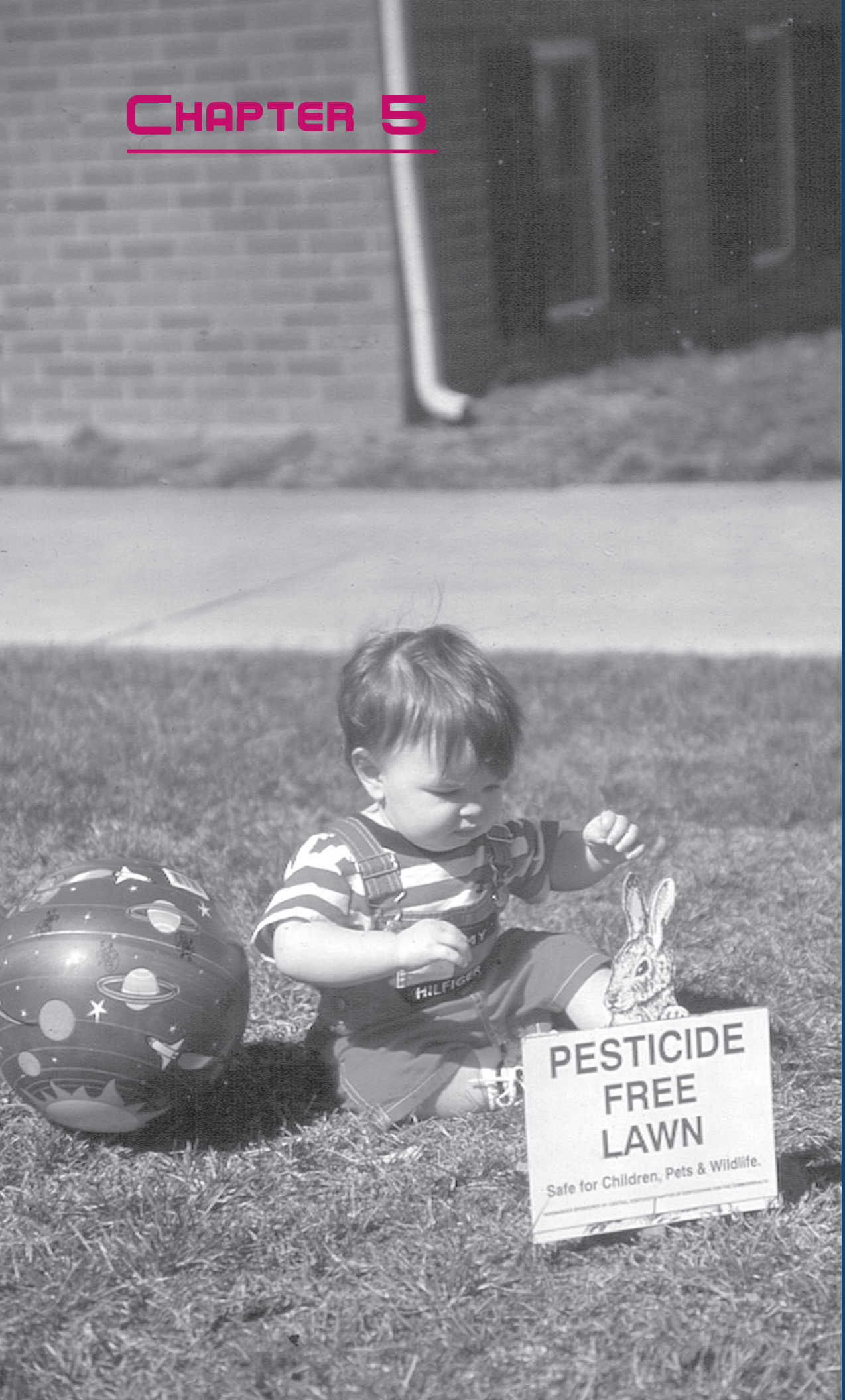
Chapter 5

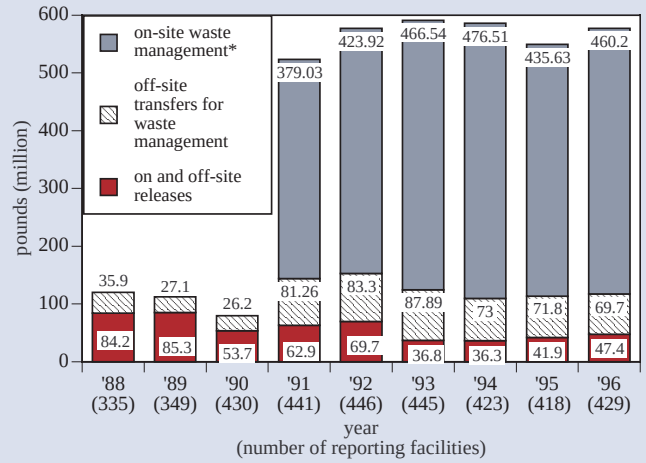
Toxics



Indicator 1: Generation of Toxics

BACKGROUND Toxic chemical wastes are produced as by-products of the manufacturing process. The primary source of information relating to the generation, release, or transfer of toxic chemicals is the Toxics Release Inventory (TRI). The TRI was created by Congress as part of the federal Emergency Planning and Community Right-to-Know Act of 1986. The act requires certain manufacturers to self-report to the public the amount of more than 650 chemicals generated, released, or transferred for treatment. But TRI has serious limitations when it comes to detailing toxic releases and measuring reduction trends. The U.S. Office of Technology Assessment estimates that the TRI accounts for only 5% of the total releases of toxic chemicals to the environment. And chemicals are continually added to or deleted from the TRI list, making yearly comparisons difficult. Still, TRI is the best data available to monitor toxic generation and releases to the environment.

Figure 1 Generation of TRI Toxic Chemicals in Kentucky



Source: Toxics Release Inventory Reports

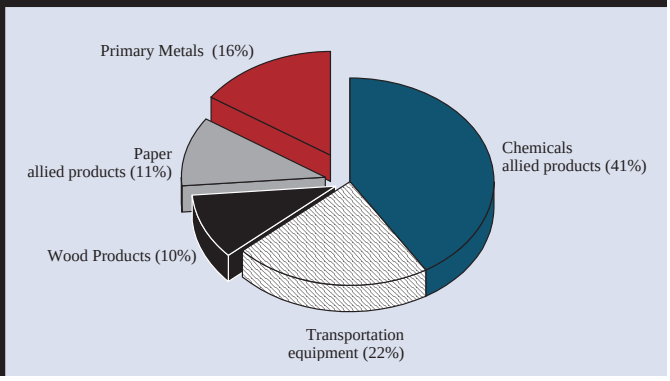
*Note: Previous years are not adjusted for newly added or deleted chemicals. Data not required to be reported on recycling and energy recovery until 1991. *On-site waste management category was added in 1991 and includes chemicals generated, treated, and recovered at the site of generation.*

SOURCE In 1996, the most recent year that TRI data are available, 21,626 facilities in the U.S. reported generating 23.4 billion pounds of toxic chemicals and related waste. In Kentucky, 429 facilities generated 577 million pounds of TRI chemicals during 1996.

GOAL Reduce the weight of toxic chemicals generated (per KRS 224.46-305) by 25% at each Kentucky facility by January 1, 1997, and a 50% reduction by January 1, 2002, using 1987 as a base year.

PROGRESS In 1996, 429 facilities reported generating 577 million pounds of TRI chemicals. To put this in perspective, that amounts to nearly 148 pounds of toxic chemicals for every man, woman, and child residing in Kentucky. The chemical/allied products industry was the largest generator of TRI toxic chemicals, accounting for 41% of the total generation. No specific analysis has been conducted in the state to determine if each facility generating TRI chemicals has met the 25% and 50% reduction goals.

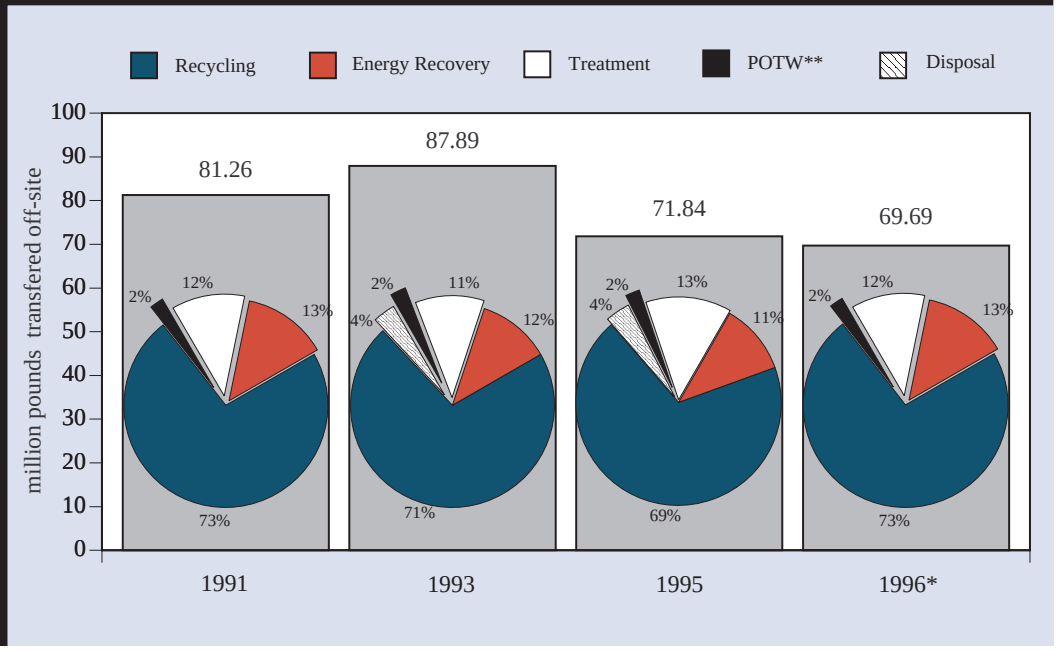
Figure 2 Major Generators of TRI Toxic Chemicals in Kentucky (1996)



Note: Based on generation of 577 million lbs. of toxic chemicals reported by Ky. manufacturers.
Source: Toxics Release Inventory Report

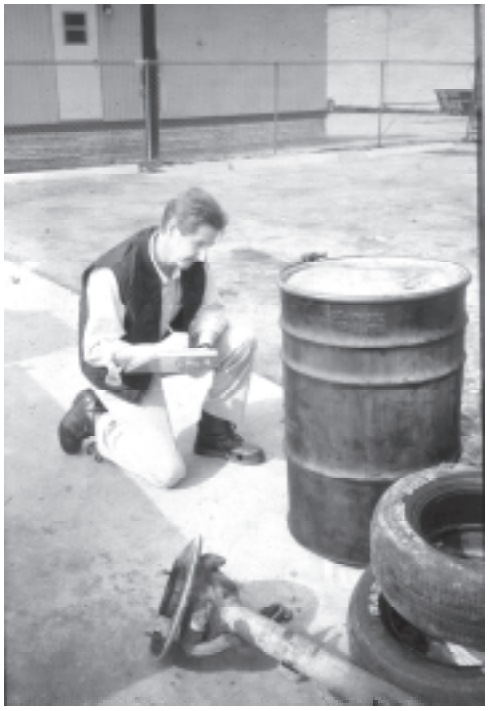
Indicator 2: Toxic Chemical Transfers

Figure 3 **Kentucky Generated TRI Toxic Chemical Waste Transferred Off-Site**



*Note: Transfers off-site for recycling, energy recovery, treatment, disposal, and to POTWs were not tracked until 1991. *U.S. EPA moved transfers off-site for disposal into the release category. 1996 was the first year that land disposal off-site was tracked as a release. **POTW-Publicly Owned Treatment Works.*
Source: Toxics Release Inventory Reports

BACKGROUND About 80% (460 million tons) of the 577 million pounds of the TRI toxic chemicals produced in Kentucky during 1996 was treated at the site of generation while 8% (47.4 million pounds) was released to the environment. The remaining 12% (69.7 million pounds) was transferred off-site for treatment or disposal. Chemicals can be transferred off-site for recycling, energy recovery, treatment (includes neutralization, incineration, biological and physical separation), to a public wastewater treatment plant for treatment, or to a landfill for disposal.



SOURCE During 1996, 242 facilities in Kentucky reported transferring toxics off-site for treatment. Kentucky ranked 16th in the nation in the amount of chemicals sent off-site. In addition, Kentucky received 1.5 million pounds of TRI waste from other states for treatment.

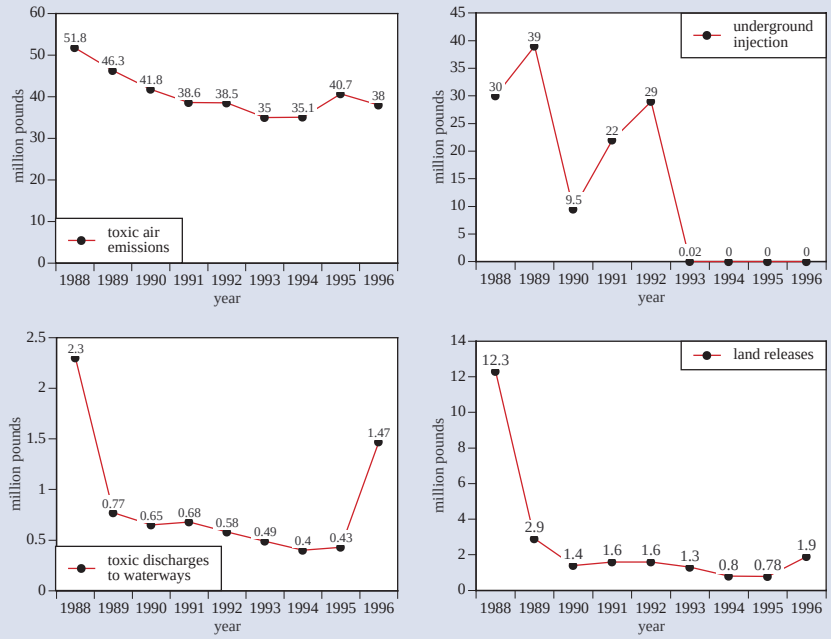
GOAL To promote a hierarchy of waste management priorities with source reduction the preferred option as specified in the federal Pollution Prevention Act of 1990. If a waste cannot be eliminated outright, then the second-best waste management option is to recycle, followed by treatment, and lastly disposal.

PROGRESS A majority of the toxic waste transferred off-site by Kentucky facilities, 50.7 million pounds (73%), was recycled in 1996. Another 13% (9.4 million pounds) was recovered for energy and 12% (eight million pounds) was treated to render it non-toxic.

Indicator 3: Toxic Releases to the Environment

Figure 4

TRI Chemical On-Site Releases to Kentucky's Environment



Note: Previous years are not adjusted for newly added or deleted chemicals. Disposal to land does not include pounds of chemicals disposed at landfills off-site. In 1996, 5.98 million pounds of TRI chemicals generated in Kentucky were disposed in landfills off-site in 1996. In 1994, 2.8 million pounds were disposed off-site.
Source: Toxics Release Inventory Report

BACKGROUND Most of the TRI toxic chemical by-products produced in Kentucky are managed at the site of generation, primarily through recycling and treatment. However, 8% (47.4 million pounds) of the 577 million pounds of toxic chemicals generated during 1996 were released to the environment. A release is an on-site or off-site discharge of toxic chemicals to the land, air, or water.

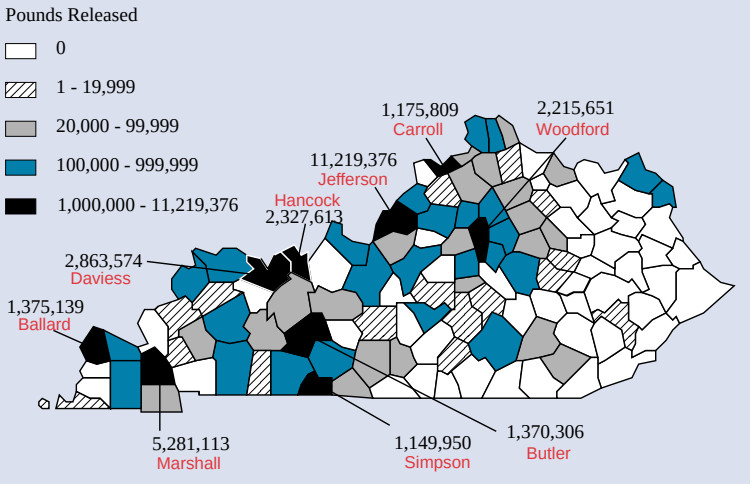
SOURCE In 1996, 337 Kentucky facilities reported releasing toxic chemicals into the environment. Ten companies accounted for 49%, or 23.3 million pounds, of the toxic chemicals released. Nine counties received 73% of the toxic releases that year.

GOAL Reduce the weight of toxic chemicals generated (KRS 224.46-305) by 25% at each Kentucky facility by January 1, 1997 and by 50% by January 1, 2002, using 1987 as a base year.

PROGRESS In 1996, Kentucky industries reported releasing 47.4 million pounds of toxic chemicals to the environ-

Figure 5

TRI Toxic Chemical On-Site Releases to Air, Land, Water in Kentucky (1996)



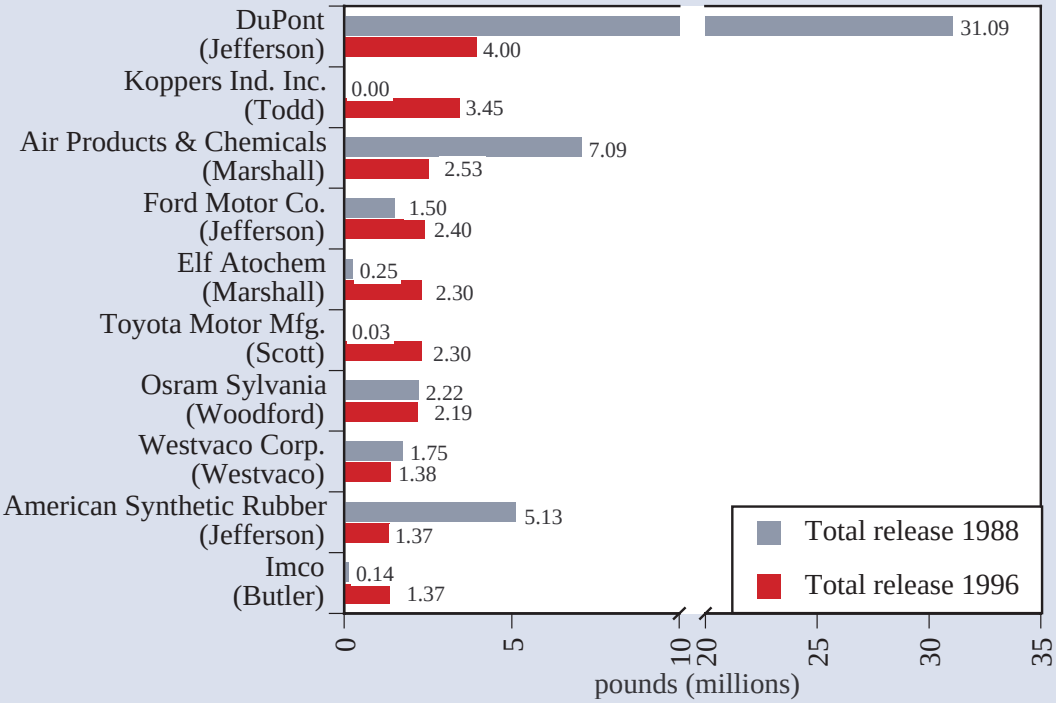
Note: Releases on-site of generation.
Source: Toxics Release Inventory Report

Figure 6 **Top Ten TRI Toxic Chemicals Released to Ky's Water, Land, Air (1996)**

Water Releases (lbs.)	*Land Releases (lbs.)	Air Releases (lbs.)
Nitrate Compounds (1,018,690)	Aluminum (1,218,950)	Methanol (5,005,957
Methanol (193,540)	Copper Compounds (139,769)	Xylene (4,466,941)
Ammonia (102,733)	Manganese (117,079)	Chlorodifluoromethane (4,289,701)
Ethylene Glycol (22,850)	Barium Compounds (112,639)	Toluene (3,935,803)
Formaldehyde (21,902)	Cadmium Compounds (50,700)	N-Hexane (2,591,748)
Chlorine (13,333)	Antimony Compounds (41,868)	Glycol Ethers (1,834,273)
Acetaldehyde (11,999)	Manganese Compounds (36,082)	1-chloro-1,1-difluroethane (1,574,000)
Manganese Compounds (11,157)	Lead Compounds (34,000)	Dichloromethane (1,209,567)
Zinc Compounds (10,526)	Zinc Compounds (30,366)	Hydrochloric Acid (900,962)
Tert-Butyl Alcohol (9,699)	Chromium Compounds (29,301)	N-Butyl Alcohol (863,818)

**Includes only on-site releases to land. Source: Toxics Release Inventory Report*

Figure 7 **Top 10 Kentucky Facilities Releasing TRI Chemicals (1996)**



Note: 1996 numbers include both land releases and transfers off-site for land disposal. Source: Toxics Release Inventory Reports

ment. Kentucky is ranked 20th in the nation in toxic releases. A majority of these releases, 87% (38 million pounds), were to the air.

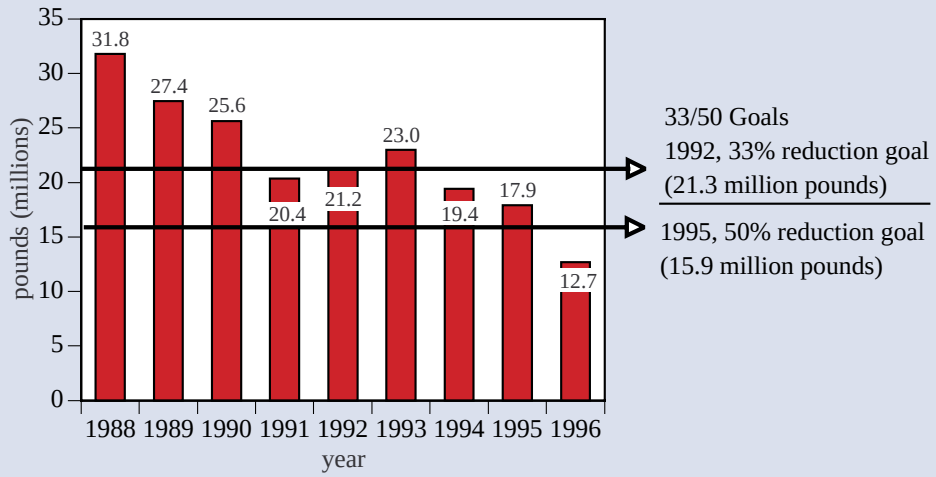
The total releases of toxic chemicals to Kentucky's environment dropped by 51% from 1988 to 1996, primarily in response to DuPont eliminating the underground injection of hydrochloric acid after finding a market for it in 1992. However, between 1995 and 1996, overall toxic chemical releases increased 13%. This was likely due to the addition of 282 new reportable chemicals and an increase in manufacturing related to an improved economy. For example, there was a threefold increase in toxics released to waterways between 1995 and 1996 due to the addition of nitrates to reportable chemical releases. American Steel in Carroll County reported 946,810 pounds of the 1,018,690 pounds of nitrates reported released to waterways in 1996.

While a specific analysis has not been conducted to determine which facilities have reduced toxic emissions, a review of the top ten companies with toxic releases reveals that four have reduced releases since 1988. For example, Air Products and Chemicals in Marshall County cut releases by 64% while American Synthetic Rubber Corp. in Jefferson County reduced toxic emissions 73% between 1988 and 1996.

Indicator 4: Priority Toxics

Figure 8

Generation of 17 TRI Priority Toxics in Kentucky



Note: Based on releases on-site and transfers off-site for waste management. Does not include transfers for recycling and energy recovery which were not reported until 1991. Yearly totals are based on the reduction of priority chemicals by all Ky. facilities and not just those participating in the national 33/50 program. Source: Toxics Release Inventory Reports

BACKGROUND In 1991, the U.S. EPA launched a national program to encourage industries that release significant amounts of highly toxic chemicals to voluntarily reduce their emissions. The national "33/50 Program" is designed to track the release and transfer of 17 TRI priority chemicals. These chemicals were targeted by U.S. EPA for reduction because they are highly toxic, used in large volumes, or pose a significant risk to public health and the environment.

SOURCE Nationwide, 1,300 companies participate in the U.S. EPA's 33/50 Program. Approximately 76 of the companies have facilities in Kentucky.

GOAL Reduce the generation of 17 TRI priority chemicals 33% by 1992 and 50% by 1995, using 1988 as the base year.

PROGRESS The U.S. EPA reports that participating companies have met the 33/50 program reduction goals. Total U.S. generation of 17 TRI priority chemicals was reduced by 55.6% between 1988 and 1995. Kentucky met the 33% 1992 reduction goal, but failed to meet the 50% reduction goal in 1995. Kentucky did meet the 50% reduction goal in 1996. Between 1988 and 1996, 24 companies in the state reduced the generation of priority toxics by 50%.

A review of generators of 17 TRI priority chemicals in Kentucky reveals that ten companies accounted for 78% of the priority toxics produced in 1996. Two companies, Ford Motor Co. and Sherwin Williams, led the state in 1996 production of priority toxics and accounted for 41% of the statewide total generation.

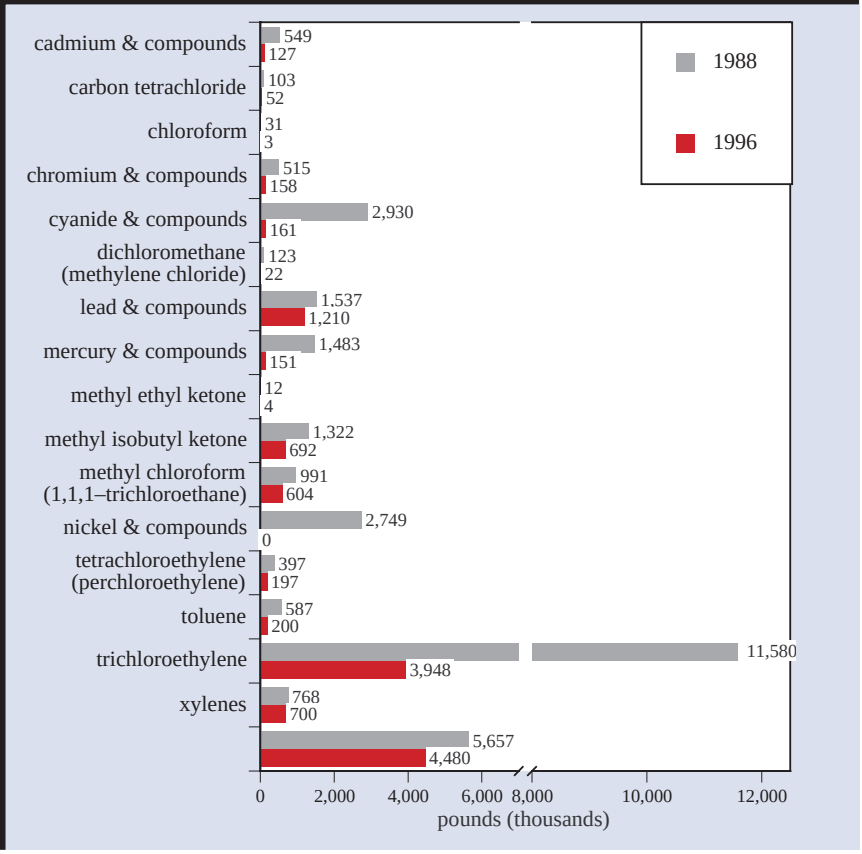
Figure 9

Top Ten Kentucky Generators of 17 TRI Priority Toxics (1996)

Facility	County	Generation (lbs.)
Ford Motor Co.	Jefferson	2,802,486
Sherwin Williams	Madison	2,380,462
American Synthetic	Jefferson	1,382,770
Akzo Coatings	Jefferson	1,067,390
ISP	Marshall	864,101
Johnson Controls	Jefferson	429,663
United Catalysts	Jefferson	320,646
Ashland Petroleum	Boyd	281,175
Rayloc	Union	214,133
Englehard	Jefferson	191,165
total top 10		**9,933,991**
total state		**12,677,482**

Note: Based on releases on-site and transfers off-site for waste management of 17 priority toxics. Does not include transfers for recycling and energy recovery. Source: Right To Know Network, Toxics Release Inventory Report

Figure 10 Release and Transfer of 17 TRI Priority Toxics in Kentucky



Note: 33/50 or priority toxics are 17 chemicals prioritized for reduction by the U.S. EPA due to their high toxicity, carcinogenicity, or high volume of release with potential environmental impacts. This chart includes releases on-site and transfers off-site. Excludes transfers for recycling and energy recovery which were not required to be reported until 1991.
Source: Toxics Release Inventory Reports

Figure 11 Kentucky Companies Reducing 17 TRI Priority Toxics by 50% (1988-1996)

County	Company	County	Company
Boyle	ATR Wire & Cable	Hardin	Gates Rubber
Boyle	Phillips	Hancock	Willamette
Bullitt	Interlake Conveyor	Jefferson	Am. Syn. Rubber
Boone	Emerson Electric	Jefferson	B.F. Goodrich
Ballard	Westvaco	Jefferson	Borden
Carroll/Hardin	Dow Corning	Jefferson/Green	E.I. DuPont
Christian	Ebonite	Marshall	Air Products
Daviess	Green River Steel	Marshall	North Star Steel
Fayette	Trane	Marshall	SKW Alloys
Greenup	North Am. Refractories	McCracken	U.S. Enrichment
Hardin	Collis	Pulaski	Tecumseh Products
Hardin	Copper Industries	Warren	Lord

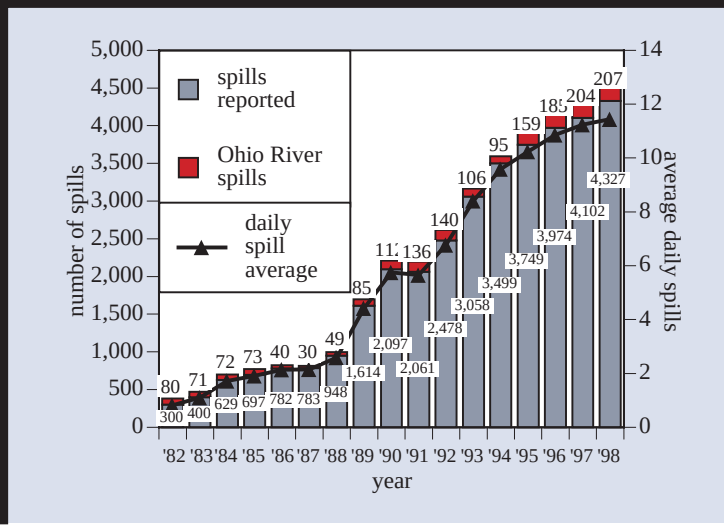
Note: Based on releases on-site and transfers off-site for waste management for 17 TRI priority toxic chemicals.
Source: Right To Know Network, Toxics Release Inventory Report

Indicator 5: Toxic and Hazardous Spills

BACKGROUND Each year millions of gallons of toxic and hazardous substances are accidentally spilled along transportation routes and at industrial sites in the U.S. Industries and others handling these materials are required to report spills and accidental releases to the state and other agencies.

SOURCE There are numerous sources of toxic and hazardous material spills in Kentucky including truck, train, and barge accidents and industrial spills and releases.

Figure 12 Toxic and Hazardous Spills in Kentucky

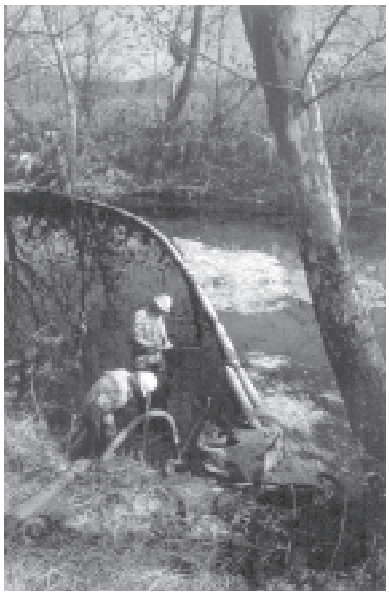


Note: 1982-83 data are estimates. 1986 Federal Emergency Planning and Community Right-Know Act law requires more extensive spill reporting.
Source: Ky. Dept. for Environmental Protection; Ohio River Valley Water Sanitation Commission

GOAL Prevent and respond to and contain spills to minimize environmental degradation and public health threats.

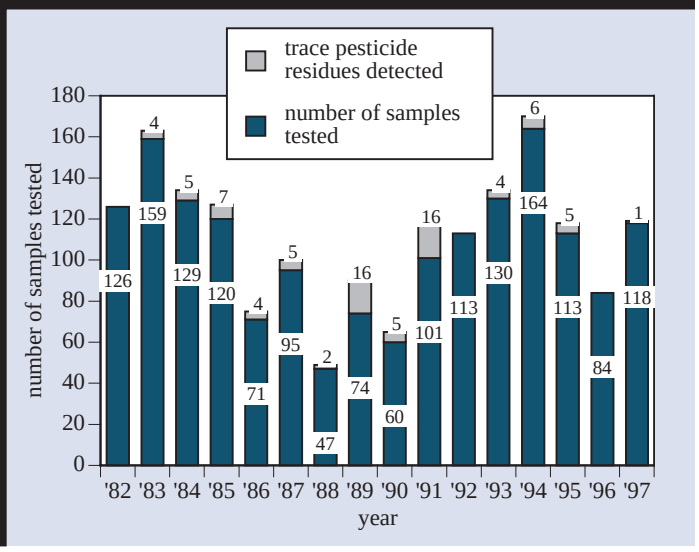
PROGRESS Spill incident notifications received by the Kentucky Department for Environment Protection's Environmental Response Team have increased from one report a day in 1983 to 11 a day in 1998. The 17-year rise in reported spills is attributed to an increase in transportation activity (stronger economy), tightening of reporting requirements earlier in the decade, and better education and awareness of reporting requirements. In 1997, there were 4,327 release incidents reported, 34% of which were in response to leaking underground storage tanks.

Two large incidents have occurred in Kentucky in recent years. A fire, of unknown origin, at the Cargill fertilizer plant in Maysville occurred on January 4, 1998, and burned a 75,000-square-foot building containing 400 tons of ammonium nitrate fertilizer. The release of toxic chemicals into the air forced the evacuation of nearly 3,000 residents and a consumer drinking water advisory was issued for one day. Another major spill occurred at the Ashland Oil Refinery in Catlettsburg on December 21, 1997. Negligence of the tankerman and mechanical failure while filling an oil barge resulted in a spill of 46,500 gallons of heavy oil into the Big Sandy River. One drinking water intake was temporarily closed as a precaution.



Indicator 6: Pesticides in Food

Figure 13 **Pesticide Residues in Kentucky Produce**



Note: Food samples screened for parts per billion of chlorinated pesticides and .05 parts per billion of organophosphates. If other contaminants are suspected, additional testing is conducted. Residue levels detected have been below tolerance standards since 1990.
Source: Ky. Department for Public Health

BACKGROUND Ensuring the safety of the nation's food supply remains a high priority among federal and state officials. The Centers for Disease Control and Prevention report 8,557 confirmed cases of food poisoning in the U.S. in 1997. However, it is estimated that up to eight million food poisoning cases may have gone unreported that year. While the majority of these incidents involved bacteriological contamination of food, chemical contamination, in the form of pesticides, poses threats as well. Because public concern was so great, Congress passed the Food Quality Protection Act in 1996. This act amends the two previous pesticide-related statutes—the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act, which contained the Delaney Clause. The Food Quality Protection Act requires the government, for the first time, to consider the risks associated with cumulative exposure to all pesticides in food. This act also requires additional protections for infants and children.

SOURCE In the U.S., 2.2 billion pounds of pesticides are used each year on food crops. There are currently 20,000 registered pesticide formulations. Of these 20,000 pesticide formulations, the U.S. EPA has set residue (tolerance) limits on 9,000. The U.S. EPA plans to reassess tolerance limits and exemptions for 500 pesticide active ingredients by the year 2007 to meet the new requirements of the Food Quality Protection Act.

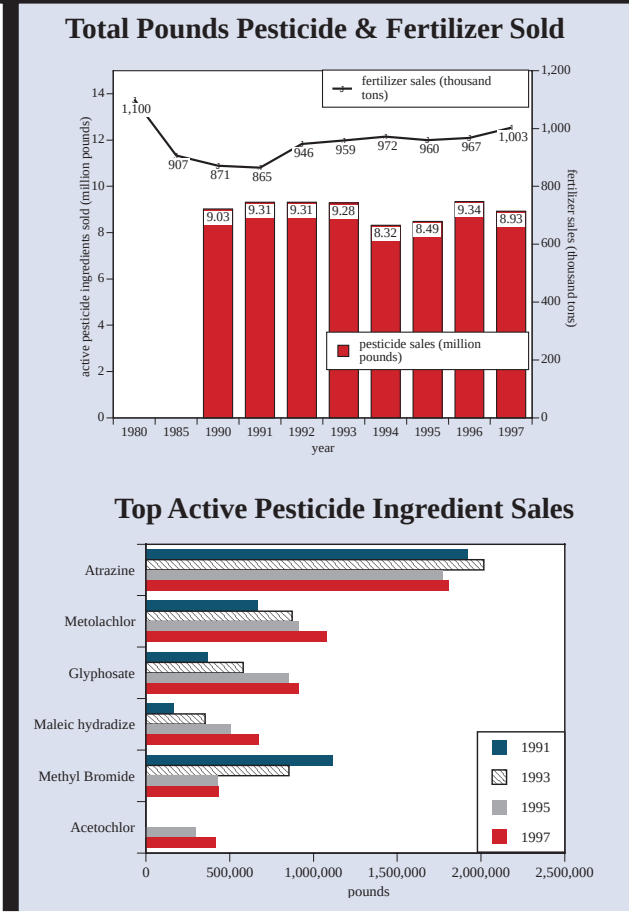
GOAL Reduce the health risks of pesticide residues in food.

PROGRESS The U.S. Food and Drug Administration reports that 34% of the food they tested during 1997 had detectable pesticide residues of which 1.4% of samples were above the safe limits. The Kentucky Cabinet for Health Services randomly samples produce grown in the state for pesticide residues. In 1997, 118 samples were tested. One trace residue was detected in a sample which was below the tolerance level.

Public and commercial interest in foods produced without the use of chemicals is growing. As of March 1998, 67 organic farms (8,666 acres) were certified by the state. About 929 acres are currently in active organic crop production in Kentucky.

Indicator 7: Agricultural Chemicals

Figure 14 **Agricultural Chemical Sales in Kentucky**



Note: Pesticide sales based on annual surveys. Pesticide sales data not available prior to 1990.
Source: Ky. Department of Agriculture, Ky. Agriculture Statistics Service

BACKGROUND Agricultural chemicals are widely used in Kentucky to enhance crop production. However, there is increasing concern regarding the health and environmental effects associated with the use of more than 20,000 different pesticide products. For example, agricultural chemicals have been detected in private well water, in several communities' raw drinking water supplies, and periodically in finished public drinking water supplies. A pesticide, for purposes of this report and as defined under federal law, is a broad nonspecific term that includes insecticides, herbicides, fungicides, and other agents.

SOURCE Agriculture accounts for 75% of the total amount of pesticides used in the U.S. There are 13.9 million acres of farmland in Kentucky, covering 55% of the state's land area. Kentucky farmers used an estimated 9.34 million pounds of pesticides in 1996—the highest amount sold since the state began tracking sales in 1990. The total pounds of pesticides sold in Kentucky increased 10% between 1995 and 1996. This increase is likely due to a 21% larger corn crop in 1996 from 1995 levels. Soybean production increased 8% over 1995 levels, winter wheat was up 15% (the second largest crop on record), and harvested acres of tobacco were up 30,000 acres in 1996—the largest in three years. Pesticide use has since declined 4% between 1996 and 1997.

The top six pesticides accounted for 59% of the sales in Kentucky during 1997. Atrazine remains the top agricultural pesticide sold in Kentucky accounting for 20% of sales. Atrazine is a herbicide used to control weeds in corn fields. Metolachlor, another broad-spectrum herbicide, remains second in sales.

GOAL Reduce pesticide use and ensure the safe use and disposal of pesticides.

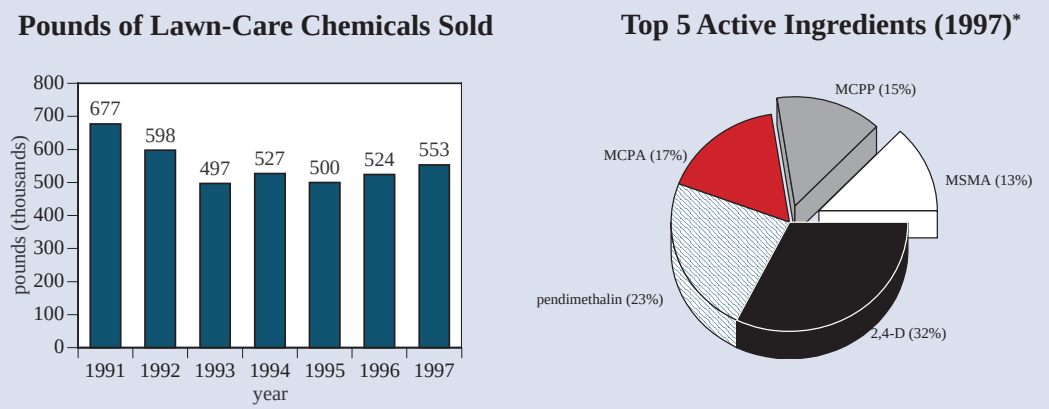
PROGRESS State efforts to promote the safe use and disposal of pesticides continue. The state Division of Conservation encourages the use of Integrated Pest Management (IPM)—a program to reduce pesticide use on farmlands. It is not known how many of the state's 3.7 million acres of cropped land utilize IPM.

The Kentucky Department of Agriculture initiated a program to collect old or unwanted agricultural pesticides related to farm use in 1995. A total of 142,460 pounds of pesticides have been collected from 365 participants and disposed of at the LWD incinerator in Calvert City.

The Kentucky Division of Pesticides also operates a rinse-and-return program for pesticide containers. In fiscal year 1997-98, a total of 89,198 pounds of containers were collected and chipped. That year, 98 counties participated in the program and 466,330 one-gallon and 303,695 2.5-gallon containers were collected and chipped for recycling—a 23.4% statewide recycling rate for pesticide containers, according to the Kentucky Division of Pesticides.

Indicator 8: Lawn-Care Chemicals

Figure 15 Commercial Lawn-Care Chemicals Sold in Kentucky



** Based on 553,000 pounds of active ingredients sold in Ky. to licensed commercial applicators in 1997 as reported in surveys.*
Source: Ky. Division of Pesticides

BACKGROUND The intense and concentrated use of lawn care chemicals, particularly in densely populated areas, has raised concerns about the potential of these chemicals to contaminate waterways and impact public health. Incidents of contaminated runoff from improper use or disposal of lawn-care chemicals continue to cause water quality problems across the state.

SOURCE It is estimated that 70 million pounds of active pesticide ingredients are applied to lawns each year in the U.S. In Kentucky, an average of 512,000 pounds of chemicals were applied per year to lawns by commercial applicators during the past four years, based on sales survey data.

Figure 16 Certified Pesticide Applicators and Enforcement Actions (fiscal year)

Certification of Applicators

Type	1985	1991	1997
Commercial	3,000	10,000	8,843
Private	20,000	60,000	50,347
Total	**23,000**	**70,000**	**59,190**

Inspections/Enforcement Actions*

	1989	1991	1997
Inspections	5,210	11,000	6,742
Enf. Actions	1,500	1,218	833

**Inspection and enforcement actions by the Ky. Div. of Pesticides.*
Source: Ky. Dept. of Agriculture

GOAL Ensure the safe use of pesticides.

PROGRESS The Kentucky Division of Pesticides within the Department of Agriculture enforces laws and regulations governing the safe application and use of lawn-care and agricultural pesticides. The Division certifies and licenses private and commercial applicators of pesticides, requiring applicants to pass a test on proper handling and application techniques. Currently 59,190 applicators are licensed in Kentucky. A majority of the 10,000 commercial licensed applicators are employed by lawn care companies.

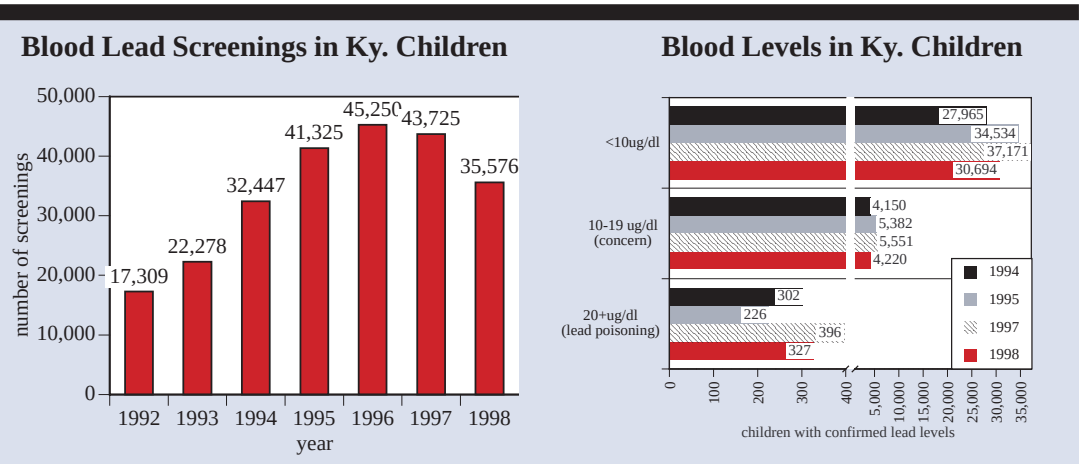
During fiscal year 1997, the Kentucky Division of Pesticides conducted 6,742 inspections and took 833 enforcement actions. A breakdown of enforcement actions is as follows:

Civil complaints issued	1	Administrative hearing	1
Warnings issued	100	Stop-sale, seizure	153
Other	2	Cases assessed fines	12
Compliance assistance	564		

Indicator 9: Blood Lead Levels in Children

Figure 17

Blood Lead Testing in Kentucky Children

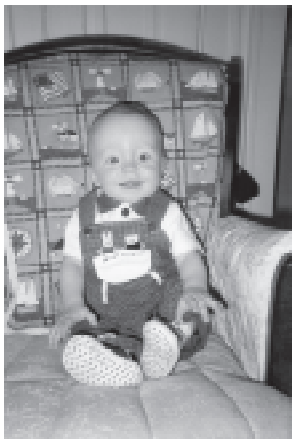


Note: Percentages rounded. µg/dl- micrograms per deciliter of blood. New data collection system started in 1996.
Source: Ky. Department for Public Health

Background Lead poisoning is considered to be one of today's most preventable child health problems. About one in eleven children in American has high levels of lead in his/her blood, according to the Centers for Disease Control and Prevention. The long-term effects of lead in a child can be severe. They include learning disabilities, decreased growth, hyperactivity, impaired hearing, and even brain damage. If caught early, these effects can be limited by reducing exposure to lead or by medical treatment.

Source The use of lead in consumer products has dramatically declined since the 1970s and 80s. Leaded gasoline was phased out beginning in 1985 and after December 31, 1995 was no longer available in the U.S. Lead-based paint was banned for domestic use in 1978. But the historic deposition of lead in soils likely from automobile exhaust, lead paint, and industrial air releases remains a problem, particularly in urban areas. Lead-based paint in older homes has become a primary source of lead exposure to children. The U.S. Department of Housing and Urban Development estimates that 64 million dwellings, 75% of the homes built before 1978, have lead-based paint. This translates to 875,000 homes in Kentucky that could contain lead-based paint, 148,750 of which are estimated to have children under six years of age—the age group most susceptible to lead poisoning.

Goal In 1991, the U.S. Public Health Service established the goal of eliminating childhood lead poisoning by 2011. In conjunction with this goal, the Centers for Disease Control and Prevention (CDC) issued guidelines calling for children age one through five to be screened for lead toxicity. In November 1997, the CDC determined that there was a declining trend of average blood lead levels in children and revised its guidelines to better target children at risk. The Kentucky Cabinet for Health Services is currently reviewing the CDC's new guidelines for screening young children for lead poisoning.



Progress The Kentucky Cabinet for Health Services conducts programs for lead poisoning prevention, child blood-lead level testing, and public education about the hazards of lead. In 1998, local health departments conducted 35,576 blood lead screenings of children under the age of six. The tests found that 327 children (0.9% of those tested) had blood lead levels of 20 µg/dl or above, high enough to cause severe and adverse health impacts. And 12% of the children tested (4,220) had blood lead levels of concern (10 to 19 µg/dl) which could result in behavioral and developmental problems.