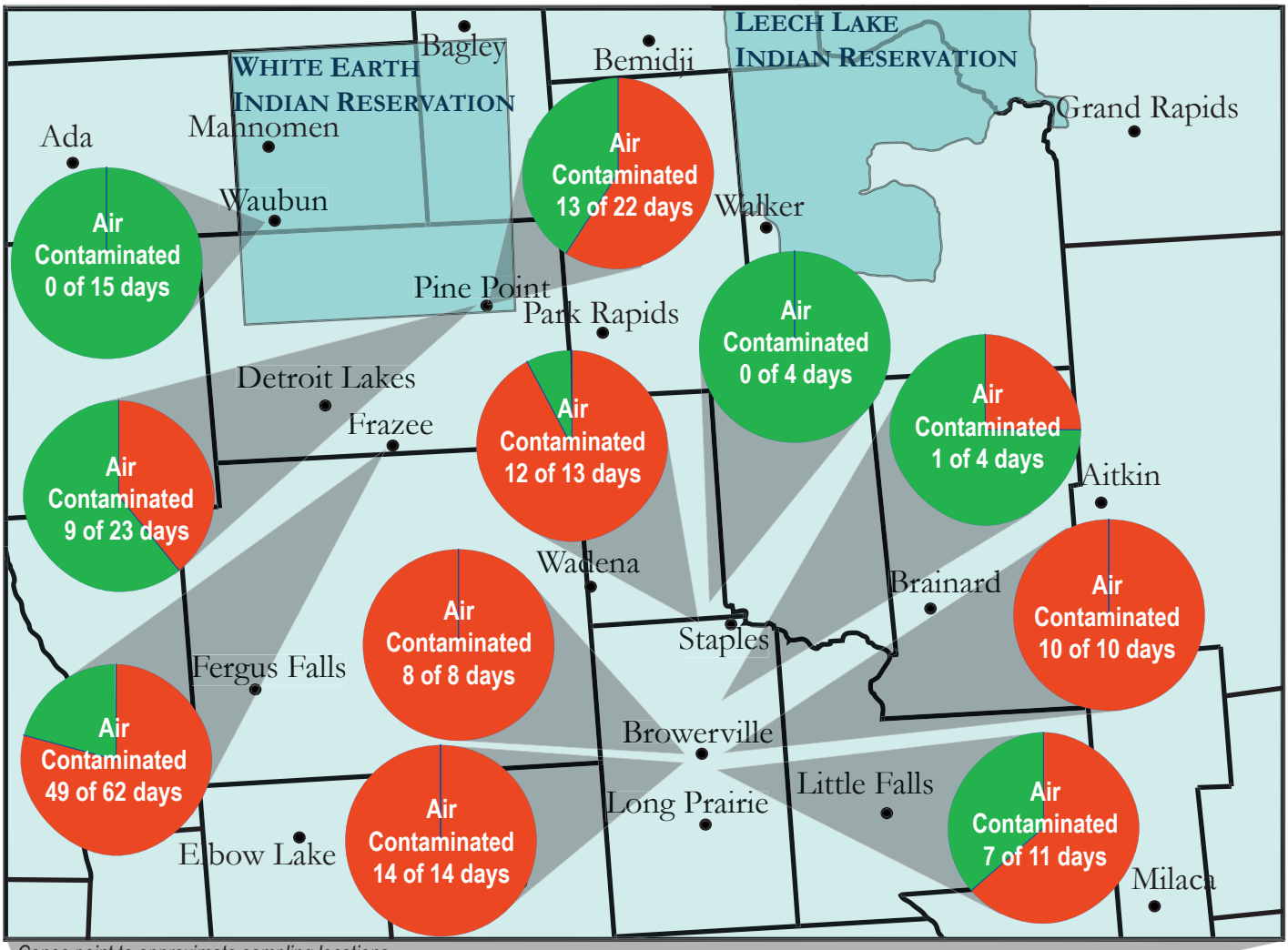
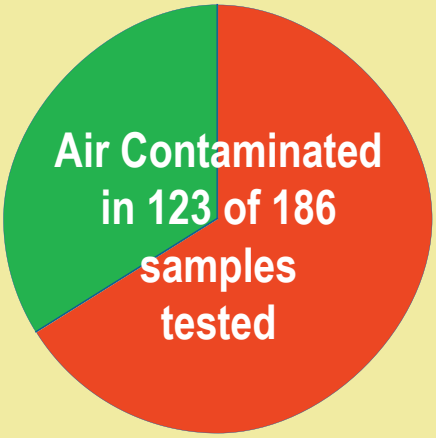
Pesticides and Air Pollution in Minnesota:

The Frequency of Detection of Chlorothalonil, a Fungicide Used on Potatoes, at 11 Sites in 2006-07



Cones point to approximate sampling locations.

Pooling the data from all 11 sites, chlorothalonil was detected 66% of the time.



Minnesota Pesticide Awareness

Clean Water Action — Our Water, Our Health, Our Future

White Earth Pesticide Action Network

Pesticide Action Network North America

Pesticide Action Network North America :: 49 Powell St., Suite 500 :: San Francisco, CA 94102 :: www.panna.org

Community based environmental monitoring shows that Minnesotans are exposed to pesticide drift

Communities used Drift Catchers to document pesticide drift

In the summers of 2006 and 2007, concerned citizens collected air samples using Drift Catchers—simple air sampling systems designed for community use. Drift Catchers work like vacuum cleaners, sucking air through sample tubes packed with adsorbent resin that traps pesticides present in the air. The resin is then analyzed for a number of pesticides. 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.

People set up Drift Catchers in their yards, the yards of their friends, and in one case at an elementary school. All of the sampling sites were adjacent to large fields, a situation typical of rural Minnesota. In general, samples were collected daily for several days or weeks in a row. At some sites, sampling was timed to coincide with anticipated pesticide applications, while other sampling projects captured "ambient" pesticide concentrations—meaning that samples were taken over a long period of time, without regard to when or whether applications took place nearby.

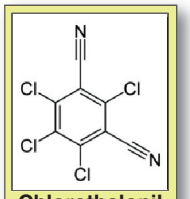
Communities are exposed to chlorothalonil in the air they breathe

Several pesticides were found in the samples, but by far the most commonly found pesticide was chlorothalonil—a fungicide used extensively on potatoes. As depicted on the other side of this sheet, **123 out of the 186 Drift Catcher samples analyzed so far contained chlorothalonil**. These results may represent only the tip of the iceberg in terms of the extent of pesticide air contamination in rural Minnesota, since sampling took place for only part of the year, and of the 1000+ pesticide active ingredients approved for use, only a fraction can be detected by these methods—other pesticides may be drifting out of fields but simply not detected.

Details of Chlorothalonil Analysis	
Detection limit (PANNA)	1 ng/m^3
Detection limit (commercial lab)	4 ng/m^3
Maximum level observed	197 ng/m^3
Average level when detected	23 ng/m^3

Chorothalonil is commonly used on potatoes in Minnesota

Chlorothalonil, also known by its trade names Bravo® and Daconil®, has been used on U.S. crops since 1970. It was the 3rd most commonly used fungicide in the U.S. as of 1997, with almost 12 million lbs applied to food crops nationally, mostly on peanuts and potatoes.[1] In Minnesota, 522,000 lbs were sold in 2005[2] with 400,000 lbs used on potatoes; 83% of potato acres were treated with it that year.[3]



Chlorothalonil

Chlorothalonil is much more toxic when inhaled than when ingested

The EPA classifies chlorothalonil as toxicity category IV (not acutely toxic) by oral exposure but category II (moderately toxic) by inhalation exposure.[4] Despite the large dependence of toxicity on exposure route, the EPA used data from an oral study to assess the risk associated with breathing chlorothalonil, claiming that the necessary inhalation studies were not available.[4] In a more recent review of chlorothalonil's toxicity, the state of California found several acute inhalation studies that could be used. Disturbingly, adverse effects were observed at *every* dose level tested in *every* inhalation study identified by the state. In other words, for even the smallest inhaled amounts that were tested, chlorothalonil caused signs of sickness in lab animals.[5] Based on these studies, California identified 530 ng/m^3 as an "Acute Screening Level," for chlorothalonil—the maximum air level the state considers to be without significant health concern for acute (short-term, 24-hour) exposure.[6]

EPA Toxicity Ratings for Chlorothalonil	
Oral	IV (Not acutely toxic)
Inhalation	II (Moderately toxic)
Dermal	IV (Not acutely toxic)
Eye Irritation	I (Severe Irritation)
Cancer Rating	B2 "Probable"

References (1) Gianessi LP and Marcelli MB, *Pesticide Use in U.S. Crop Production: 1997*, National Center for Food and Agricultural Policy, November 2000. (2) *Minnesota Pesticide Sales Information*, Minnesota Department of Agriculture, Accessed September, 2007. http://www.mda.state.mn.us/chemicals/pesticides/useandsales.htm (3) *Agricultural Chemical Use Database,* National Agricultural Statistics Service, Accessed September, 2007. http://www.pestmanagement.info/nass/ (4) *Reregistration Eligibility Decision (RED): Chlorothalonil*, U.S. EPA, April 1999. (5) *Chlorothalonil Risk Characterization Document for Dietary Exposure*, Department of Pesticide Regulation, CalEPA, January 5, 2005. (6) *Ambient Air Monitoring for Pesticides in Lompoc, California. Volume 3: Multiple Pesticides*, Department of Pesticide Regulation, CalEPA, March 2003. (7) Cox C, "Fungicide Factsheet: Chlorothalonil," *Journal of Pesticide Reform*, 17(4):14-20, 1997.

The hazards of long-term inhalation exposure to chlorothalonil are unknown

The levels observed in these Drift Catcher studies are all lower than the acute screening level, but as shown on the reserve side of this sheet, Minnesotans are exposed to chlorothalonil drift repeatedly and often for durations longer than 24-hours—an exposure scenario best described as "sub-chronic." No chronic or sub-chronic inhalation studies for chlorothalonil were identified in the risk assessments by EPA and California,[4,5] and thus the air level that is "without significant risk" remains unknown as do the health effects associated with sub-chronic exposure.

Chlorothalonil is classified as a "probable" carcinogen by the EPA based on cancers observed in rats fed diets containing chlorothalonil.[4]

Chlorothalonil exposure has caused severe allergic reactions in some people. There are reports of people developing allergies to chlorothalonil upon repeated exposure. Rashes are the most common symptom, but asthma and even anaphylactic shock have also been reported. At least one death has been attributed to allergic reaction to chlorothalonil. After playing golf on a course that had been treated with chlorothalonil in the previous week, Lt. George Prior developed a fever and headache, which progressed to blistered skin, aspiration pneumonia, kidney failure, and ultimately death. Military pathologists concluded that a reaction to chlorothalonil was the cause.[7]

The effects of exposure to mixtures of pesticides are largely unknown

At some sites people breathe other pesticides in addition to chlorothalonil. Pendimethalin, an herbicide, was found in many Drift Catcher samples from Pine Point Elementary School, and samples from a home in Browerville contained chlorpyrifos (a neurotoxic insecticide) and pentachloronitrobenzene (PCNB, a fungicide and possible carcinogen) in addition to chlorothalonil. Chlorothalonil itself is sometimes contaminated with trace amounts hexachlorobenzene, a probable carcinogen, and chlorothalonil's primary breakdown product is about 30 times more toxic than chlorothalonil itself. It is possible that additive or synergistic effects may increase the toxicity of one pesticide in the presence of others.

Pesticide Action Network
WHITE EARTH PESTICIDE ACTION NETWORK
CLEAN WATER ACTION
Minnesota Pesticide Awareness