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August 5, 2022

Office of Pesticide Programs
Environmental Protection Agency, (28221T),
1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

Re: Proposed Revisions to the Atrazine Interim Registration Review Decision, Case Number 0062

Dear Madam/Sir,

These comments are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and the world.

In our comments on the Proposed Interim Decision for Atrazine (EPA-HQ-OPP-2013-0266-1274), we urged the agency to revoke the registration of this herbicide due to the high risk findings and demonstrated adverse impacts as identified in the agency's health and ecological assessments. Although the agency is not now soliciting comment on any other aspects of the atrazine Interim Decision (ID) other than those specifically identified in the proposed revisions to the atrazine ID memorandum (EPA-HQ-OPP-2013-266-1625), we nonetheless reiterate our appeal for the agency to adhere to FIFRA's statutory mandate and suspend the registration of atrazine which poses unreasonable adverse health and environmental effects. Atrazine is highly mobile and persistent in the environment and has been linked to numerous adverse health and environmental effects which have motivated numerous public interest campaigns to ban its use in the U.S., as it has been in Europe.

The proposal for revisions to the atrazine ID are to: (1) provide clarification to specific sections of the ID that address atrazine exposure in aquatic plant communities;

and (2) propose additional mitigation to address potential risks of concern to aquatic plant communities identified through this re-evaluation.

The agency is attempting to clarify the confusion elicited in the ID concerning the aquatic plant community-equivalent level of concern (CE-LOC) in the 2016 draft atrazine ecological risk assessment of 3.4 µg/L and the value of 15 µg/L as a 60-day average used in the 2019 regulatory update (EPA-HQ-OPP-2013-0266-1260). The agency is reasserting its initial determination and support of using the CE-LOC of 3.4 µg/L as a 60-day average. The agency acknowledges there is uncertainty inherent in the various models used to calculate the CE-LOC. Utilizing the scoring interpretation methods recommended by the 2012 FIFRA Scientific Advisory Panel and accounting for uncertainty, the agency determined the CE-LOC ranges from 1.9 to 26 µg/L with a median of 8.5 µg/L. The agency has ultimately decided to use the concentration of 3.4 µg/L as a 60-day average for unacceptable risk to account for potential aquatic community recovery at lower concentrations.

We disagree with considering recovery in assessing ecological risk. The concept of recovery is highly subjective and time dependent.[1] Ecological structure and function can be perturbed in the short term and adverse impacts can be transferred outside the system in question with permanent consequences. For instance, a short-term shift in dominance of the algal community will impact zooplankton biomass and reduce food availability for juvenile waterfowl resulting in waterfowl population loss.[2] The CE-LOC used also does not incorporate toxic metabolites of atrazine including desethyl-s-atrazine (DEA), desisopropyl-s-atrazine (DIA), and diaminochlorotriazine (DACT) that also pose serious risk concerns to aquatic plant communities. Another key consideration would be direct or indirect effects to endangered species. In November 2021, the agency released the final Biological Evaluation (BE) assessing risks to listed species from labeled uses of atrazine. The agency made likely to adversely affect (LAA) determinations for 1013 species and 328 critical habitats. Therefore, it is more appropriate to use the lowest estimated CE-LOC for establishing risk concern thresholds. In comparison, Canada uses a 1.8 µg/L aquatic concentration limit for the protection of aquatic life.[3]

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[1] Pratt, J.R. and Cairns Jr, J., 1996. Ecotoxicology and the redundancy problem: understanding effects on community structure and function. In *Ecotoxicology: a hierarchical treatment* (pp. 347-369). Lewis New York.
[2] Grue, C.E., 1988. *Agricultural chemicals and the quality of prairie-pothole wetlands for adult and juvenile waterfowl-what are the concerns?* US Fish and Wildlife Service.
[3] CCME. 1999. Canadian water quality guidelines for the protection of aquatic life—atrazine, p. 1–4. In Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg

The agency asserts risks to aquatic communities still remaining after adoption of all proposed mitigation measures including a picklist of conservation practices are outweighed by the benefits of atrazine use. We ardently disagree with this assertion as atrazine benefits are overstated and improperly considered. The agency's benefits assessment did not adequately consider loss of aquatic species and ecosystem services from impaired habitats and sensitive aquatic plant communities. The benefits of atrazine use are very much diminished by availability of alternative pest management practices that incorporate alternative cultural practices and/or less toxic pest management products, including numerous other registered pesticides.

The mitigation options being proposed by the agency are intended to reduce potential exposure and risk to aquatic plant communities from atrazine via runoff from agricultural uses. However, the various options considered only reduce potential runoff and will not eliminate serious adverse impacts to aquatic plant communities or listed species and their habitat. It also does not consider other routes of exposure such as leaching to groundwater and interflow to surface waters. The proposed mitigation options, record keeping requirements, and required picklist of conservation practices are together overly complicated to enforce and will not ensure that continued atrazine use will not cause further adverse environmental effects.

As the agency has made numerous LAA listed species and critical habitat determinations, the agency is required to initiate ESA §7(a)(2) formal consultations with the services prior to its registration decisions. The ID also does not affirmatively address the considerable endocrine disruption concerns. Given the recognized HPG-axis mode of action of atrazine and ambiguity in chronic fish and amphibian test data, the agency cannot conclude the FIFRA "no unreasonable adverse effect" standard. We therefore recommend an immediate suspension of all atrazine uses until these ESA §7(a)(2) and endocrine disruption questions are fully resolved.

Respectfully,

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Senior Science and Policy Manager

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March 2, 2020

Office of Pesticide Programs
Environmental Protection Agency, (28221T),
1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

Re: Pesticide Registration Review: Proposed Interim Decisions for Several Triazine Pesticides Atrazine (EPA-HQ-OPP- 2013-0266-1274), Simazine (EPA-HQ-OPP- 2013-0251-0146), and Propazine (EPA-HQ-OPP-2013-0250-009)

Dear Madam/Sir,

These comments are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and the world.

We are writing with serious concerns in response to the proposed interim decisions on reregistration of three triazine pesticides including atrazine (EPA-HQ-OPP- 2013-0266-1274), simazine (EPA-HQ-OPP- 2013-0251-0146), and propazine (EPA-HQ-OPP-2013-0250-009). These triazines are highly mobile and persistent in the environment and have been linked to numerous adverse health and environmental effects, which have motivated numerous public interest campaigns to ban their use in the U.S. as well as in Europe. In our comments on the Draft Ecological Risk Assessments for the Registration Review of Atrazine EPA-HQ-OPP2013-0266; Simazine EPA-HQ-OPP-2013-0251; Propazine EPA-HQ-OPP-2013-0250 dated October 5, 2016 (Attachment A), we urged the agency to revoke the registration of these compounds due to high risk findings and demonstrated adverse impacts as supported by these assessments. We reiterate our appeal to adhere to FIFRA's statutory mandate and suspend the registration of these pesticides that pose unreasonable adverse health and environmental effects.

I. Atrazine

Atrazine is an herbicide used to control broadleaf and grassy weeds on several agricultural crops and non-agricultural use sites. The highest agricultural uses include corn, sorghum, and sugarcane. Non-agricultural uses include residential and recreational sites including home lawns, school grounds, parks, golf courses, and ornamentals. Atrazine is a member of the chlorotriazine chemical class, which includes simazine and propazine along with the three following chlorinated metabolites: desethyl-s-atrazine (DEA), desisopropyl-s-atrazine (DIA), and diaminochlorotriazine (DACT). Atrazine products are registered in a variety of formulations, including granular, water dispersible granules (WDG), emulsifiable concentrates (EC), dry-flowable concentrates (DF), soluble concentrate, ready-to use products, and water-soluble packages (WSP). Atrazine may also be applied to various field crops in dry bulk fertilizers (DBF).

a. Registration Review Summary and Updates

i. Human Health Risks

The EPA has determined that the chlorotriazines (triazines) and their three chlorinated metabolites share a common mechanism of toxicity, and as such, human health risks were assessed together through a triazine cumulative risk assessment. The mechanism of toxicity is perturbation of the neuroendocrine system by disrupting hypothalamic regulation of the pituitary, leading primarily to a disturbance in the ovulatory surge of luteinizing hormone (LH) which results in both reproductive and developmental alterations. Of the numerous adverse effects associated with this disruption, the two that appear to be the most sensitive and occur after the shortest duration (4 days) of exposure are the disruption of the ovarian cycles and the delays in puberty onset. Although other effects ranging from immune suppression to mitochondrial and insulin dysfunction have been reported in the peer reviewed literature, these effects occur at doses well above the no observed adverse effect levels (NOAELs) and lowest observed adverse effect levels (LOAELs) for LH surge attenuation. Therefore, the Point of Departure (POD) chosen is based on this HPG axis disruption. Importantly, this perturbation manifests after a short duration exposure with long term life-cycle consequences so it establishes both acute and chronic toxicity levels of concern (LOCs).

The Food Quality Protection Act (FQPA) mandated safety factor of 10X has been reduced by the agency to 1X and the standard inter-species extrapolation uncertainty factor (reduced from 10X to 3X in some scenarios) because the toxicology and exposure databases for atrazine are considered complete by the agency. Moreover, the agency asserts there are no

remaining uncertainties with regard to the potential for increased susceptibility to infants and children. However, the most sensitive atrazine apical effect is the perturbation of the HPG axis and, in a study cited by the agency, there is clear sign that the HPG axis and secretion of LH is critical in early development of human newborns.[1] Together with a number of epidemiology studies reporting positive associations between atrazine exposure and birth effects among infants, including preterm delivery, low birthweight, and various birth defects/abnormalities there is further corroboration of high risk to infants.[2,3,4,5,6,7,8,9] The agency nevertheless concludes the overall epidemiological evidence is weak given certain inherent limitations in these studies. We disagree with the agency's conclusion that these studies do not introduce significant uncertainty in the risk assessment. Weak evidence is still evidence and although it may not rise to a level sufficient to confirm an association, it does impose a reasonable doubt (=uncertainty) and fails to demonstrate atrazine will not cause unacceptable risks. In considering an adverse outcome pathway (AOP) for atrazine, the well-documented initiating event (HPG axis perturbation) can be traced by the extensive laboratory data to the putative adverse outcomes assessed in the many epidemiology studies. So, if not fully confirmed, these data emphatically introduce dramatic uncertainty. The agency decision to purge the FQPA safety factor and inter-species extrapolation uncertainty factor should clearly be reversed. Reinstituting these safety factors will necessarily change the currently established PODs and elevate associated risk concerns.

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[1]De Zegher, F., Devlieger, H. and Veldhuis, J.D., 1992. Pulsatile and sexually dimorphic secretion of luteinizing hormone in the human infant on the day of birth. *Pediatric research*, *32*(5), pp.605-607.

[2]Ochoa-Acuña, H., Frankenberger, J., Hahn, L. and Carbajo, C., 2009. Drinking-water herbicide exposure in Indiana and prevalence of small-for-gestational-age and preterm delivery. *Environmental health perspectives*, *117*(10), pp.1619-1624.

[3] Waller, S.A., Paul, K., Peterson, S.E. and Hitti, J.E., 2010. Agricultural-related chemical exposures, season of conception, and risk of gastroschisis in Washington State. *American journal of obstetrics and gynecology*, *202*(3), pp.241-e1.

[4] Mattix, K.D. and Winchester, P.D., 2007. Incidence of abdominal wall defects is related to surface water atrazine and nitrate levels. *Journal of pediatric surgery*, *42*(6), pp.947-949.

[5]Winchester, P.D., Huskins, J. and Ying, J., 2009. Agrichemicals in surface water and birth defects in the United States. *Acta paediatrica*, *98*(4), pp.664-669.

[6] Stayner, L.T., Almberg, K., Jones, R., Graber, J., Pedersen, M. and Turyk, M., 2017. Atrazine and nitrate in drinking water and the risk of preterm delivery and low birth weight in four Midwestern states. *Environmental research*, *152*, pp.294-303.

[7] Almberg, K.S., Turyk, M.E., Jones, R.M., Rankin, K., Freels, S. and Stayner, L.T., 2018. Atrazine contamination of drinking water and adverse birth outcomes in community water systems with elevated atrazine in Ohio, 2006–2008. *International journal of environmental research and public health*, *15*(9), p.1889.

[8] Agopian, A.J., Lupo, P.J., Canfield, M.A. and Langlois, P.H., 2013. Case–C ontrol Study of Maternal Residential Atrazine Exposure and Male Genital Malformations. *American journal of medical genetics Part A*, *161*(5), pp.977-982.

[9] Winston, J.J., Emch, M., Meyer, R.E., Langlois, P., Weyer, P., Mosley, B., Olshan, A.F., Band, L.E. and Luben, T.J., 2016. Hypospadias and maternal exposure to atrazine via drinking water in the National Birth Defects Prevention study. *Environmental Health*, *15*(1), p.76.

The statutory standard requiring sufficient data to demonstrate atrazine will not pose any unreasonable adverse effects on the environment has clearly not been met. In fact, the available toxicity and exposure data are sufficient to demonstrate that several atrazine uses exceed risk levels of concern. Exposures to children 1-2 years old playing on turf sprayed with atrazine exceed a risk estimate of concern for combined dermal and incidental oral exposures when assuming the maximum labeled rate for spray applications (2.0 lb ai/A). However, a screening aggregate assessment without the FQPA required safety factor was performed assuming that the application rate for turf is reduced to 1.0 lb ai/A which would not be of concern for 4-day aggregate exposures. We contend that even with this rate reduction, it can be presumed children are still at risk. For occupational handlers, the agency identified the following use scenarios that exceed risk concerns even with the maximum available personal protective equipment and/or engineering controls (proposed mitigation measures) are used:

- Mixing/loading DF/WDG formulations for aerial application to sorghum and CRP areas (2.0 lb ai/A).
- Mixing/loading liquid formulation for impregnated dry bulk fertilizer application to corn, sorghum, and bioenergy crops (20 lb ai/ton).
- Mixing/loading WSP formulations for aerial application to guava (4.0 lb ai/A); sod (4.0 lb ai/A); corn, sorghum, winter weed control, and CRP areas (2.0 lb ai/A); fallow (2.25 lb ai/A); and sugarcane (4.0 lb ai/A).
- Applying sprays via mechanically pressurized handgun equipment to roadsides (0.2 lb ai/gal).
- Mixing/loading/applying DF/WDG and liquid formulations via backpack spray equipment to landscape turf (broadcast only) (0.133 lb ai/gal).
- Mixing/loading/applying DF/WDG, liquid, and WSP formulations via mechanically pressurized handgun spray equipment to macadamia nuts (0.4 lb ai/gal), sweet corn (0.2 lb ai/gal), and guava (0.2 lb ai/gal).
- Loading/applying DF/WDG and liquid, formulations for backpack spray applications to roadsides (0.2 lb ai/gal).

ii. Ecological Risks

The agency summarizes ecological risks in its refined ecological risk assessment as: "Based on the results from hundreds of toxicity studies on the effects of atrazine on plants and animals, over 20 years of surface water monitoring data, and higher tier aquatic exposure models, this risk assessment concludes that aquatic plant communities are impacted in many areas where atrazine use is heaviest, and there is potential chronic risk to fish, amphibians, and aquatic invertebrates in these same locations." We agree with this summation. In addition, the

assessment of chronic risk to fish is buttressed by recent evidence that subsequent life stages or generations of fish are at greater risk of reproductive dysfunction after embryonic/early life exposure to atrazine.[10,11]

In response to significant public comments, concerns, and inherent uncertainty related to the data, assumptions, and interpretations used to arrive at the aquatic plant community-equivalent level of concern (CE-LOC) in the 2016 draft atrazine ecological risk assessment, the agency considered alternate approaches for inclusion, evaluating/scoring, and interpretation of the atrazine ecosystem and related studies. The agency acknowledges there is uncertainty inherent in the various models used to calculate the CE-LOC. Utilizing the scoring interpretation methods recommended by the 2012 FIFRA Scientific Advisory Panel and accounting for uncertainty, the agency determined the CE-LOC ranges from 1.9 to 26 µg/L with a median of 8.5 µg/L. The agency further decided to use the concentration of 15 µg/L as a 60-day average for unacceptable risk to account for potential aquatic community recovery at lower concentrations. We disagree with considering recovery in assessing ecological risk. The concept of recovery is highly subjective and time dependent.[12] Ecological structure and function can be perturbed in the short term and adverse impacts can be transferred outside the system in question with permanent consequences. For instance, a short-term shift in dominance of the algal community will impact zooplankton biomass and reduce food availability for juvenile waterfowl resulting in waterfowl population loss.[13] Another key consideration would be direct or indirect effects to endangered species. Therefore, it is more appropriate to use the lowest CE-LOC for establishing risk concern thresholds.

As stated in the agency's refined ecological risk assessment: "Although the risk assessment relies on a selected toxicity endpoint from the most sensitive species tested, it does not necessarily mean that the selected toxicity endpoints reflect sensitivity of the most sensitive species existing in a given environment." We urge the agency to continue using the most sensitive species and endpoints in establishing LOCs and RQs to be protective of the broader number of untested species.

[10] Cleary, J.A., Tillitt, D.E., vom Saal, F.S., Nicks, D.K., Claunch, R.A. and Bhandari, R.K., 2019. Atrazine induced transgenerational reproductive effects in medaka (Oryzias latipes). Environmental Pollution, 251, pp.639-650.
[11]Wirbisky, S.E., Weber, G.J., Sepúlveda, M.S., Lin, T.L., Jannasch, A.S. and Freeman, J.L., 2016. An embryonic atrazine exposure results in reproductive dysfunction in adult zebrafish and morphological alterations in their offspring. *Scientific reports*, *6*(1), pp.1-13.
[12] Pratt, J.R. and Cairns Jr, J., 1996. Ecotoxicology and the redundancy problem: understanding effects on community structure and function. In *Ecotoxicology: a hierarchical treatment* (pp. 347-369). Lewis New York.
[13] Grue, C.E., 1988. *Agricultural chemicals and the quality of prairie-pothole wetlands for adult and juvenile waterfowl-what are the concerns?* US Fish and Wildlife Service.

b. Proposed Interim Registration Decision

Except for the Endocrine Disruptor Screening Program (EDSP), the Endangered Species Act (ESA), and pollinator components of this case, the agency has made the following PID: (1) with the exception of the outstanding GDCI data requirements, no additional data are required at this time; and (2) changes to the affected registrations and their labeling are needed at this time. To be clear, the agency is making no human health or environmental safety findings associated with the EDSP screening of atrazine, nor is it making a complete endangered species finding or a complete assessment of effects to pollinators.

i. Proposed Risk Mitigation

- Rate reduction for residential turf applications
  - Reduce application rate for granular atrazine products applied to residential turf from 2.2 pounds active ingredient per acre (lb ai/A) to 2.0 lb ai/A
  - Reduce application rate for atrazine spray applications to residential turf from 2.0 lb ai/A to 1.0 lb ai/A
- Additional personal protective equipment (PPE)
  - Combination of single- and double-layer clothing with gloves, PF10 respirators, and engineering controls
- Add mandatory spray drift reduction language
- Add herbicide resistance management language
- Required product stewardship measures to be implemented by the atrazine technical registrants

ii. Endocrine Disruptor Screening Program

Atrazine is an EDSP List 1 chemical and the agency has received all of the required Tier 1 assay data. The agency completed a review of these data in combination with other scientifically relevant information (OSRI). Based on the weight of evidence (WoE) analysis of EDSP Tier 1 guideline-like studies, the agency concluded EDSP equivalent Tier 2 testing with mammals, and OSRI, additional Tier 2 tests with fish, amphibians, or birds are not recommended for atrazine at this time because it is not expected to impact current EPA-established regulatory endpoints for human health or ecological risk assessment. However, in this PID, the agency is making no human health or environmental safety findings associated with the EDSP screening of atrazine. Given the recognized HPG-axis mode of action of triazines and ambiguity in chronic fish and amphibian test data, we recommend that the EDSP Tier 2 medaka extended one-generation reproduction test (MEOGRT; OCSPP 890.2200) and larval amphibian growth and development assay (LAGDA; OCSPP 890.2300) tests are performed to further define chronic and endocrine disruption effect thresholds in fish and amphibians for

atrazine. Also, given the established endocrine disruption properties of the triazines, we recommend that the Japanese quail two-generation toxicity test (JQTT; OCSPP 890.2100) be required to determine consequence of *in ovo* exposure on eventual reproductive viability.

iii. Data Requirements

On December 12, 2018, the EPA issued a generic data call-in (GDCI) requiring multiresidue method testing results (OCSPP Guideline 860.1360) for the chlorinated metabolites of atrazine [desethylatrazine (DEA), desisopropylatrazine (DIA), and diaminochloroatrazine (DACT)]; the data are required to be submitted to the agency by December 20, 2020. These data are needed to determine the suitability of multiresidue methodology for quantification of atrazine and its regulated metabolites. The agency states it will consider requiring submission of pollinator data as a separate action. Although existing data are adequate to demonstrate unacceptable health and environmental risks of atrazine, some additional data on fish and bird multigeneration toxicity would be beneficial in understanding the full extent of associated deleterious effects attributable to atrazine. In addition, mixtures of multiple active ingredients in product formulations or the tank mixes have not been fully assessed. Atrazine and simazine are typically co-formulated with each other and with other herbicides. Atrazine specifically is formulated with 22 different active ingredients in 52 formulated products and atrazine has been reported to synergistically increase the toxicity of organophosphates in aquatic and terrestrial invertebrates.[14,15] Testing of representative mixture formulations and major co-exposures of environmental mixtures including atrazine should be conducted.

c. Recommendation for Cancellation of All Atrazine Uses

The agency acknowledges many risks of concern associated with the uses of atrazine, but asserts the remaining serious worker and ecological risks still remaining after adoption of all proposed mitigation measures are outweighed by the benefits of atrazine use. We ardently disagree with this assertion as atrazine benefits are overstated and improperly considered. The agency's benefits assessment did not adequately consider loss of wildlife and ecosystem services from impaired habitats and wildlife. The benefits of atrazine use are very much diminished by availability of ample alternatives, as detailed in Appendix A. The documented environmental impacts and health risks from surface and ground water contamination are also not adequately diminished by the proposed mitigation measures. Therefore, the further risk of adverse effects manifestly outweighs the limited benefits. We implore the agency to revoke registration of all atrazine uses and products.

[14] Belden, J.B. and Lydy, M.J., 2000. Impact of atrazine on organophosphate insecticide toxicity. *Environmental Toxicology and Chemistry: An International Journal*, *19*(9), pp.2266-2274.
[15] Anderson, T.D. and Zhu, K.Y., 2004. Synergistic and antagonistic effects of atrazine on the toxicity of organophosphorodithioate and organophosphorothioate insecticides to Chironomus tentans (Diptera: Chironomidae). *Pesticide Biochemistry and Physiology*, *80*(1), pp.54-64.

II. Simazine

Simazine is a selective herbicide that prevents grass and broadleaf weeds from emerging. Simazine products are registered for agricultural use sites such as corn, alfalfa, orchard, vineyard, berry crop sites, and uncultivated agricultural areas. Products containing simazine are also registered for use on non-agricultural sites such as forest trees, ornamentals, lawns and turf, Christmas tree farms, nursery stock, farm buildings, golf course turf, and shelterbelt plantings. Simazine is registered in liquid, dry flowable (DF), and water dispersible granule (WDG) formulations.

a. Registration Review Summary and Updates

i. Human Health Risks

The predominant adverse health effect of concern for simazine, as for other triazines, is suppression of the luteinizing hormone (LH) surge leading to neuroendocrine effects. This mechanism of toxicity is in perturbation of the HPG axis by disrupting hypothalamic regulation of the pituitary leading primarily to a disturbance in the ovulatory surge of LH. Disruptive hormonal effects related to the LH surge are different for different age groups and sexes, and the downstream adverse effects vary considerably. Exposures during early life may lead to effects later in life including delays in sexual maturation, inflammation of the prostate, effects related to development of the genitalia, and/or irregular menstrual cycles. Therefore, this endpoint is relevant for males and females, and all life-stages.

ii. Ecological Risks

The agency's ecological risk assessment identified chronic risk estimates for mammals that exceed the agency's LOC of 1 for all uses with chronic risk quotients (RQs) up to a staggering 869. Theses chronic LOCs for mammals are exceeded up to distances of 1,000 feet off field for certain uses. Chronic levels of concern (LOC = 1) are also exceeded for birds for all simazine uses. This chronic concern is based on reproduction impacts observed in the most sensitive bird species, bobwhite quail. Chronic fish and amphibian data are lacking for simazine, but using surrogate data from atrazine the agency presumes chronic risks to fish and amphibians.

b. Proposed Interim Registration Decision

Except for the Endocrine Disruptor Screening Program (EDSP), the Endangered Species Act (ESA), and pollinator components of this case, the agency has made the following PID: (1)

no additional data are required at this time; and (2) changes to the affected registrations and their labeling are needed at this time. As with atrazine, the agency is making no human health or environmental safety findings associated with the EDSP screening of simazine, nor is it making a complete endangered species finding or a complete assessment of effects to pollinators.

i. Proposed Risk Mitigation

To address the potential residential post-application aggregate, and cumulative risk concerns, the EPA is proposing to cancel simazine use on residential turf. In addition, EPA is proposing to require additional PPE or engineering controls to address potential occupational handler risk concerns associated with various simazine uses. EPA is also proposing to update spray drift reduction language, herbicide resistance management language, and require some additional label updates for consistency with generic labeling requirements.

ii. Data Requirements

It is unclear to what degree surrogate data from atrazine represent simazine toxicity to fish and amphibian fauna. Given the recognized HPG-axis mode of action of triazines and demonstrated effects of simazine on avian reproduction, it is recommended that JQTT (OCSPP 890.2100), MEOGRT (OCSPP 890.2200), and LAGDA (OCSPP 890.2300) tests are performed to resolve chronic and endocrine disruption concerns in birds, fish, and amphibian for simazine.

iii. Endocrine Disruptor Screening Program

Simazine is an EDSP List 1 chemical and the agency has received all of the required Tier 1 assay data. The agency completed a review of these data in combination with other scientifically relevant information (OSRI). Based on the weight of evidence (WoE) analysis of EDSP Tier 1 guideline-like studies, the agency concluded EDSP equivalent Tier 2 testing with mammals, and OSRI, additional Tier 2 tests with fish, amphibians, or birds are not recommended for simazine at this time because it is not expected to impact current EPA-established regulatory endpoints for human health or ecological risk assessment. However, in this PID, the agency is making no human health or environmental safety findings associated with the EDSP screening of simazine. Given the recognized HPG-axis mode of action of triazines and ambiguity in simazine chronic fish and amphibian test data and avian reproduction effects, we recommend that EDSP Tier 2 studies JQTT (OCSPP 890.2100), MEOGRT (OCSPP 890.2200), and LAGDA (OCSPP 890.2300) tests be required to further define chronic and endocrine disruption effect thresholds in birds, fish, and amphibians for simazine.

c. Recommendations for Cancellation of All Simazine Uses

The agency acknowledges many risks of concern associated with the uses of simazine, but asserts the remaining serious worker and ecological risks still remaining after adoption of all proposed mitigation measures are outweighed by the benefits of simazine use. We ardently disagree with this assertion as simazine benefits are overstated and improperly considered. The agency's benefits assessment did not adequately consider loss of wildlife and ecosystem services from impaired habitats and wildlife. The benefits of simazine use are diminished by availability of ample alternatives, as detailed in Appendix A. The documented environmental impacts and health risks from surface and ground water contamination are not adequately diminished by the proposed mitigation measures. Therefore, the further risk of adverse effects manifestly outweighs the limited benefits. We implore the agency to revoke registration of all simazine uses and products.

III. Propazine

Propazine is an herbicide with products currently registered for use on grain sorghum and containerized ornamental plants grown in greenhouses to control broadleaf and grass weeds. The registrant has voluntarily requested cancellation of the greenhouse use to eliminate unacceptable risks from dermal and inhalation exposures existing for greenhouse uses.

a. Registration Review Summary and Updates

i. Human Health Risks

The predominant adverse health effect of concern for propazine, as for other triazines, is suppression of the luteinizing hormone (LH) surge leading to neuroendocrine effects. This mechanism of toxicity is in perturbation of the HPG axis by disrupting hypothalamic regulation of the pituitary leading primarily to a disturbance in the ovulatory surge of LH. Disruptive hormonal effects related to the LH surge are different for different age groups and sexes, and the downstream adverse effects vary considerably. Exposures during early life may lead to effects later in life including delays in sexual maturation, inflammation of the prostate, effects related to development of the genitalia, and/or irregular menstrual cycles. Therefore, this endpoint is relevant for males and females, and all life-stages.

ii. Ecological Risks

Chronic risk to mammals and birds is identified with LOCs substantially exceeded by expected exposures. Although a definitive NOAEC for avian reproduction was not available, the LOAEC exceeds the LOC. Terrestrial plants as expected with an herbicide, risk to terrestrial plants and aquatic plants was identified. Although the agency did not identify a chronic risk for fish and amphibians, the agency improperly assessed chronic risk with a fish early life stage test which is a sensitive life stage test and not a true chronic test. Impacts on reproduction which

have been demonstrated in other taxa including mammals and birds, and for the related triazine atrazine. The agency also considers it reasonable to assume that if a similar body of literature was available for propazine, risk conclusions similar to atrazine may be reached. Therefore, the full magnitude of ecological risk for propazine remains uncertain.

b. Proposed Interim Registration Decision

Except for the Endocrine Disruptor Screening Program (EDSP), the Endangered Species Act (ESA), and pollinator components of this case, the agency has made the following PID: (1) no additional data are required at this time; and (2) changes to the affected registrations and their labeling are needed at this time. As with atrazine, the agency is making no human health or environmental safety findings associated with the EDSP screening of propazine, nor is it making a complete endangered species finding or a complete assessment of effects to pollinators.

i. Proposed Risk Mitigation

Due to cumulative risks of concern for the triazines which stem from atrazine and simazine, propazine is presumed to also contribute. The agency also identified potential ecological risks of concern for mammals, birds, terrestrial plants, and non-vascular aquatic plants. To reduce these risks the agency weighed the benefits against the potential ecological risks and is proposing mandatory spray drift language that will reduce ecological exposure of propazine in the environment. Besides mandatory spray drift management language, the EPA is proposing to update the herbicide resistance management language and personal protective equipment (gloves) on the propazine label. The registrant has requested cancellation of the greenhouse use to nullify risks of concern for that use.

ii. Data Requirements

The agency concludes no additional data are anticipated as being needed at this time for this registration review. However, the available ecological database is incomplete. The agency will consider requiring submission of additional pollinator data as a separate action. Given the recognized HPG-axis mode of action of triazines and lack of a definitive chronic avian NOAEC or appropriate chronic fish and amphibian test data, we recommend that EDSP Tier 2 studies JQTT (OCSPP 890.2100), MEOGRT (OCSPP 890.2200), and LAGDA (OCSPP 890.2300) tests be required to further define chronic and endocrine disruption effect thresholds in birds, fish, and amphibians for propazine.

iii. Endocrine Disruptor Screening Program

In this PID, the agency is making no human health or environmental safety findings associated with the EDSP screening of propazine. With the defined endocrine mode of action of the related triazines, we recommend that propazine move directly to EDSP Tier 2 testing.

c. Recommendation for Cancellation of Remaining Propazine Use

The registrant has requested cancellation of the greenhouse use. This will nullify the occupational handler risks of concern for dermal and inhalation exposures that are present for greenhouse uses. Sorghum is the only remaining propazine use. The agency acknowledges many risks of concern associated with the uses of propazine, but asserts the remaining serious worker and ecological risks still remaining after adoption of all proposed mitigation measures are outweighed by the benefits of propazine use. We disagree with this assertion as propazine benefits are overstated and improperly considered. The agency's benefits assessment did not adequately consider loss of wildlife and ecosystem services from impaired habitats and wildlife. The benefits of propazine use are diminished by availability of ample alternatives, as detailed in Appendix A. The potential environmental impacts and health risks from spray drift, surface water, and ground water contamination are not adequately diminished by the proposed mitigation measures. Therefore, the further risk of adverse effects manifestly outweighs the limited benefits. We urge the agency to revoke the only remaining propazine registration for use on grain sorghum.

Respectfully,

Leslie W. Touart, Ph.D.
Senior Science and Policy Manager

These comments are supported by the following organizations:

Beyond Toxics

Center for Food Safety

Farmworker Association of Florida

Hawaii Seed

Maryland Pesticide Education Network

Northwest Center for Alternatives to Pesticides

Northeast Organic Farming Association – Massachusetts Chapter

People and Pollinators Action Network

Toxic Free North Carolina

Women's Voices for the Earth

Attachment A.

Attachment A

BEYOND PESTICIDES
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October 5, 2016

Office of Pesticide Programs
Environmental Protection Agency, (28221T),
1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

Re: Draft Ecological Risk Assessments for the Registration Review of Atrazine EPA-HQ-OPP-2013-0266; Simazine EPA-HQ-OPP-2013-0251; Propazine EPA-HQ-OPP-2013-0250

Dear Sir/Madam,

We are writing in response to the publication of the draft ecological risk assessments for the triazines; atrazine, simazine, propazine and their degradates. This class of herbicides is widely used in the U.S. on various agricultural and non-agricultural sites. According to the U.S. Environmental Protection Agency (EPA), over 90 percent of atrazine is used on corn, which, as the most widely cultivated crop in the U.S.,[1] means atrazine contamination is a threat to millions of acres of land and waterways. Atrazine, as well as simazine and propazine, has been linked to numerous adverse health and environmental effects, which has motivated numerous public interest campaigns to ban its uses in the U.S.

Atrazine, like the other triazines, is highly mobile and persistent in the environment, and has documented adverse impacts on numerous wildlife. Currently, atrazine is not approved for use in the European Union based on concerns that atrazine residues in groundwater would exceed its standards.[2] Based on EPA's updated ecological risk assessment, which supports previous findings of atrazine's highly hazardous toxicological profile and environmental contamination risks, we urge the agency to issue a revocation of its registration. Since simazine and propazine also have similar toxicological profiles to atrazine, we are urging that their registrations be revoked as well.

1 USDA Economic Research Service. http://www.ers.usda.gov/topics/crops/corn.aspx.

2 European Commission. Review report for the active substance atrazine Finalised in the Standing Committee on the Food Chain and Animal Health at its meeting on 3 October 2003. Available at http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=activesubstance.ViewReview&id=108 .

I. Atrazine

a. Ecological Toxicity

According to EPA's refined ecological assessment for atrazine,[3] "...aquatic plant communities are impacted in many areas where atrazine use is heaviest, and there is potential chronic risk to fish, amphibians, and aquatic invertebrates in these same locations. In the terrestrial environment, there are risk concerns for mammals, birds, reptiles, plants and plant communities across the country for many of the atrazine uses." Atrazine, even at the lowest application rates, exceed current levels of concern (LOCs) and poses risks for almost every specie of plant and animal studied. Specifically:

For mammals,

> "..chronic levels of concern are exceeded for a number of uses while acute RQs only exceed the listed species LOC..."
> "Based on a tier I terrestrial spray drift analysis, chronic risk LOCs for mammals are exceeded at distances of 25 to 250 feet off the field following ground spray application."

For birds,

> "..acute and chronic levels of concern are exceeded for a number of uses."
> "Although acute risks are of concern, for most use scenarios, chronic risks pose the greater concern in birds."

For amphibians and reptiles,

> "Consistent with the calculated RQs for birds, the primary risk concerns for herpetofauna were associated with chronic risk, with RQs ranging from 1.2 to 22.6."
> "The weight of evidence analysis concluded there is possible risk to amphibians as there is significant overlap of multiple effects endpoints...This is consistent with the results found for all other aquatic organisms, including fish, invertebrates and plants."

For aquatic vertebrates,

> "Chronic exposure studies for freshwater and estuarine/marine fish, aquatic phase amphibians ... resulted in significant effects on survival, growth or reproduction, with freshwater fish having the most sensitive reported chronic endpoint due to reproductive effects."
> "Levels of concern are exceeded for freshwater and estuarine marine fish based on chronic exposures to atrazine through runoff and spray drift following labeled applications for all registered uses (RQs = 0.94 to 61). Estimated RQs following the modeled refinements, reduced application rates and soil incorporation, exceed levels of concern for all modeled corn scenarios."

For aquatic invertebrates,

> "There are risk concerns to listed freshwater invertebrates from acute exposures (RQs = 0.2 - 0.3 and to non-listed and listed species from chronic exposure (RQs = 0.5 - 3.3).

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3 USEPA. 2016. Refined Ecological Risk Assessment for Atrazine. Office of Pesticide Programs, Washington DC.

> Estuarine/marine invertebrates are more sensitive than freshwater species on both an acute exposure and chronic exposure basis and result in risk conclusions for all uses and modeled rate reduction scenarios."

For terrestrial plants,

> " levels of concern for terrestrial plants are exceeded for all atrazine labeled uses and application rates....the levels of concern are exceeded for all runoff and runoff+spray drift conditions."
>
> "...terrestrial plants exposed to atrazine from spray drift following aerial application, and runoff with and without spray drift following either ground or aerial applications are at risk..."
>
> "A broad diversity of plants are sensitive to atrazine exposure. The breadth of species and families of plants potentially impacted by atrazine use at current maximum labeled rates, as well as following application at reduced rates of 0.5 and 0.25 lb a.i./A suggest that terrestrial plant biodiversity and communities are likely to be impacted from off-field exposures via runoff and spray drift."

For aquatic plants,

> "The non-listed LOCs for aquatic non-vascular and vascular plants are exceeded for all uses, rates and [Surface Water Concentration Calculator, SWCC] scenarios including those evaluating exposures following reduced rates and soil incorporation (RQs = 5.2 – 316 and 1.1 – 68.7 respectively)."
>
> "The [Concentration Equivalent Level of Concern (CELOC)] is exceeded for all labeled uses and for 100% of the modeled scenarios for these uses. The evaluation of lower application rates down to 0.5 lb a.i./A results in reduced RQs; however, risk to the aquatic plant community is still predicted, with all scenarios exceeding the CELOC."
>
> "Because of the dependence of the entire aquatic ecosystem on the plant community, negative impacts on the plant community are expected to cascade through the ecosystem. Potential impacts on the entire aquatic ecosystem include reduced biological diversity, reduced food items for fish, birds and mammals (e.g., drifting insects; benthic organisms, and emerging insects), reductions in spawning and nursery habitat, increased erodibility, and reduction in overall water quality."

The evidence and conclusions presented in this risk assessment are quite resounding, reflect the independent literature, and support the need for a more proactive approach for protecting non-target species from atrazine. Atrazine is a potent endocrine disruptor with strong associations with birth defects, sex reversal and hermaphroditism in organisms,[4] and whose risk to environmental health is exacerbated by pervasive surface, ground and drinking water contamination.[5] The science and environmental monitoring data supports a national ban

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4 Hayes, T., et al. 2011. Demasculinization and feminization of male gonads by atrazine: Consistent effects across vertebrate classes. *J. Steroid Biochem and Molecular Bio*. 127(1-2):64-73.

5 USEPA. 1999. A Review of Contaminant Occurrence in Public Water Systems. EPA 816-R-99-006, Office of Water, Washington DC

on this herbicide, citing unreasonable risks to the environment under the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA).

b. Monitoring and Mitigation Measures Not Effective in Reducing Contamination Levels

Potential mitigation measures, like those proposed in past atrazine assessments, continue to prove inadequate in reducing environmental exposures from the chemical. For instance, in its 2003 Interim Registration Eligibility Decision (IRED),[6] EPA stated that to mitigate ecological risks, registrants in consultation with EPA, would "develop a program under which the registrants monitor for atrazine concentrations and mitigate environmental exposures if EPA determined that mitigation is necessary," and that this, "monitoring and mitigation program would be designed, conducted and implemented on a tiered watershed level and must be consistent with existing state and federal water quality programs."

As a result of the 2003 IRED and the subsequent 2004 Memorandum of Agreement,[7] monitoring for atrazine in watersheds has been required. If atrazine concentrations are detected at or above certain set levels under various conditions, mitigation action must be conducted to reduce impacts to aquatic plant communities, and drinking water.[8] The agency stipulated that the mitigation measures to reduce atrazine loads (concentrations that exceed LOCs) would be specific to the watershed and undertaken with local watershed management programs. Ultimately, these mitigation measures typically comprise 'best management practices,' buffer zones, and reduced application rates.

Not surprisingly, watersheds that exceed federal recommended levels are mostly in areas with heavy atrazine application in corn, sugarcane, and sorghum producing areas (Midwest, some southern states). According to the U.S. Geological Survey (USGS), atrazine, including its degradate deethylatrazine (DEA), continue to be the most frequently detected pesticides in U.S. streams and rivers at concentrations at or above one or more benchmarks at sampled sites.[9] Independent monitoring reports since the 2003/4 monitoring stipulations, like those conducted by the Natural Resources Defense Council (NRDC), [10] also show continued pervasive contamination at levels of concern in watersheds across the country. Atrazine is also frequently detected in shallow groundwater in agricultural areas, and in urban streams.[11] USGS also reports that during the spring, after the application of herbicides, the concentrations of

6 USEPA. 2003. Interim Reregistration Eligibility Decision for Atrazine. Office of Pesticide programs. Washington DC.
7 Memorandum of Agreement Between the U. S. Environmental Protection Agency and Agan Chemical Manufacturing, Dow AgroSciences, Drexel Chemical, Oxon Italia S.P.A., and Syngenta Crop Protection Concerning the Registration of Pesticide Products Containing Atrazine. 2004. https://www3.epa.gov/pesticides/chemsearch/regactions/reregistration/relatedPC-0808039-Nov-04.pdf
8 USEPA. Atrazine Ecological Exposure Monitoring Program https://www.epa.gov/ingredients-used-pesticide-products/atrazine-background-and-updates#aeemp.
9 USGS. 2013. Quality of Our Nation's Waters: Ecological Health in the Nation's Streams, 1993-2005. Water-Quality Assessment Program. Circular 1391.
10 Wu. M, Quirindongo, M, Sass, J, Wetzler, A. 2010. Still Poisoning the Well: Atrazine Continues to Contaminate Surface Water and Drinking Water in the United States. Natural Resources Defense Council. Washington DC.
11 Gilliom, R, Barbash, J., et al. 2006. Pesticides in the Nation's Streams and Ground Water, 1992–2001. U.S. Geological Survey.

atrazine and others are frequently 3-10 times greater than the maximum contaminant level (MCL).[12]

In its most recent monitoring report (2001–2010), USGS finds there was a smaller proportion of downtrends in atrazine detections even though national use declined. While the Midwest and Great Lakes regions experienced some nonsignificant downtrends, there were uptrends in the Southeast which may reflect possible increasing use of atrazine on turf grass.[13] However, for this same time period, there were more uptrends than downtrends in DEA concentrations compared to atrazine, which the authors theorize can be a result of a failure to account for certain uses that were increasing, or groundwater sources that have multi-year lags between use and contribution to streams from past uses. Further, the authors consider that rising DEA concentrations may also be a result of land management practices that increases atrazine runoff as DEA. This shows that even with best management practices on farms, DEA still poses a contamination issue.

These trends exemplify that current monitoring and mitigation measures are not adequate in significantly reducing atrazine and its degradate runoff into streams. Additionally, the seemingly increasing use of atrazine on non-agricultural sites is also becoming a significant source of waterway contamination- which has not been previously addressed in mitigation efforts. This can only be remedied by eliminating these uses.

c. The Benefits of Continued Use of Atrazine Do Not Outweigh Ecological Costs

In the 2003 IRED, EPA concluded, the "benefits of continued use of atrazine will outweigh any potential ecological risk." In support of this the agency detailed the economic costs of removing atrazine from the market (including an average estimated loss of $28 per acre corn). However, as is customary to agency reviews, no assessment of a loss of ecosystem services from impaired habitats and wildlife was considered.

In this ecological assessment the agency has acknowledged broad ecological impairment from atrazine exposure. The agency states:

> "..negative impacts on the plant community are expected to cascade through the ecosystem. Potential impacts on the entire aquatic ecosystem include reduced biological diversity, reduced food items for fish, birds and mammals (e.g., drifting insects; benthic organisms, and emerging insects), reductions in spawning and nursery habitat, increased erodibility, and reduction in overall water quality. Impacts on smaller scale communities such as headwater streams, ponds, and wetlands could carry over to larger rivers, lakes, and reservoirs which contain organisms that depend on the

12 Thurman, E.M. et al. 1992. A Reconnaissance Study of Herbicides and Their Metabolites in Surface Water of the Midwestern United States Using Immunoassay and Gas Chromatography/Mass Spectrometry. *Environ. Sci. Technoi. 26:* 2440-2447.

13 Ryberg, K.R and Gilliom, R.J. 2015. Trends in pesticide concentrations and use for major rivers of the United States. *Science of the Total Environmen*t 538: 431–444.

headwaters and microhabitats the CELOC is intended to protect for refuge (e.g., during high flow events, thermal events, predation and competition) and rich feeding sites for spawning and nursery habitat."

Atrazine's high toxicity to mammals, amphibians, birds, terrestrial and aquatic plants, and invertebrates threatens the heath and function of the ecosystems to which these organisms belong. Impairments to populations of these organisms lead to reductions in aquatic and terrestrial biodiversity. Studies looking at the value of ecosystem services calculate that annual damage to wildlife and ecosystem biodiversity due to agricultural production (crop production) is approximately $1133-1162.2 million annually,[14] while others estimate that the economic and environmental loses as a result of groundwater contamination is closer to $2 billion.[15]

In addition, the costs of atrazine's contamination of drinking water sources must be considered. According to some estimates, local governments and water utilities will have to shoulder over $150 billion over a 20-year period to ensure they meet drinking water standards for pesticides.[16] Additional costs for removing atrazine from drinking water in regions where atrazine contamination is widespread places undue hardships on already strained local budgets. A recent lawsuit[17] distributed over $100 million to various local utilities, but this amount would not cover additional needs for cleanup, given the constant presence of atrazine in waterways.

As indicated in EPA's ecological assessment, atrazine's impact on terrestrial and aquatic ecosystems has a detrimental effect on the health, function, and productivity of these diverse ecosystems. Impacts on contaminated drinking water sources, reduced habitat, food sources and overall reduced biodiversity impact organisms at all trophic levels, whose economic benefits to human and environmental well-being must be considered.

d. Revoking atrazine's registration will not burden farmers

EPA will undoubtedly face push back for the findings in this assessment from industry and farming groups who promote the benefits of atrazine. Contrary to sensationalist headlines, the impact on farmers will not be dire, given the many other chemical options on the market. However, according to one Tufts University study, industry-funded studies that feed these sensational claims significantly overestimate the benefits of atrazine without considering the value of alternative weed management techniques.[18] Claims that a loss of atrazine will lead to reduced corn yields and an increase in prices have been refuted by these researchers. Assumptions that crop prices are unaffected by changes in crop yields are misleading given that prices are affected by multiple factors, including demand. Given that much of the corn grown in

[14] Tegtmeier, E and Duffy, M,D. 2004. External Costs of Agricultural Production in the United States. *International J Agricultural Sustainability.* 2(1).
[15] Pimentel, D, Peshin, R. (Eds). 2014. Integrated Pest Management, Pesticide Problems Vol. 3. Springer New York.
[16] USEAP. 2009. Water on tap: what you need to know. Office of Water (4601) www.epa.gov/safewater.
[17] *City of Greenville v. Syngenta Crop Protection, Inc., and Syngenta AG*, Case No. 3:10-cv-00188- JPG-PMF.
[18] Ackerman, F, Whited, M and Knight, P. 2014. Would banning atrazine benefit farmers? I*nternational Journal Of Occupational And Environmental Health* 20(1).

the U.S. are intended for ethanol producers and livestock feed, corn prices will be heavily determined by the demand from these two sectors, when compared to production costs.

This study finds that a loss of atrazine would actually boost farm revenues, while minimally impacting consumer prices. Specifically, corn growers' revenue would actually *increase* by 3.2%, providing a total of $1.7 billion to farmers and the U.S. economy. Additionally, there are also several chemical and non-chemical alternatives to atrazine available to farmers. This, coupled with the ecological costs of atrazine, present a case which supports moving forward with an elimination of atrazine from the market.

II. Simazine

a. Ecological toxicity

Like atrazine, simazine is mobile and persistent in the environment, and elicits risks to birds, mammals and plants. Similar to atrazine's assessment, simazine is highly toxic to several species of plant and animals. For birds and mammals, chronic exposures are the main risks of concern, with spray drift a concern for all labeled uses.

For terrestrial plants, runoff and spray drift exposure exceed levels of concern. EPA notes, "the diversity of species that are sensitive to simazine in the vegetative vigor and seedling emergence studies suggests that a broad diversity of plants are sensitive to simazine exposure. The breadth of species and families of plants potentially impacted by simazine use at current maximum labeled rates, as well as following application at a reduced rate of 0.5 lb a.i./A suggest that terrestrial plant biodiversity and communities are likely to be impacted from off-field exposures via runoff and spray drift." EPA also identified risks for aquatic animals, and non-vascular and vascular plants.

Like atrazine, simazine is frequently detected in surface and groundwaters. According to USGS for 2001-2010 simazine concentrations at sample sites reflected uptrends and downtrends in certain regions of the country.[19] The uptrends were found in the regions of the Mississippi river and Great Lakes where use on corn increased. Previous surveys (1996–2004 and 2000–2008) have also reported increasing concentrations in urban areas, suggesting that nonagricultural uses are increasing.[20]

Similar to atrazine, mitigation and monitoring measures would not be enough to protect sensitive species from the impacts of simazine. Additionally, we find that ecological costs outweigh economic benefits, given the available alternatives. Like atrazine, we recommend revoking simazine registrations.

III. Propazine

[19] Ryberg, K.R and Gilliom, R.J. 2015. Trends in pesticide concentrations and use for major rivers of the United States. *Science of the Total Environmen*t 538: 431–444.

[20] Ryberg, K, Vecchia, A, Martin, J and Gilliom, R. 2010. Trends in Pesticide Concentrations in Urban Streams in the United States, 1992–2008. U.S. Geological Survey Scientific Investigations Report 2010–5139, p101.

a. Ecological toxicity

Like atrazine and simazine, propazine's assessment identified risks to several species, including chronic risks to mammals, chronic risks to birds, terrestrial plants, and aquatic vascular and nonvascular plants. The science on the adverse impacts associated with propazine use are not as robust as atrazine, but the agency believes risk conclusions are similar to atrazine.

In 2014, EPA denied a Section 18 request for propazine to control glyphosate resistant Palmer amaranth on three million acres of cotton.[21] In the letter to the state of Texas issuing the denial of the request EPA states, "Safety determinations are based on all routes of exposure to the public and include food, drinking water, and residential uses (an aggregate assessment). Current registered uses already show unacceptable risk levels which must then be incorporated into the aggregate risk estimates in order to make a safety finding for the proposed Section 18 use, as required by the FQPA [Food Quality Protection Act]." The letter continues, "...drinking water estimates suggest that risks from drinking water alone may lead to unacceptable risks in some cases, both for the parent compound (including chlorinated metabolites) and for the hydroxyl metabolites." Further, the agency notes that the aggregate risks are likely to be "unacceptable."

In light of the toxicological profile of propazine and the "unacceptable" risks posed to drinking water, this chemical should also be have its registration revoked.

IV. Impacts on amphibians are not uncertain

Of the triazines, atrazine has been the most studied regarding its impact on amphibians. EPA thoroughly reviewed the scientific literature surrounding the impacts of atrazine on amphibians. But while the agency concluded that for aquatic phase amphibians, "there is potential for chronic risks," the agency is uncertain about the risks to amphibians in general. Specifically, EPA finds "[T]he available amphibian data suggest that the range of effects reported for amphibians exposed to atrazine vary considerably between species and testing conditions....Many uncertainties and concerns have been identified in study protocols and results of the available amphibian data. Therefore, it is difficult to make definitive conclusions about the impact of atrazine at a given concentration, but multiple studies have reported effects to various endpoints at environmentally-relevant concentrations."

Nevertheless, most would say that the scientific consensus is definitive on the adverse impact atrazine exposure has on amphibians. Many studies, including those by Hayes and Rohr, have documented hormone disruption and feminization in amphibians and other aquatic

[21] Jack E. Housenger, Director, Office of Pesticides, USEPA. (July 18, 2014). Letter to David Kostroun, Chief Administrator for Agriculture and Consumer Protection, Texas Department of Agriculture, Re: Emergency Exemption Number-14TX04.

organisms as a result of atrazine exposure.[22,23] Many of these studies have been forwarded by Beyond Pesticides in previous comments to the agency,[24] and have been reviewed for these current assessments. There can be no uncertainty in this fact: atrazine is a gender-bending chemical that has no place contaminating waterways where amphibians and other organisms live.

V. Chemical Mixtures Still Unevaluated

EPA notes that it does not routinely conduct evaluations of mixtures of multiple active ingredients in product formulations or the tank mixes. Atrazine and simazine are typically co-formulated with each other and other herbicides (metolachlor, acetochlor, glyphosate, dicamba),[25] and atrazine specifically is formulated with 22 different active ingredients in 52 formulated products. Further, according to the agency, atrazine has been reported to synergistically increase the toxicity of organophosphates in aquatic and terrestrial invertebrates. EPA also notes that USGS has identified real-world chemical mixtures commonly detected in streams, with the atrazine/metolachlor combination detected 77 percent of the time. In atrazine's ecological risk assessment the agency admits that, "Quantitatively predicting the combined effects of all these variables on mixture toxicity to any given taxa with confidence is beyond the capabilities of the available data and methodologies," and concedes that the impact of chemical mixtures in the environment remains an uncertainty. However, EPA has the responsibility to evaluate these real world risks so as not to underestimate the hazards.

VI. Uncertainties and Data Gaps Remain

As mentioned above, EPA has identified uncertainties within the ecological assessment for the triazines, including the unknown hazards of chemical mixtures. EPA lists several other uncertainties and limitations in its assessments that include monitoring and modeling aquatic exposures, drinking water risks to terrestrial organisms, and sensitivity differences between test species and wild species. These are all valid limitations to any chemical risk assessment and underscore the importance of taking a conservative and precautionary approach to regulating toxic substances that have a ubiquitous presence in the environment.

Additionally, data gaps exist for pollinator tier 1 assessment following the new pollinator guidance, as well as an endangered species evaluation consistent with the Endangered Species Act (ESA). For atrazine, EPA indicates that it will complete its consultation by 2020, citing the continued development of a common method for ESA analysis among federal agencies (U.S. Fish and Wildlife Service, National Marine Fisheries Services). The pollinator assessment suffers from a lack of data regarding adult oral exposure and larval exposure needed to officially

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22 Hayes, T., et al. 2011. Demasculinization and feminization of male gonads by atrazine: Consistent effects across vertebrate classes. *J. Steroid Biochem and Molecular Bio*. 127(1-2):64-73.

23 Rohr, J and McCoy, K. 2010. A Qualitative Meta-Analysis Reveals Consistent Effects of Atrazine on Freshwater Fish and Amphibians. *Environ Health Perspect;* 118(1): 20–32.

24 Comment submitted by Nichelle Harriott, Staff Scientist, Beyond Pesticides. EPA-HQ-OPP-2013-0266-0073.

25 National Pesticide Information Retrieval System http://npirspublic.ceris.purdue.edu/ppis/.

complete the tier 1 assessment, even though the triazines generally have low toxicity to honey bees. Due to outstanding data gaps around important sensitive species, EPA must not delay in collecting this outstanding information, and should in the meantime prevent these substances from causing potential harm to these sensitive organisms.

VII. Alternatives are widely available

Given the availability of alternative pest management practices that incorporate alternative cultural practices and/or less toxic pest management products, including other registered pesticides, the agency has a statutory duty to revoke all registrations of the triazine pesticides under its unreasonable adverse effects standard in FIFRA. The risks and uncertainties identified by EPA and in the independent scientific literature are not reasonable in light of the availability of less toxic alternatives and materials and practices.

To the extent that EPA assumes the benefits of the triazines in the marketplace, the agency is not fulfilling its statutory or regulatory duty to evaluate benefits in light of risk criteria being exceeded. Certainly, a review of the literature and an inventory of field experience in integrated pest management and organic agriculture demonstrate the viability of alternative practices that do not rely on atrazine, simazine or propazine. EPA would fail to meet its legal responsibility under FIFRA if it allows the continued use of triazines, given the current ecological assessments which show that these substances impact multiple plants and animal species and can disrupt fragile ecosystems upon which we depend.

When it comes to atrazine, previous calls for a ban have been responded to with mitigation measures and surface water monitoring. However, these measures have failed to reverse atrazine contamination, and safeguard against the risks it poses to ecological health as atrazine continues to wash into surface water and leach into groundwater, even finding its way into municipal drinking water. Further, along with the multitude of ecological impacts outlined in the assessment, atrazine has also been linked to a myriad of health problems in humans including endocrine disruption and birth defects. Given the availability of other herbicides on the market, including least-toxic options and integrated organic land management, there is no economic or production-based reason that atrazine should be left to continue to plague our environment.

We urge the agency to move quickly to update its human health review of the atrazine, simazine, and propazine and find an “unreasonable adverse effect” finding under FIFRA and revoke their registrations.

Respectfully,

Nichelle Harriott
Science and Regulatory Director