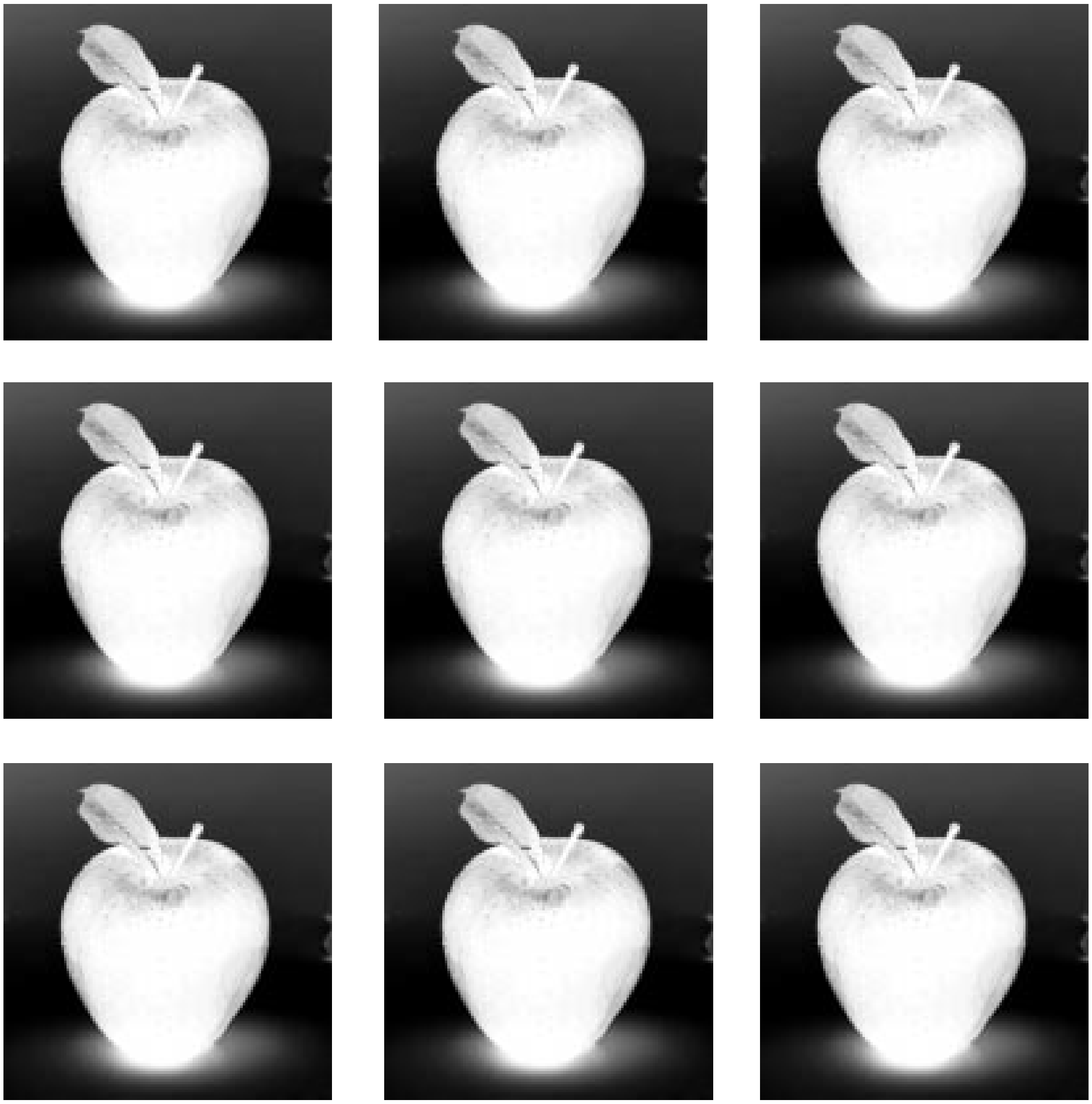

HOW 'BOUT THEM APPLES?

PESTICIDES IN CHILDREN'S FOOD
TEN YEARS AFTER ALAR

ENVIRONMENTAL WORKING GROUP™

RICHARD WILES
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This report is dedicated to our friends and colleagues at the
Natural Resources Defense Council,
whose pioneering research, litigation and advocacy
have done so much to rid the
food supply of dangerous chemicals like Alar,
and make protection of children the
central goal of federal pesticide policy.

Environmental
Working Group™

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Environmental Working Group

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Contents

Foreword

The government always insists the food supply is "safe." Right up until it bans a high-risk pesticide like Alar that has been on the market, and in the food of millions of children, for decades. Then the government says the safe food supply is "safer."

It's nonsense, of course. There are literally dozens of pesticides on the market today that government scientists in large measure have concluded are unsafe for at least some, if not most, of their registered uses. All of those chemicals—like nearly all of the major pesticides used in "modern" American agriculture—have been on the market for 25 years or more. They're old. They're toxic. They render the foods they contaminate unsafe. Kids eat them every day. A great many are now under regulatory suspicion, and have been for many years. To borrow a phrase from two bold young politicians of the early 1990s, it's time for them to go.

But they don't go. If you could summarize the government's stance in the face of overwhelming evidence of risk, it would be a massive and helpless shrug.

One saw a version of that shrug on a *60 Minutes* story that aired ten years ago this week, as we go to press. The government's top pesticide regulator told an astonished Ed Bradley that the pesticide Alar was far too carcinogenic to qualify for federal approval under the standards then in place for "new chemicals." But by then Alar had been on the market and in apple products for decades. Parents, understandably, were neither reassured by, nor sympathetic to the government's legalistic response when Bradley asked why it could not take action against a carcinogenic pesticide its scientists were deeply concerned about, and that contaminated apples, apple juice and other apple products heavily consumed by children.

So what parents rightly did instead was to stop relying on the government's word that the food supply was safe. Parents couldn't ban Alar from the food supply. But they could damned well do something about the apples and apple juice their kids were consuming while the gov-

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Two years after the *60 Minutes* broadcast, the Bush Administration banned Alar. Not because parents were still upset—but because the chemical posed an unacceptable cancer risk.

The real "food scares" in pesticide policy resemble the one pesticide companies and farm groups are trying to perpetrate now, as the government turns its attention to the health risks posed by organophosphate insecticides in the food supply.

ernment dithered, diddled and deferred to pesticide companies. In various ways—some quite dramatic—parents stopped feeding their kids apples. It was traumatic and tragic for the apple industry, but was hardly the reaction *60 Minutes* intended, or what the Natural Resources Defense Council recommended, in the pioneering research report *(Intolerable Risk)* that formed the basis for the broadcast.

Consumer response to their government's stark paralysis, in the face of a clear food risk, gave birth to the myth that the Alar episode was an unfounded "food scare." Traffickers in the myth—including, to our dismay, a great many journalists—rarely tell the story to the end.

Two years after the *60 Minutes* broadcast, the Bush Administration banned Alar. Not because parents were still upset—federal pesticide law has no parental distress clause—but because the chemical posed an unacceptable cancer risk. The ban was made politically easier by the fact that the manufacturer, Uniroyal, had voluntarily taken the product off the market in the wake of the uproar. But the fact remains that NRDC was right on the science—and so was CBS—and it was science that produced an Alar ban.

Several things about the Alar episode did turn out to be unfounded. One was the apple grower's lawsuit. CBS won at every level in the legal system a few years later. So resoundingly, in fact, that farm groups resorted to the creation of an entirely new body of legislation—the "veggie libel laws"—in order to stifle media coverage of food safety issues. Oprah famously trounced them in the "hamburger hate crime" trial, on the farmers' home court in Texas just last year.

Equally unfounded was the notion that without Alar, apple production would be impossible. Pesticide companies and farm groups have shouted such claims whenever a pesticide has been threatened by regulatory action, going back to DDT. Apple production continued without a blip after Alar was banned. The real "food scares" in pesticide policy resemble the one pesticide companies and farm groups are trying to perpetrate now, as the government turns its attention to the health risks posed by organophosphate insecticides in the food supply. The use of a number of these chemicals needs to be banned or severely curtailed, as EWG documented a year ago. Farmers say there is no risk, they have no options, and that food prices will skyrocket. That, too, is nonsense.

This latest EWG report shows that apples still need a clean-up ten years after Alar. So do many other fruits and vegetables. It is the latest in a series of EWG reports, dating from our founding in 1993, that focuses on the special risks posed by pesticides in the diets of infants and children. We dedicate it to our friends at the Natural Resources Defense Council (NRDC) because their work ten years ago on Alar, their lawsuit to enforce the Delaney Clause, and their ongoing advocacy not only forced a dangerous chemical out of the food supply, but helped pave the way for a stronger pesticide law to protect kids. We're proud to fight alongside NRDC, Consumers Union, and other public interest colleagues today to try to make the protections in the Food Quality Protection Act of 1996 a reality. So far, we're losing. So are America's kids.

EWG has come to the conclusion that this government is not going to do its job to protect children from pesticides, despite the new law. The Administration's front-page promises in 1993 and afterwards to slash pesticide use and take the most dangerous pesticides off the market have amounted to nothing—so far. The government is still trying to figure out what it might someday do about dangerous chemicals like methyl parathion and chlorpyrifos that kids eat every day at unsafe levels.

What should parents and other consumers do while the government makes up its mind? In this report and at our new, award-winning web site—www.foodnews.org—we provide some advice. It does not mean dropping fruits and vegetables from the diet—that, too, is apocalyptic, post-Alar rhetoric from the pesticide lobby.

What it does mean, in our opinion, is giving little kids fewer—or no—apples, peaches and other produce that carry pesticides that government scientists think are unsafe. There are plenty of alternatives to choose from, up to and including organic produce, in order to enjoy a healthful diet rich in fresh fruits and vegetables, while slashing pesticide exposure.

We also advise parents to weigh in with food companies, grocery stores, and Washington. Our web site is one route, but there are many others. Politicians will stand up to pesticide companies and farm groups if they hear enough concern from parents about pesticides in food. NRDC got that point through in the Alar episode a decade back, and our kids have been the safer for it.

Kenneth A. Cook
President,
Environmental Working Group
Washington, D.C.

EWG has come to the conclusion that this government is not going to do its job to protect children from pesticides.

Executive Summary

Ten years after the American public demanded that the EPA ban the cancer-causing pesticide Alar, children are no better protected from pesticides in the nation's food supply. Multiple pesticides known or suspected to cause brain and nervous system damage, cancer, disruption of the endocrine and immune systems, and a host of other toxic effects are ubiquitous in foods children commonly consume at levels that present serious health risks.

A series of new analyses of government pesticide records by the Environmental Working Group show that:

- More than a quarter million American children ages one through five eat a combination of 20 different pesticides every day. More than one million children ages one through five eat at least 15 pesticides on any given day. And overall, 20 million children five and under eat an average of 8 pesticides a day, every day—a total of more than 2,900 pesticide exposures per child per year from food alone. Adults are also exposed to multiple pesticides in food.

- Every day, 610,000 children ages one through five eat a dose of neurotoxic organophosphate insecticides (OPs) that the government deems unsafe (Table 1). This is equal to all the children ages one through five in the states of Washington and Oregon combined, eating an unsafe dose of OP insecticides every day. Some 61,000 of these children exceed the

More than one million children ages one through five eat at least 15 pesticides on any given day.

Table 1. More than 600,000 children under age six get an unsafe dose of neurotoxic pesticides in food each day.

Age	Estimated number of children exceeding the EPA "safe" dose per day	Percent of Population	Children exceeding 10 times the EPA "safe" dose per day
1	137,200	3.4%	13,500
2	131,400	3.3%	13,500
3	130,000	3.2%	13,900
4	104,300	2.6%	9,700
5	107,600	2.7%	10,400
Total	**610,400**	**3.1%**	**61,000**

(Figures rounded to nearest hundred.)

Source: Environmental Working Group. Compiled from USDA food consumption data 1989-1996, USDA and FDA pesticide residue data 1991-1997, and U.S. EPA 1998a and U.S. EPA 1998b.

Table 2. Apples and apple products account for more than half the unsafe organophosphate insecticide exposure for children under age six.

Food	Estimated number of children exceeding the EPA "safe" dose/day from individual foods					
	1-year-olds	2-year-olds	3-year-olds	4-year-olds	5-year-olds	Total
Apples	32,430	51,050	54,720	48,370	48,380	234,950
Peaches	15,450	11,670	16,220	9,570	11,430	64,340
Fresh Green Beans	12,320	9,870	13,360	10,830	10,550	56,920
Applesauce	15,440	9,610	10,620	7,430	12,360	55,460
Apple Juice	18,920	14,350	9,110	5,470	2,830	50,680
Grapes	10,040	11,850	10,110	8,440	8,610	49,050
Pears	4,410	5,470	3,040	3,380	2,960	19,260
Nectarines	1,610	1,210	2,080	1,670	2,970	9,540
Tomatoes	1,460	500	640	780	780	4,170
Frozen Green Beans	1,790	940	280	870	230	4,100
Raisins	340	1,550	280	470	-	2,640
Strawberries	330	500	390	440	430	2,080
Plums	380	450	360	620	260	2,070
Bell Peppers	40	440	210	410	460	1,560
Spinach	210	350	310	110	320	1,280
Tangerines	280	90	180	210	410	1,160
Celery	130	230	140	410	180	1,090
Total for all Foods	**137,200**	**131,400**	**130,000**	**104,300**	**107,600**	**610,500**

(Figures rounded to nearest hundred.)

Source: Environmental Working Group. Compiled from USDA food consumption data 1989-1996, USDA and FDA pesticide residue data 1991-1997, and U.S. EPA 1998a and U.S. EPA 1998b.

Some apples are so toxic that just one bite can deliver an unsafe dose of OPs to a child under five.

government's safe daily dose of these pesticides by a factor of 10 or more. Exposure to neurotoxic compounds like lead, PCBs and OP insecticides can cause permanent long-term damage to the brain and nervous system when exposure occurs during critical periods of fetal development or early childhood.

- More than 320,000 of these unsafe exposures are from one pesticide, methyl parathion.

- Ten years after Alar, apples are still loaded with pesticides. More than half of the 610,000 children exposed to an unsafe dose of OP insecticides each day, get that dose by eating an apple, apple sauce or apple juice (Table 2). A child is just as likely to eat an apple with 9 pesticides on it, as he or she is to eat one with none. The average one year old gets an unsafe dose of OPs 2 percent of the time he or she eats just three bites of an apple sold in the United States. Some apples are so toxic that just one bite can deliver an unsafe dose of OPs to a child under five.

- Pesticide concentrations increased from 1992 through 1996 on seven of eight foods heavily consumed by children. Cancer-causing pesticides led the way, increasing on six of the eight crops for which data are available for all five years. Levels of neurotoxic and endocrine disrupting pesticides remained essentially unchanged. No significant decreases in residues were reported for any group of pesticides. These results are based on data from the USDA Pesticide Data Program (PDP), a special pesticide testing initiative developed in response to the Alar events, that targets fruits and vegetables heavily consumed by children. Pesticide concentrations in the PDP are measured after the produce is washed and prepared for normal consumption.

In 1993, the National Academy of Sciences published the landmark study, *Pesticides in the Diets of Infants and Children*. This five-year consensus report confirmed the central lesson of Alar: children need extra protection from pesticides and federal regulations do not provide it. Three years later, the Congress unanimously passed sweeping pesticide reform legislation that for the first time requires specific protection of infants and children from pesticides in food and environment. The EPA is moving slowly toward issuing new standards under this law. To date, however, no government standards have been set that specifically protect infants, children, or anyone else from the multiple pesticide exposures they experience each day.

Fortunately, parents can significantly cut their family's exposure to pesticides by taking a few precautions when they shop for food.

Parents should feed their children a variety of fruits and vegetables, with emphasis on those with fewer pesticides on them. EWG analysis of comprehensive data of pesticides in food from the

If you feel that everyone from retailers to the EPA can do a much better job of reducing pesticide use, banning the most toxic compounds, and making the food supply safer for infants and children, voice your concerns via www.foodnews.org.

Table 3. Parents can reduce health risks to their children by feeding them fruits and vegetables with consistently low pesticide residues.

Most Contaminated Foods		Least Contaminated Foods	
Rank	**Food**	**Rank**	**Food**
1	Apples	1	Corn
2	Spinach	2	Cauliflower
3	Peaches	3	Sweet Peas
4	Pears	4	Asparagus
5	Strawberries	5	Broccoli
6	Grapes - Chile	6	Pineapple
7	Potatoes	7	Onions
8	Red Raspberries	8	Bananas
9	Celery	9	Watermelon
10	Green Beans	10	Cherries - Chile

Source: Environmental Working Group. Compiled from USDA and FDA pesticide residue data 1992-1997.

Food and Drug Administration data show that red raspberries, strawberries, apples, and peaches grown in the United States and cantaloupe from Mexico, are the foods most contaminated with pesticides (Table 3). The fruits least contaminated with pesticides were watermelon, bananas, kiwi, pineapple, and domestically grown cantaloupe. The least contaminated vegetables include corn, onions and peas.

As an aid to further understanding which foods contain the most pesticides, EWG has launched a new Web site—**www.foodnews.org**—that for the first time allows anyone to choose foods they commonly eat and instantly learn which pesticide residues were in those foods, with the same odds that consumers have of getting those foods in the real world. Digital diners can choose from more than 350 commonly eaten foods and food ingredients. **www.foodnews.org** also provides parents with information about the health risks those pesticides pose, and how to avoid them.

www.foodnews.org also provides direct e-mail links to the EPA, the Congress, supermarkets and food companies so that consumers can voice their views on pesticide residues in to food supply. If you feel that everyone from retailers to the EPA can do a much better job of reducing pesticide use, banning the most toxic compounds, and making the food supply safer for infants and children, voice your concerns via **www.foodnews.org.**

Ten Years After Alar

No safety standards for children

Ten years after Alar there is no evidence that the food supply is any safer for infants and children than it was in 1989. Current standards for pesticides in food do not yet include specific protections for the fetus, infant or young child, in spite of major changes to federal pesticide law in 1996 that specifically require these reforms. Safety standards do not include protections from multiple pesticides, nor do food standards account for the fact that children are exposed to pesticides in many different ways such as indoor pest control, drinking water contamination, or via pesticides in the air they breathe.

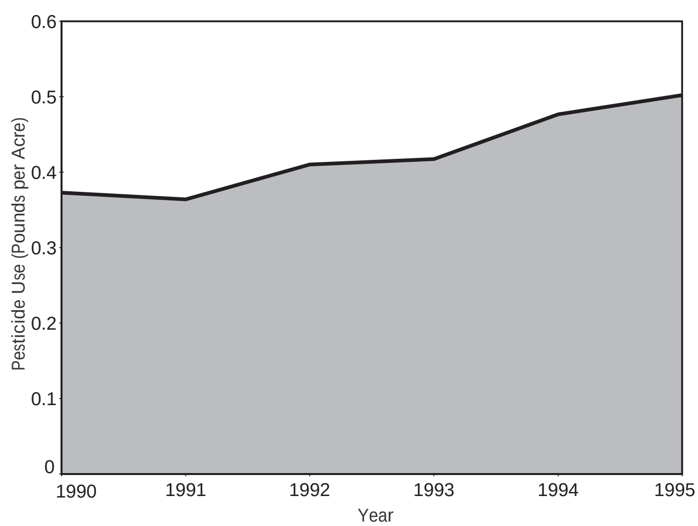
Pesticide use and food residues are increasing

Overall pesticide use has increased by about 8 percent, or 60 million pounds since 1989, with the high volume field crop and fumigant uses still dominated by older, highly toxic pesticides (Table 4). The use of pesticides that leave residues on food (insecticides and fungicides) has increased even more. Applications per acre, the most objective indicator of dependence on pesticides, increased 34 percent for insecticides and fungicides between 1990 and 1995 (Figure 1).

Residues in food have increased or held steady and so-called "safer" pesticides have gained only a toehold on the market. The market for organic food has grown but still only represents 1.5 percent of all food sales.

In response to the Alar episode, the USDA began the Pesti-

Figure 1. Use of pesticides found in food has intensified since the Alar episode of 1989.



Source: USDA, "Agricultural Resources and Environmental Indicators, 1996-97."

Table 4. Older, highly toxic pesticides continue to dominate the market.

Pesticide	First Product Registered	Estimated Total Use 1995 (pounds)	Health Effects
Atrazine	1959	70,500,000	Carcinogen, hormone disrupter, tap water contaminant
Metolachlor	1977	61,500,000	Carcinogen, hormone disrupter, tap water contaminant
2,4-D	1948	53,000,000	Neurotoxicant, hormone disrupter
Metam Sodium	1955	51,500,000	Carcinogen, teratogen
Methyl Bromide	1947	48,500,000	Readily lethal neurotoxicant, teratogen, depletes the ozone layer
Glyphosate	1974	43,000,000	Neurotoxicant
Dichloropropene	1960	40,500,000	Carcinogen
Cyanazine	1971	26,500,000	Teratogen, carcinogen, tap water contaminant
Pendimethalin	1975	25,500,000	Carcinogen
Trifluralin	1963	25,500,000	Carcinogen, hormone disrupter
Chlorpyrifos	1965	25,000,000	Developmental neurotoxicant

Source: EPA Pesticide Industry Sales and Usage: 1994 and 1995 Market Estimates, August 1997; Health Information from U.S. EPA Office of Pesticide Programs data.

From 1994 through 1998, the government allowed 237 new pesticides on the market but restricted only a handful.

cide Data Program in 1991. The program targets foods heavily consumed by children, and tests for pesticides after foods have been washed, peeled, cored or otherwise prepared the way they are normally eaten. PDP technicians use advanced analytical techniques capable of detecting residues at levels well below those detectable by the FDA in its routine monitoring of the food supply for illegal food residues. The data are by far the most accurate available on pesticide levels in food, although not all foods are tested and some pesticides of toxicological concern remain unmonitored.

PDP data show that pesticide levels increased between 1992 and 1996 on seven of eight foods analyzed at least four of these five years. Cancer-causing pesticides led the increase, rising on six of the eight crops, while levels of pesticides that cause other toxic effects remained essentially unchanged. No significant decreases in food residues were reported for any group of pesticides. Average pesticide levels in nine other fruits and vegetables analyzed by the FDA appear to have increased even more significantly, although these residues are measured prior to thorough washing of the produce.

More hazardous pesticides in food and drinking water

From 1994 through 1998, the government allowed 237 new pesticides on the market but restricted only a handful. These 237 new pesticides are by far the most pesticides ever put on the market during any five-year period in the history of the EPA. Nearly two-thirds (63 percent) of these pesticides did not meet the agency's "safer" pesticides criteria (EPA 1998c, EPA 1995).

Notable among the new pesticides is the weed killer acetochlor, a probable human carcinogen. Acetochlor was held off the market by the EPA during the Reagan and Bush Administrations because of its toxicity and the certainty that it would contaminate drinking water supplies. Two years after it was allowed for use by the Clinton EPA, the manufacturer's own tests found the weed killer in 42 percent of all water systems tested, and in 20 percent of all tap water samples analyzed. In April 1997 acetochlor was banned in the state of New York after the state Department of Environmental Conservation concluded that, "acetochlor has toxicological and environmental fate profiles comparable to or worse than those of the other (herbicide) compounds" (Nosenchuck 1997).

Another step backwards in pesticide safety occurred with the insecticide aldicarb, the most toxic pesticide ever allowed for use in the U.S. food supply. In 1985 the illegal use of aldicarb in watermelons put about 1,000 people in the hospital in California. In 1990, the manufacturer of aldicarb, Rhone-Poulenc, voluntarily removed aldicarb from the market after tests of individual potatoes found residues of aldicarb that were clearly unsafe for children.

From 1993 through 1995, Rhone-Poulenc lobbied the EPA with data purporting to show that a new application system could guarantee levels of aldicarb in cooked potatoes that would be safe for small children. Ultimately, EPA was convinced by industry analysis and put aldicarb back into the food supply in September 1995. After just two growing seasons, however, history has repeated itself. Recently released data from the USDA reveal that a small but significant number of children are again exposed to unsafe levels of this supertoxic insecticide in potatoes (USDA 1999, Consumer Reports 1999).

Children are exposed to unsafe amounts of pesticides that can damage the brain and nervous system

Since the Alar controversy of 1989 scientists and regulators have become extremely concerned about the potential for permanent brain and nervous system damage that could be caused by exposure to neurotoxic pesticides in food. In 1993, the National Research Council described the situation this way:

> "The data strongly suggest that exposure to neurotoxic compounds at levels believed to be safe for adults could result in permanent loss of brain function if it occurred during the prenatal or early childhood period of brain development. This information is particularly relevant to dietary exposure to pesticides, since policies that established safe levels of

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Apples — Ten Years After Alar — Still Loaded With Pesticides

There is no evidence that apples are any safer today than they were during the Alar events of 1989. Admittedly Alar itself is gone and the cancer risk from pesticides on apples may be less than it was, but apples remain so contaminated with pesticides that one cannot reasonably argue that the overall health threats to children from pesticides in apples are less than they were in 1989.

The use of some high risk pesticides in apple production increased dramatically during the 1990s (USDA 1998b, USDA 1992). In particular, the use of the cancer-causing EBDC fungicides skyrocketed from several hundred thousand pounds in 1991, to more than 1.4 million pounds in 1997. The use of methyl parathion, the most toxic organophosphate (OP) insecticide allowed on food in the U.S., nearly doubled on apples during the same period, from 135,000 to 259,000 pounds. Use of chlorpyrifos, a developmental neurotoxin and potent OP increased from 468,000 to 571,000 pounds, and the use of the DDT relative, methoxychlor, went from no applications on apples in 1991 to more than 50,000 pounds in 1997. Pesticide use in apples went up even as the number of fruit-bearing acres went down.

The total pesticide load on apples (after they are washed) held steady from 1992 through 1995 and then increased sharply in 1996. It is not clear if this increase represents a trend, but there is no evidence that residues on apples are decreasing, and there is clear evidence that the use of pesticides that are not monitored by the government, notably the EBDC fungicides, increased radically during the early 1990's. In 1995 and again in 1996, USDA technicians found apple samples with up to 12 pesticides and breakdown products on them after washing. A child is just as likely to eat an apple with 9 pesticides on it as he or she is to eat one with none.

Risks from neurotoxic pesticides, particularly organophosphate (OP) insecticides, also seem to be increasing. As noted throughout the report, pesticides on apples, apple sauce and apple juice deliver more than half the unsafe doses of neurotoxic OP insecticides received by children ages 5 and under each day. The average one-year-old gets an unsafe dose of OPs roughly 2

exposure to neurotoxic pesticides for adults could not be assumed to adequately protect a child less than four years of age." (NRC 1993)

Lead and PCBs best demonstrate the vulnerability of the fetal, infant and young child brain. Experience has clearly documented that exposures to these neurotoxic compounds at levels safe for an adult, can cause permanent loss of cognitive skills, learning deficits, and behavioral changes when exposure occurs early in life.

Notably, animal studies did not accurately predict the low levels of exposure to lead and PCBs that we now know causes toxic effects in children (Rice et al. 1996). Instead, epidemiological studies proved this low dose percent of the time he or she eats just three bites of an apple sold in the United States. Some apples are so toxic that just one bite can deliver an unsafe dose of OPs to a child under five.

A significant percentage of apples still contain cancer causing pesticides after washing, including the probable human carcinogens captan and ortho phenyl-phenol, and the possible human carcinogen benomyl. Use of the probable human carcinogens mancozeb and metiram rose to very high levels during the 1990's, but no federal government agency tests apples or apple products for the cancer-causing by-product of these fungicides, ethylene thiourea.

Other hazardous compounds used in apple production are the endocrine disrupters endosulfan and methoxychlor. Both are chemically related to DDT, and methoxychlor in particular may present significant health risks to children because it is a carcinogen that disrupts the endocrine system, and also has been linked to birth defects in animal studies. Methoxychlor was found in 17 percent of more than 2,000 washed apples analyzed by the USDA Pesticide Data Program from 1994 through 1996.

Finally, apple juice, a critical component of the infant and child diet, is still contaminated with pesticides. Infants drink about 20 times more apple juice relative to their size than adults. One apple juice sample analyzed by the USDA had seven different pesticides in it. In 1997, USDA found dimethoate, a potent neurotoxic OP insecticide in more than 27 percent of nearly 700 samples tested. Carbaryl, another neurotoxic compound that is also a carcinogen was found in a similar percentage of the apple juice samples. The real situation, however, may be worse. USDA did not test apple juice for the cancer causing breakdown product of the EBDC fungicides, ethylene-thiourea. ETU is formed during processing, when heat is applied to the parent compound EBDCs, essentially the same way that the potent carcinogen UDMH was formed in apple juice treated with Alar. USDA did test a limited number of apple juice samples in 1997 for THPI, a breakdown product of the fungicide captan, a probable human carcinogen. Every one of 30 samples analyzed contained the contaminant.

toxicity only after children were already harmed. This sad history argues persuasively for additional safety margins to protect infants and children from neurotoxic compounds for the simple reason that tests on rodents are not sensitive enough to predict toxic effects in the much more complex human brain (Rice et al. 1996, Makris et al. 1998). There is serious concern that OPs, which are specifically designed to be neurotoxic (lead and PCB's are not), may be more harmful to the developing brain and nervous system that either lead or PCBs.

There has been only one significant regulatory action against a neurotoxic organophosphate insecticide since 1989. In 1991 the EPA restricted the food crop uses of the highly toxic OP insecticide ethyl parathion.

More than 600,000 children, equal to the population ages one through five in the states of Washington and Oregon combined, eat an unsafe dose of OP insecticides every day.

EWG's analysis of the most recent EPA data shows that 610,000 children a day ages one through five are exposed to unsafe amounts of neurotoxic organophosphate (OP) insecticides in food. This is equal to all the children ages one through five in the states of Washington and Oregon combined, eating an unsafe dose of OP insecticides every day. Ten percent of these children exceed the safe daily dose by a factor of ten (Table 1).

The analysis that produced these results is similar to an analysis of combined exposure to OPs in food published by EWG in January 1998. Since the publication of *Overexposed*, the EPA has decided to regulate combined daily OP exposure using an acute reference dose as the benchmark of safety, and EWG has adjusted this analysis accordingly. We have also updated our data to include the most recent government information on food consumption and pesticide residues in food.

The crops that expose the greatest number of children to an unsafe dose of OP insecticides are apples, peaches, fresh green beans, grapes and pears. (Table 2). Roughly 2 percent of all apples, grapes, and pears (and nearly 19 percent of all peaches) have such a potent dose of OP insecticides on them after they are washed that eating three bites will cause the average 25-pound one-year-old to exceed EPA daily safety standards for OP exposure.

The foods that gave children ages one through five the most toxic dose of OPs (caused children to exceed the reference dose, or RfD, by the greatest amount) were peaches, apples and grapes. More than 80 percent of all children exposed to

Table 5. Peaches, apples, and grapes account for most of the daily OP exposures that exceed the EPA "safe" dose by a factor of ten or more.

Estimated number of children exppsed to 10 times the EPA "safe" dose/day from individual foods						
Food	**1-year-olds**	**2-year-olds**	**3-year-olds**	**4-year-olds**	**5-year-olds**	**Total**
Peaches	5,700	4,500	5,700	2,800	3,500	22,100
Apples	2,600	4,300	4,100	3,700	3,200	18,000
Grapes	2,100	2,400	2,200	1,700	1,700	10,200
Nectarines	500	600	800	300	700	2,800
Pears	600	700	400	400	400	2,600
Fresh Green Beans	400	300	300	300	300	1,600
Total for all foods	**13,200**	**13,300**	**13,700**	**9,500**	**10,200**	**59,900**

(Figures rounded to nearest hundred.)

Source: Environmental Working Group. Compiled from USDA food consumption data 1989-1996, USDA and FDA pesticide residue data 1991-1997, and U.S. EPA 1998a and U.S. EPA 1998b.

more than 10 times the safe daily dose of OPs each day get this exposure from eating these three foods (Table 5).

The pesticides that cause the most unsafe exposures are methyl parathion, dimethoate, azinphos methyl, chlorpyrifos, methamidiphos and acephate. These six pesticides account for more than 90 percent of the unsafe daily dietary exposure to OPs.

Although protecting children from neurotoxic organophosphate (OP) insecticides was identified as the EPA's top pesticide regulatory priority under the FQPA, it is likely the agency will miss legislative deadlines requiring levels of these pesticide in food to be reduced to levels that are safe for children by the summer of 1999.

Cancer and Other Risks Remain High

On top of these 610,000 unsafe daily exposures to neurotoxic insecticides, children one through five years of age are also exposed to multiple pesticides that cause cancer, disrupt the hormone system, compromise the immune system, and cause a host of other toxic effects.

Protections against cancer-causing pesticides are weak, even as childhood cancer rates are rising, according the EPA's own Office of Children's Health Protection (Schmidt 1998). Disproportionately high exposure to cancer-causing pesticides early in life is still not considered in EPA's safety standards. Instead, these standards assume an average lifetime exposure to pesticides, even though a detailed analysis by EWG showed that children consume up to half of their lifetime exposures to some carcinogens by age 5 (EWG 1993). This heavy exposure early in life was a major concern of the National Research Council in it landmark 1993 report, *Pesticides in the Diets of Infants and Children*.

Perhaps worse, current standards for carcinogens in food are based on experiments with adult animals that do not expose fetal or infant animals to the chemical being tested. Standards derived from adult animal data are severely compromised when it comes to protecting children. EPA decided recently not to request cancer studies on fetal or infant animals from pesticide manufacturers, even though the peer-reviewed literature clearly documents increased cancer incidence when exposure begins in-utero or neonatally (Chan 1983, Drew et al. 1983, Gray et al. 1991, Lijinsky 1986, Vesselinovich 1979, Vesselinovich 1983, Vesselinovich 1984).

Infant rats are approximately 50 times more likely to develop brain and liver cancer following exposure to ethylnitrosourea and vinyl chloride, respectively, than if exposure is begun later in life (Ivankovic 1982). Young rats are up to 15 times more susceptible

Six pesticides (methyl parathion, dimethoate, azinphos methyl, chlorpyrifos, methamidiphos and acephate) account for more than 90 percent of the unsafe daily dietary exposure to OPs.

Protections against cancer-causing pesticides are weak, even as childhood cancer rates are rising.

Today, it is generally accepted that endocrine disrupting pesticides present significant risks to the fetus, infant, and young child.

In April 1998, the USDA reported that it found 67 different pesticides in just 12 different fruits and vegetables that it tested in 1996.

to the carcinogenic effects of diethylnitrosamine (Dyroff et al. 1986).

Endocrine Disrupting Pesticides: A New Threat to Children

During the Alar episode, the potential for pesticides to disrupt the normal functioning of the endocrine, or hormonal, system was not well understood. Today, it is generally accepted that endocrine disrupting pesticides present significant risks to the fetus, infant, and young child, particularly as these hormones regulate the normal healthy development of sexual organs. For example, DDT is now known to exert much of its toxicity by disrupting the normal flow of androgen (the masculinizing hormone). Tiny doses of endocrine disrupters, properly timed, can have long term permanent effects on reproductive organ development and function. Path breaking new research shows that there may be no threshold "safe" dose below which endocrine disrupters cannot exert a toxic effect (Sheehan et al. 1999).

Both male and female reproductive organs are very sensitive to proper hormone balances, and disruptions at critical periods of development can cause long term adverse effects that range from birth defects to poor function to cancer. Cancers of the reproductive organs—breast, testicle, and prostate—are among those with the fastest growing incidence rates in the U.S. population. Birth defects of the male reproductive organs that are caused by disruption in the endocrine system are also increasing. Research by scientists at the Centers for Disease Control found a near doubling in the incidence of hypospadia (a malformation of the penis) in the United States between the early 1970s and 1993 (Paulozzi 1997). More alarming is a decline in sperm count that has been confirmed by numerous analyses of data from industrialize countries (Swan 1997).

While precise cause and effect relationships between specific pesticides and these effects remain elusive, the preponderance of the evidence indicates that exposure to pesticides that disrupt the endocrine system in-utero or during the first years of life, can contribute to cancers, birth defects, and functional reproductive deficits and abnormalities later in life (Gray 1992, Dunn 1963).

Children are Exposed to Multiple Pesticides Each Day

The incidence of multiple pesticides in individual foods is not decreasing (EWG 1998, USDA 1998). In April 1998, the USDA reported that it found 67 different pesticides in just 12 different fruits and vegetables that it tested in 1996, a slight increase from the previous three years when it found an average of 61. These findings include 12 pesticides on a single sample of spinach, 10 pesticides on a single sample of apples, 9 pesticides on single samples of peaches and green beans and 8 on single samples of tomatoes and grapes. The most recent data from the Food and Drug Administration (1996-1997), which uses less rigorous testing technology, shows similar patterns, with 9 pesticides on a single raspberry sample, 8 on a bell pepper, and 6 pesticides on single samples of peaches, strawberries, apples and pears.

The results of EWG's latest Monte Carlo analysis of all pesticides in food show that every day, more than a quarter million American children ages one through five eat a combination of 20 different pesticides. More than one million children ages one through five eat at least 15 pesticides on any given day. And overall, children five and under eat an average of 8 pesticides a day, every day—a total of more than 2,900 pesticide exposures per year from food alone. This piling-on of exposures is a clear health threat to infants and young children.

Yet even these estimates understate the number of pesticides that a child is exposed to on any given day. Common routes of exposure such as home and garden use, applications in schools, day care centers, public housing and other buildings, and exposure via drinking water and air were not included. Independent lab analysis of Midwestern tap water shows a persistent pattern of herbicide contamination since 1995 (EWG 1995, EWG 1996, EWG 1997, EWG 1998), with 1998 producing the most contaminated tap water yet, a single sample from an Ohio town that contained 9 herbicides and two metabolites, after treatment.

Some large cities have stepped-up the use of powdered activated carbon to reduce levels of weed killers in finished tap water, at significant expense to their customers. Most small towns cannot afford this practice, and many small cities and towns in agricultural areas continue to serve up tap water laced with multiple weed killers and metabolites.

Children drinking this tap water could easily ingest 20 or more pesticides a day, every day, for several months during the peak tap water contamination periods that occur each summer. Newborn babies drinking formula reconstituted with this tap water will be exposed to elevated levels of multiple weed killers and toxic metabolites during critical developmental periods. Current EPA health standards for pesticides in tap water do not account for the fact that bottle feeding infants consume 10 times as much drinking water as adults when they are feeding exclusively on reconstituted infant formula. Instead EPA safety standards for carcinogens in tap water are based on lifetime average water intake estimates. Even for contaminants that present short term threats, EPA assumes just twice the adult average water consumption rate for children under one year of age.

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Overall, children five and under eat an average of 8 pesticides a day, every day––a total of more than 2,900 pesticide exposures per year from food alone.

What You Can Do

The government is locked in the toughest battle it has faced in decades with the pesticide industry. At stake is implementation of new standards for pesticides in food — standards that must now specifically protect the fetus, infant, and child in accord with the 1996 Food Quality Protection Act. Bringing pesticide standards in line with FQPA will require dramatic reductions in the use of many pesticides, and an outright ban on a handful of others. Predictably, the pesticide industry, along with farm and agribusiness interests, oppose virtually all changes to current pesticide safety standards. They argue, much like the tobacco industry, that absolute proof of harm to children is necessary before any changes in current pesticide standards are justified.

In response to this heavy pressure, EPA is moving slowly toward incremental improvements in current safeguards. In the meantime, there are several steps that parents can take to protect their children without sacrificing the nutritional benefits of fruits and vegetables, by simply serving more of certain types of fresh produce that consistently have fewer and lower levels of pesticides on them.

In 1995, EWG published our widely read *Shopper's Guide to Pesticides in Produce* which listed the twelve fruits and vegetables most contaminated with the most toxic pesticides, according to government data and toxicity evaluations. The analysis behind the *Shopper's Guide* showed that pesticide exposure in food can be cut in half by substituting equally nutritious alternatives for the twelve most pesticide laden fruits and vegetables. The same conclusion holds true today. Indeed, many simple food choices can produce big reductions in pesticide exposure, like eating blueberries instead of strawberries, or eating domestic instead of imported grapes (Table 3). People can reduce pesticide exposure even more by supplementing these choices with purchases of organic food whenever possible.

Simple food choices can produce big reductions in pesticide exposure, like eating blueberries instead of strawberries, or eating domestic instead of imported grapes

www.foodnews.org

To help people learn more about pesticides in commonly eaten foods, and to give them an opportunity to express their views to food companies, grocery stores, and the government, EWG developed the interactive *All You Can Eat* web site at **www.foodnews.org**. Now, anyone with access to the Internet

***All You Can Eat,* at www.foodnews.org, is based on the same data and method of risk assessment used by the EPA and the pesticide industry. The difference: For the first time this information is available to the public and easy to use.**

The overwhelming weight of the scientific evidence strongly suggests that a small but real percentage of the fetal, infant and child population is being harmed by pesticides in food.

can get an easy–to–understand look at the kinds of pesticides that occur in the foods they eat or feed their children, plus information on the dangers of each specific pesticide, brief descriptions of health effects, as well as e-mail links to food companies, retailers, and the EPA.

All You Can Eat is a computer simulation that uses the latest government data and methods to estimate how many and which pesticides were on the food that you report eating on any given day. Here is how it works.

For each food you select, our *All You Can Eat* computer picks a lab test result at random from an EWG database that contains the results of more than 90,000 government lab tests for food contaminants conducted from 1991 through 1997 (the most recent data available). For example, if you say that you ate a fresh apple, the program will match the apple you ate with the results of more than 2,500 batches of apples tested for pesticides by the U.S. Department of Agriculture. You may get an apple with no pesticides on it, or you may get an apple with 10 pesticides on it, just as you might in the real world. This process is repeated for every food you selected to give you a total number of pesticides and other toxic contaminants eaten on a given day.

It's just a simulation, but it accurately presents pesticide contamination with the same randomness that government labs have found when they sampled the same foods for pesticides. *All You Can Eat* is based on the same data and method of risk assessment used by the EPA and the pesticide industry. The difference: For the first time this information is available to the public and easy to use.

You can reduce your family's exposure by taking these steps:

1. Choosing nutritious, widely available alternatives that we have identified to the most contaminated foods.

2. Look for foods that have been certified as having exceptionally low pesticide residues, such as Kashi Cereal products and NutriClean certified produce.

3. Buy as much organic food as possible.

4. Never use pesticides in homes with small children unless there is a health emergency that requires pesticide use.

5. Call or write your local grocery store or favorite food company telling them to stop siding with the pesticide industry in opposition to strict implementation of new kid-safe pesticide standards, and to reduce the pesticides they allow in and on their products right now.

To make that easy to do, we have added a feature to *All You Can Eat* that makes sending an e-mail to food companies and grocery stores as easy as point and click. First try the simulation and see how many pesticides you ate today, then depending on how you feel about it, send an e-mail to your favorite company.

We expect the pesticide industry and agribusiness interests to fight any move by the EPA to reduce the load of pesticides in the food supply. But the food industry should have different loyalties. They should be loyal to you. If you want them to fight for tough pesticide standards that protect infants and children, you need to tell them so. We think they will listen.

Conclusions

The overwhelming weight of the scientific evidence strongly suggests that a small but real percentage of the fetal, infant and child population is being harmed by pesticides in food. Safety margins are small and routinely exceeded, particularly for small children, and almost all data used to set safety standards for pesticides are derived from studies on adult animals. In this very fundamental way the vast majority of the available data on pesticide toxicity tells regulators little of what they need to know about setting standards to protect children. It is not logical, under any circumstances, to argue (as does the pesticide industry) that multiple exposures to pesticides early in life are completely safe and contribute to no ill health effects in the human population.

The landmark 1993 National Research Council (NRC) report, *Pesticides in the Diets of Infants and Children*, confirmed the basic messages of the Alar events, and signaled mainstream science's agreement that fetuses and very young children need special protection from pesticides. The report lead to a major overhaul of the nation's pesticide law in 1996. Among other things, the Food Quality Protection Act requires that all pesticide exposures be safe for infants and children, including the pervasive exposures to multiple pesticides that are demonstrated so vividly above.

Unfortunately for consumers and parents, no new standards of any consequence have been set under the new law. Indeed, since the publication of the NRC report in 1993, and for all intents and purposes since the events of 1989, the available evidence points to no progress, or in fact a worsening of the risk from pesticides in food and the environment.

Ten years ago citizen concern about children's health prompted EPA to remove the dangerous carcinogen, Alar, from the food supply. Now with the advent of **www.foodnews.org** consumers can find out what pesticides they eat every day, using the same state-of-the-art information and analyses available to EPA, agribusiness, pesticide companies and the food industry. Armed with this information we hope that citizens will be motivated to urge food companies and the EPA to dramatically reduce pesticide exposure in the American diet.

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Methods and Data Sources

Two slightly different methodologies were used to calculate the principal findings in this report. Both, however, relied on the same data, all of which came from federal government sources.

First, we describe the method used to calculate the number of children exceeding the reference dose each day for combined dietary exposure to OP insecticides. Second, we discuss the minor differences in the analysis that allowed us to calculate the number of pesticides to which children are exposed to each day.

Dietary Exposure to Multiple OP Insecticides

Food Consumption Data. The food consumption data used in this analysis are from the USDA Continuing Survey of Food Intakes by Individuals (CSFII) for the years 1989, 1990, 1991, 1994, 1995, and 1996, the most recent years for which data are available. No data were collected in 1992 and 1993. The CSFII is a weighted, stratified sample of individuals that is designed to provide a representative picture of the dietary patterns of the U.S. population. The survey contains 3,857 coded foods and beverages reported as eaten by the survey population ranging from blueberry pie to scrambled eggs, potato chips to mint juleps. A total of 4,632 children between one and five years of age were surveyed in the years 1989-91 and 1994-96. These 4,632 children provided one to three days of valid information each, for a total of 9,413 valid eating days. Children under age one were not included in this analysis.

Survey participants are asked to complete a diary containing the amount (by weight) of each food eaten at each meal during the three nonconsecutive days of the survey, and the weight, sex and date of birth of the person consuming that food. The information in the diaries was confirmed by telephone interview. These data allow age group analyses, as well as estimates of food consumption on a per kilogram of body weight per day basis, for each individual in the database.

Pesticides in the Food Supply

Data on pesticides in the food supply are collected by the USDA and the FDA. There are three major programs: the USDA Pesticide Data Program, the FDA Pesticide Surveillance and Monitoring Program and the FDA Total Diet Study. Each has a specific purpose, and its own strengths and weaknesses.

Our analysis may underestimate food residues and risk in one important way. All of the residue data described below and used in this analysis are based on analysis of composite samples of foods. For foods eaten individually, such as many fresh fruits and vegetables treated with organophosphates, composite sample results like those used here can substantially dilute the residues and risks from eating the "hot" apple in the ten-pound slurry tested. This is important because OPs present an acute risk that can occur from a single eating event.

Recently published data from the USDA showed that residues of the highly toxic bug killer aldicarb on individual potatoes were up to 7 times higher than the results of a ten-pound composite of the same potatoes (USDA 1999). In a 1997 study, the Ministry of Agriculture and Fisheries in Great Britain found that levels of pesticide residues in individual fruits and vegetables could vary from their composites by as much as a factor of 29, and often by more than a factor of ten (Pesticides Safety Directorate 1997). These data strongly suggest that peak exposures may be far higher than those reported here. Our analysis, however, relies solely on composite samples and does not account for potentially higher OP residues in individual foods.

USDA/Pesticide Data Program. The USDA Pesticide Data Program (PDP) was started in 1991 specifically to monitor pesticide levels in fruits and vegetables most commonly consumed by children. The purpose of the program was to supplement the FDA surveillance data with more accurate and statistically representative information on pesticides residues on fruits and vegetables heavily consumed by infants and children. PDP typically samples twelve to fourteen foods, mostly fresh fruits and vegetables, per year. Samples are collected to accurately reflect the percent contribution to the national food supply for a given crop by growing region and season. Samples are then washed, peeled, and cored to reflect normal food preparation and consumption practice for that fruit or vegetable. PDP residue testing uses powerful analytical techniques that can detect trace residues in the 1 part per billion range or less, similar to the range of detection in the Total Diet Study (TDS). PDP takes 200-800 samples of each crop per year. More than 40,000 PDP samples from the years 1992 through 1997 were used in this analysis. These data were the data of first choice for fresh fruits and vegetables.

FDA Surveillance Data. The FDA Pesticide Surveillance and Monitoring Program enforces food tolerances established by the EPA. Because the monitoring is designed for regulatory enforcement purposes, as opposed to dietary exposure assessment, the data do not provide a strictly statistically representative picture of pesticides in the U.S. food supply. This shortcoming, however, is largely offset by the sheer size of the database generated by the program and the fact that the program does sample food from all regions of the country at labs located in nine different metropolitan areas. Between 12,000 and 16,000 samples of food are tested for pesticides each year, about half of which are imports. We analyzed all records from the FDA surveillance database from the years 1992 through 1997, which contained residue findings for 67,000 food samples.

Our analysis used only random "surveillance" samples. "Compliance" samples, which are specifically aimed at crops or growers with a known problem or history of violations, are not included in the analysis. Surveillance samples are typically taken at packing sheds, warehouses, or other central distribution points. They are not taken at retail points of sale or from grocery store shelves. Further, the samples are not washed or peeled prior to testing — e.g. the melon is tested with the rind, the banana is tested with the peel — so that the residue levels found tend to overstate the amount of pesticides consumed when the fruit is eaten. Because of these biases built into the FDA surveillance protocols, data from this program were used only as a last resort. And as discussed below, when they were used, a reduction factor was applied to the residues found on each sample, to better estimate actual exposure.

FDA Total Diet Study. The second FDA pesticide residue monitoring program is the Total Diet Study (TDS). The TDS was started in the early 1960s to study the prevalence of radioactive fallout in the food supply as a result of atmospheric nuclear weapons testing. Today, the program tests 234 different foods four times a year for a host of contaminants. The 234 foods sampled are determined to be representative of the U.S. diet. The entire sample is purchased at grocery stores four times each year, one in each of four geographic region of the country. This "market basket" covers a broad range of both processed (bottled, canned, frozen) and fresh foods including fresh fruits and vegetables, as well as baby food, dairy products, frozen meals, fresh meats, cereals and peanut butter, and prepared foods like pizza.

Prior to testing, the foods are prepared as they normally would be in the home. Bananas are peeled, tuna casserole is baked, rice is boiled, and hamburger is grilled. The prepared food is then analyzed for pesticides and other toxic contaminants.

Table 6. The EPA's most recent acute reference doses were used in this analysis.

Pesticide	Acute Reference Dose (RfD)
acephate	0.005
azinphosmethyl	0.003
chlorpyrifos	0.001
diazinon	0.0025
dichlorvos	0.017
dimethoate	0.0006
ethion	0.005
malathion	0.5
methamidiphos	0.001
methidathion	0.002
methyl parathion	0.000025
phosmet	0.0036
pirimiphos-methyl	0.008

Source: U.S. Environmental Protection Agency. See "Reference Dose Data" in Reference section.

Unlike the FDA surveillance data, the TDS data are designed to provide a representative snapshot of contaminants in the U.S. diet. The biggest shortcoming of these data is that the sample sizes tend to be small (4 samples of each food per year). The strength of the program is that it provides real world data that reflect pesticide residues very likely encountered by the average person. In addition, the TDS uses powerful analytical techniques that can detect low level residues of pesticides in the range of 1 part per billion or less, a significant advantage over the FDA surveillance program which does not employ such advanced technology.

After several years of repeated inquiries, multiple Freedom of Information Act requests, and many rounds of discussions with FDA staff, Environmental Working Group received TDS data for the years 1991 through 1996 in electronic form. These six years of data contain 4,520 food samples that were analyzed for pesticides. To our knowledge, these data have never before been assembled in electronic form, nor have they ever been released to the public in their entirety in any form.

Toxicity Data

EPA Reference Doses. The combined toxicity of organophosphate insecticides is measured in terms of cholinesterase inhibition. Cholinesterase inhibition is measured as an acute effect, and the standard of safety used to protect the population from these effects is known as an acute reference dose or acute RfD. The reference dose is the EPA's determination of a safe daily dose of a pesticide, or in this case, the dose of OPs that will produce no adverse cholinesterase effects, expressed in milligrams of pesticide per kilogram of body weight per day (mg/kgbw/day). The reference doses (RfDs) used in this report are the most recently calculated acute reference dose values available from the EPA (EPA 1998) (Table 6).

The acute RfD was chosen as the measure of toxicity in this study in accord with agency policy on OP regulation. In January 1998, EWG released a similar analysis based on combined exposure to OP insecticides compared to chronic RfDs. The use of the chronic RfDs at that time was based on our observation that on average, 88 percent of all children 5 and under were exposed to at least one OP each day. In our view the chronic RfD is a more accurate measure of safety in this exposure situation.

The acute reference dose is derived from any of a number of animal toxicity tests required by the EPA, or on data from studies on humans. Several critical RfDs are based on human data of questionable scientific integrity. For example, the RfD for chlorpyrifos is based on data from a study conducted on 16 adult male prisoners. RfDs for pirimiphos-methyl, ethion, and diazinon are also based on human data.

Exposure Assessment

Food Consumption Data. Each year of CSFII data contained from 100 to 200 individuals per age group (one-year-olds, two-year-olds etc.) Each individual reported from one to three eating days that were validated by USDA. An eating day can be thought of as all the food reported eaten by one individual on one day. Only eating days with complete information and positive validation by USDA were used. The six years of CSFII data used in the report contained a total of 9,413 valid eating days for children age one through five years. Age group cohorts were constructed by combining individuals of the same age from the six years of CSFII data used in the analysis.

Survey participants through five years of age reported eating about 3,857 different foods. Many of these different foods, however, are nearly identical versions of the same food, and were considered to be the same food for this analysis. For example, orange juice drinks that would be considered different foods in the CSFII include unsweetened orange juice, orange juice with sugar, orange juice with calcium, orange juice from concentrate and fresh orange juice. For purposes of linking food consumption data with residue data in this report, these similar foods are considered the same food. The federal pesticide residue databases used in this analysis contained residue results for 866 of the 3,857 foods reported eaten by children one through five years of age. These 866 foods account for 77 percent of the diet of these children. Of these 866 foods, 670 were found to contain detectable levels of OP insecticides. Our method for matching the specific foods reported eaten, with residue testing results, is described below.

Residue Data. The goal of the exposure analysis was to produce the most accurate real world picture of pesticide exposure via the diet. To achieve that end the three residue databases described above were used in the analysis,

Table 7. Reductions applied to residue levels reported by the FDA pesticide surveillance program.

25% Reduction Cucumber Eggplant Peppers **50% Reduction** Apricots Asparagus Berries Cherries Green Onions Leeks Nectarines Olives Plums **70% Reduction** Beets Garlic Onions Radishes Rutabaga Turnips	**75% Reduction** Grape Juice **85% Reduction** Cabbage Cauliflower Loose Leaf Lettuce **90% Reduction** Collards and other greens **95% Reduction** Avocado Kiwifruit Lemons Limes Mango Melons Papaya Pineapple Tangelos

Source: Environmental Working Group.

in the following order of priority. For fruits and vegetables eaten raw, PDP data were used because the data represent residues after washing and peeling, and because samples are statistically reliable and representative of U.S. food consumption. For all other non-processed foods, FDA surveillance data were used. These data provide large sample sizes, but generally overstate residues at the time of consumption. To account for this, a residue reduction factor of from 25 to 95 percent was applied to all FDA surveillance data (Table 7). The reduction factors are based on actual reductions observed when PDP and FDA surveillance data for individual OP insecticides were compared on similar fruits and vegetables.

For processed and cooked foods, data from the FDA Total Diet Study were used. The small sample sizes in the TDS created some concern that TDS data might overstate exposure to some OPs. For example, the six years of TDS data provide to EWG contained only 16 samples of wheat bread, but all of them were positive for OP residues. Using these 16 samples to represent the entire U.S. wheat bread supply might overstate OP exposure via wheat bread. On the other hand the residues in these products, while ubiquitous, were generally at low levels, and not likely by themselves to present great risk to any consuming individual.

To test the validity of the bread product residue findings, we examined OP residue data in all of the more than 600 samples of processed wheat products in the TDS. From pasta to pretzels, to wheat bread and wheat breakfast cereal, more than 99 percent of more than 600 samples tested for pesticides were positive for either chlorpyrifos, malathion, or both. This strongly suggests that the low level OP residues reported in the TDS for any single processed wheat product are very likely representative of the commodity as a whole. To increase the sample size for baby food, tests of baby food for pesticides commissioned by EWG in 1995 were added to TDS data from FDA. The results from both TDS and EWG were quite similar.

Of the 39 OP insecticides with a common mechanism of toxicity, only 13 were detected in the food supply. These 13 OP compounds, in turn, were found on 670 of the 3,857 foods reported eaten by children age five and under in the USDA survey.

Linking Food and Residue Data

More than 3,857 food items were reported eaten by children under age five in the CSFII. For purposes of predicting pesticide exposure, however, many of these 3,857 foods can be considered the same food. For example, it is reasonable to assume that cooked carrots with fat, cooked carrots without fat, and cooked carrots (fat unspecified), are the same in terms of pesticide residues. Many other decisions were not that straight forward. Links between foods reported eaten, and residue findings were made as described below. As a general rule foods were linked with residue values only when a direct match between the two foods was available. Any deviation from this rule is described below.

For fruits and vegetables eaten raw, food consumption values were matched first to data from PDP, when available, and then with FDA surveillance data with a residue reduction factor applied. Frozen fruits and vegetables (not canned) were assumed to have the same residue levels as fresh fruits and vegetables and the same residue values were applied. For fruits and vegetables eaten cooked, either from canned or fresh vegetables, residue values from the total diet study (TDS) were used.

For all other processed and cooked foods that were reported in the CSFII, TDS data were used when a direct match was available. For thousands of specific foods reported eaten by the population studied — cherries jubilee, pepperoni pizza, all soft drinks — no direct matches were available in the residue files. These foods were not used in the analysis. For example, we did not attempt to match the pepperoni pizza consumption data with OP residue data from cheese pizza, because of uncertainty about the exact weight ratio of the foods that constitute each respective pizza. Likewise we did not match cherry pie residues with cherries jubilee consumption data, and so on for thousands of foods with no direct match. With sandwiches, consumption data was matched with residue data only when the sandwich consumption data was reported in its component parts that matched the residue data. For example, when a peanut butter and jelly sandwich was reported as X grams of bread, X grams of peanut butter and X grams of jelly, these consumption values were matched with corresponding test results from the TDS. When the sandwich was simply reported as a peanut butter and jelly sandwich, it was not used.

The one technical exception to this rule was with wheat products in the form of pasta and bread. In this case residue data were available for white bread, wheat bread, macaroni and spaghetti. Children age five and under, however, reported eating many types of pasta (spaghetti, macaroni, lasagna noodles etc.) and many different types of bread (French bread, Italian bread, pita bread etc.) In this case, any wheat-based bread or pasta was matched with the residue values from the most closely matched wheat-based bread or pasta products in the TDS.

The Monte Carlo

The exposure assessment is a Monte Carlo-style probability distribution analysis designed to simulate real world dietary exposure to OP pesticides using the best available data. The analysis was modeled after that used by the National Research Council Committee on Pesticides in the Diets of Infants and Children (NRC 1993 pp. 297 through 307).

Dietary exposure to OPs was analyzed in 24 hour units to match the toxicity of OPs which are active for a least 24 hours after they are consumed. For example, an OP eaten at breakfast, will remain active in the body in the afternoon and can be added, for purposes of risk assessment, to an OP eaten at dinner.

The program was run on a Power Mac 8600 using FoxPro software. A distribution of dietary OP exposure was simulated for each age group year (one-year-olds, two-year-olds etc.) The distribution was created by instructing the computer to identify a valid individual eating day in the database (person one, day one) and to match each food eaten by that individual on that day with a randomly selected residue result from all the samples for that food in the residue database described above, including all samples where no residues were detected. Total daily exposure to each of the thirteen individual OPs in the residue files was then calculated and converted to a mg/kg exposure value for each OP consumed, depending on the amount of the food consumed, the residue(s) found on the sample that was selected (zeros were included as reported in the data), and the weight of the child.

For example, if a child ate 100 grams (a little under four ounces) of green beans and the green bean sample, randomly chosen from the residue database, had 1 part per million (ppm = mg/kg) of acephate, the program would calculate that 1 mg/kg acephate x 100 grams of beans = 0.1 mg of acephate on those beans. If the child weighed 10 kg, the *dose* of acephate that child got from those green beans would be 0.1 mg/10 kg = 0.01 mg/kg body weight acephate. If the sample selected had no residues of OP pesticides on it, OP exposure for that individual from that food on that day would be zero.

For each of the valid eating days available for each age year, this process was repeated 500 times, to produce a distribution of 700,000 to one million individual exposure days, per age group, for each of the OP compounds.

Risk Assessment

Each of the 700,000 to one million individual exposure days for each age group contains a total mg/kg exposure value for each of the OPs for which residue data were available. For example, individual #245,450 might have eaten 0.3 mg of acephate, 0.04 mg of azinphos methyl and so on for all thirteen OPs found in food.

Conversion to Chlorpyrifos Equivalents. To assess the risk of this exposure, an individual's total OP exposure on any given day was then converted to chlorpyrifos equivalents. To do this, a chlorpyrifos toxic equivalency factor (TEF) was applied to convert the mg/kg dose of each OP to the appropriate dose of chlorpyrifos. This TEF accounts for the difference between the reference dose of chlorpyrifos and the reference dose of any other OP.

A conversion factor for pesticide X would be calculated by dividing the reference dose for chlorpyrifos by the reference dose for pesticide X. For example, the acute reference dose for chlorpyrifos is 0.001 mg/kg and the reference dose for pesticide X was 0.0002 mg/kg. The conversion factor for pesticide X would be 0.001/0.0002, or 5, meaning that pesticide X is five times more toxic than chlorpyrifos. To express the dose of pesticide X in chlorpyrifos equivalents, one would simply multiply the mg/kg dose of pesticide X by 5, and so on for all of the OPs. Total daily exposure is then calculated as the sum of chlorpyrifos equivalents for each OP, on any given day. An individual's total daily OP exposure, expressed in chlorpyrifos equivalents, can then be compared to the chlorpyrifos reference dose. Using sample weights in the USDA food consumption data, one can then estimate the number of children in the U.S. population that will exceed appropriate safety margins each day.

This procedure differs slightly from the method used by the National Research Council Committee on Pesticides in the Diets of Infants and Children. The committee conducted a similar Monte Carlo analysis and converted exposure to chlorpyrifos equivalents using "no observable effect levels" (NOELs) instead of reference doses (RfD). An RfD, which is the functional equivalent of what EPA deems a "safe" daily dose of the pesticide, is derived by dividing the NOEL by a specified safety factor. Safety factors differ from pesticide to pesticide, depending on the quality of the data and the effects observed in critical studies.

Initially we employed a methodology similar to that used by the NRC committee. However, the results produced by this analysis (the number of children exposed to levels that exceed a specific safety margin) were entirely dependent on the safety factors applied to the various NOELs. In essence, when NOELs are used to convert the toxicity of multiple pesticide exposures to a baseline compound, the number of children that exceed the reference dose changes, depending on the pesticide chosen as the baseline compound. For the results to be meaningful and unbiased, the estimated number of children exposed to OPs in food at levels that exceed a specific safety margin must be the same, regardless of the chemical chosen as the baseline pesticide. Basing the TEF on RfDs corrects this problem.

For example, the chlorpyrifos proposed RfD is based on a 100-fold uncertainty factor applied to a NOEL from a study on humans, whereas methyl parathion is based on a 1,000-fold uncertainty factor applied to a NOEL from a study on rats. When conversions were based on the NOELs, using methyl parathion as the baseline pesticide put 9.1 percent of all one-year-olds over the RfD, whereas using chlorpyrifos as the baseline chemical put only 3.2 percent of these same one-year-olds over the RfD. In contrast, when the conversions are based on the RfDs, the analysis yields the same percentage of one-year-olds exposed to an unsafe dose of OPs on any given day (5.2 percent) regardless of the pesticide chosen as the baseline compound.

Daily Exposure to Multiple Pesticides

The analysis used to predict multiple daily exposure to pesticides in the diet used the same data as the above analysis of combined dietary OP exposure. The differences in the analysis were that:

- The multiple pesticide analysis counted exposure to all pesticides in food, not just organophosphates.
- The multiple exposure analysis did not quantify mg/kg amounts of exposure, nor compare daily exposure to a reference dose or other benchmark dose. The analysis simply counted the number of pesticides that were present in the foods that an individual in the simulation ate on a given day.

Beyond this, the method and the data used were exactly the same as the analysis of multiple daily dietary OP exposure.

References

Chan, P. and T.L.Dao., 1983. Effects of Dietary Fat on Age Dependent Sensitivity to Mammary Carcinogenesis. Cancer Letters, 18: 245-249.

Consumers Union, 1999. “How Safe is Our Produce?” Consumer Reports. March, 1999.

Drew, R.T., et al., 1983. The Effect of Age and Exposure Duration on Cancer induction by a Known Carcinogen in Rats, Mice, and Hamsters.” Toxicology of Applied Pharmacology. 68: 120-130.

Dryoff, M., et al., 1986. “Correlation of O-ethyldeoxythymidine Accumulation, Hepatic Initiation and Hepatocellular carcinoma Induction in Rats Continuously Administered Diethylnitrosamine.” Carcinogenesis. 7: 241-246.

Dunn, T and A Green, 1963. “Cysts of the Epididymis, Cancer of the Cervix, Granular Cell Myoblastoma, and Other Lesions After Estrogen Injection in Newborn Mice.” Journal of the National Cancer Institute. 31:425-38.

Environmental Working Group (EWG), 1998a. “Overexposed: Organophosphate Insecticides in Children’s Foods.” Washington, DC. January, 1998.

Environmental Working Group (EWG), 1998b. “Full Disclosure: What Ohioans Need to Know to Clean up their Rivers and Tap Water.” Washington, DC. October, 1998.

Environmental Working Group (EWG), 1997. “Tough to Swallow: How Pesticide companies Profit from Poisoning America’s Tap Water.” Washington, DC. August, 1997.

Environmental Working Group (EWG), 1996. “Just Add Water.” Washington, DC. May, 1996.

Environmental Working Group (EWG), 1995. “Weed Killer by the Glass: A Citizens’ Tap Water Monitoring Project in 29 Cities.” Washington, DC. August, 1995.

Environmental Working Group (EWG), 1993. “Pesticides in Children’s Food.” Washington, DC. 1993.

Gray et al., 1991. “Chronic Nitrosamine Ingestion in 1040 Rodents: The effect of the Choice of Nitrosamine, the Species Studied, and the Age of Starting Exposure.” Cancer Research. 51:6470-6490.

Gray, Leon Earl Jr., 1992. “Chemical Induced Alterations of Sexual Differentiation: A Review of Effects in Humans and Rodents.” in Colborn, Theo and Coralie Clement, eds. Chemically-Induced Alterations in Sexual and Functional Development: The Wildlife/ Human Connection. New Jersey: Princeton Scientific Publishing Co., Inc., 1992.

Ivankovic, S., 1982. “Chemical and Viral Agents in Prenatal Experimental Carcinogenis.” Biological Research in Pregnancy. 3:99-102.

Lijinsky, W. and R. Kovatch, 1986. “The Effect of Age on Susceptibility of Rats to Carcinogenisis by Two Nitrosamines.” Japanese Journal of Cancer Research. 77:1222-1226.

Makris, S., et al, 1998. “A Retrospective Analysis of Twelve Developmental Neurotoxicity Studies Submitted to the USEPA Office of Prevention, Pesticides, and Toxic Substances (OPPTS).” United States Environmental Protection Agency, Office of Pesticide Programs, Health Effects Division. November 12, 1998.

National Research Council, 1993. Pesticides in the Diets of Infants and Children. Washington, DC: National Academy Press, 1993.

Natural Resources Defense Council (NRDC), 1989. “Intolerable Risk: Pesticides in our Children’s Food.” New York, 1989.

Nosenchuck, Norman, 1997. “Letter to Michael S. O’Connor, Acetochlor Registration Partnership re: Denial of the Application to Register Pesticide Products Containing the New Active Ingredient Acetochlor.” New York State Department of Environmental Conservation, Division of Solid and Hazardous Materials. Albany, April 1997.

Paulozzi L.J., Erickson J.D., Jackson R.J., 1997. “Hypospadias trends in two US surveillance systems.” Pediatrics. 100(5): 831-4.

Pesticides Safety Directorate, 1997. UK Ministry of Agriculture, Fisheries and Food. "Unit to Unit Variation of Pesticide Residues in Fruit and Vegetables."

Rice, Deborah C., et al, 1996. "Lessons for Neurotoxicology from Selected Model Compounds: SGOMSEC Joint Report." Environmental Health Perspectives Supplement. 104(2): 105-15.

Schmidt C.W., 1998. "Childhood Cancer: A Growing Problem." Environmental Health Perspectives Supplement. 106(1): A18-23.

Sheehan, D., et al, 1999. "No Threshold Dose for Estradiol-induced Sex Reversal of Turtle Embryos: How Little Is Too Much?" Environmental Health Perspectives. 107(2): 155-159.

Swan S.H., Elkin E.P., Fenster L., 1997. "Have Sperm Densities Declined? A Reanalysis of Global Trend Data." Environmental Health Perspectives. 105(11): 1228-32.

United States Department of Agriculture (USDA), 1999. "1997 Pesticide Data Program." http://www.ams.usda.gov/science/pdp/.

United States Department of Agriculture (USDA), 1998. "1996 Pesticide Data Program." http://www.ams.usda.gov/science/pdp/.

United States Department of Agriculture (USDA), 1998b. "Agricultural Chemical Usage: 1997 Fruits Summary." National Agricultural Statistics Service, Ag Ch 1(98), July 1998.

United States Department of Agriculture (USDA), 1996. "Agricultural Chemical Usage: 1995 Fruits and Nuts Summary." National Agricultural Statistics Service, Ag Ch 1(96), July 1996.

United States Department of Agriculture (USDA), 1994. "Agricultural Chemical Usage: 1993 Fruits and Nuts Summary." National Agricultural Statistics Service, Ag Ch 1(94), June 1994.

United States Department of Agriculture (USDA), 1992. "Agricultural Chemical Usage: 1991 Fruits and Nuts Summary." National Agricultural Statistics Service, Ag Ch 1(92), June 1992.

United States Environmental Protection Agency (US EPA), 1999b. "Pesticide Program Highlights from Fiscal Year 1998." http://www.epa.gov/oppfead1/annual/1998/fy98hlts.htm

United States Environmental Protection Agency (US EPA), 1998a. "FQPA Safety factor Recommendations for the Organophosphates. A

Combined Report of the Hazard Identification Assessment Review Committee and the FQPA safety Factor Committee." Health Effects Division, Office of Pesticide Programs, U.S. EPA August 6, 1998.

United States Environmental Protection Agency (US EPA), 1998b. "Hazard Assessment of the Organophosphates. Report of the Hazard Identification Assessment Review Committee." Health Effects Division, Office of Pesticide Programs, U.S. EPA. July 7, 1998.

United States Environmental Protection Agency (US EPA), 1998c. "Office of Pesticide Programs Annual Report for 1997." http://www.epa.gov/oppfead1/annual/1997/97annual.pdf

United States Environmental Protection Agency (US EPA), 1997. "Office of Pesticide Programs Annual Report for 1996." http://www.epa.gov/oppfead1/annual/1996

United States Environmental Protection Agency (US EPA), 1996. "Office of Pesticide Programs Annual Report for 1995." http://www.epa.gov/oppfead1/annual/1995/95a_text.htm

United States Environmental Protection Agency (US EPA), 1995. "Office of Pesticide Programs Annual Report for 1994." http://www.epa.gov/oppfead1/annual/1994/94a_text.htm

Vesselinovitch, S.D., 1983. "Perinatal Hepatocarcinogenisis." Biological Research in Pregancy and Perinatology. 4: 22-25.

Vesselinovitch, S.D. et al, 1984. "Carcinogenicity of Diethylnitrosamine in Newborn, Infant, and Adult Mice." Journal of Cancer Research and Clinical Oncology. 108:60-65.

Vesselinovitch, S.D. et al, 1979. "Neoplastic Response of Mouse Tissues During Perinatal Age Periods and its Significance in Chemical Carcinogenisis." Perinatal Carcinogenisis. National Cancer Institute Monograph 51.

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