

Distorting science



Flame retardants are found in a variety of household products despite evidence they put people's health at risk. A Tribune investigation looks at how industry has used deceptive tactics to convince the public they're needed.

Sam Roe and Patricia Callahan, Chicago Tribune reporters

Twenty-five years ago, scientists gathered in a cramped government laboratory and set fire to specially designed chairs, TVs and electrical cables packed with flame retardants. For the next half-hour, they carefully measured how much the chemicals slowed the blaze.

It was one of the largest studies of its kind, and the chemical industry seized upon it, claiming the results showed that flame retardants gave people a 15-fold increase in time to escape fires.

Manufacturers of flame retardants would repeatedly point to this government study as key proof that these toxic chemicals — embedded in many common household items — prevented residential fires and saved lives.

But the study's lead author, Vytenis Babrauskas, told the Tribune that industry officials have "grossly distorted" the findings of his research, which was not based on real-world conditions. The small amounts of flame retardants in typical home furnishings, he said, offer little to no fire protection.

"Industry has used this study in ways that are improper and untruthful," he said.

The misuse of Babrauskas' work is but one example of how the chemical industry has manipulated scientific findings to promote the widespread use of flame retardants and downplay the health risks, a Tribune investigation shows. The industry has twisted research results, ignored findings that run counter to its aims and passed off biased, industry-funded reports as rigorous science.

As a result, the chemical industry successfully distorted the basic knowledge about toxic chemicals that are used in consumer products and linked to serious health problems, including cancer, developmental problems, neurological deficits and impaired fertility.

Industry has disseminated misleading research findings so frequently that they essentially have been adopted as fact. They have been cited by consultants, think tanks, regulators and [Wikipedia](#), and have shaped the worldwide debate about the safety of flame retardants.

One series of studies financed by the chemical industry concluded that flame retardants prevent deadly fires, reduce pollutants and save society millions of dollars.

The main basis for these broad claims? A report so obscure it is available only in Swedish.

When the Tribune obtained a copy and translated it, the report revealed that many of industry's wide-ranging claims can be traced to information regarding just eight TV fires in western Stockholm more than 15 years ago.

Although industries often try to spin scientific findings on the safety and effectiveness of their products, the tactics employed by flame retardant manufacturers stand out.

Tom Muir, a Canadian government research analyst for 30 years, called the broad claims based on the eight Stockholm TV fires "the worst example I have ever seen of deliberate misinformation and distortion."

The American Chemistry Council, the leading trade group for the industry, said flame retardants are safe products that help protect life and property. "ACC's work is grounded in scientific evidence, as we believe regulatory decisions related to chemistry must be evaluated on a scientific basis," the trade group said in a written statement.

But when the Tribune asked the trade group to provide research that showed flame retardants are effective, the council initially provided only one study — the one Babrauskas wrote and now says is being distorted by industry.

Later, in response to additional questions from the newspaper, the trade group highlighted a different study as evidence that flame retardants work well: research based largely on the obscure Swedish report.

In reviewing key scientific studies and analyses behind the chemical industry's most common arguments, the Tribune identified flaws so basic they violate central tenets of science.

'Bogus' conclusions

When Babrauskas and his team of scientists began their pioneering research in 1987, it was well-established that flame retardants slowed fires — at least when massive amounts were packed into products.

Less clear was what that meant in terms of precise gains in fire safety. Seeking answers, the chemical industry commissioned Babrauskas' team at the National Bureau of Standards to conduct one of the first large-scale studies on the effectiveness of flame retardants.

The industry, Babrauskas said, wanted to know what would happen if the most potent and expensive chemicals were embedded in common items, such as TV cabinets and upholstered chairs. The industry picked out the flame retardants to be used, and Babrauskas' team began custom-building the household items to be tested.

Working out of a yellow-brick laboratory with a large chimney, the researchers set fire to each item and then, in what Babrauskas called the "grand finale," ignited a room full of samples containing large amounts of retardants and a room of items containing none. Among the conclusions: The room of flame retardant samples would provide people 15 times more escape time than the other room.

The results weren't surprising. More noteworthy was the way industry misrepresented the results.

For example, the Bromine Science and Environmental Forum has regularly cited the 15-fold increase in escape time to argue that the flame retardants in everyday household products, such as TVs, save lives. "This should allow sufficient time for the fire brigade to reach your place before it is too late," states the website of the forum, a Brussels-based industry group that is funded by the largest makers of flame retardants.

Babrauskas calls such claims "totally bogus" because the amounts of flame retardants in the burned samples in his tests were so much greater than what is found in typical consumer items.

"Where you would see them is in the aviation industry, [NASA](#), naval facilities — the market where there is no sensitivity to dollar costs," he said.

In fact, as Babrauskas explicitly noted in his study, research shows that the flame retardants in household furnishings such as sofas and chairs do not slow fire.

Many couches, love seats and chairs sold nationwide contain flame retardants to comply with a California flammability rule. But studies by the U.S. Consumer Product Safety Commission have concluded that this standard provides no meaningful protection from deadly fires.

The standard requires that raw foam withstand a candle-like flame for 12 seconds. But, Babrauskas said, upholstered furniture is covered with fabric, and if the cover ignites, the flames from the fabric quickly grow larger than that of a candle and overwhelm even flame retardant foam.

"The fire just laughs at it," Babrauskas said.

The bottom line: Household furniture often contains enough chemicals to pose health threats but not enough to stem fires — "the worst of both possible worlds," he said.

Babrauskas, who spent 16 years as a fire scientist at the National Bureau of Standards, now known as the [National Institute of Standards and Technology](#), said he didn't know the chemical industry was misrepresenting his study until two years ago when a scientist at the Lawrence Livermore National Laboratory in California contacted him. Babrauskas addressed the distortion in a paper he presented last year at an international conference, but the industry continues to misquote his work.

In its written statement, the chemistry council said the group has not mischaracterized Babrauskas' study, saying the group has stated the research shows flame retardants "can provide" a 15-fold increase in escape time.

Babrauskas, now a consultant, said the industry is being "flat-out deceptive" and should stop misrepresenting his work in order to sell more flame retardants. "I don't want to be part of anything that willfully and needlessly poisons the planet," he said.

Tiny study, big claims

The report written in Swedish is so obscure you won't find it online or among the millions of papers listed in government and industry databases. The American Chemistry Council says it doesn't have a copy. Even the chemicals' most vocal critics say they have never seen one.

Yet the paper about electrical fires in Sweden has had significant influence, thanks to the chemical industry's manipulation of its findings.

The Tribune obtained a copy of the study from the only library in the world believed to have one, the National Library of Sweden, and had it translated. The 50-page report, written by a Swedish federal board, estimated the total number of electrical fires in Sweden by analyzing the causes of all fires in and around western Stockholm in 1995 and 1996.

The report's main conclusion — that electrical fires in Sweden were less common than previously thought — was relatively insignificant. But a chemical industry team zeroed in on a tiny portion of the report and used it to manufacture several flimsy arguments for why flame retardants are good for society.

At the time the Swedish report was published, in 1997, environmentalists in Europe were raising concerns about flame retardants in TVs and other electronics. The chemical industry began searching for evidence that the benefits of flame retardants in those products outweighed any risks.

Leading the search were three people with close industry ties: an executive with flame retardant maker [Albemarle Corp.](#); a public relations specialist with a unit of [Burson-Marsteller](#), a global PR firm; and Margaret Simonson, a fire scientist at a leading research institute in Sweden.

The three were collecting statistics on electrical fires when some data in the Swedish study caught their eye: Western Stockholm, with 265,000 residents, experienced 32 electrical fires in a two-year span. Of those 32 fires, eight — or 25 percent — were caused by TVs.

A basic principle of science is that broad conclusions should not be based on small or unrepresentative samples. Flip a coin five times and it might land on heads each time. But you couldn't then conclude that 500 coin flips would always come up heads.

Yet the three industry researchers used the 25 percent figure to estimate that Europe as a whole — a region of roughly 500 million people — had experienced 165 TV fires per million sets annually.

That rate, the researchers wrote, was far higher than the U.S. rate, which they put at five TV fires per million sets. And because the outer plastic casings of televisions in the U.S. typically contained flame retardants, while European sets did not, the researchers concluded that the "dramatic difference" in TV fire rates was due to the chemicals.

When the researchers published their figures in 2000 in a peer-reviewed journal, one of the authors listed was the PR specialist.

Simonson, the fire scientist, went on to write several additional papers — all funded by the flame retardant industry — that also relied on the eight fires as support for her broad conclusions.

For example, in a 2002 study that looked at the environmental impact of TV sets, Simonson concluded that sets with flame retardants actually are responsible for lower emissions of certain hazardous pollutants over their lifetimes than TVs without retardants. This is primarily because, she wrote, TVs with retardants are involved in fewer and smaller fires, so they produce less smoke.

Industry repeatedly has pointed to this study when addressing environmental concerns about flame retardants.

Simonson's figures have been quoted far and wide. European regulators credited her statistics for prodding some international TV manufacturers to add flame retardants to sets sold in Europe.

One of the few to question Simonson's studies has been Tom Muir, a retired analyst for Canada's environmental protection agency.

He translated bits of the obscure Swedish report but said he couldn't entirely understand Simonson's methodology. In an interview with the Tribune, Muir said her studies appeared to be "an elaborate, manufactured platform of assumption strings and assertions and extrapolations."

When the Tribune provided Muir with a complete translation of the Swedish study as well as Simonson's responses to the newspaper's questions about her methods, Muir was even more critical.

"It's worse than I thought," he said, noting that Simonson repeatedly estimated crucial statistics when solid data did not exist. "She's just making these numbers up."

Also critical of Simonson's calculations is the author of the Swedish study that Simonson relied on in her work.

Ingvar Enqvist said in an interview that he did not know Simonson and the chemical industry were relying on the eight TV fires mentioned in his report as the basis for sweeping claims about the benefits of flame retardants, a fact he called "a little peculiar." He also said Simonson shouldn't extrapolate the eight fires to all of Europe, given the vast differences among the countries.

Simonson, who now uses her maiden name and goes by Margaret Simonson McNamee, is a research manager at the SP Technical Research Institute of Sweden. She denied Muir's accusation of fabricating numbers but acknowledged using many statistical extrapolations and assumptions because, she said, solid data were scarce.

"We certainly did the best that we could given the data that we had available," she said. She added that a British study had found similar TV fire rates in various European countries, so she thought it was fair to extrapolate the blazes in Sweden to all of Europe.

Simonson emphasized that her methods were transparent, allowing critics to redo her studies with different numbers if they like. "Part of the scientific process is having a dialogue and not necessarily being in agreement with your peers," she said.

Besides receiving industry money for her research, Simonson chairs the science advisory committee of the National Association of State Fire Marshals, a group of American public officials that has worked closely with the chemical industry to push for wider use of flame retardant products.

But Simonson said she has never skewed findings to suit industry needs. "Marketing material is something that they produce themselves," she said. "Our research was independent research."

Muir disagrees. "She's never erring on the other side," he said. "Her numbers are always pointing in the same direction — in industry's favor."

'Industry loves him'

When chemicals receive bad publicity, industry has a go-to person: Dennis Paustenbach.

A veteran toxicologist and industrial hygienist, he has sided with industry on some of the most controversial health issues. Working for tobacco industry lawyers, Paustenbach disputed federal regulators' conclusion that secondhand smoking causes [lung cancer](#) in adults. His industry-supported work was used to cast doubt on the risks of some occupational exposures to benzene and asbestos, two carcinogens.

"Industry loves him," said Peter Infante, a former senior administrator with the U.S. [Occupational Safety and Health Administration](#). "They know what answer they are going to get. Nothing is ever harmful."

For the makers of flame retardants, Paustenbach helped interpret data about whether a widely used retardant posed a risk to children.

In 2002, concerns had been growing about a flame retardant known as deca that was being added to TVs and other electronics. The [U.S. Environmental Protection Agency](#) wanted more information about possible health risks to children, and chemical manufacturers volunteered to collect data and present them to an EPA-sponsored panel of industry, government and university researchers.

For help, the chemical-makers hired [Exponent Inc.](#), a California-based scientific consulting firm where Paustenbach served as vice president. After analyzing various ways children might be exposed to deca, including inhaling dust and chewing on consumer products, Paustenbach's company wrote a 123-page report concluding the chemical posed little risk.

But its conclusions had a weak foundation: They were based to a large degree on a study of serum samples collected from just 12 adult blood donors in Illinois in 1988. Again, the chemical industry used a small sample to reach a broad conclusion.

In the Illinois blood study, researchers from the [Centers for Disease Control and Prevention](#) and Stockholm University found that five of the 12 serum samples had detectable amounts of deca. But

when Paustenbach's firm wrote up its report for the chemical industry, it flipped the findings around, emphasizing the seven samples where none of the chemical was detected.

"Given that the majority of serum samples tested had non-detectable levels of (deca), it is most likely that the majority of the U.S. population has very low, if not zero, exposure," the report states.

The industry's report also stated — contrary to the conclusion of the Illinois blood donor study — that no further evaluation of the flame retardant was warranted.

When the EPA panel of researchers reviewed the industry report, many members objected. They said the risk to the nation's children should not lean so heavily on just 12 blood samples, let alone samples from adults, who tend to be less vulnerable to chemical exposure. Some members also noted the samples were collected in 1988, when levels of deca in the environment might have been lower.

Industry officials "were trying to pull a fast one," recalled panel member Ruthann Rudel, a toxicologist at the Silent Spring Institute, an environmental research organization.

Paustenbach and five others went on to write up the report for a peer-reviewed journal, which can lend the results of a study more credibility.

Their paper was published in the Journal of Children's Health — a year-old publication edited by Paustenbach.

In an interview, Paustenbach said it was appropriate to publish the report in a journal that he edited. He also defended the report's use of the small sample of Illinois blood donors to cast doubt on the health risks of deca. "We did the best job we could with the available data," he said.

Paustenbach is now president and founder of ChemRisk, a San Francisco-based consulting firm, and an adjunct professor of toxicology at the [University of Michigan](#). Regarding criticism of his work for industry on controversial topics, he said: "It's unfortunate there is such polarization in the environmental sciences on views on chemicals."

In 2009, the three largest manufacturers of deca reached an agreement with the EPA to phase out sales of the chemical by the end of next year.

The journal that Paustenbach edited folded a few months after the questionable paper was published. Paustenbach said it closed because of competitive pressures.

It was in existence less than two years.

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