Canada. *Aquat. Toxicol. Special Issue, Amphibian toxicology* 91: 110-117.

Due to chronic and simultaneous exposure to several pesticides, the effects cannot be linked directly and only to atrazine, but this herbicide was dominant in all of Dr. Boily's water samples throughout the study. Some of the effects observed in frogs are currently being tested in the Yellow perch (Perca flavescens) sampled in the St. Lawrence River.

Atrazine was also extensively tested in isolation under controlled laboratory conditions and effects were observed on aquatic and terrestrial species, vertebrate or invertebrate, plant or animal. Few examples:

- It is well known that by affecting photosynthesis, atrazine modifies algae communities and contributes to reduce the abundance of macrophytes.[19] This aquatic vegetation is essential to maintaining zooplankton and larvae of mussels, fish, amphibians;
- The reduction in algae harm animals that consume plant, like gastropods. These organisms live close to the sediment and are thus exposed to atrazine retained in sediments;
- Among the most important hazards of atrazine in the environment are linked to endocrine disruption, affecting aromatase, which synthesizes estrogen from testosterone. This decrease of androgen in favor of estrogen particularly affect vertebrates who have no sex chromosomes whose morphology is different: fish, amphibians and reptiles[20];
- The residues found in soils affect the diversity of microorganisms and the health of earthworms. When absorbed by plants (cultivated or wild), atrazine acts as an oxidizing agent and when present in pollen, it presents a risk to bees. In a recent study, Dr. Boily exposed bees to atrazine concentrations similar to concentrations found in the pollen of corn, and oxidizing effects (lipid peroxidation) were observed, and a decrease in antioxidants like carotenoids and vitamin E[21].

Dr. Hayes from Berkeley University found that the testes of tadpoles exposed at levels below those found in surface water in Canada (0.1 µg/L), developed oocytes-eggs that should only be found in female frogs - and that the effect was higher at lower doses. The phenomenon of higher effect at lower doses has been previously demonstrated for endocrine disputing substances which do not have linear dose response curves and often have much greater impacts at lower concentrations.[22] Dr. Hayes reports endocrine effects such as demasculinization of males with increased atrazine concentration in fish, amphibians, and reptiles and in human cell lines and partial or complete feminization in fish, amphibians and reptiles. Regarding the effective doses, the demasculinization effects of atrazine were produced at low ecologically relevant doses (e.g. 2.5 µg/L or below) in amphibians which is well below levels detected in Canada in surface and groundwater.[23]

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[19] Cunningham, J.J., Kemp, W.M., Lewis, M.R., Stevenson, J.C. 1984. Temporal responses of the macrophyte,*Potamogeton perfoliatus* L., and its associated autotrophic community to atrazine exposure in estuarine microcosms. Estuaries 7: 519-530.

[20] T.B. Hayes, Hormonal regulation of sex differentiation in amphibians, reptiles, and birds, in: E. Knobil, J. Neill (Eds.), Encyclopedia of Reproduction, Academic Press, San Diego, 1998, pp. 102–109.

[21] Hedrei Helmer, S., Kerbaol, A., Aras, P., Jumarie, C., Boily, M. 2014. Effects of realistic doses of atrazine, metolachlor, and glyphosate on lipid peroxidation and diet-derived antioxidants in caged honey bees (Apis mellifera). Environ. Sci. Pollut. Res. 22: 8010 – 8021.

[22] Conflict Brewing Over Herbicide's Link to Frog Deformities. NOVEMBER 2002 VOL 298 SCIENCE

[23] Tyrone B. Hayes, Lloyd L. Anderson, Val R. Beasley, Shane R. de Solla, Taisen Iguchi,

PMRA must take into account synergistic effects with other pesticides

In addition to the synergistic effects discussed above, the field studies conducted by Dr. Boily emphasize the importance of acquiring scientific data involving atrazine in the presence of other compounds. For example, a study by Key et al.[24] has revealed that atrazine, combined to fipronil and imidacloprid (two insecticides frequently detected in surface waters), increased shrimp larvae mortality (Palaemonetes pugio) in a synergistic manner, i.e. a higher mortality rate than with the three products tested separately. Field crops also require significant amounts of fertilizer (phosphorus and nitrogen). By using mesocosms, Rohr et al.[25] demonstrated that atrazine was the herbicide that is having the greatest influence on the infection of the leopard frog by trematodes. This influence on the abundance of parasites has increased by 23% when the frogs were exposed to atrazine combined to phosphorus. Similarly, when the leopard frog tadpoles were exposed to combinations of atrazine and nitrogen, the effects observed with only atrazine were increased, revealing yet again, a synergy between the two substances[26].

PMRA must take into account health effects from atrazine use by farmers, farm workers, pesticide applicators and farming communities

The PMRA didn't assess human health risks as required under s.19(2) from exposures that occur to farmers, farm workers, pesticide applicators and farming communities where atrazine is used in agriculture despite the following studies showing links between atrazine exposure and human health:

- A study of 579 pregnant women in France found that the presence versus absence of quantifiable levels of atrazine or a specific atrazine metabolite in their urine was associated with fetal growth restriction and small head circumference for sex and gestational age.[27]

Holly Ingraham, Patrick Kestemont, Jasna Kniewald, Zlatko Kniewald, Valerie S. Langlois, Enrique H. Luque, Krista A. McCoy, Mónica Mu˜noz-de-Toro, Tomohiro Oka, Cleida A. Oliveira, Frances Orton, Sylvia Ruby, Miyuki Suzawa, Luz E. Tavera-Mendoza, Vance L. Trudeau, Anna Bolivar Victor-Costa, Emily Willingham.2011. Demasculinization and feminization of male gonads by atrazine: Consistent effects across vertebrate classes. Journal of Steroid Biochemistry and Molecular Biology. 127 (2011) 64– 73.

24 Key, P., Chung, K., Siewicki, T., Fulton M. 2007. Toxicity of three pesticides individually and in mixture to larval grass shrimp (Palaemonetes pugio). Ecotoxicology and Environmental Safety 68: 272–277.

25 Rohr, J.R., Schotthoefer, A.M., Raffel, T.R. et al. 2008. Agrochemicals increase trématode infections in a declining amphibian species. Nature Letters: 455: 1235-1240.

26 Orton, F., Carr, J.A., Handy, R.D. 2006. Effects of nitrate and atrazine on larval development and sexual différentiation in the northern léopard frog Rana pipiens. Environ. Toxicol. Chem., 25: 65–71.

27 Cécile Chevrier,Gwendolina Limon, Christine Monfort, Florence Rouget, Ronan Garlantézec, Claire Petit,Gaël Durand, and Sylvaine Cordier. 2011. Urinary Biomarkers of Prenatal Atrazine Exposure and Adverse Birth Outcomes in the PELAGIE Birth Cohort. Environmental Health Perspectives. 119:7

- Positive association was found between stomach cancer incidents and atrazine levels in Ontario.[28]

- A link between maternal exposure to endocrine disruptors, such as atrazine, and the risk of choanal atresia (a congenital disorder impacting the nasal passage) is plausible based on previous findings[29]

- A study of atrazine exposure and menstrual cycles found that the evidence that atrazine exposure at levels below the USEPA standard is associated with increased menstrual cycle irregularity and other effects on menstrual cycle function.[30]

- In the human H295R adrenocortical carcinoma cell line, atrazine has been found to have hormonal disrupting and tumor promoting properties in vivo, by induction of aromatase, the rate-limiting enzyme in the conversion of androgens to estrogens.[31]

- In animal models, atrazine has been found to cause demasculinization in males and causes delay in puberty[32]

- A Kentucky study found an increase in the odds of preterm birth for women residing in the counties included in the highest atrazine exposure group compared with women residing in counties in the lowest exposure group.[33]

- A relationship was found between exposure to atrazine and increased breast cancer incidents in a study of 120 counties in Kentucky. Exposures were based on assessment of ground and surface water levels of atrazine which were similar to levels found in Canada, and proximity to corn growth because like in Canada atrazine is applied to corn.[34]

- Atrazine has been associated with cancer in research conducted in California, the leading agricultural state in the United States. It used the population-based cancer registry (the California Cancer Registry), and a comprehensive, statewide pesticide reporting system

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[28] Van Leeuwen John A, Waltner Toews David, Abernathy Tom, Smit Barry and Shouki Mohamed. Association between stomach cancer and incidence and drinking water contamination with atrazine and nitrate in Ontario (Canada) agroecosystems, 1987-1991. International Journal of Epidemiology. 1999:28:836-840.

[29] A. Jack Agopian, Yi Cai, Peter H. Langlois, Mark A. Canfield, and Philip J. Lupo. The Journal of Pediatrics. Maternal Residential Atrazine Exposure and Risk for Choanal Atresia and Stenosis in Offspring. Vol 162, No. 3

[30] Lori A.Cragin a,b,n, JamesS.Kesner c, AnnetteM.Bachand a, DanaBoydBarr d,e, JulianaW.Meadows c, Edward F.Krieg c, JohnS.Reif. 2011. Menstrual cycle characteristics and reproductive hormone levels in women Exposed to atrazine in drinking water. EnvironmentalResearch111(2011)1293–1301

[31] 2-Chloro-s-Triazine Herbicides Induce Aromatase (CYP19) Activity in H295R Human Adrenocortical Carcinoma Cells: A Novel Mechanism for Estrogenicity? J. Thomas Sanderson,Willem Seinen, John P. Giesy, and Martin van den Berg. TOXICOLOGICAL SCIENCES 54, 121–127 (2000)

[32] Jonathan R. Roy, Sanjoy Chakraborty, Tandra R. Chakraborty. Estrogen-like endocrine disrupting chemicals affecting puberty in humans – a review. Med Sci Monit, 2009; 15(6): RA137-145

[33] Jessica L. Rinsky, Claudia Hopenhayn, Vijay Golla, Steve Browning, Heather M. Bush, Atrazine Exposure in Public Drinking Water and Preterm Birth. Public Health Reports / January–February 2012 / Volume 127

[34] Michele A. Kettles, Steven R. Browning, Timothy Scott Prince, and Sanford W. Triazine Herbicide Exposure and Breast Cancer Incidence: An Ecologic Study of Kentucky Counties. Environmental Health Perspectives Horstman Volume 105, Number 11, November 1997

(the California Department of Pesticide Regulation).[35] In this study, the following correlations were observed Hispanic males: leukemia and atrazine (r = .40), atrazine and brain cancer (r = .54), and atrazine and testicular cancer (r = .41). For black males, atrazine and prostate cancer (r = .67) has been observed. These segments of the population have traditionally been employed as farm workers in California and have had the greatest potential for exposure to pesticides.

Thank you for considering these comments. We hope to have the opportunity to comment again on a revised special review document that evaluates all the risks and the values of the registered end-use products containing atrazine.

Sincerely,

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[35] PAUL K. MILLS. 1998. Correlation Analysis of Pesticide Use Data and Cancer Incidence Rates in California Counties. Archives of Environmental Health . Vol. 53 (No. 6)l