

# Airborne Poisons:

## Pesticides in Our Air and in Our Bodies

### Communities document pesticide exposure, call for protection

California is famous for its citrus, but at what cost to the health of children and families who live in agricultural areas? A new study proves that one of the most hazardous pesticides—even when applied according to state regulations—is found in the bodies of people who live near orange groves.



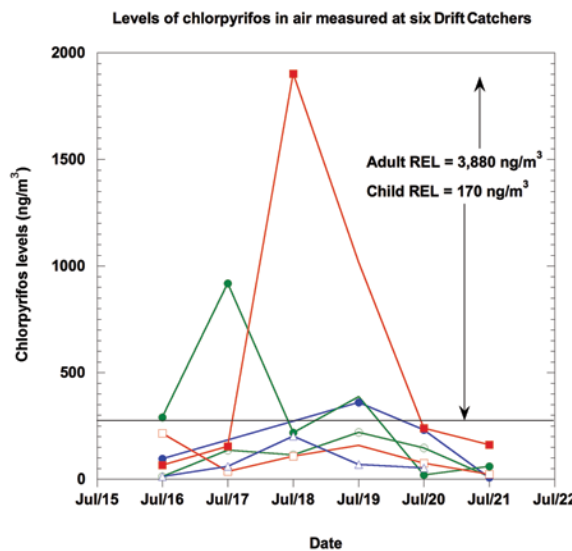
*They might ignore poisons in our air, but how can they tell us it doesn't matter that nerve toxins are in our bodies and in the bodies of our children?*

—Irma Arrollo, President of the community group El Quinto Sol de América, mother of four children and resident of Lindsay, California

### Pesticides are in our air...

During summer peak spray seasons from 2004–2006, a group of community and statewide organizations monitored the air in Lindsay, California, for chlorpyrifos, a highly toxic insecticide applied to citrus trees.

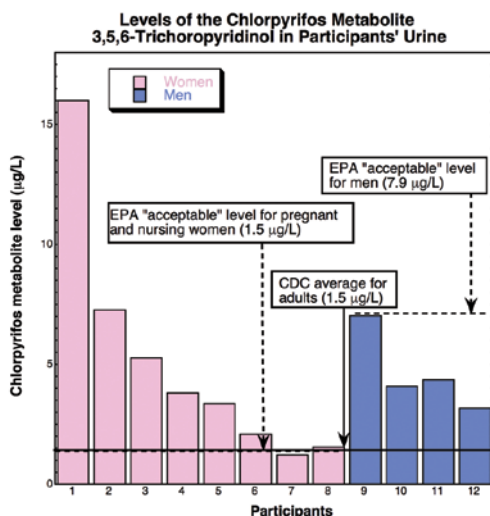
Results showed that chlorpyrifos levels in Lindsay's air exceeded levels of concern derived from U.S. Environmental Protection Agency (EPA) studies by up to 11 times. In 2006, 28% of the 116 air samples were above the “acceptable” exposure level for a one-year-old child based on EPA studies.<sup>1</sup>



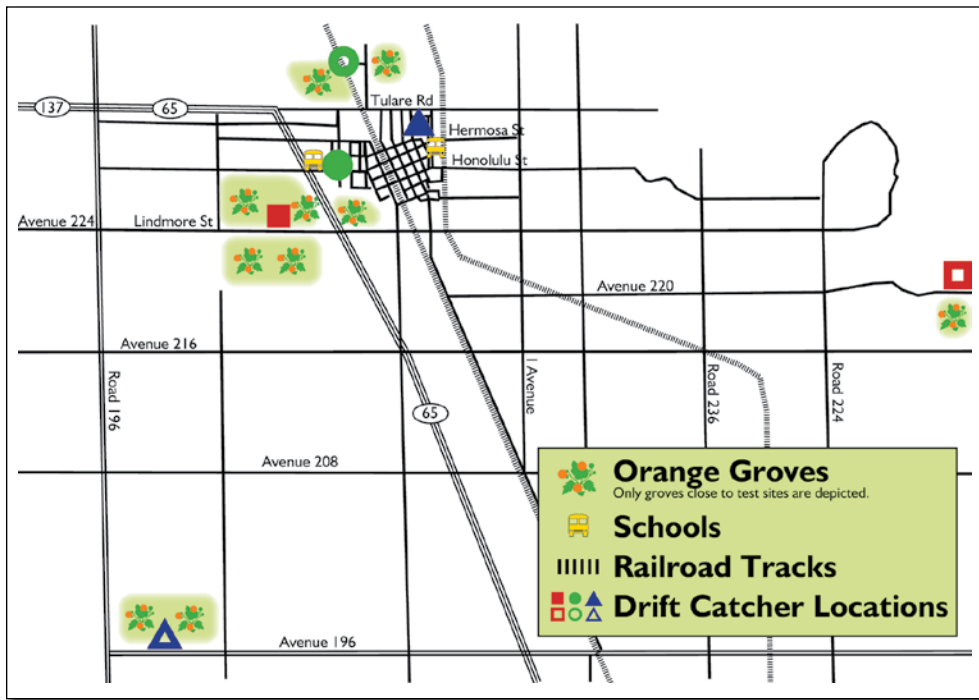
On the days when urine samples were collected, three of the six Drift Catchers detected chlorpyrifos levels above the “acceptable” level of 170 ng/m<sup>3</sup> for short term (acute and sub-chronic) exposure for children. The data not shown (extending from July 11 to July 30) indicated that every house had at least one day when measured levels were above the reference level. Of the 116 air samples taken over a 21-day period, 33 (or 28%) were above this children's reference level. At one house, nearly surrounded by orange groves, levels reached 1902 and 1017 ng/m<sup>3</sup> on two consecutive days. (Symbols on this graph correspond to the Drift Catcher locations shown on the map on the next page.)

### ...Pesticides are in our bodies

Knowing that the air contained high levels of chlorpyrifos, community members wondered if the insecticide made its way into their bodies as well. To answer this question, 12 Lindsay residents provided urine samples during the height of the 2006 summer spray season. The study found that 11 of the 12 people tested had above average levels of the primary chlorpyrifos breakdown product in their urine,<sup>2</sup> and seven of the eight women had amounts above the “acceptable” level for pregnant and nursing women calculated from U.S. EPA data.<sup>3</sup>



Most of the participants had levels of chlorpyrifos in their urine above the average level found in adult U.S. residents. Only one woman had a level in the range considered “acceptable” for pregnant and nursing women.



Lindsay 2006 Drift Catching locations

Pesticide air monitoring devices called “Drift Catchers” were set up in the locations marked on this map. Javier Huerta lives in a trailer park next to an orange grove on the southwest edge of town. Javier and his wife Luz Medellín participated in the project. Neither of them worked in or near the fields during the sampling, yet the levels of chlorpyrifos-related chemicals in their urine ranged from two to three times the U.S. average. All of the residents tested — only two of whom worked in or near fields during the sampling — showed similar results.

## Pesticides can cause serious health effects

Many pesticides can cause serious short- and long-term health effects. Chlorpyrifos, the insecticide monitored in this study, works by harming the nervous system of target insects. It does the same to humans, other mammals, birds and fish that are exposed. The U.S. EPA banned use of chlorpyrifos in residential settings in 2001 because of the severe health risks it poses to children. But the widespread agricultural use of chlorpyrifos continues in rural areas, routinely exposing children and other community members to these dangers. In 2005, nearly two million pounds of chlorpyrifos were used on California crops.<sup>4</sup>

Immediate symptoms of chlorpyrifos exposure include headaches, inability to concentrate, weakness, tiredness, nausea, diarrhea and blurred vision, abdominal cramps, vomiting, sweating, eye watering, muscular tremors, pinpoint pupils, low blood pressure, slow heartbeat and difficulty breathing.<sup>5</sup> Chlorpyrifos may also trigger the onset of asthma in people who have never had this disease or make asthmatic symptoms worse in individuals who already have it.<sup>6</sup>

Luis Medellín and his family awoke one night at their home in Lindsay, California, with headaches and nausea and soon began to vomit. Pesticide applicators were spraying the orange grove next to their trailer park, and their air cooling system pumped the fumes directly into their bedrooms. “It shoots it into the house and it’s just like you were in the orchard, just walking around smelling the pesticides,” Luis told reporters.”

In addition, many recent studies indicate numerous long-term health impacts associated with exposure to chlorpyrifos. Even low-level exposures can interfere with the development of the nervous system in mammals.<sup>7</sup> Recent studies on pregnant women in New York City exposed to chlorpyrifos through home

*When I learned about the levels of pesticides in my body, my mind was on my family, my neighbors, and all the people exposed to pesticides without their knowing about the potential effects to their health. I was angry with the growers because they do not give us any notice in order for us to take action to avoid exposure to pesticides.*

*I have health problems and the doctor for the study told me that these might be related to exposures. The income of my family is low and I don’t have resources to go to the doctors. I have to choose between feeding my family or taking them to the doctor when pesticides seem to be making them ill.*

— Javier Huerta



Ana Espinoza and baby

*I live in front of a school and my baby may be going to that school and I want her to be safe. We have orange groves near our home. The doctor with the study told me that my test showed above the normal (two to three times). I got concerned and my baby was the first to come to my mind.*

*I want to ensure that my family is safe from pesticides. I’m waiting on another baby and because there is information that babies may be born with health problems because of pesticides, I wanted to ensure actions are taken to protect our health.*

*I did not know about pesticide problems until we moved here to Tulare County. Sometimes I think we should move to another place away from agriculture but I know it does not solve the problem. We need to participate to make needed changes.*

— Ana Espinoza

pesticide use demonstrate a link between exposure to chlorpyrifos and low birth weights and smaller head size of newborns. When chlorpyrifos was taken off the home-use market, infant birth weights increased.<sup>8</sup> Highly exposed children (born before the ban) also showed delays in learning and mental development, and were more likely to have attention problems and pervasive development disorder.<sup>9</sup> While the U.S. EPA does not list chlorpyrifos as a carcinogen, recent studies suggest possible links to both lung<sup>10</sup> and prostate<sup>11</sup> cancer.

## Protect our communities from pesticide pollution: the Safe Air for Everyone Campaign

Like hundreds of thousands of Californians who live near agricultural fields, residents of Lindsay are not protected from pesticide pollution. Community members in rural areas across California have no way of knowing when pesticide applications will happen near their homes, schools, playgrounds or businesses and often have no means to take themselves out of harm's way if spraying takes place. Many rural community members earn their living working in agriculture and want the agricultural economy to thrive, but they don't want to sacrifice the health of their children and families in the process.



In order to protect the health of children, families and communities from the dangers of pesticides in the air, members of the Californians for Pesticide Reform coalition launched the Safe Air for Everyone (SAFE) campaign in 2003. The SAFE campaign recommends:

### I. Establish no-spray Protection Zones around sensitive sites.

"I would like to see authorities establish buffer zones around towns, schools and the places where people work and live to ensure we are better protected. I want authorities to help growers find safer pesticides and I think that the pesticide applicators should be made responsible for the harm to people's health." — Luis Medellín

Local Tulare County residents launched a campaign in 2006 to establish protection zones — areas where pesticides can't be applied — around schools and all sensitive sites in Tulare County such as homes, day cares and hospitals. The campaign has received over 220 individual and more than 50 organizational endorsements.

More than half of Tulare County's 176 public schools are within ¼ mile of agricultural operations yet little is being done to ensure that pesticides don't drift onto them. In 2002 the California

## The Lindsay Study: Air Monitoring + Biomonitoring

### About the Drift Catcher Air Monitoring Device

The "Drift Catcher" is a simple air sampling system designed for community use. It works like a vacuum cleaner, sucking air through sample tubes packed with an adsorbent resin. As pesticide-contaminated air is drawn through the tubes, pesticides stick to the resin. After collection, the sample tubes are sent to a laboratory for analysis.

The Drift Catcher's simple design is based on air sampling equipment used by the state of California and follows methods developed by the National Institute for Occupational Safety and Health and the California Air Resources Board. Its results meet the highest scientific standards.



Sandra Garcia and Irma Arrollo with a Drift Catcher

### About Biomonitoring

Biomonitoring is the measurement of human tissue or fluids for the presence of toxic chemicals or their breakdown products. The testing of urine, blood, bone, hair, human milk or other biospecimens can provide ultimate proof of exposure. In the past few years, data from biomonitoring projects testing humans for the presence of lead, flame-retardants, or the chemicals found in stain resistant clothing have led to new government regulations more protective of human health and to industry reformulation of products. Because biomonitoring alone does not tell us about pathways of exposure, combining biomonitoring with studies that document source of exposure can be especially useful.

### Lindsay Project Partners

This Project owes its success to the group's ability to bring together complementary experiences and resources and our shared concern about pesticide use near agricultural communities.

Project partners were comprised of core staff of the statewide coalition Californians for Pesticide Reform (CPR) with CPR member groups Pesticide Action Network, El Quinto Sol, and Commonweal. Project collaborators included Dr. Salvador Sandoval of the Golden Valley Health Center, Merced, California, and faculty members at the Fresno campus of the University of California—San Francisco.

### For more information about the Lindsay Biomonitoring study, contact:

Margaret Reeves, PhD, Senior Scientist, Pesticide Action Network, mreeves@panna.org, 415-981-1771; Sharyle Patton, Commonweal, spatton@igc.org, 415-868-0970 ext 728.

legislature passed a law (Assembly Bill 947) giving county agricultural commissioners the authority to regulate pesticides within ¼ mile around schools, but the law has never been implemented for any Tulare County school.

## 2. Phase out all uses of chlorpyrifos and other pesticides prone to pollute air.

Banned for residential use because of the health risks it poses to children, chlorpyrifos continues to affect rural communities. These communities deserve the same protection as



Humberto Espinoza at a meeting of project participants

urban communities: the SAFE campaign calls for EPA to phase out all uses of chlorpyrifos.

## 3. Establish state government support for farmers transitioning away from the use of synthetic pesticides.

“Now the technology is available to grow fruit without risks from the use of dangerous pesticides. I really appreciate that there are people and organizations that care for the environment and take actions to make good changes.” — Humberto Espinoza

## 4. Implement neighbor notification laws for all pesticide applications near homes, schools, businesses or public areas.

“I want authorities to implement regulations that require growers to notify neighbors of their pesticide applications, that way students at schools will also be more protected from pesticides.”

— Petra Torres



Petra Torres stands by her backyard gate

### For more information about the SAFE Campaign and to get involved, contact:

**Teresa deAnda**  
Central Valley Representative,  
Californians for Pesticide Reform,  
661-304-4080, [teresa@igc.org](mailto:teresa@igc.org)

**Gustavo Aguirre**, Community Organizer,  
Californians for Pesticide Reform/Center  
on Race, Poverty and the Environment,  
661-667-0136, [aguigustavo@gmail.com](mailto:aguigustavo@gmail.com)

**Irma Arrollo**, President,  
El Quinto Sol de América,  
559-827-7786,  
[irma\\_medellin@yahoo.com](mailto:irma_medellin@yahoo.com)

## Notes

- See PAN's calculations for reference exposure levels for a one-year-old child based on EPA's inhalation No Observed Acute Effect Level (NOAEL): Mills, K and S Kegley. 2006. *Air Monitoring for Chlorpyrifos in Lindsay, California June–July 2004 and July–August 2005*. Pesticide Action Network, San Francisco, CA., p.24. <http://www.panna.org/campaigns/DCLindsay04-05.dv.html>
- The average level of chlorpyrifos metabolite (3,5,6-Trichloro-2-pyridinol or TCP) was 1.5 µg/L for adults 20–85 years old as reported in a large U.S. government study of chemicals in the bodies of U.S. residents. Eleven of the 12 participants had levels above that level (numbers ranged from 0.9 to 16.0 µg/L). If levels are shown per gram of the urine protein creatinine (which controls for dilution in individuals who drink relatively more water), then participants' levels ranged from 2.4 µg/g to 13.3 µg/g and were all above the U.S. average levels of 1.8 µg/g for women (of all ages) and 1.7 µg/g for men (of all ages). Source: Department of Health and Human Services and Centers for Disease Control and Prevention. *Third National Report on Human Exposure to Environmental Chemicals*, July 2005. National Center for Environmental Health, Division of Laboratory Sciences, Atlanta, Georgia, NCEH Pub. No. 05-0570.
- EPA's "acceptable" dose for pregnant or nursing women is described as a chronic Population Adjusted Dose and is set at 1.5 µg/L. EPA's "acceptable" chronic exposure level for healthy adults (excluding pregnant or nursing women) is referred to as a Reference Dose and is set at 7.9 µg/L. For further explanation see: Schafer, KS, M Reeves, S Spitzer and SE Kegley. *Chemical Trespass: Pesticides in our bodies and corporate accountability*. 2004. Pesticide Action Network, San Francisco, CA. <http://www.panna.org/campaigns/docsTrespass/chemicalTrespass2004.dv.html>
- See PAN's online pesticide database at [www.pesticideinfo.org](http://www.pesticideinfo.org). Data are derived from California Department of Pesticide Regulation pesticide use reports: <http://www.cdpr.ca.gov/docs/pur/purmain.htm>.
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- AOEC Exposure Codes, George Washington University, Occupational Medicine Group for the Association of Occupational and Environmental Clinics, <http://www.aoec.org/aoeccode.htm>.
- a) Slotkin, TA, ED Levin, FJ Seidler. Comparative Developmental Neurotoxicity of Organophosphate Insecticides: Effects on Brain Development Are Separable from Systemic Toxicity, *Envi. Health Persp.* 2006, 114(5): 746–51 and references cited therein.  
b) Jameson, RR, FJ Seidler, D Qiao, TA Slotkin. Chlorpyrifos Affects Phenotypic Outcomes in a Model of Mammalian Neurodevelopment: Critical Stages Targeting Differentiation in PC12 Cells, *Envi. Health Persp.* 2006, 114(5): 667–72.  
c) Aldridge, JE, A Meyer, FJ Seidler, TA Slotkin. Alterations in Central Nervous System Serotonergic and Dopaminergic Synaptic Activity in Adulthood after Prenatal or Neonatal Chlorpyrifos Exposure, *Envi. Health Persp.* 2005, 113(8): 1027–31.
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- Rauh, VA, R Garfinkel, FP Perera et al. Impact of Prenatal Chlorpyrifos Exposure on Neurodevelopment in the First 3 Years of Life Among Inner-City Children, *Pediatrics*, 2006, 118(6):e1845–e1859.
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- Alavanja, MCR, C Samanic, M Dosemeci, J Lubin, R Tarone, CF Lynch, C Knott, K Thomas, JA Hoppin, J Barker, J Coble, DP Sandler and A Blair. Use of Agricultural Pesticides and Prostate Cancer Risk in the Agricultural Health Study Cohort. *Am J of Epidem.* 2003,157:800–814.