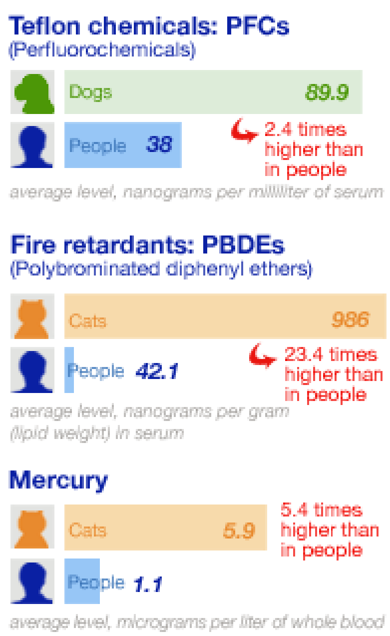
Polluted Pets

Summary and Findings

They are trying their best to warn us.

In the first study of its kind, Environmental Working Group found that American pets are polluted with even higher levels of many of the same synthetic industrial chemicals that researchers have recently found in people, including newborns.

The results show that America's pets are serving as involuntary sentinels of the widespread chemical contamination that scientists increasingly link to a growing array of health problems across a wide range of animals—wild, domesticated and human.



Source: Analysis of blood and urine from 20 dogs and 37 cats in study conducted by EWG. Laboratory analyses by AXYS Analytical, Sidney, BC.

Just as children ingest pollutants in tap water, play on lawns with pesticide residues, or breathe in an array of indoor air contaminants, so do their pets. But with their compressed lifespans, developing and aging seven or more times faster than children, pets also develop health problems from exposures much more rapidly. The National Research Council has found that sickness and disease in pets can inform our understanding of our own health risks (NRC 1991). And for anyone who has lost a pet to cancer or another disease potentially linked to chemical exposures, this sentinel role played by pets becomes a devastating personal loss.

In recognition of the unique roles that pets play in our lives, the Environmental Working Group (EWG) undertook a study to investigate the extent of exposures pets face to contaminants in our homes and outdoor environments. In a novel study representing the broadest biomonitoring investigation yet conducted in pets, what we found was surprising.

Dogs and cats were contaminated with 48 of 70 industrial chemicals tested, including 43 chemicals at levels higher than those typically found in people, according to our study of plastics and food packaging chemicals, heavy metals, fire retardants, and stain-proofing chemicals in pooled samples of blood and urine from 20 dogs and 37 cats collected at a Virginia veterinary clinic.

Average levels of many chemicals were substantially higher in pets than is typical for people, with 2.4 times higher levels of stain- and grease-proof coatings (perfluorochemicals) in dogs, 23 times more fire retardants (PBDEs) in cats, and more than 5 times the amounts of mercury, compared to average levels in people found in national studies conducted by the Centers for Disease Control and Prevention (CDC) and EWG (Figure).

This study is the most comprehensive investigation of the chemical body burden of companion animals conducted to date, with 23 chemicals reported in pets for the first time. The results reinforce findings from prior studies showing that pets' unique behaviors may place them at risk for elevated exposures and health risks from chemicals pollutants in the home and outdoors, in air, water, food, soil, and consumer products for people and pets.

For nearly all the chemicals included in the current study, health risks in pets have not been studied. But the chemicals are linked to serious health effects in other studies from laboratory data or human populations:

Dogs: High levels of plasticizers, grease-proof chemicals,and fire retardants

35 chemicals detected - 40% at higher levels in dogs than people

Source: Analysis of blood and urine from 20 dogs in study conducted by EWG.
Laboratory analyses by AXYS Analytical, Sidney, BC.

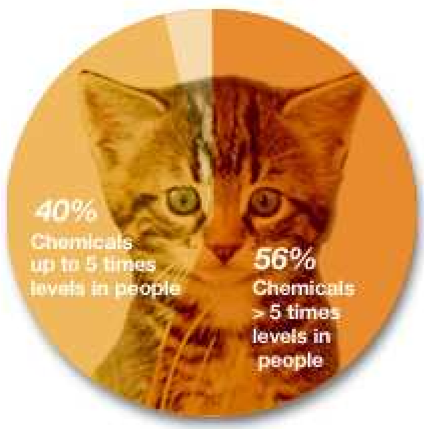
- For dogs, blood and urine samples were contaminated with 35 chemicals altogether, including 11 carcinogens, 31 chemicals toxic to the reproductive system, and 24 neurotoxins. The carcinogens are of particular concern, since dogs have much higher rates of many kinds of cancer than do people, including 35 times more skin cancer, 4 times more breast tumors, 8 times more bone cancer, and twice the incidence of leukemia, according to the Texas A&M Veterinary Medical Center (2008). Between 20 and 25 percent of dogs die of cancer, making it the second leading cause of death in dogs (Purdue University Department of Veterinary Pathobiology 2000).

- Cat samples contained 46 chemicals altogether, including 9 carcinogens, 40 chemicals toxic to the reproductive system, 34 neurotoxins, and 15 chemicals toxic to the endocrine system. Endocrine (hormone) system toxins raise particular concerns for cats, since they include the thyroid toxins and fire retardants called PBDEs. Thyroid disease (hyperthyroidism) is a leading cause of illness in older cats (Gunn-Moore 2005). The growing use of PBDEs in consumer products over the past 30 years has paralleled the rising incidence of feline hyperthyroidism, and a preliminary study suggests that PBDEs are found at higher levels in cats stricken with this disease (Dye 2007). Studies also show a high correlation between eating canned food and developing hyperthyroidism later in life for cats (Edinboro 2004; Kass 1999, Martin 2000). In addition to PBDEs, hyperthyroidism in cats could be linked to the plastics chemical and potent endocrine disruptor BPA that is known to leach from the pop-top cat food can lining into food (Edinboro 2004; Kang 2002).

In America there are 8 times more companion dogs and cats than there are children under five. Seventy percent more households have dogs or cats than children of any age. These pets are often beloved family members, and yet they can be subjected to chronic, constant exposures to chemical contaminants in homes, yards, and parks that pet owners cannot always prevent.

Cats: notably high levels of fire retardants, high levels of plasticizers, and grease-proofing chemicals

46 chemicals detected - 96% at higher levels in cats than people



Source: Analysis of blood and urine from 37 cats in study conducted by EWG.
Laboratory analyses by AXYS Analytical, Sidney, BC.

As cats meticulously groom themselves, they lick off accumulated dust that studies show can be contaminated with the neurotoxic fire retardants PBDEs and reproductive toxins called phthalates that were found in the cats we tested (Bornehag 2004, Stapleton 2005, Wormuth 2006). A dog eating scraps from the floor may also swallow dirt and dust tracked in from the outdoors and contaminated with heavy metals and pesticides (Colt 2004, vom Lindern 2003). A flea collar can spew droplets of insecticide that can be lethal to cats (Linnett 2008). Dogs and cats often eat food processing and packaging chemicals that contaminate their food, day after day and year after year, resulting in cumulative exposures with unknown health risks (FDA CVM 2008b). Chew toys might contain plastic softeners, foam beds might be infused or coated with fire retardants and stain-proofing chemicals linked to cancer and birth defects, and plastic water bowls might leach hormone disruptors.

Pets face chemical exposures that in some ways are similar to those of infants and toddlers, who have limited diets and play close to the floor and put their hands and household objects in their mouths far more often than adults. For pets as for children, exposures are greater and the resulting health risks are higher (Betts 2007).

EWG’s review of scientific literature identified studies that demonstrate a plethora of links between chemicals exposures and health risks for pets. The perversely named “dancing cat fever” describes the results of neurological damage in cats with acute mercury poisoning (Koya 1964), while “Teflon toxicosis” has been the cause of death for hundreds of pet birds nationwide whose lungs filled with blood after they breathed in toxic fumes from overheated, non-stick pans (EWG 2003a, NRC 1991). Horses have died after chewing on wooden fences infused with the same arsenic-based pesticide found in the decks and playsets of 70 million homes nationwide (Casteel 2001, Edlich 2005, Khan 2006). Studies show lung cancer (mesothelioma) in dogs exposed to asbestos fibers at home (Glickman 1983), bladder cancer in dogs living near industrial areas (Hayes 1981) or exposed to topical flea and tick pesticides (Glickman 2004) or lawn and garden weed killers and insecticides (Glickman 2004), lead toxicosis in dogs and cats in homes with chipping lead-based house paint (Knight 2003, Marino 1990, Miller 1992), malignant lymphomas in dogs whose owners use the lawn pesticide 2,4-D (Hayes 1991), and mouth cancer (oral squamous cell carcinoma) in cats exposed to flea repellants (Bertone 2003).

Major gaps in our system of public health protections allow most industrial chemicals on the market with no mandatory safety testing. Chemical companies do not have to prove products are safe before they are sold, or understand how much of their chemicals end up in people let alone pets. There are few standards that limit chemical contamination in pet food, pet toys and other products for our companion animals (FDA CVM 2008a,b). For pets as for people, the result is a body burden of complex mixtures of industrial chemicals never tested for safety. Health problems in pets span high rates of cancer in dogs (Paoloni 2008; Paoloni 2007; Waters 2006) and skyrocketing incidence of hyperthyroidism in cats (Edinboro 2004; Peterson 2007). Genetic changes can't explain the increases in certain health problems among pets. Scientists believe that chemical exposures play a role (e.g., National Research Council 1991, Landrigan 2001).

The presence of chemicals in dogs and cats sounds a cautionary warning for the present and future health of children as well. This study demonstrating the chemical body burden of dogs and cats is a wake-up call for stronger safety standards from industrial chemical exposures that will protect all members of our families, including our pets.

Detailed findings

Dogs: The 20 dogs tested included 5 mutts or mixes and 15 dogs of 7 different breeds, including a Pug, Great Dane, Dachshund, Great Pyrenees, and others. In the group, 12 dogs were female and 8 male; ages ranged between 6 months and 12 years (average age 6.3 years). The laboratory analyzed composite blood and urine samples collected from the animals. The dogs' blood and urine was contaminated with 35 chemicals altogether. These included 7 chemicals (20%) with average levels at least 5 times higher than typical levels in people, and another 7 chemicals with average levels up to 5 times amounts found in people. Relative to people, dogs showed high levels of stain- and grease-proof chemicals (perfluorochemicals in the Teflon family), plastics chemicals called phthalates, and fire retardants called PBDEs:

- Teflon chemicals - Highest levels. Tests showed 6 of 13 perfluorochemicals present in dog blood, with five at levels higher than those in more than 80 percent of people tested nationally, including 2 at levels more than 5 times higher than average amounts in people. Dogs were polluted with 2 chemicals in the Teflon family of stain- and grease-proof coatings (perfluorochemicals) at higher levels than any detected in people in national studies by EWG and CDC (perfluorobutanoic acid (PFBA) and perfluorohexanoic sulfonate (PFHxS)). Only PFOA (perfluorooctanoic acid), known as the "Teflon chemical" because it has been used to make Teflon and other non-stick pans, was detected at levels in the range of what is typically found in people (45th percentile) as opposed to far in excess. For dogs likely sources of exposure include food contaminated with PFCs leaching from dog food bag coatings, as well as house dust, and stain-proofed furniture, dog beds, and carpets.

- Toxins in plastic toys and medicines. Dogs were contaminated with breakdown products of four plastic softeners (phthalates) at average levels higher than those in more than 80 percent of Americans tested nationally, at levels ranging between 1.1 and 4.5 times the average concentrations in people. These included breakdown products of DEHP, DBP, and DBzP, which are used in veterinary medicines, plastic containers and toys, shampoos, and a huge range of other consumer products. Six of 7 phthalate breakdown products were found in dogs altogether. These chemicals pose risks for reproductive damage, birth defects, and cancer.

- Fire retardants in bedding, house dust, and food. Dog samples contained 19 different fire retardant chemicals known as PBDEs, or polybrominated diphenyl ethers, of 46 chemicals tested. Compared to people, levels were very elevated for highly brominated forms of these chemicals, with 5 compounds that are octaBDEs, nonaBDEs, and decaBDE found at levels higher than between 97 and 99 percent of people tested nationally, ranging up to 17 times the average amounts in people. PBDEs disrupt the normal functioning of thyroid hormones and pose risks to the brain during development. For dogs, potential sources of exposure include foam furniture and bedding manufactured before 2005, contaminated air and house dust, and food contaminated with PBDEs that pollute the environment, especially seafood.

Cats: Veterinary technicians collected blood and urine samples from 37 cats, which included 13 female and 21 males cats (gender not reported for 3 cats). The group included cats with ages from 9 months to 17 years. The laboratory analyzed blood and urine samples composited from all the animals. The cats' blood and urine was contaminated with 46 chemicals altogether. These included 25 chemicals (54%) with average levels at least 5 times higher than typical levels in people, and another 18 chemicals (39%) with average levels up to 5 times amounts found in people. Relative to people, cats showed very high levels of neurotoxic fire retardants called PBDEs and methylmercury, a pollutant from coal power plants and a common seafood contaminant.

- Teflon chemicals. Cats were polluted with 8 of 13 chemicals tested in the Teflon family of stain and grease-proof coatings (perfluorochemicals, or PFCs), including 6 at very high levels, above amounts found in between 89 and 99 percent of people tested in national studies, and 4 found at levels more than 5 times average amounts in people. The Scotchgard chemical PFOS, phased out of use by 3M over health concerns in 2000, was found at markedly low levels in cats, at one-quarter of the levels in dogs and in amounts lower than those found in 91 percent of people tested in national studies. PFOA, the "Teflon chemical", was detected at levels in the range of what is typically found in people (45th percentile). The skewed profiles of PFC exposures in cats relative to humans, with 6 different PFCs occurring at levels far in excess of those typical in people, suggests that cats may have unique exposures or different metabolic responses compared to people. Likely sources of PFCs in cats include food contaminated with PFCs leaching from food bag coatings, house dust, and stain-proofed furniture, cat beds, and carpets.

- Toxins in plastic toys and medicines. Cats' samples contained 6 out of 7 breakdown products of five industrial plasticizers called phthalates. Cats were polluted with the breakdown product of DMP (dimethyl phthalate) at an average level higher than amounts in every one of more than 5,500 people tested by CDC. In addition to its use in plastics and other consumer products, DMP is an insect repellant with reported uses in flea and tick collars and veterinary medicines. Cats' samples contained other phthalate breakdown products at low to moderate levels, in excess of amounts found in between 4 and 76 percent of Americans tested in national studies. Cats can be exposed to phthalates from veterinary medicines, plastic containers and toys, and a huge range of other consumer products. Phthalates raise risks for reproductive damage, birth defects, and cancer.
- Fire retardants in bedding, house dust, and food. Cat samples contained 29 of 46 different fire retardant chemicals known as PBDEs, or polybrominated diphenyl ethers, with 16 found at levels higher than amounts in any of the 100 to 2,000 people tested for these chemicals in national studies. The total concentration of all PBDEs in cats was higher than levels in 98 percent of Americans tested, and 26 of 29 individual PBDE chemicals found were at average levels in excess of what is found in 90 percent of the U.S. population. For cats, potential sources of exposure include foam furniture and bedding manufactured before 2005, contaminated air and house dust, and food contaminated with PBDEs that pollute the environment, especially seafood.

Conclusions

The body burden testing conducted in this investigation is the most expansive ever published for companion animals. The study indicates that cats and dogs are exposed to complex mixtures of industrial chemicals, often at levels far in excess of those found in people. Our pets well may be serving as sentinels for our own health, as they breathe in, ingest or absorb the same chemicals that are in our environments. Exposures that pose risks for pets pose risks for human health as well. A new system of public health protections that required companies to prove chemicals are safe before they are sold would help protect all of us, including the pets we love.

Chemical exposures and pets' health

Pets, who share their living environment with humans, are exposed to scores of human-produced chemicals by inhaling indoor air with contaminated dust, strolling in industrial urban neighborhoods, drinking tap water full of disinfection byproducts, eating factorymade pet food laden with numerous chemicals, and contacting a variety of house and garden products, from herbicides to flame retardants. As a result of these multiple exposures, pet cats have 23 times higher levels of brominated flame retardants (polybrominated diphenyl ethers, or PBDEs) in their serum compared to humans, while dogs are contaminated with perfluorinated chemicals (PFCs) at levels 2.4 times higher than typical amounts found in people.

The EWG investigation detected 48 of 70 (68%) different chemicals that were tested in cats and dogs. Companion animals have long been viewed as sentinels of chemical hazards to human health (Bukowski 1997; Potera 2007; van der Schalie 1999). However, this EWG study demonstrates for the first time the extent to which pets themselves are at risk from human industrial activities and pervasive presence of hazardous chemicals in the environment.

Pet cats and dogs have been noted to suffer harmful health effects from chemical pollution in the environment, often earlier than humans. In Minamata Bay in Japan during the 1950s, neurobehavioral symptoms were first observed in cats that consumed mercury-contaminated fish (Koya 1964; Muraki 1965; Tsuchiya 1992). The disturbed behavior of suffering animals has been dubbed by the locals as “dancing cat fever.”

Compared to humans, cats and dogs live shorter lives. They also have correspondingly shorter latency periods for the development of life-threatening diseases such as cancer (Kelsey 1998). At the same time, behavioral patterns of pets (living close to the ground, ingesting dust, chewing on domestic objects, licking and self -grooming) are similar to the behavior of human toddlers (Betts 2007). Thus, the presence of toxic chemicals in cats and dogs sounds a cautionary warning for the present and future health of children. As emphasized in a report by the National Academy of Science, "Animals as Sentinels of Environmental Health Hazards," systematic evaluation of chemical exposure-related diseases of companion animals could lead to identification of unsuspected chemical hazards to vulnerable human populations that might otherwise go unnoticed (National Research Council 1991).

EWG reviewed veterinary research literature published over the past three decades, and identified numerous studies documenting illnesses linked to chemical exposures in companion animals. The list spans diverse diseases and exposures starting from lead toxicosis in cats and dogs to asbestos-related canine mesothelioma and oral carcinoma in cats related to use of flea and tick products. Ten examples of key research observations in the scientific literature are:

- **Mesothelioma in dogs and exposure to asbestos.** Dog owners employed in a profession with asbestos exposure carry traces of asbestos fibers home on their working gear and apparel. The presence of asbestos fibers in home insulation serves as another significant source of asbestos exposure to both people and dogs. In a Purdue University study, the asbestos exposures of dog owners were associated with an eight-fold increase in risk of mesothelioma in their pets. The authors wrote: “Because of the short latent period for tumor development in dogs, their mesothelioma would often precede human disease by many years” (Glickman

1983). In the same study study, lung tissue from three dogs with mesothelioma and from one dog with squamous cell carcinoma of the lung had higher levels of chrysolite asbestos fibers than lung tissue from control dogs. In a second study, asbestos bodies were found in three of five dogs with mesotheliomas but rarely were found in control dogs (Harbison 1983).

- **Bladder cancers in dogs and local industrial activity.** In a study of 8,760 pet dogs at 13 veterinary teaching hospitals, a significant positive correlation was seen between the morbidity ratios for canine bladder cancer and the overall level of industrial activity in the host county of the hospital, suggesting environmental exposure to carcinogens (Hayes 1981). Strikingly, human mortality from bladder cancer in the same counties showed a similar correlation with industrial activity (Hayes 1981). While this study did not identify specific chemical exposures that lead to bladder cancer in dogs, pet dogs living in chemically polluted area were found to have high levels serum levels of toxic chemicals such as polychlorinated biphenyls (PCBs) (Schilling 1988). Association with urban pollution has also been observed for tonsillar carcinoma in dogs in several studies (Reif 2006).

- **Bladder cancers in dogs and the use of insecticides and herbicides.** In a case-control study of bladder cancer in household dogs, cancer risk was significantly increased by the use of topical insecticides. For 1-2 topical applications per year, bladder cancer risk was increased by 1.6 times, while more than 2 applications per year the risk was 3.5 times greater (Glickman 1989). As the authors noted in their publication, in addition to active insecticides, flea and tick dip products contain up to 96% organic solvent carriers such as benzene, toluene, and xylene, all known carcinogens, which could act as additional risk factors for bladder cancer (Glickman 1989; Kelsey 1998). A more recent study demonstrated that the risk of bladder carcinoma was significantly increased among dogs exposed to lawns or gardens treated with both herbicides or insecticides (7.2 times greater risk) or with herbicides alone (3.6 times greater risk), and was also increased for dogs exposed to lawns or gardens treated with insecticides alone (1.6 times greater risk), compared with dogs exposed to untreated lawns (Glickman 2004).

- **Canine malignant lymphoma and yard herbicide application.** As demonstrated by a study of over 1400 dogs performed by National Cancer Institute (NCI) researchers, exposure to a common herbicide, 2,4-dichlorophenoxyacetic acid (2,4-D) which is associated with non-Hodgkin's lymphoma in humans (McDuffie 2001), increases the risk of malignant lymphoma in dogs (Hayes, Tarone and Cantor 1995; Hayes 1991). High concentrations of 2,4-D were found in urine of dogs exposed to 2,4-D treated lawns, providing evidence that dogs living in and around residences with recent 2,4-D treatments absorb measurable amounts of the herbicide through normal activities and behaviors (Reynolds 1994). Although the NCI study was attacked by the pesticide industry and the Professional Lawn Care Association of America, the conclusion remains strong: lawn application of insecticides puts the health of household animals at risk (Hayes, Tarone and Cantor 1995; Reif 2006); as discussed above, herbicides and insecticides are also a

risk factor for bladder cancer in dogs (Glickman 2004). 2,4-D herbicide remains a potential health hazard for pets and for children, who share similar exposures to environmental sources that can be contaminated with this insecticide such as soil, outdoor air, indoor air, and carpet dust (Morgan 2008)

- **High rates of various testicular cancers in military dogs.** A two-fold excess lifetime risk for seminomas was found among military working dogs who had served in the Vietnam war (Hayes 1990). Furthermore, pathology study of tissues from 1,048 military dogs that died in Vietnam noted significant excesses of testicular hemorrhage, epididymitis/orchitis, sperm granuloma, testicular degeneration, and seminoma (Hayes, Tarone and Casey 1995). Military working dogs served in close proximity with their human handlers, sharing common exposures to war-related activity, infectious agents, chemical pesticides, phenoxy herbicides, and extensive use of therapeutic drugs (Hayes 1990). These studies noted another similarity: both the dogs and their handlers shared a higher risk for testicular cancers (van der Schalie 1999).

- **Oral squamous cell carcinoma in cats and the use of flea control products.** In a study by epidemiology researchers at University of Massachusetts, Amherst, flea control product use and canned food intake were significantly associated with risk of oral squamous cell carcinoma in cats (Bertone 2003). Further, the same group of researchers noted that household tobacco smoke increased the risk of both oral carcinoma and malignant lymphoma (Bertone 2002, 2003). In addition to concern for cancer risk, acute toxicosis in cats from flee control products has also been reported (Linnett 2008); and anti-flea products used regularly on cat's bed or bedding have been linked to a high risk for hyperthyroidism (Olczak 2005).

- **High levels of brominated flame retardants (polybrominated biphenyls or PBDEs) in cats.** In a 2007 paper published in the journal Environmental Science and Technology, total PBDE serum concentrations of 4.3-12.7 ng/mL have been reported in cats (Dye 2007). For comparison, the EWG study detected the sum of PBDEs in cat serum at 5.2 ng/ml concentration. As demonstrated by these two studies, PBDE levels in cats are 20- to 100-fold greater than median levels in US adults (0.1-0.2 ng/mL). A significant portion of PBDEs in pet cats may come from dietary sources; at the same time, cats likely ingest 7-fold more dust than adult humans (Dye 2007), and household dust is laden with flame retardant chemicals (Stapleton 2005). One of the hypotheses posed by the researchers in this study was that high PBDE levels in cats could be linked to hyperthyroidism, a feline disease that has increased dramatically since 1980s (Peterson 2007). Although high sample variability precluded detection of association between PBDE levels and hyperthyroidism in this study, other studies have noted the connection of this disease with consumption of canned cat food (Edinboro 2004; Kass 1999; Martin 2000).

- **Lead toxicosis in dogs and cats.** Prior to the 1970s' federal regulation of lead, lead toxicosis was considered the most common accidental poisoning in small animals (Knight 2003). Lead poisoning is clinically and epidemiologically similar in dogs and human infants (Morgan 1994; National Research Council 1991; Prescott 1983). Historically, small children and pet animals pick up the same sources of lead exposure such as peeling old lead paint or proximity to traffic (Kucera 1988). In a 1976 study of 83 dog-owning families in Illinois, high blood levels in dogs were significantly linked to high blood levels in a child within the same household (Thomas 1975, 1976). Neurologically disturbed behavior of the pets could be noted as the first sign of trouble, such as "shaking and twisting" of pet dogs (Marino 1990) or anorexia in pet cats (Miller 1992). Often, these symptoms appear following remodeling of old houses and subsequent exposure to lead fumes and dust (Knight 2003).

- **Teflon toxicosis or "polymer fume fever" in birds.** As noted in the National Academies of Sciences report (National Research Council 1991), polymer fume fever in birds has been known since the 1970s. Upon heating, olytetrafluoroethylene or PTFE, a common coating on non-stick cookware, undergoes pyrolysis (heat-induced breakdown) and forms solid particle fumes (Seidel 1991). These fumes coat the inside surface of lungs, causing shortness of breath, shivering, dizziness, and death by asphyxiation in pet birds (Blandford 1975; Wells 1983), as well as severe flu-like symptoms in bird owners (National Research Council 1991; Shusterman 1993).
- **Chemical contamination of pet food.** A massive recall was initiated in March 2007 after many pets became sick or died after eating certain brands of pet foods (FDA 2007). Poisonings of pets were traced to the presence of melamine and cyanuric acid in imported wheat gluten that was used for pet food production (Burns 2007a, b). These events highlighted the vulnerability of pets and their owners who, due to insufficient government oversight over chemicals present in pet food, are left to trust that the pet food industry will regulate itself. Following hearings in the House and Senate on the need for additional food safety regulations, Human and Pet Food Safety Act was passed in September 2007 (Nolen 2007). This act set in place an early warning system to alert the public about unsafe pet food; however, much yet remains to be done to protect both animal and human food supply before dangerous incidents occur.

These 10 examples help to situate within the existing research literature EWG demonstration of high levels of industrial chemicals in pets and dogs. Clearly, companion animals are at risk from the environmental pollution. In light of this fact, it is striking that we are still lacking national-level statistics on diseases that companion animals. Overall, data for incidence rates of cancer and other diseases in dogs and cats are limited to a few sources, most of which are badly outdated (Kelsey 1998; Reif 2006). For example, the most commonly cited cancer statistics come from the California Animal Neoplasm Registry which is based on the data more than 40 years old that was published in 1968 (Dorn, Taylor, Frye 1968; Dorn, Taylor, Schneider 1968). A lot has changed in the intervening period. For example, greater awareness of health impact of environmental tobacco smoke has changed hazard perceptions and attitudes towards smoking, especially indoor smoking. This is great news for pets' health as well, since environmental tobacco smoke is associated with lung and nasal cancers in dogs (Reif 1998; Reif 1992; Roza 2007) and malignant lymphoma in cats (Bertone 2002).

Other environmental changes have not been so beneficial. For example, as noted by the Environmental Protection Agency researchers, a rise in feline hyperthyroidism has coincided with the widespread introduction of brominated flame-retardants into household materials (Dye 2007), while the hazards of over-heated non-stick cookware to pet birds have been documented with countless reports of bird owners (EWG 2003a, c). We need to look at the issue of pet animal health in the context of overall health of animals, wild and domesticated. As evidenced by research observations and news stories about feminized fish in sewage effluent locations (Filby 2007), hermaphroditic frogs in areas of high pesticide use (Hayes 2002; Hayes 2006) and high rates of cancers in California sea lions and in St. Lawrence estuary beluga whales due to chemical contamination with PCBs and DDT (Newman 2006; Ylitalo 2005), the health of animals everywhere is imperiled. It is thus up to us, humans, to come up with policies that will protect the health of animals – and our own.

Who is protecting pets?

The Toxics Substances Control Act (TSCA) is the cornerstone in our system of health protections for industrial chemical exposures. Passed in 1976, it is the only major public health and environmental law in the U.S. that has never been updated. It allows nearly all industrial chemicals on the market and in consumer products with no mandate for safety testing, and with no requirement that companies prove their products are safe for children and others who are vulnerable before they are sold. The result of this weak law is a body burden of industrial chemicals found in every member of every household in this country, pets and people alike.

Congress and public health agencies attempt to hold together the threadbare safety net provided by TSCA with a series of other programs and laws targeted at particular kinds of exposures, including laws and regulations that provide some oversight on the safety of drugs, pesticides in food, cosmetics, and food additives. But even with this hodgepodge of programs, we've seen recent glaring evidence of safety gaps, with potential health risks from exposures that include everything from antifreeze in toothpaste (FDA 2007b) and lead and asbestos in children's toys (CDC 2007, 2008), to cancer-inducing chemicals in cosmetics and personal care products (EWG 2007; Brody 2007; Darbre 2006; Irigaray 2007) and unregulated contaminants in overseas-produced food and drugs (Armstrong 2008).

As weak as the system of protections is for people, it's even weaker for pets. Public health agencies have little authority and few resources to ensure that products produced for pets are safe (FDA CVM 2007a).

A massive pet food recall in 2007 brought attention to the most urgent issues in pet food safety such as regulations, ingredients and additives in commercial foods and accountability of pet food manufacturers to government agencies and to the general public (AVMA 2007). Illnesses and deaths of pets caused by melamine-contaminated food have contributed to a loss of public confidence in pet food safety, raising many questions about the role of the government in this important area (FDA 2008).

Basic common sense suggests that commercially distributed pet food should be held to the same health and safety standards as human food. Indeed, the FDA Center for Veterinary Medicine (CVM) describes its mission as a “consumer protection organization [that fosters] public and animal health by approving safe and effective products for animals” (FDA CVM 2000a). In this position, CVM is “responsible for the evaluation, approval and/or surveillance of animal drugs, food additives, feed ingredients, and animal devices” (FDA CVM 2000b). These public statements indicate that, similar to the FDA's Center for Food Safety and Applied Nutrition (CFSAN) which oversees 80% of food intended for human consumption in the United States (FDA 2002), the CVM is in a position to provide leadership, oversight, and targeted regulations in order to assure the safety of pet food. However, the current reality falls far short of this worthy goal. When it comes to the presence of dubious food additives, chemical pollutants or untested ingredients in pet food, pets and pet owners are still largely on their own.

For human food, the FDA CFSAN regulates food additives, colorants, and chemical contaminants in food such as pesticide residues. Together with CFSAN, other government agencies oversee the safety of human food supply, including the Food Safety and Inspection Service of the U.S. Department of Agriculture, Environmental Protection Agency, and state and local governments. Even with this system, food additives and preservatives that may pose health risks are sometimes approved for use in human food (FDA 1993, 2007c). Recent studies, for instance, demonstrate links between attention deficit/hyperactivity disorders and common food additives (McCann 2007; McCann 2008). The adequacy of health protections for food additives has been called into question many times (Barrett 2007). But food manufactured for pets falls outside of even this flawed system.

Significantly less stringent oversight is applied to pet food compared to food standards for people. Unlike their role in human food safety, FDA and USDA are doing and are required to do close to nothing for pet food safety under the current laws and regulations. Some standards and mandates for government oversight of pet foods do exist (FDA CVM 2007a; Syverson 2007a, b). In practice, these regulations have massive gaps. To draw a comparison, for human food additives companies need to submit an application to obtain pre-clearance approval from FDA. Provisions for the similar pre-clearance mechanism for pet food additives are defined in Title 21 Code of Federal Regulations (CFR) subchapter on animal drugs, feeds, and related products. Such a petition should contain a description of the chemical identity, manufacturing process and controls, human food safety data, target animal safety data, product labeling, and in some cases an environmental assessment. For some additives, tolerance limitations need to be established in order to ensure their safety. Yet despite having the power to do so, the CVM does not scrutinize manufacturer’s practices with regard to pet food additives. As described on the CVM website (FDA CVM 2007a):

> *CVM has used regulatory discretion and not required food additive petitions for substances that do not raise any safety concerns. In this case, we ask the company to submit the information needed to list the ingredient in the Official Publication of the Association of American Feed Control Officials (AAFCO). This ingredient definition process is done to conserve agency resources, as food additive approval is time-consuming. CVM reviews the data to ensure the ingredient has utility and can be manufactured*

consistently to meet product specifications. Although ingredients used under regulatory discretion are still unapproved food additives, we agree we will not take regulatory action as long as the labeling is consistent with the accepted intended use, the labeling or advertising does not make drug claims, and new data are not received that raise questions concerning safety or suitability.

As a result, companies are not required to notify FDA before they use a chemical additive in pet food, as they are for human food. Instead, pet foods can legally contain unapproved food additives whose safety has not been adequately examined by scientific experts. This state of affairs puts the health of pets into a version of a hit-or-miss game.

Several case studies of toxic chemicals in commercial pet foods illustrate the problems inherent in this lack of regulation. Antioxidant preservative ethoxyquin is a controversial additive that is currently allowed at levels up to 150 parts per million (ppm, equivalent to microgram of additive per gram of food) in animal feeds and canned pet food, as described in 21 CFR section 573.380 (FDA 1996a). Presence of ethoxyquin in dog food has been linked to numerous adverse effects in dogs, such as liver, kidney, thyroid and reproductive dysfunction, teratogenic and carcinogenic effects, allergic reactions, and skin and hair abnormalities (Dzanis 1991). Although FDA acknowledges that 150 ppm levels of ethoxyquin may be hazardous for lactating female dogs and puppies, no action has been taken by the agency beyond a request to the pet food industry that ethoxyquin in complete dog foods be voluntarily lowered to 75 parts per million (FDA 1997; FDA CVM 2007b). At the moment, pet owners cannot know what levels of this additive may be found in a can of pet food; they can only hope that the levels are less than what could harm their dogs.

It is relatively easy for a manufacturer to include a chemical ingredient in pet food. Any food additive that has been cleared by the FDA under the extensive "Generally Recognized As Safe" (GRAS) category is permitted. So far so good. However, if a company wishes to add a new, untested chemical substance into pet food, it merely needs to notify the voluntary AAFCO organization. Under current standards, that is sufficient - no FDA notification is required.

In contrast to the wide range of permitted animal food additives and all the potentially present unapproved food additives, EWG analysis found only one chemical prohibited by FDA from use in pet food. Water-retaining additive propylene glycol has been used as an ingredient in soft-moist pet foods (FDA 1996b). Propylene glycol causes inactivation and clumping of hemoglobin in the red blood cells of cats, thereby causing anemia and other adverse effects in cats consuming the substance at levels that used to be commonly present in soft-moist food (Christopher 1989). Current regulations expressly prohibit the presence of propylene glycol in cat foods. Nevertheless, this is just one ingredient among many whose safety or even quantity in pet food is not adequately studied and publicly available.

As the government, general public and the media are well aware, even with all the standards in place for human food safety, the agencies and companies make huge mistakes and leave gaps that put human health at risk. So, we can readily imagine how unreliable the safety of food supply is for dogs and cats where there is almost no oversight from the government at all. Indeed, this is exactly what happened in the melamine crisis of 2007. Congressional hearings that followed the crisis revealed blatant gaps in pet food safety in the United States. Not only has there been no adequate monitoring system for the chemical composition of pet foods, but there was also a huge delay in companies' response to the crisis. Nearly three weeks passed between the first report of cat illness (received by the Menu Foods on February 22, 2007) and the date when Menu Food notified FDA of the problem and initiated the recall (March 15, 2007). This long delay resulted in a lot of preventable illnesses and even deaths of many pets (Burns 2007a).

Following a great public outcry and congressional investigation, legislation was passed in September 2007 to protect the health of both animals and humans (Food and Drug Administration Amendments Act 2007; Nolen 2007). The new legislation amends the Federal Food, Drug, and Cosmetic Act to require companies to immediately notify FDA of any food contamination problems. It also requires the Secretary to establish: (1) processing and ingredient standards for pet food; (2) update standards for pet food labeling; and (3) set in place an early warning system to alert the public about unsafe pet food. Although bought at a high cost of needless animal suffering, this Act has the potential to increase the safety of pet food – if the FDA issues appropriately strict rules and regulations and ensures ongoing oversight and surveillance of pet food manufacturing practices. In the meanwhile, more gaps than standards are evident as the lack of government supervision over pet food and other pet products continues to put companion animals at risk over and over again. In the absence of government oversight, the safety of products intended for pets is almost completely within the purview of the manufacturers themselves.

The pet food industry, as represented by the manufacturers' association known as the Pet Food Institute (PFI), is largely self-regulating. However, as the melamine crisis clearly demonstrated, this model of voluntary compliance and internal setting of manufacturing criteria has not functioned successfully. The only organization that reviews standards on pet food is the Association of American Feed Control Officials (AAFCO). AAFCO has no regulatory authority, although it publishes a code, known as Model Pet and Specialty Pet Food Regulation. As stated on the CVM website, AAFCO responsibility for the pet food products is necessary "because FDA has limited enforcement resources that are focused on human food safety issues" (FDA CVM 2007a). Yet, would it not be better for pets and their owners, more secure, and more scientifically defensible if the FDA itself issued binding pet food regulations instead of relying on a voluntary organization to provide guidelines and suggestions to the industry? For example, for years cat owners have worried about the presence of ash in cat food because of its potential links to kidney problems and chronic renal failure (Hughes 2002). Within the ash, there is calcium, magnesium, calcium, potassium and other trace minerals; greater quantities of ash are produced when low quality meat parts are included in pet food. On its website, FDA states that ash per se is not related to the incidence of feline lower urinary tract disease (FDA CVM 2007c). However, a pet owner cannot help but wonder how high can be the levels of ash that a pet food manufacturer can legally include in a product? Who is setting these levels and has their safety being adequately demonstrated?

Another issue of significant concern is the safety of pet products, such as pet toys, pet beds, and pet clothing, and numerous other products developed and marketed for pets. There are no government standards in this area, leaving the industry group itself, the American Pet Product Manufacturers Association, to adopt whatever manufacturing practices it wishes. As a result, pet toys can contain endocrine-disrupting and asthma-inducing phthalates and pet beds and clothing may have toxic flame retardants in them. Nobody is looking and nobody bears legal responsibility – hardly a situation that inspires confidence in pet owners.

Again, a comparison between products for human use and products for pets points out how the lack of safety standards endangers the health of pets. The Consumer Product Safety Commission (CPSC) oversees the safety of human products. This agency is entrusted by the Congress “to protect the public against unreasonable risks of injuries and deaths associated with consumer products" (CPSC 2007). Specifically, the Consumer Product Safety Act sec. 31 (2) (A) states that the CPSC, with the assistance of a Chronic Hazard Advisory Panel, has the authority to review whether a substance in a product may be a carcinogen, mutagen, or a teratogen. When such a determination is made, the Panel needs to report an estimate of the probable harm to human health that will result from exposure to the substance. This process allows CPSC to issue rules and regulations under the Federal Hazardous Substances Act that will ensure safety of consumer products from chemical contaminants.

In contrast to CPSC control over products for human consumption, it has no power over products for pets. In a letter to EWG, CPSC stated: “The Commission does not have the authority to require labeling that warns of dangers to animals.” Instead, only a “personal” injury or illness of a human consumer can constitute grounds for CPSC action. Thus, as EWG found out, reports of hundreds of deaths of pet birds due to Teflon cookware falls outside the interests of this regulatory agency (EWG 2003b).

All these examples point in a single direction: food and products for pets receive hardly any government oversight, standards, or regulations. This situation puts the health of pets into danger.

Pets are sentinels for the urgent need for a system of health protections that requires companies to prove their products are safe before they are sold. Modernizing public health laws now more than 30 years old is a critical step to protecting the health of all members of American households, whether they walk on two legs or four.

Study Methodology

Introduction. For 20 dogs and 37 cats, a trip to the vet in December and January included a special procedure – the donation of a small amount of blood or urine needed for an exploratory study of industrial pollutants in pets. In the most comprehensive tests ever conducted on companion animals, we analyzed samples for a broad battery of industrial chemicals and pollutants – 70 chemicals in total, from 5 chemical classes. To our knowledge this work includes the first reported biomonitoring tests for 23 of the targeted chemicals in pets. Information below describes the components of this new study, detailing the sample collection procedures, sample preparation and analysis methods, and the quality assurance and quality control provisions included in the study design.

Blood and urine sample acquisition and storage. Samples were collected from dogs and cats visiting the Hanover Animal Hospital in Mechanicsville, Virginia. Each pet owner was informed of the nature of the study, and signed a consent form in order to participate. A dog typically can safely provide 3 to 4 mL of blood and 1 mL of urine, while due to smaller size, a cat typically can safely provide only 1 to 2 mL of blood and 1 mL of urine.

Number of pets sampled, sample medium, and sample storage container varied depending on the class of chemicals targeted for analysis:

- 5 dogs and 10 cats provided blood samples stored and processed in plastic vacutainers and vials for perfluorochemicals analysis;
- 5 dogs and 5 cats provided urine samples for phthalates and BPA analysis;
- 10 dogs and 17 cats provided blood samples stored and processed in glass vacutainers and vials for PBDEs analysis;
- 5 dogs and 10 cats provided blood samples stored in EDTA-treated plastic vacutainers for metals analysis.

Blood samples collected for perfluorochemical and PBDE analyses were allowed to clot for 30 minutes, then centrifuged. The serum was extracted and stored for analysis. Blood samples collected for metals analysis were used whole. Serum, whole blood, and urine samples were frozen and shipped at the end of the collection period to Axys Analytical Services in British Columbia, Canada. There, individual samples were combined to create a single dog and a single cat serum sample for perfluorochemicals analysis, a single dog and a single cat urine sample for phthalates and BPA analysis, and a single dog and a single cat serum sample for PBDEs analysis. Whole blood samples were shipped to Brooks Rand in Seattle, Washington, where they were composited to create a single dog sample and a single cat sample for metals analysis. Samples were stored at -20 degrees C until analyzed.

Analysis of Perfluorochemicals (PFCs). Analysis for perfluorochemicals was conducted on approximately 0.5 mL of serum. The sample was first spiked with three 13C-labeled perfluorochemical surrogate standards prior to extraction using formic acid on a solid phase extraction cartridge. The extract was spiked with labeled recovery standards and analyzed by liquid chromatography tandem mass spectrometry (LC/MS/MS) using a Micromass Quattro Ultima MS/MS coupled with a Waters 2690 high performance liquid chromatographic (HPLC) system. Target compounds are quantified using the internal standard method, comparing the area of the quantification ion to that of the 13C-labeled standard and correcting for response factors. Final sample concentrations were determined by isotope dilution/internal standard quantification against matrix-matched calibration standards carried through the analysis procedure alongside the samples. Measurements are reported in nanograms per milliliter (wet weight) of blood serum.

Analysis of Phthalate Metabolites and Bisphenol A (BPA). Phthalate metabolites and BPA were co-extracted from 1 mL urine samples. Urine samples were first buffered with ammonium acetate, and spiked with 13C-labeled phthalate monoesters, d6-bisphenol A, 13C4-4-methylumbelliferone, and 4-methylumbelliferyl glucuronide. Urine samples were also spiked with beta-glucuronidase enzyme (for deconjugation of glucuronidated forms of the target analytes). The treated samples were incubated to hydrolyze the glucuronides (the completeness of hydrolysis was monitored by the recovery of 4-methylumbelliferone).

Samples were extracted and cleaned up using solid phase extraction (SPE) procedures. Extracts were spiked with labeled recovery standards for both phthalate metabolites and BPA, split into 2 portions, and each portion was analyzed separately by LC/MS/MS using a Micromass Quattro Ultima MS/MS coupled with a Waters 2695 HPLC system. The method determined the total of the free and the glucuronidated phthalate metabolites and bisphenol A. Analyte concentrations were determined using isotope dilution quantification.

Values are reported in units of micrograms per gram creatinine, a urine protein, to account for variation in the dilution of the urine samples due to different levels of fluid intake by the participating animals.

Analysis of Polybrominated Diphenyl Ethers (PBDEs). Analyses for PBDEs were achieved using a 6 gram serum sample. Samples were spiked with a suite of 13C-labeled surrogate standards, extracted and cleaned up using solid phase extraction (SPE) procedures, followed by acid silica clean up. Extracts were spiked with labeled recovery standards and analyzed by gas chromatography with high-resolution mass spectrometric detection (GC/HRMS) in accordance with EPA method 1614. GC/HRMS analyses were performed using a Micromass Ultima high-resolution mass spectrometer equipped with a Hewlett-Packard 6890 gas chromatograph. Quantification of target analytes was achieved by isotope dilution quantification using the 13C-labeled surrogate standards.

Values are reported in units of nanograms per gram of lipid in the blood serum, as PBDEs accumulate in the lipid fraction of blood.

Analysis of Metals. Analysis for metals was conducted by Brooks Rand LLC (Seattle, WA). To measure methylmercury, 0.1 gram whole blood samples were subjected to alkaline digestion, followed by ethylation, then purging and trapping of the resulting ethylated mercury derivatives. The mercury compounds were thermally desorbed and transferred to a gas chromatography column, which separated the species by mass. Ethylated mercury compounds were heated to form elemental mercury, which was measured using cold vapor atomic fluorescence spectroscopy (CVAFS). Values are reported in units of micrograms per liter (wet weight) of whole blood.

To measure total mercury, 1 gram whole blood samples were subjected to acid digestion and oxidation. Mercury ions in the sample were reduced to elemental mercury, then purged and trapped. The concentrated mercury was measured using CVAFS. Values are reported in units of micrograms per liter (wet weight) of whole blood.

To measure lead, 200 microliter whole blood samples were first diluted by a factor of 50 in a 1% nitric acid solution and filtered. Analysis was conducted using inductively couple plasma – mass spectrometry (ICP-MS). Values are reported in units of micrograms per deciliter (wet weight) of whole blood.

Procedures for quality assurance and quality control (QA/QC). All organic analyses were conducted in accordance with AXYS' accredited QA/QC program including regular analysis of QC samples and participation in international inter-laboratory comparison programs. Each analysis batch included a procedural blank to demonstrate cleanliness and a spiked laboratory control sample to monitor precision and recovery. The sample results were reviewed and evaluated in relation to the QA/QC samples worked up at the same time. The sample surrogate standard recoveries and detection limits, procedural blank data and the laboratory control sample data were evaluated against method criteria to ensure acceptable data quality.

All metal analyses were conducted in accordance with Brooks Rand's accredited QA/QC program. Samples were analyzed in conjunction with NIST 966 standard-spiked blanks, and 4 method blanks.

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All test results

The Environmental Working Group has conducted a study of industrial chemicals in samples of blood and urine from 20 dogs and 40 cats collected at a Virginia veterinary clinic. For each of 70 chemicals, two composite samples were analyzed, one for dogs and one for cats. The table below gives the detailed findings from the study. The results shown, which reflect an average level in the animals tested, are compared to arithmetic average levels found in national studies of chemicals in people, conducted by the Centers for Disease Control and Prevention (CDC 2008), and the Environmental Working Group (EWG 2008) when data from CDC were not available.

Chemical/Chemical group	Dog result (multiple of humans)	Cat result (multiple of humans)	Average human result (source)
Heavy metals and bisphenol A			
Bisphenol A (ug/g creatinine in urine)	1.1 (0.267x)	not detected	4.1 (2,514 people by CDC)
Lead (ug/dL wet weight in whole blood)	0.54 (0.305x)	0.216 (0.122x)	1.77 (9,179 people by CDC)

Mercury, total (ug/L wet weight in whole blood)	0.82 (0.758x)	5.9 (5.45x)	1.08 (9,179 people by CDC)
Methylmercury (ug/L wet weight in whole blood)	0.76 (0.702x)	4.81 (4.44x)	1.08 (9,179 people by CDC)
Perfluorochemicals (PFCs) (ng/mL wet weight in blood serum)			
Total Perfluorochemicals (PFCs)	89.8 (3.07x)	28 (0.959x)	29.2 (47 people by EWG)
PFDA (Perfluorodecanoic acid)	0.796 (4.68x)	1.23 (7.23x)	0.17 (2,094 people by CDC)
PFHpA (Perfluoroheptanoic acid)	not detected	0.826 (14.6x)	0.0567 (2,094 people by CDC)
PFHxS (Perfluorohexansulfonate)	30.9 (10.7x)	5.19 (1.8x)	2.89 (1,591 people by CDC)
PFNA (Perfluorononanoic acid)	2.97 (2.68x)	2.39 (2.16x)	1.11 (2,094 people by CDC)
PFOA (Perfluorooctanoic acid)	3.5 (0.818x)	3.97 (0.928x)	4.28 (2,094 people by CDC)
PFOS (Perfluorooctanesulfonate)	49.6 (1.54x)	12.4 (0.385x)	32.2 (1,591 people by CDC)
PFUnA (Perfluoroundecanoic acid)	not detected	0.756 (9.74x)	0.0776 (2,094 people by CDC)
PFBA (Perfluorobutyric acid)	1.99 (8.04x)	1.26 (5.09x)	0.247 (47 people by EWG)
Phthalates(ug/g creatinine in urine)			
Total Phthalates	365 (0.581x)	536 (0.854x)	628 (8,154 people by CDC)
Mono-(2-ethyl-5-hydroxyhexyl) phthalate	45.8 (1.09x)	2.26 (0.0538x)	42 (5,506 people by CDC)
Mono-(2-ethyl-5-oxohexyl) phthalate	8.9 (0.328x)	not detected	27.1 (5,506 people by CDC)
Mono-(2-ethylhexyl)phthalate	23.4 (3.3x)	6.2 (0.874x)	7.09 (8,154 people by CDC)
Monobenzyl phthalate	121 (4.53x)	9.5 (0.357x)	26.6 (8,154 people by CDC)

Monoethyl phthalate	89.7 (0.187x)	55.5 (0.116x)	479 (8,154 people by CDC)
Monomethyl phthalate	not detected	452 (98.6x)	4.58 (5,506 people by CDC)
Mono-butyl phthalate	76.5 (2.19x)	11.4 (0.325x)	35 (8,154 people by CDC)
Polybrominated diphenyl ethers (PBDEs) (ng/g lipid weight in blood serum)			
Total Polybrominated diphenyl ethers (PBDEs)	113 (2.67x)	986 (23.4x)	42.1 (99 people by EWG)
PBDE-209	98.8 (16.8x)	360 (61.2x)	5.89 (99 people by EWG)
PBDE-206	3.44 (14x)	11.7 (47.6x)	0.246 (99 people by EWG)
PBDE-207	3.27 (6.44x)	52.1 (103x)	0.507 (99 people by EWG)
PBDE-208	2.31 (6.92x)	20.6 (61.7x)	0.333 (99 people by EWG)
PBDE-183	0.127 (0.73x)	9.96 (57.5x)	0.173 (99 people by EWG)
PBDE-138	0.0211 (0.392x)	3.34 (62.1x)	0.0538 (99 people by EWG)
PBDE-140	not detected	0.934 (17.4x)	0.0537 (59 people by EWG)
PBDE-85	0.0306 (0.0199x)	3.34 (2.17x)	1.54 (2,000 people by CDC)
PBDE-153	2.01 (0.253x)	29.4 (3.7x)	7.96 (99 people by EWG)
PBDE-154	0.0776 (0.0647x)	20.9 (17.5x)	1.2 (2,014 people by CDC)
PBDE-99	0.674 (0.0521x)	258 (20x)	12.9 (1,985 people by CDC)
PBDE-155	not detected	1.91 (32.1x)	0.0593 (59 people by EWG)
PBDE-100	0.111 (0.0113x)	21.1 (2.15x)	9.81 (2,040 people by CDC)

PBDE-47	1.01 (0.0207x)	184 (3.76x)	49 (2,016 people by CDC)
PBDE-49	not detected	0.477 (3.91x)	0.122 (59 people by EWG)
PBDE-51	not detected	0.189 (18.5x)	0.0102 (59 people by EWG)
PBDE-17	0.0232 (0.634x)	0.579 (15.8x)	0.0366 (99 people by EWG)
PBDE-203	0.607 (5.67x)	3.11 (29.1x)	0.107 (99 people by EWG)
PBDE-166	0.0211 (0.323x)	3.34 (59 people by EWG)	
PBDE-119	not detected	0.287 (13.9x)	0.0206 (59 people by EWG)
PBDE-66	not detected	1 (1.77x)	0.565 (1,999 people by CDC)
PBDE-71	not detected	0.396 (71.3x)	0.00556 (99 people by EWG)
PBDE-25	0.0232 (0.378x)	0.579 (9.43x)	0.0614 (59 people by EWG)
PBDE-33	0.0459 (0.056x)	1.03 (1.26x)	0.819 (59 people by EWG)
PBDE-120	not detected	0.287 (13.9x)	0.0206 (59 people by EWG)
PBDE-28	0.0459 (0.119x)	1.03 (2.68x)	0.386 (1,992 people by CDC)
PBDE-126	not detected	0.137 (310x)	0.000442 (59 people by EWG)
PBDE-35	not detected	0.18 (59x)	0.00305 (59 people by EWG)
PBDE-15	0.0904 (0.41x)	0.313 (1.42x)	0.221 (59 people by EWG)

Pets for the Environment

I'm a dog on a mission.

When nonstick chemicals from a frying pan killed my buddy Feathers, and my feline friend Cleo and I found out that we're full of chemicals too, I was barking mad. Did you know that the humans' government doesn't make companies test chemicals for safety before they start using them in our toys, furniture, or even our food? And where do you think all those flame retardants, mercury, and perfluorochemicals end up? In us! And I know because I was tested. The chemicals in me are the same kinds of chemicals in people, and scientists think that other cats and dogs—and horses and birds and bunnies and snakes—around the country are full of them, too.

That's why I started Pets for the Environment. The humans have made a mess, and they aren't doing anything about it. I need your help educating our humans and getting their government to pass toxic chemical reform legislation. They'll never listen to just one pet, but all of us barking and meowing and cawing and squeaking together can make a lot of noise. Join Pets for the Environment and help me make a difference!

Want to know more?
Learn what you can do to protect yourself and your family
Sign up for email updates

Polluted Pets

Amounts of Toxics in Blood and Urine Many Times Higher in Pets Than Humans

WASHINGTON – In the first study of its kind, Environmental Working Group (EWG) found that companion cats and dogs are polluted with even higher levels of many of the same synthetic industrial chemicals that researchers have recently found in people, including newborns.

In addition to being guardians, playmates and even beloved family members, dogs and cats may also be serving as sentinels for human health problems that can arise from exposures to industrial chemicals.

In recognition of the unique roles that pets play in our lives, the Environmental Working Group (EWG) undertook a study to investigate the extent of exposures dogs and cats face to contaminants in our homes and outdoor environments. What we found was startling.

Dogs and cats were contaminated with 48 of 70 industrial chemicals tested, including 43 chemicals at levels higher than those typically found in people, according to our study of blood and urine from 20 dogs and 40 cats. Average levels of many chemicals were substantially higher in pets than is typical for people, with 2.4 times higher levels of stain-and grease-proof coatings (perfluorochemicals) in dogs, 23 times more fire retardants (PBDEs) in cats, and more than 5 times the amounts of mercury, compared to average levels in people found in national studies conducted by the Centers for Disease Control and Prevention (CDC) and EWG.

“Like humans, pets are also exposed to toxic chemicals on a daily basis, and as this investigation found, are contaminated at higher levels,” said Jane Houlihan, VP for Research at EWG. “The presence of chemicals in dogs and cats sounds a cautionary warning for the present and future health of children as well. This study demonstrating the chemical body burden of dogs and cats is a wake-up call for stronger safety standards from industrial chemical exposures that will protect all members of our families, including our pets.”

“This study is valuable in that it used pet animals that live in nearly fifty percent of all US households as environmental sentinels to measure the level of contamination with a wide variety of industrial chemicals that have also been shown to be present in human tissue. Because pet animals tend to have similar or higher concentrations of these chemicals in their body than humans, epidemiological studies of pets can be used to identify potential adverse health effects at a lower cost and in a much shorter period of time than it would take to perform similar studies in humans,” said Dr. Larry Glickman – a leading veterinarian and distinguished scientist who for the past three decades conducted research in veterinary epidemiology.

"This study shows that our pets are susceptible to the absorption of potentially harmful chemicals from our environment just as we are. Perhaps even more troubling is that these chemicals have been found in higher levels in pets than in humans implying potential harmful consequences for their health and well being and the need for further study," said Dr. John Billeter, DVM, the veterinarian who conducted the blood and urine tests.

Just as children ingest pollutants in tap water, play on lawns with pesticide residues, or breathe in an array of indoor air contaminants, so do their pets. But with there compressed lifespans, developing and aging seven or more times faster than children, pets also develop health problems much more rapidly. Pets, like infants and toddlers, have limited diets and play close to the floor, often licking the ground as well as their paws, greatly increasing both their exposures to chemicals and the resulting health risks.

In America there are 8 times more companion dogs and cats than there are children under five. Seventy percent more households have dogs or cats than children of any age. These pets are often beloved family members, and yet they can be subjected to chronic, constant exposures to chemical contaminants in homes, yards, and parks that pet owners cannot always prevent.

Scientists Link Chemical Exposure to Increased Rates of Cancer, Other Diseases in Pets: Under current federal law, chemical companies do not have to prove chemicals are safe before they are used in products, including pet toys and other products for our companion animals. For pets as for people, the result is a body burden of complex mixtures of industrial chemicals never tested for safety. Health problems in pets span high rates of cancer in dogs and skyrocketing incidence of hyperthyroidism in cats.

Genetic changes can't explain the increases in certain health problems among pets, leaving scientists to believe that chemical exposures play a significant role.

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EWG is a nonprofit research organization based in Washington, DC that uses the power of information to protect human health and the environment.