



BEYOND PESTICIDES

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Statement of
Jay Feldman, Executive Director, Beyond Pesticides
on
HB 1698-FN
to
House Committee on Environment and Agriculture

In Opposition

March 28, 2024

Honorable Members of the House Committee on Environment and Agriculture. Thank you for the opportunity to testify in opposition of HB 1698-FN because the public has the right to know whether they are exposed to toxic petrochemical-based pesticides and this bill would take a disastrous to preventing exposure to chemically sensitive populations and the broader public.

Beyond Pesticides is a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to improve protections from pesticides and promote alternative pest management strategies that reduce or eliminate a reliance on toxic pesticides. Our membership spans the 50 states, the District of Columbia, and groups around the world. We are submitting this statement on behalf of our supporters in New Hampshire.

Beyond Pesticides Urges Public Notification of All Pesticides Applications, including from Drones. An exemption from notification for pesticide application from drones undermines the public's right-to-know and the protective measure that can be taken.

The official summary of HB 1698-FN¹ states: It exempts the application of pesticides using drones from notification procedures. The bill adds a new paragraph to RSA 430:34-a, stating that the notification requirements for aerial pesticide application do not apply to the aerial application of pesticides by a person with a valid certificate of registration or permit, while using unmanned aircraft for agricultural purposes at a height not exceeding 50 feet above ground level. The bill will take effect 60 days after its passage.

¹ See Fast Democracy, accessed March 28, 2024, <https://fastdemocracy.com/bill-search/nh/2024/bills/NHB00011698/#billtexts>.

Our opposition is based on two key understandings:

1. **All pesticides are registered as poisons and can harm children, pets, and families.** All pesticides in commerce—with the exception of “minimum risk pesticide” under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) §25(b) and listed in 40 C.F.R. §152.25(f)—are registered by the U.S. Environmental Protection Agency (EPA) and the state of New Hampshire and can have both acute (headaches, rashes, nausea, etc.) and chronic effects (cancer, nervous and immune system effects, reproductive system effects, etc.). Please see Appendix C, *Health Effects of 40 Commonly Used Lawn Chemicals*—all general use pesticides.
2. **Protection of children, pets, and families starts with notification for all pesticides.** This committee must recognize that pesticides can have both acute and chronic and any exemption for application methods that result in exposure undermines the purpose of notification in existing New Hampshire state law—which is to enable people to avoid involuntary exposure.

The bill analysis HB 1698-FN² states: This bill exempts the application of pesticides using drones from notification procedures. The bill inserts a “New Paragraph; Notification of Aerial Pesticide Application. Amend RSA 430:34-a by inserting after paragraph III the following new paragraph: IV. This section shall not apply to the aerial application of pesticides by a person possessing a valid certificate of registration or permit pursuant to RSA 430:33 while applying pesticides for agricultural purposes using unmanned aircraft as defined in RSA 422:3, XXVII-a at a height not exceeding 50 feet above ground level.”

This proposed legislation language flies in the face of what can and should be New Hampshire’s comprehensive approach to ensure those at greatest risk from pesticide exposure—children, those with preexisting health conditions, essential workers, and landscapers—are fully protected. The bill’s language is unacceptable given the known harms of pesticide drift through the air, waterways, and soil.³

Beyond Pesticides opposes HB 1698-FN in the context of decades of experience reviewing the latest scientific analysis regarding commonly used toxic pesticides on public and private spaces (See Appendix D for more information on “Health Effects of 40 Commonly Used Lawn Pesticides”). The people of New Hampshire have a right to know when and where toxic petrochemical pesticides in their communities.

Background on the health effects of pesticides

² HB 1698-FN.

³ “Pesticide Drift or Chemical Trespass Continue Uncontrolled, despite Successful Litigation,” Beyond Pesticides Daily News Blog, March 17, 2022, <https://beyondpesticides.org/dailynewsblog/2022/03/pesticide-drift-or-chemical-trespass-continue-uncontrolled-despite-successful-litigation/>.

As you know, pesticides are an umbrella term that includes herbicides, insecticides, fungicides, and other biocides. Each category of pesticide has the potential to cause significant harm to human health and the wider environment (See Appendix B and C for more information). Herbicides, such as glyphosate (and its formulated products (Roundup)) and 2,4-D, both widely used on turf and lawns, can also be tracked indoors where they settle in dust, air and on surfaces and may remain in carpets, resulting in long-term exposures.^{4,5} In these environments, exposure may increase the risk of developing asthma, exacerbate a previous asthmatic condition, or even trigger asthma attacks by increasing bronchial hyper-responsiveness.⁶ This is especially important as infants crawling behavior and proximity to the floor account for a greater potential than adults for dermal and inhalation exposure to contaminants on carpets, floors, lawns, and soil.⁷

Insecticides pose similar concerns to public health. Synthetic pyrethroids, a class of neurotoxic chemicals commonly used on lawns, landscapes, and agriculture have been repeatedly linked by peer-reviewed studies to neurological issues such as learning disabilities in children. A 2015 study by Cincinnati Children's Hospital Medical Center found a strong association between urinary concentrations of synthetic pyrethroids and the development of ADHD, primarily in boys (aged 8 to 15). Any concentrations found above the level of detection corresponded to a three-fold increase in the chance of developing ADHD, when compared to boys without detectable levels.⁸ Similarly, organophosphate pesticides are toxic and have a range of adverse impacts to health, including neurological effects, cardiovascular disease, bronchitis, asthma, and cancer.⁹

Fungicide use results in significant risks to community health, particularly for the most sensitive, such as young children and the elderly. The use of a certain class of fungicides, the strobilurins, has been linked in peer-reviewed research to the development of autism in children and

⁴ Nishioka, M., et al. 1996. Measuring lawn transport of lawn-applied herbicide acids from turf. *Env Science Technology*, 30:3313-3320.

⁵ Nishioka, M., et al. 2001. "Distribution of 2,4-D in Air and on Surfaces Inside Residences. *Environmental Health Perspectives* 109(11).

⁶ Hernández, AF., Parrón, T. and Alarcón, R. 2011. Pesticides and asthma. *Curr Opin Allergy Clin Immunol*.11(2):90-6.

⁷ Bearer, CF. 2000. The special and unique vulnerability of children to environmental hazards. *Neurotoxicology* 21: 925-934; and Fenske, R., et al. 1990. Potential Exposure and Health Risks of Infants following Indoor Residential Pesticide Applications. *Am J. Public Health*. 80:689-693.

⁸ Wagner-Schuman, et al. 2015. Association of pyrethroid pesticide exposure with attention-deficit/hyperactivity disorder in a nationally representative sample of U.S. children. *Environmental Health* 14, 44. <https://ehjournal.biomedcentral.com/articles/10.1186/s12940-015-0030-y>.

⁹ Hongbing Sun, Michael Leo Sun, Dana Boyd Barr, Exposure to organophosphorus insecticides and increased risks of health and cancer in US women, *Environmental Toxicology and Pharmacology*, Volume 80, 2020, 103474, <https://doi.org/10.1016/j.etap.2020.103474>. See also [Common Use Organophosphate Insecticides Pose a Greater Threat to Women's Health](#), Beyond Pesticides, March 18, 2021..

Alzheimer's in older adults.¹⁰ Drug-resistant fungal infections are on the rise, and many researchers indicate the use of fungicides is likely playing a role.¹¹

While the effects of different pesticide types can be delineated, a significant body of research finds that pesticide use in general is hazardous to health. A study published in the *Journal of the National Cancer Institute* finds that household and garden pesticide use, in general, can increase the risk of childhood leukemia as much as seven-fold.¹² Women who are exposed to pesticides in homes and yards are more than two times more likely to give birth to children with neural tube defects than those who do not use pesticides, according to one study.¹³ A meta-analysis investigating years of previous research on residential pesticide use and childhood leukemia finds associations with exposure during pregnancy.¹⁴

Limitations in the regulations governing pesticides use

EPA has undergone a severe reduction in programmatic work and adequate scientific assessment over the last several decades. This is an urgent problem, given that the state regulatory system (New Hampshire Department of Agriculture, Markets, and Food) relies almost exclusively on the underlying scientific determinations of EPA when it registers pesticides in the state.

In recent years, there has been a reversal by federal regulators, which sheds light on a deeper problem that calls for local action on all pesticides in the absence of federal and state protections:

- PFAS contamination and the fact that pesticides have been shown in some cases to be contaminated with PFAS tells a story of inadequate regulation that calls for a precautionary approach to toxic chemical use that you have the power to effect.
- When EPA reversed a decision in 2015 to ban the use of the insecticide chlorpyrifos, which is a neurological toxicant that damages children's brains, it took over five years to get EPA to act.¹⁵
- That set the tone for the agency's decision to take no action on the weed killer glyphosate/Roundup, despite the independent science and the World Health

¹⁰ Pearson et al. 2016. Identification of chemicals that onal changes associated with autism, brain aging and neurodegeneration. *Nature Communications* **volume 7**, Article number: 11173 <https://www.nature.com/articles/ncomms11173>.

¹¹ Richtel, Matt and Jacobs, Andrew. 2019. A Mysterious Infection, Spanning the Globe in a Climate of Secrecy <https://www.nytimes.com/2019/04/06/health/drug-resistant-candida-auris.html>

¹² Lowengart, R. et al. 1987. Childhood Leukemia and Parent's Occupational and Home Exposures. *Journal of the National Cancer Institute*. 79:39.

¹³Brender, JD., et al. 2010. Maternal Pesticide Exposure and Neural Tube Defects in Mexican Americans. *Ann Epidemiol*. 20(1):16-22.

¹⁴ Turner, M.C., et al. 2010. Residential pesticides and childhood leukemia: a systematic review and meta-analysis. *Environ Health Perspect* 118(1):33-41.

¹⁵ Levin, Sam. 2019. Trump Administration won't ban pesticide tied to childhood brain damage. *The Guardian*. <https://www.theguardian.com/us-news/2019/jul/18/epa-chlorpyrifos-ban-children-brain-damage-trump>.

Organization's 2015 finding on its cancer-causing properties, and other science on it causing liver and kidney damage and endocrine disrupting effects.¹⁶

- EPA, in recent years, further weakened protections for 23 synthetic pyrethroid insecticides. Pyrethroids are a common class of neurotoxic insecticides that have been repeatedly linked by peer-reviewed studies to neurological issues such as learning disabilities in children.¹⁷ The agency allowed a three-fold increase in exposure to the chemical, when the data indicates that children are more susceptible to the impacts of toxic pesticides.¹⁸
- U.S. regulators at the U.S. Department of Agriculture were influenced by representatives of Bayer to pressure a United Nations Task Force to drop any reference of “fungicides” or “crops” from a document intended to counter the rising number of drug-resistant fungal infections.

Given all pesticides' hazards and widespread use, full notification is especially important.

Conclusion

In light of the hazardous nature of pesticides and a weakened regulatory at the federal level (on which the state of New Hampshire depends for pesticide safety determinations), it is important that the state of New Hampshire provide all residents with the right to notification of all pesticide use. To this end, we urge that the Committee **to oppose HB 1698-FN** so that the notification provision of state law applies to all pesticide application methods, including the use of drones.

Thank you for your consideration of our comments.

¹⁶ International Agency for Research on Cancer. 2015. Monograph on Glyphosate. <https://monographs.iarc.fr/wp-content/uploads/2018/06/mono112-10.pdf>.

¹⁷ Dalsager, L. et al. Maternal urinary concentrations of pyrethroid and chlorpyrifos metabolites and attention deficit hyperactivity disorder (ADHD) symptoms in 2-4-year-old children from the Odense Child Cohort. *Environmental Research*, 10 Jun 2019, 176:108533.

¹⁸ Jacobs, Andrew. 2020. Emails Show How Pesticide Industry Influenced U.S. Position in Health Talks. *New York Times*. <https://www.nytimes.com/2020/09/24/health/pesticides-drug-resistance-trump-anifungals.html>.

Appendix A. Key Areas of Concern with Toxic Pesticides Pesticide-Induced Diseases

The scientific literature documents elevated rates of chronic diseases among people exposed to pesticides, with increasing numbers of studies associated with both specific illnesses and a range of illnesses. Beyond Pesticides' Pesticide-Induced Diseases Database¹⁹ documents over 750 studies linked to human health effects. Of which, there are 359 studies on cancer; 107 studies on sexual and reproductive dysfunction; 102 studies on Parkinson's disease; 87 studies on learning and developmental disorders; 33 studies on birth defects; 32 studies on asthma; 18 studies on diabetes; and 12 studies on Alzheimer's disease.

The studies in the database show that our current approach to restricting pesticide use through risk assessment-based mitigation measures is not working. This failed human experiment must be ended. The warnings of those who have expressed concerns about risk assessment, such as U.S. Environmental Protection Agency (EPA) Administrator under Presidents Nixon and Reagan, William Ruckelshaus, have been borne out by three decades of use and study. Mr. Ruckelshaus in 1984 said, "We should remember that risk assessment data can be like the captured spy: If you torture it long enough, it will tell you anything you want to know." EPA's risk assessment fails to look at chemical mixtures, synergistic effects, certain health endpoints (such as endocrine disruption), disproportionate effects to vulnerable population groups, and regular noncompliance with product label directions. These deficiencies contribute to its severe limitations in defining real world poisoning, as captured by epidemiologic studies in the database.

Children's Vulnerability

Children face unique dangers from pesticide exposure. The National Academy of Sciences reports that children are more susceptible to chemicals than adults and estimates that 50% of lifetime pesticide exposures occur during the first five years of life.²⁰ In fact, studies show children's developing organs create "early windows of great vulnerability" during which exposure to pesticides can cause great damage.²¹ For example, according to researchers at the University of California-Berkeley School of Public Health, exposure to pesticides while in the womb increases the odds that a child will have attention deficit hyperactivity disorder (ADHD).²² Likewise, Cincinnati Children's Hospital Medical Center found a strong association between urinary concentrations of pyrethroids, a commonly used lawn care pesticide, and the development of ADHD, primarily in boys (aged 8 to 15). Any concentrations found above the

¹⁹ Beyond Pesticides. 2020. Pesticide Induced Diseases Database.

<http://www.beyondpesticides.org/resources/pesticide-induced-diseases-database/overview>.

²⁰ National Research Council, National Academy of Sciences. 1993. Pesticides in the Diets of Infants and Children, National Academy Press, Washington, DC: 184-185.

²¹ Landrigan, P.J., L Claudio, SB Markowitz, et al. 1999. "Pesticides and inner-city children: exposures, risks, and prevention." Environmental Health Perspectives 107 (Suppl 3): 431-437.

²² Marks AR, Harley K, Bradman A, Kogut K, Barr DB, Johnson C, et al. 2010. Organophosphate Pesticide Exposure and Attention in Young Mexican-American Children: The CHAMACOS Study. Environ Health Perspect 118:1768-1774.

level of detection corresponded to a three-fold increase in the chance of developing ADHD, when compared to boys without detectable levels.²³

As EPA points out in its document, *Pesticides and Their Impact on Children: Key Facts and Talking Points*:²⁴

- “Due to key differences in physiology and behavior, children are more susceptible to environmental hazards than adults.”
- “Children spend more time outdoors on grass, playing fields, and play equipment where pesticides may be present.”
- “Children’s hand-to-mouth contact is more frequent, exposing them to toxins through ingestion.”

In 2012, the American Academy of Pediatrics (AAP) released a landmark policy statement, *Pesticide Exposure in Children*, on the effects of pesticide exposure in children, acknowledging the risks to children from both acute and chronic effects.²⁵ AAP’s statement notes that, “Children encounter pesticides daily and have unique susceptibilities to their potential toxicity.” The report discusses how kids are exposed to pesticides every day in air, food, dust, and soil. Children also frequently come into contact with pesticide residue on pets and treated lawns, gardens, and indoor spaces.

Pesticides, such as glyphosate and its formulated products (Roundup) and 2,4-D, both widely used on turf and lawns, can be tracked indoors resulting in long-term exposures. Scientific studies show that pesticides, like 2,4-D, that are applied to lawns drift and are tracked indoors where they settle in dust, air and on surfaces and may remain in carpets.^{26,27} Pesticides in these environments may increase the risk of developing asthma, exacerbate a previous asthmatic condition, or even trigger asthma attacks by increasing bronchial hyper-responsiveness.²⁸ This is especially important as infants crawling behavior and proximity to the floor account for a greater potential than adults for dermal and inhalation exposure to contaminants on carpets, floors, lawns, and soil.²⁹

A study published in the Journal of the National Cancer Institute finds that household and

²³ Wagner-Schuman, et al. 2015. Association of pyrethroid pesticide exposure with attention-deficit/hyperactivity disorder in a nationally representative sample of U.S. children. *Environmental Health* 14, 44.

<https://ehjournal.biomedcentral.com/articles/10.1186/s12940-015-0030-y>

²⁴ See: <https://www.epa.gov/sites/production/files/2015-12/documents/pest-impact-hsstaff.pdf>.

²⁵ Roberts JR, Karr CJ; Council On Environmental Health. 2012. Pesticide exposure in children. *Pediatrics*. 2012 Dec; 130(6):e1765-88.

²⁶ Nishioka, M., et al. 1996. Measuring lawn transport of lawn-applied herbicide acids from turf. *Env Science Technology*, 30:3313-3320.

²⁷ Nishioka, M., et al. 2001. “Distribution of 2,4-D in Air and on Surfaces Inside Residences. *Environmental Health Perspectives* 109(11).

²⁸ Hernández, AF., Parrón, T. and Alarcón, R. 2011. Pesticides and asthma. *Curr Opin Allergy Clin Immunol*.11(2):90-6.

²⁹ Bearer, CF. 2000. The special and unique vulnerability of children to environmental hazards. *Neurotoxicology* 21: 925-934; and Fenske, R., et al. 1990. Potential Exposure and Health Risks of Infants following Indoor Residential Pesticide Applications. *Am J. Public Health*. 80:689-693.

garden pesticide use can increase the risk of childhood leukemia as much as seven-fold.³⁰ Similarly, a 2010 meta-analysis on residential pesticide use and childhood leukemia finds an association with exposure during pregnancy, as well as to insecticides and herbicides. An association is also found for exposure to insecticides during childhood.³¹

Prenatal exposures to pesticides can also have long-lasting impacts on infants and children. Herbicides, like glyphosate, can adversely affect embryonic, placental and umbilical cord cells, and can impact fetal development. Preconception exposures to glyphosate were found to moderately increase the risk for spontaneous abortions in mothers exposed to glyphosate products.³² One 2010 analysis observed that women who use pesticides in their homes or yards were two times more likely to have offspring with neural tube defects than women who did not use pesticides.³³ Studies also find that pesticides, like 2,4-D, can also pass from mother to child through umbilical cord blood and breast milk.^{34,35}

Biomonitoring testing has also documented pesticide residues in children. Residues of lawn pesticides, like 2,4-D and mecoprop, were found in 15 percent of children tested, ages three to seven, whose parents had recently applied the lawn chemicals. Breakdown products of organophosphate insecticides were present in 98.7 percent of children tested.³⁶ In one study, children in areas where glyphosate is routinely applied were found to have detectable concentrations in their urine.³⁷ While glyphosate is excreted quickly from the body, it was concluded, “a part may be retained or conjugated with other compounds that can stimulate biochemical and physiological responses.” A 2002 study finds children born to parents exposed to glyphosate show a higher incidence of attention deficit disorder and hyperactivity.³⁸

Pesticides and Pets

Studies find that dogs exposed to herbicide-treated lawns and gardens can double their chance of developing canine lymphoma (1) and may increase the risk of bladder cancer in certain

³⁰ Lowengart, R. et al. 1987. Childhood Leukemia and Parent’s Occupational and Home Exposures. *Journal of the National Cancer Institute*. 79:39.

³¹ Turner, M.C., et al. 2010. Residential pesticides and childhood leukemia: a systematic review and meta-analysis. *Environ Health Perspect* 118(1):33-41.

³² Arbuckle, T. E., Lin, Z., & Mery, L. S. (2001). An Exploratory Analysis of the Effect of Pesticide Exposure on the Risk of Spontaneous Abortion in an Ontario Farm Population. *Environ Health Perspect*, 109, 851–857.

³³ Brender, J.D., et al. 2010. Maternal Pesticide Exposure and Neural Tube Defects in Mexican Americans. *Ann Epidemiol*. 20(1):16-22.

³⁴ Pohl, H.R., et al. 2000. Breast-feeding exposure of infants to selected pesticides. *Toxicol Ind Health*. 16:65-77.

³⁵ Sturtz, N., et al. 2000. Detection of 2,4-dichlorophenoxyacetic acid (2,4-D) residues in neonates breast-fed by 2,4-D exposed dams. *Neurotoxicology* 21(1-2): 147-54.

³⁶ Valcke, Mathieu, et al. 2004. Characterization of exposure to pesticides used in average residential homes with children ages 3 to 7 in Quebec. National Institute of Public Health, Québec.

³⁷ Acquavella, J. F., et al. (2004). Glyphosate Biomonitoring for Farmers and Their Families: Results from the Farm Family Exposure Study. *Environ Health Perspect*. 112(3), 321-326.

³⁸ Cox C. 2004. *Journal of Pesticide Reform*. Vol. 24 (4) citing: Garry, V.F. et al. 2002. “Birth defects, season of conception, and sex of children born to pesticide applicators living in the Red River Valley of Minnesota.” *Environ. Health Persp*. 110 (Suppl. 3):441-449.

breeds by four to seven times (2).

- (1) Scottish Terriers exposed to pesticide-treated lawns and gardens are more likely to develop transitional cell carcinoma of the bladder, a type of cancer.³⁹
- (2) “Statistically significant” increase in the risk of canine malignant lymphoma in dogs when exposed to herbicides, particularly 2,4-D, commonly used on lawns and in “weed and feed” products.⁴⁰

Adverse Effects to Wildlife

While the data is pouring in on intersex species in waterways that surround urban and suburban areas and there are certainly a mix of factors, the contribution of runoff from suburban landscapes are seen as an important contributor. In *Suburbanization, estrogen contamination, and sex ratio in wild amphibian populations*, the authors from Yale University’s School of Forestry and Environmental Studies and the U.S. Geological Survey (USGS) find the following: “While there is evidence that such endocrine disruption can result from the application of agricultural pesticides and through exposure to wastewater effluent, we have identified a diversity of endocrine disrupting chemicals within suburban neighborhoods. Sampling populations of a local frog species, we found a strong association between the degree of landscape development and frog offspring sex ratio. Our study points to rarely studied contamination sources, like vegetation landscaping and impervious surface runoff, that may be associated with endocrine disruption environments around suburban homes.”⁴¹

³⁹ [Hayes, H. et al., 1991. “Case-control study of canine malignant lymphoma: positive association with dog owner’s use of 2,4-D acid herbicides,” *Journal of the National Cancer Institute*, 83\(17\):1226.](#)

⁴⁰ [Glickman, Lawrence, et al. 2004. “Herbicide exposure and the risk of transitional cell carcinoma of the urinary bladder in Scottish Terriers,” *Journal of the American Veterinary Medical Association* 224\(8\):1290-1297.](#)

⁴¹ Lambert, M.R., Giller, G.S.J., Barber, L.B., Fitzgerald, K.C., Skelly, D.K., 2015. Suburbanization, estrogen contamination, and sex ratio in wild amphibian populations. *Proc. Natl. Acad. Sci.* 112, 11881e11886.

Appendix B. The Failure of EPA's Regulatory System

Pesticides are, by their very nature, poisons. The Federal Insecticide Fungicide and Rodenticide Act (FIFRA), the law governing pesticide registration and use in the U.S., relies on a risk-benefit assessment, which allows the use of pesticides with known hazards based on the judgment that certain levels of risk are acceptable. However, EPA, which performs risk assessments, assumes that a pesticide would not be marketed if there were no benefits to using it and therefore no risk/benefit analysis is conducted or evaluated by the agency "up front." Registration of a pesticide by EPA does not guarantee that the chemical is "safe," particularly for vulnerable populations such as pregnant mothers, children, pets, and those with chemical sensitivities. Below are examples of concern within the pesticide registration process. These factors should give pause to lawmakers tasked with protecting public and environmental health, and supports action to prohibit toxic pesticides and, in so doing, encourage alternatives.

Conditional Registration. EPA will often approve the use of a pesticide without all of the necessary data required to fully register the chemical and will assign it a "conditional" registration. The agency assumes that while it waits for additional data the product would not cause adverse impacts that would prevent an eventual full registration. A recent report (2013) from the Government Accountability Office, entitled *EPA Should Take Steps to Improve Its Oversight of Conditional Registrations*,⁴² strongly criticizes this process, citing poor internal management of data requirements, constituting an "internal control weakness." The report states, "The extent to which EPA ensures that companies submit additional required data and EPA reviews these data is unknown. Specifically, EPA does not have a reliable system, such as an automated data system, to track key information related to conditional registrations, including whether companies have submitted additional data within required time frames." However, these recommendations do not go far enough. Pesticides without all the data required for a full understanding of human and environmental toxicity should not be allowed on the market. Several historic examples exist of pesticides that have been restricted or canceled due to health or environmental risks decades after first registration. Chlorpyrifos, an organophosphate insecticide, which is associated with numerous adverse health effects, including reproductive and neurotoxic effects, had its residential uses canceled in 2001. Others, like propoxur, diazinon, carbaryl, aldicarb, carbofuran, and most recently endosulfan, have seen their uses restricted or canceled after years on the market due to unreasonable human and environmental effects. Recently, a product manufactured by DuPont, Imprelis, with the active ingredient aminocyclopyrachlor, was removed from the market only two years after EPA approval under conditional registration.⁴³ Marketed as a broadleaf weed killer, Imprelis was found to damage and kill trees. However, in EPA's registration of the chemical, the agency noted, "In accordance with FIFRA Section 3(c)(7)(C), the Agency believes that the conditional registration of aminocyclopyrachlor will not cause any unreasonable adverse effects to human health or to the environment and that the use of the pesticide is in the public's interest; and is

⁴² Government Accountability Office. August 2013. EPA Should Take Steps to Improve Its Oversight of Conditional Registrations. GAO-13-145. <http://www.gao.gov/products/GAO-13-145>.

⁴³ Environmental Protection Agency. June 2012. Imprelis and Investigation of Damage to Trees. <http://www.epa.gov/pesticides/regulating/imprelis.html>.

therefore granting the conditional registration.”⁴⁴

Failure to test or disclose inert ingredients. Despite their innocuous name, inert ingredients in pesticide formulations are neither chemically, biologically, or toxicologically inert; in fact they can be just as toxic as the active ingredient. Quite often, inert ingredients constitute over 95% of the pesticide product. In general, inert ingredients are minimally evaluated, even though many are known to state, federal, and international agencies to be hazardous to human health. For example, until October 23, 2014,⁴⁵ creosols, chemicals listed as hazardous waste under Superfund regulations and considered possible human carcinogens by EPA,⁴⁶ were allowed in pesticide formulations without any disclosure requirement. EPA recently took action to remove creosols and 71 other inert ingredients from inclusion in pesticide formulations as a result of petitions from health and consumer groups. However, numerous hazardous inerts remain. For example, a 2009 study, entitled *Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells*,⁴⁷ found that an inert ingredient in formulations of the weed killer Roundup (glyphosate), polyethoxylated tallowamine (POEA), is more toxic to human cells than the active ingredient glyphosate, and, in fact, amplifies the toxicity of the product – an effect not tested or accounted for by the pesticide registration process. A 2014 study, *Major pesticides are more toxic to human cells than their declared active principle*, found inert ingredients had the potential to magnify the effects of active ingredients by 1,000-fold.

Pesticide manufacturers argue against the disclosure of inert ingredients on pesticide product labels, maintaining that this information is proprietary. Limited review of inert ingredients in pesticide products highlights a significant flaw with the regulatory process. Rather than adopt a precautionary approach when it comes to chemicals with unknown toxicity, EPA allows uncertainties and relies on flawed risk assessments that do not adequately address exposure and hazard. Then, when data becomes available on hazards, these pesticides, both active ingredients and inerts, have already left a toxic trail on the environment and people’s well-being.

Label Restrictions Inadequate. From a public health perspective, an inadequate regulatory system results in a pesticide product label that is also inadequate, failing to restrict use or convey hazard information. While a resident may be able to glean some acute toxicity data,

⁴⁴ Environmental Protection Agency. August 2010. Registration of the New Active Ingredient Aminocyclopyrachlor for Use on Non-Crop Areas, Sod Farms, Turf, and Residential Lawns.
<http://www.regulations.gov/contentStreamer?objectId=0900006480b405d8&disposition=attachment&contentType=pdf>.

⁴⁵ Environmental Protection Agency. October 2014. EPA Proposes to Remove 72 Chemicals from Approved Pesticide Inert Ingredient List.
<http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceac8525735900400c27/3397554fa65588d685257d7a0061a300!OpenDocument>.

⁴⁶ Environmental Protection Agency. October 2013. Cresol/Cresylic Acid.
<http://www.epa.gov/ttnatw01/hlthef/cresols.html>.

⁴⁷ Benachour and Seralini. 2009. Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells. *Chemical Research and Toxicology*.
<http://pubs.acs.org/doi/abs/10.1021/tx800218n>.

chronic or long-term effects will not be found on products' labels. Despite certain pesticides being linked to health endpoints, such as exacerbation of asthma,⁴⁸ learning disabilities,⁴⁹ or behavioral disorders,⁵⁰ this information is not disclosed on the label. Furthermore, data gaps for certain health endpoints are also not disclosed.

Mixtures and Synergism. In addition to gaps in testing inert ingredients and their mixture with active ingredients in pesticide products, there is an absence of review of the health and environmental impacts of pesticides used in combination. A study by Warren Porter, PhD., professor of zoology and environmental toxicology at the University of Wisconsin, Madison, examined the effect of fetal exposures to a mixture of 2,4-D, mecoprop, and dicamba exposure —frequently used together in lawn products like Weed B Gone Max and Trillion— on the mother's ability to successfully bring young to birth and weaning.⁵¹ A 2011 study, entitled *Additivity of pyrethroid actions on sodium influx in cerebrocortical neurons in primary culture*,⁵² finds that the combined mixture's effect is equal to the sum of the effects of individual pyrethroids. This equates to a cumulative toxic loading for exposed individuals. Similarly, researchers looked at the cumulative impact the numerous pesticides that may be found in honey bee hives in the 2014 paper *Four Common Pesticides, Their Mixtures and a Formulation Solvent in the Hive Environment Have High Oral Toxicity to Honey Bee Larvae*.⁵³ The findings of the study send no mixed messages —pesticides, whether looked at individually, in different combinations, or even broken down into their allegedly inert component parts have serious consequences on the bee larvae survival rates. The synergistic effects in most combinations of the pesticides amplify these mortality rates around the four-day mark.

Research by Tyrone Hayes, PhD, professor of integrative biology at UC Berkeley has compared the impact of exposure to realistic combinations of small concentrations of pesticides on frogs, finding that frog tadpoles exposed to mixtures of pesticides took longer to metamorphose to adults and were smaller at metamorphosis than those exposed to single pesticides, with consequences for frog survival. The study revealed that “estimating ecological risk and the impact of pesticides on amphibians using studies that examine only single pesticides at high concentrations may lead to gross underestimations of the role of pesticides in amphibian declines.”⁵⁴

⁴⁸ Hernandez et al. 2011. Pesticides and Asthma. *Current opinion in allergy and clinical immunology*. <http://www.ncbi.nlm.nih.gov/pubmed/21368619>.

⁴⁹ Horton et al. 2011. Impact of Prenatal Exposure to Piperonyl Butoxide and Permethrin on 36-Month Neurodevelopment. *Pediatrics*. <http://www.ncbi.nlm.nih.gov/pubmed/21300677>.

⁵⁰ Furlong et al. 2014. Prenatal exposure to organophosphate pesticides and reciprocal social behavior in childhood.

⁵¹ Cavieres MF, Jaeger J, Porter W. Developmental toxicity of a commercial herbicide mixture in mice: I. Effects on embryo implantation and litter size. *Environmental Health Perspectives*. 2002;110(11):1081-1085.

⁵² Cao et al. 2011. Additivity of Pyrethroid Actions on Sodium Influx in Cerebrocortical Neurons in Primary Culture. *Environmental Health Perspectives*. <http://ehp.niehs.nih.gov/1003394/>.

⁵³ Zhu et al. 2014. Four Common Pesticides, Their Mixtures and a Formulation Solvent in the Hive Environment Have High Oral Toxicity to Honey Bee Larvae. *PLOS One*. <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0077547>.

⁵⁴ Hayes TB, Case P, Chui S, et al. Pesticide Mixtures, Endocrine Disruption, and Amphibian Declines: Are We Underestimating the Impact? *Environmental Health Perspectives*. 2006;114(Suppl 1):40-50. doi:10.1289/ehp.8051.