

# TOXIC TRACES

By Mike Edgerly, Minnesota Public Radio,  
and Sasha Aslanian, American RadioWorks  
*February 2005*

**3M announced in 2000 that it was phasing out its popular Scotchgard product, because the anti-stain spray contained chemicals toxic to lab animals. The chemicals had also turned up in the blood of 3M workers, though the company said its employees were not harmed.**

**3M produced the chemicals at its plant in Cottage Grove, Minnesota. An investigation by Minnesota Public Radio and American RadioWorks found that even after 3M said it would no longer make the toxic chemicals, the Minnesota Pollution Control Agency let two years pass before it began any inquiries.**

**The story raises questions about who is responsible for the safety of the public and the environment, and about whether state agencies are doing enough to protect citizens from toxic chemicals.**

**Exhibit  
2004**

State of Minnesota v. 3M Co.,  
Court File No. 27-CV-10-28862

## the science



### The chemistry of Scotchgard

Until 2000, 3M was the sole manufacturer of the perfluorinated chemicals used in Scotchgard and DuPont's Teflon. Those chemicals stay in the environment, and have contaminated drinking water in at least one Minnesota city.

## the neighbors



### Questions from the community

Before there was an MPCA or a Superfund cleanup program, people who lived near 3M's Cottage Grove plant and its nearby landfill in Woodbury had questions about their safety.

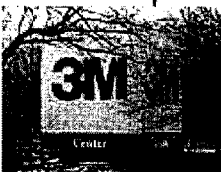
## the politics



### MPCA: "Not a research agency"

A respected MPCA scientist clashes with her bosses over what the agency should do about perfluorinated chemicals.

## the company



### 3M's handling of the situation

Much of what is known about perfluorochemicals comes from manufacturers like 3M, which has researched them for years. 3M is facing several lawsuits over contamination.



## the future



### What happens next?

The research into perfluorochemicals is being ramped up, even as thousands of other such substances remain unregulated and unstudied.



### The long reach of perfluorochemicals

These chemicals are widespread around the world, found in the U.S. blood supply, the blood of 3M plant workers, as well as fish, birds and animals living far from chemical factories.

## Part 1: The science

by Mike Edgerly, Minnesota Public Radio  
February 22, 2005

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*3M headquarters in Maplewood, Minnesota. Chemical contamination found in wells and landfills in Washington County has been linked to substances made by 3M. (MPR Photo/Melanie Sommer)*

**3M's announcement in 2000 that it was phasing out its popular Scotchgard product led to a major investigation by the Federal Environmental Protection Agency. The anti-stain spray contained chemicals toxic to lab animals. The chemicals had also turned up in the blood of 3M workers, though the company said its employees were not harmed.**

**On the state level, an investigation by Minnesota Public Radio and American Radio Works found that even after 3M said it would no longer make the chemicals, the Minnesota Pollution Control Agency let two years pass before it began any inquiries. 3M developed the chemicals in Cottage Grove, Minnesota. The MPCA moved into action only after 3M approached it, to say the drinking water at its Cottage Grove chemical plant was contaminated.**

**Over the next two years, the MPCA's top researcher on new chemicals was repeatedly denied the chance to investigate how far the toxins may have spread.**

**The story raises questions about who is responsible for the safety of the public and the environment. And about whether state agencies are doing enough to protect citizens from toxic chemicals.**

St. Paul, Minn. — On Jan. 25, 2005, Oakdale residents learned their drinking water was contaminated with chemicals formerly made by 3M.

At the news conference, health department scientists joined Oakdale's mayor and some of his staff at city hall to get out the word -- tests of six city wells showed that five of them were contaminated. But the amounts of the chemicals -- called PFOA and PFOS -- were small.



Q Oakdale's  
mayor

"Levels found in our local wells do not exceed those health-based values," said Mayor Carmen Sarrack.

In other words, Oakdale's water was safe to drink. Prompted by TV reporters, Sarrack dutifully took a drink from the city hall tap in front of the cameras.

"This afternoon I went home for lunch and had two glasses of water, and I'm still here," Sarrack said.

Oakdale is the second known location in the U.S. where traces of PFOA and PFOS have contaminated a public water supply. Drinking water near a West Virginia chemical plant has also been contaminated.

But if you got your blood tested today, it would almost certainly contain traces of both compounds found in Oakdale's water. And you would not be alone. An estimated 95 percent of adults and children in the United States would test positive for perfluorooctanyl sulfonate, known as PFOS, or a related compound, perfluorooctanoic acid, known as PFOA.



Q Scotchgard

These chemicals are present around the world, including in the U.S. blood supply, the blood of 3M plant workers, as well as fish, birds and animals living far from chemical factories.

Until 2000, 3M was the sole manufacturer of this family of chemicals, which went into Scotchgard. Scotchgard is made from a chemical that breaks down into PFOS. It was primarily made at 3M's plant in Decatur, Alabama. PFOA was produced at 3M's plant in Cottage Grove, Minnesota, and sold to customers like DuPont for use in its Teflon brand of non-stick coatings.

#### **SCOTCHGARD THE RESULT OF 'A LUCKY ACCIDENT'**

Scotchgard is one of 3M's signature products, helping to earn the company millions of dollars and a reputation as one of the most admired companies in America. For more than a century, 3M has been seen as a pillar of Minnesota's business community, and known for corporate good deeds and financial support of nonprofits, including Minnesota Public Radio.

Radio legend Arthur Godfrey was full of praise for 3M when he brought his CBS show to Minneapolis in 1969.



Q Patsy Sherman

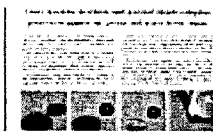
"You know who they are! 3M, my gosh, is one of the great names in American industry. Kind of like sterling on silver, is the way I like to think of them."

Scotchgard started out as a brilliant success story for 3M. It was the result of a lucky accident. The company started a major research effort on something called fluorochemicals in the 1950s. In the lab one day, chemist Patsy Sherman spilled a mixture on a lab assistant's tennis shoe. The stain turned out to be impervious to water, soap and scrubbing.

This led to innovative products like marine firefighting foam, food packaging, and most famously, Scotchgard fabric protector, introduced in 1956.

Scotchgard was a hit with housewives. In 1969, WCCO radio's Boone and Erickson featured inventor Patsy Sherman for a call-in segment on Scotchgard.

repels all stains!



"I'd like to ask your guest whether or not Scotchgard is safe to use on items such as silk ties?" asked one female caller.

"The spray can product should be safe for any product that is safe in drycleaning," responded Patsy Sherman. "And yes, it will keep the gravy off the tie," because the gravy can't get to the thread.

Scotchgard ad

Rich Purdy is a former 3M scientist familiar with the chemicals in Scotchgard.

"So if you put it on paper, the grease doesn't soak through the paper. If you put it on fabric, then it doesn't soil as easy. Or you put it on your carpet. Scotchgard or Stainmaster are two brands of carpet treatments that have that property," says Purdy. "It has those wonderful properties. And the other wonderful property of it, it doesn't break down as easy."

### CONCERN ABOUT THE CHEMICALS

In fact, scientists say, perfluorochemicals like PFOS and PFOA don't break down at all in the environment. Scientists are still studying how they enter humans, but it's thought to be through air and water.

Once the chemicals are in the body, 3M's medical director Dr. Larry Zobel says they hitch a ride with protein in the bloodstream, and circulate through the body.



3M's Larry Zobel

"They're very unlike other materials that get in the body and stay a long time, which might go to fat or to bone. These materials don't. They're actively moving around the body," explains Zobel. "They bind to protein in the blood. The liver removes them and actually excretes them in the bile. So they get into the intestine, and as they're moved down the intestine they are re-absorbed again. So they come back through the circulation back to the liver, they re-attach to protein and they circulate some more."

Zobel says PFOS stays in the human body about five years, and PFOA almost four. Scientists say that chemicals that stay in the body or stick around the environment aren't necessarily a problem -- unless they turn out to be toxic.

Rich Purdy says when he joined 3M in 1981, it was his job to evaluate the environmental safety of the company's products, including Scotchgard. He says he noticed that the chemical structure of PFOA and PFOS -- carbon attached to fluorine -- was similar to other well-known environmental toxins.

"You know about chlorinated chemicals -- the dioxins and DDT and so forth. ... Fluorine belongs to the same -- in the periodic table, it's right next to chlorine. ... And so you would expect that they'd be similar in several properties," says Purdy. "Everyone in my group had concerns about them. ... We didn't have data that showed that they were very toxic or anything, but we looked at it in two ways. One was that you should find out. But the other one is, that even if they aren't, you need to do the testing, because somebody else is going to look at the structure and ask the questions."



Concerned from the beginning

Purdy says in the 1990s, 3M tested the compounds in lab rats and monkeys, and the chemicals proved toxic. But 3M says the chemicals have not caused health effects in its workers.

Michael Santoro, 3M's director of health safety, is working on the corporation's fluorochemical investigation. He says the company began monitoring its chemical plant workers for PFOS in the 1970s. He says the company kept working to improve its detection techniques.

In the 1990s, 3M was able to identify the presence of the chemical down to the level of parts per billion. That's a level so small, it's like picking one second out of 32 years. In 1997, a lab comparing 3M workers' blood to randomly chosen Red Cross samples found the chemicals were present in the blood bank samples, too. This indicated the chemicals had become widespread in humans, though at low levels.

Santoro says 3M began looking for a safer formulation to replace the old Scotchgard.

"There were a number of factors that came together that said to us, 'You know, it seems to us that phasing out here would be the most appropriate thing to do,'" said Santoro.

## SCOTCHGARD REMOVED FROM THE MARKET

On May 16, 2000, 3M made its announcement. The company's press release said the low levels of chemicals present in humans and the environment did not pose a health risk. Still, the company said it would phase out Scotchgard as a part of responsible environmental management.

3M says the decision cost it \$325 million in annual sales. DuPont, 3M's major customer for PFOA, began making the chemical itself. Anyone wanting to make or use PFOS in the U.S. must now get permission from the EPA.

In May 2000, when the phaseout was announced, Karen Studders was serving as the commissioner of the Minnesota Pollution Control Agency. She remembers the day she learned 3M would no longer make Scotchgard in its original formulation.



Former MPCA  
commissioner

"It was either one of two things. It was either 3M actually called the commissioner's office, or one of the senior staff came into the commissioner's office and relayed it to me," says Studders. "So we actually heard about it before it was public. And I believe I saw it in the Star Tribune and the Pioneer Press, a few days later."

The story made the front page of the Star Tribune, and the front of the business section of the St. Paul Pioneer Press. After the news broke, Studders said she took no steps on the Scotchgard matter beyond her office. She did not ask for a meeting with 3M.

"I don't think I really did, personally. I really think I'd recall that if I'd done that," Studders says. "What I do recall, however, is talking with staff that work on compiling information about new and emerging chemistry and chemicals, and talking to them to see what information we had."

Even though 3M cited environmental concerns in its voluntary decision to quit making the chemicals, the MPCA would not begin to investigate the places where the chemicals had been developed and disposed of for another two years.



MPCA files

Staff and managers of the MPCA give differing stories explaining that delay. Some say they didn't know anything about this front-page story. Others say they knew about the issue generally, but didn't understand the extent of 3M's chemical production and disposal in Minnesota.

The next year, in 2001, 3M again made news when it released a study showing PFOS had been found in the blood of bald eagles in the Great Lakes region, in river otters in the Northwest, in birds and turtles in the Southeast, in polar bears in Alaska -- even in albatrosses in the Pacific Ocean.

Michigan State University toxicologist John Giesy did the research, and 3M funded it. He said at the time, his discovery increased the mystery of how these compounds were spreading.

"We need more information on some of the toxicology to try to interpret what these levels mean," says Giesy.

In the MPCA's "correspondence" file for the 3M Cottage Grove plant, for the year 2001, there is just one piece of paper -- a news report headlined, "Scotchgard sticks in the environment." There were no memos, no studies, no records of communication with 3M.

But one scientist at the agency was growing concerned about perfluorinated chemicals -- Fardin Oliaei.

## AT THE TOP OF THE LIST OF CONCERNS

Dr. Oliaei is an emerging contaminant coordinator. Her job at the MPCA is to identify new

environmental threats -- chemicals that by definition, no one is regulating; chemicals too new to have much of a track record.

Oliaei, a native of Iran, is a top research scientist at the MPCA. She was recruited to join the agency in 1989 because of her work on acid rain and dioxins in Lake Superior.



*Dr. Fardin Oliaei*

Oliaei says perfluorinated chemicals hit her radar in 2000.

"In 2001, PFOS and PFOA were climbing the ladder to become a priority list. In my view I would put those on the top of the emerging contaminants of concern," says Oliaei.

Oliaei got the go-ahead from the MPCA to do one study in 2002 on 14 fish in Voyageurs National Park, in northern Minnesota. She wanted independent confirmation of what 3M was finding.

She says half the fish samples were contaminated with perfluorinated chemicals.

"And we couldn't get to any conclusion, except expanding our data and gathering monitoring data from the environment," Oliaei says.

This would be the first independent study to show the chemicals were spreading in the environment in Minnesota. But Oliaei would not get to follow up.

Oliaei wanted to trace the contaminants from their source -- most likely 3M -- through wastewater treatment plants, sewage sludge, sediment, and finally to fish and humans. Her requests would be repeatedly denied by MPCA middle managers.

In March 2002, 3M called a meeting with the MPCA. 3M reported that drinking water at its Cottage Grove plant, which produced thousands of pounds of PFOA a year, was contaminated with the chemicals.

Dave Douglas is the person at the MPCA who knew the most about 3M's Cottage Grove chemical plant. The MPCA had begun work at the plant in 1985 to clean up a small amount of hazardous waste as a part of Minnesota's Superfund cleanup program. Douglas had managed the project since 1987.

Douglas was at the 2002 briefing with 3M.

"It was basically at that briefing that this whole issue of perfluorochemicals came to my mind, to my attention," says Douglas.

3M also passed on to the MPCA its studies showing the effects of PFOS on pregnant rats and their offspring. An internal memo from the EPA described the death of the rat pups as "unusual."

Douglas, who's described by Fardin Oliaei as a "morally alert" scientist, was concerned.

"From the get-go, here at the first meeting, 3M came in and they started talking about the second generation rat studies, which is troubling, and we all recognized that," says Douglas. "And we're going to ask questions of them about what they know about that, because that gets to the question of whether we have a significant long-term human problem."

After the 3M briefing, Douglas began to investigate what was at the Cottage Grove plant and how to clean it up. But the scope would keep growing.

It emerged that at least three public landfills in Lake Elmo, Oakdale and Woodbury also contain waste from 3M's perfluorochemical operations. All are surrounded by houses.

## Part 2: The neighbors

by Mike Edgerly, Minnesota Public Radio  
by Sasha Aslanian, Minnesota Public Radio  
February 22, 2005



*Susan Berndt and her dog, Captain, on the trail leading to the old landfill where she and her friends used to play when they were children. 3M disposed of chemical wastes in that landfill. (MPR Photo/Melanie Sommer)*

St. Paul, Minn. — Before there was an MPCA or even a Superfund cleanup program, people who lived near 3M's Cottage Grove plant and its nearby Woodbury landfill had questions.



*"A more innocent time"*

Susan Berndt's family has lived in the area since before the Civil War. In the 1960s, neighbors and businesses dumped their trash in the woods not far from her family's home. 3M had bought the landfill in 1961. She and the neighborhood kids would play amid household junk and derelict cars there.

"There were no fences. Or if there were, I was just a farm kid and we didn't pay much attention to fences. You know, the land was pretty much free. We would just go wherever we wanted and people didn't mind," Berndt says. "It was a different, more innocent time. We didn't think of things that could have hurt us. We never thought of chemicals at all."

### THE YEAR THE DUMP BURNED

Susan Berndt's most vivid memory is of the year the dump burned. In the '60s, cleanup meant burning what was there. In 1968, 3M burned the dump. The fire sent soot up into the air for weeks. 3M says the mass burning took place with the consent of nearby communities and the state. Berndt remembers skiing the woods near the fire, and how the snow had changed color.



*The old farm*

"That winter when the dump was burning, there was a black layer. Then there'd be swirls of ash in a black layer in the snow, and there'd be clear white snow. It was so different from what it had been in the past," Berndt says. "We also would eat the icicles off the house, and that year there was a lot of black particles in the icicles, and I remember that the icicles tasted very different."

When the burning was over, Berndt recalls, 3M showed up at the family's house, bearing gifts.

"Two guys from 3M came up in a car and they were going to give us a gift. They wanted to apologize for the burning for the last year, or however long it was," Berndt recalls. "My brother was there, and they opened the car window just far enough to give him the box. And he pulled the box out and he ran in the house. He thought he had a great treasure. And that was their apology they gave us. For having to put up with the smoke and the smells for that period of time, they gave us a box of tape!"



Susan Berndt says this wasn't her family's last contact with 3M. She and her sister, Cindy Ratzlaff, recall men in 3M uniforms coming by without warning, to take water from their outdoor tap.



3M's Cottage  
Grove plant

"The specific time that I remember was when I was babysitting at the neighbors. It was 1974, because their mother was in the hospital," Ratzlaff says. "And the guy came and he went to the faucet, and I said, 'What are you doing?' And he said, 'I'm just taking a water sample.' He filled up a bag of water, rolled it up at the top and left with it."

The two remember that the man had a 3M logo on the jacket he was wearing. They say he came twice that summer.

When asked if they were ever scared by these events -- the fire and the water testing -- Susan Berndt said she wasn't at the time.

"But over the years there has been a lot of questioning about whether they really cleaned it up, and whether they were really truthful with us about what it was," Berndt says.

### SEEKING MORE ANSWERS

<BR> <p>

3M says in the mid-1960s, it tested some private wells for contamination -- but not contamination for perfluorinated chemicals. The technology for those kinds of tests didn't exist then. 3M says only one shallow well showed drinking water contamination. To solve the problem, the company replaced it with a deeper well.

Today, the Woodbury landfill is a grassy field surrounded by a tall cyclone fence. It's managed by 3M in a voluntary program with the Minnesota Pollution Control Agency.



Stanley Hale at  
the landfill

Stanley Hale lived near this landfill for 25 years. Hale is a white-haired, meticulous Englishman. Like a lot of people around here, he's a former 3M employee. He leads a driving tour through his old neighborhood where he lived and raised his family.

"So you know the location of the dump site? This one here? I lived down here on the left, so you can see why I had an active interest in finding out more about what was in that site," Hale says.

The 3M smokestacks on the edge of the Mississippi River come into view. This is the 3M Cottage Grove plant, the one the locals know as Chemolite.

"Now this is the facility where a number of years ago I tried to get details on the total emission -- not this stack, not that one, but the grand total of all emissions," says Hale.

In the 1990s, Hale organized other residents who shared his concerns about potential ground and air contamination from the plant and landfill.



Hale and  
Winston Riedesel

Winston Riedesel is one of Hale's old compatriots. Riedesel is a retired civil engineer. He's tall and thin, with large glasses. We settle into his tidy living room with a picture window and a bird clock.

"I'd ask people down there in that area, 'Do you know the Chemolite plant -- do you know what they do?' And nobody knew. They'd been there for all their lives and nobody knew, and that just amazed me," says Riedesel.

Depending on the direction the wind blows, Riedesel and his family can smell the plant. Riedesel complains that 3M hasn't been open enough about what it's producing and burning in its incinerator. 3M gave Riedesel a tour of the plant.

But he still wasn't satisfied with answers from the company, or from the MPCA and other public officials.

"Everybody was in bed with 3M, and they were all just sleeping together," he says. "Nobody was looking out for the health and welfare of the citizens."

Riedesel says he's been frustrated about this for years. He even testified at a Cottage Grove City Council meeting back in 1998.

In 1996, the Old Cottage Grove Concerned Citizens Group petitioned the Cottage Grove City council to ban housing developments near the landfill, until the MPCA could prove the underground pollution was contained.



At a meeting on Sept. 2, 1998, the MPCA and 3M had been invited to answer residents' questions about the cleanup of the adjacent Woodbury landfill.

The MPCA showed maps of the contaminated groundwater. At that point in time, the agency did not know to test for perfluorinated chemicals.

3M was piping this groundwater to the plant, and then to the Mississippi River.

Sheryl Corrigan

Sheryl Corrigan, a senior environmental engineer with 3M, explained the water was used as a coolant at the Cottage Grove chemical plant, and also at a power plant.

"There is a monitoring plant before it's discharged to the Mississippi, and it's consistently clean," Corrigan said in a videotape of the 1998 meeting.

3M says according to the standards of the day, the water was clean. MPCA records estimate 45 tons of perfluorochemical wastes are buried at the Woodbury landfill. The groundwater below the landfill is not treated before it reaches the Mississippi River.

In response to a request from Minnesota Public Radio, the MPCA calculated that the 3M Cottage Grove plant released about 10,000 pounds of perfluorinated chemicals into the river in 2001, when 3M was in the middle of its phaseout of PFOA production.

Today, 3M has installed filters at the plant to catch most of the perfluorinated chemicals.

3M's Sheryl Corrigan was also, for a time, Dave Douglas' counterpart on the Cottage Grove Superfund site. As a 3M representative, it was her job to give him data about the contamination there. In 2002, Corrigan left 3M to become commissioner of the Minnesota Pollution Control Agency.

## Part 3: The politics

by Mike Edgerly, Minnesota Public Radio  
by Sasha Aslanian, Minnesota Public Radio  
February 22, 2005



*Sheryl Corrigan was appointed commissioner of the Minnesota Pollution Control Agency in 2002. Prior to her appointment she was employed at 3M. (MPR file photo)*

St. Paul, Minn. — Republican Gov.-elect Tim Pawlenty named Sheryl Corrigan to be commissioner of the Minnesota Pollution Control Agency in 2002. The governor said he was looking for an environmental watchdog with a business perspective.

Corrigan says a 3M manager recommended her for the job.

"My understanding is a former boss of mine forwarded my name as someone who had the kind of experience the Pawlenty administration was looking for, in terms of an environmental management background," says Corrigan.

Corrigan still owns stock in her former employer, 3M. By law, she reported her 3M stock holdings to the Ethical Practices Board. She told Minnesota Public Radio it amounts to about \$20,000.

Corrigan says she has had no contact with MPCA staff who handle 3M matters from the time she took office. She put her recusal from 3M matters into writing a year and a half later. The letter was addressed to her top managers and the governor. It was not distributed to MPCA staff.

### **FROM 3M TO THE MPCA**

At MPCA headquarters in St. Paul, Corrigan is relaxed and confident, eager to talk about her initiative to clean up polluted waterways across the state. When asked about her 1998 statement to Cottage Grove residents that the landfill water flowing into the Mississippi was clean, Corrigan says her words still stand.

"The statements I made in 1998 I would have made today. I understand that the science has changed again and has evolved, and so we know more," says Corrigan. "But that's the nature of our business. As time goes by we learn more, and so we're able to respond in a different way."



Q 3M

In 1998, when Corrigan was still at 3M, the company was involved in extensive testing about its perfluorinated chemicals. Sheryl Corrigan says she knew the testing was underway.

"The information I had was information that the public had. 3M has been very open about what was on the books and what folks had access to. I had no more information than the public at any given time about what was the occurrence of any particular chemical at any particular place," says Corrigan.

Corrigan was asked whether the residents of Cottage Grove should have known there were perfluorinated chemicals in the blood supply, even as they were asking questions of 3M and the MPCA.

"The information that was available was publicly available," Corrigan responded. "I think it would be a misstatement to say that folks at 3M were in any way, shape or form keeping information from people. That wasn't the corporate policy and that wasn't the corporate practice."

Corrigan's appearance before the Cottage Grove City Council was in 1998. It would be two years later, in 2000, when perfluorinated chemicals would become front page news.



Q 3M's Santoro

Michael Santoro, 3M's director of health safety, was asked about Corrigan's answers -- whether 3M knew in 1998 about the potential threat posed by PFCs at the plant, or near the landfill, and whether Corrigan should have said something to Cottage Grove residents at that city council meeting.

"Well, that's a good question," Santoro responded. "I think at that time the focus of the discussion -- and I obviously can't speak for her -- was more about what I call conventional types of pollutants. The understanding we had of site operations with any onsite landfill led us to say there were no offsite concerns associated with the waste materials that were talked about at that time."

"We knew, I think, that we had disposed of some materials there," said Santoro. "I don't think there's a good an understanding as we have today from the standpoint of the nature of persistence, and the fact that they may have an impact."

Like any major manufacturer in Minnesota, 3M has many routine dealings with the MPCA.

At the 2002 news conference announcing her appointment, Corrigan said she "knew of no current issues involving 3M and the MPCA that would complicate her new role."

3M's Michael Santoro backs up Corrigan's statement.

"Yes, I think so. Keep in mind that our relationship with the Minnesota Pollution Control Agency, I think, over the years, has been very positive. If there are issues, we deal with them upfront and solve any problems that we might have. So I'd say that's an accurate statement," said Santoro.



Q Sen. John Marty

Corrigan's appointment met no opposition in the state Senate. At her confirmation hearing, no senator asked whether her previous employment at one of Minnesota's largest manufacturers might pose a potential conflict of interest.

Corrigan was confirmed in April 2004, after serving in the job for more than a year. The DFL chair of the Senate Environment and Natural Resources committee, John Marty, says she was judged more on her short track record at the MPCA than her private sector work.

"My initial reaction would have been, 'She's a decent person.' I still believe that. But I'd prefer to have the appointees who are head of the Pollution Control Agency as people who are going to be strong advocates for protecting the environment," Marty says.

"Somebody coming from industry -- that's not saying they can't be that -- but the initial reaction was, I'm not as likely to expect her to be as aggressive as some environmentalist might be," Marty says. "But again, it's the governor's appointment, and I guess I didn't think we were going to get anything better than we got with her."

#### **MPCA SCIENTIST CLASHES WITH HER BOSS**

Fardin Oliaei, the MPCA scientist who wanted to study perfluorinated chemicals, only got one chance to do so after Commissioner Sheryl Corrigan took office in 2003.

On a cold November day in 2004, Oliaei and her colleague Joe Julik are taking core samples from a closed public landfill in Washington County, in Lake Elmo. It is one of several locations in the area where 3M disposed waste from its perfluorochemical operations in the late 1960s and early '70s.



Gathering soil samples

Oliaei and Julik, a hydrogeologist, are pounding soil samples from collection tubes. The landfill looks like any grass-covered field. There are homes nearby, and tracks made by deer and other wildlife. But a sharp chemical smell gives away the field's history. Oliaei has selected this landfill because she knows the soil is likely still contaminated with perfluorinated chemicals.

"This is a soil sample that we are getting to get some idea about the concentration of PFOS/PFOA in this soil sample, going down to groundwater level," she explains.

Oliaei's samples are taken in intervals down to 25 feet.

"It tells us about the traveling of these contaminants through the soil, down to the aquifer," says Oliaei.

A few months earlier, the Minnesota Department of Health found wells at seven nearby homes contaminated with PFOA, but the water was not unsafe to drink.



Julik and Oliaei

Joe Julik says old landfills can leak.

"Unfortunately, where they sited a lot of these was in old gravel pits, because there was a hole there. Well, gravel pits have sandy bottoms and so they leak," Julik says. "This is an example of one that had a sandy bottom. So the leachates that formed from the water moving through the waste leach down into the groundwater and cause the problem."

Julik points in the direction the groundwater flows -- toward nearby homes, and ultimately to the Mississippi River.

Oliaei would like to follow this underground trail. As the coordinator of the MPCA's program on emerging contaminants, Oliaei had proposed a series of tests to measure how perfluorinated chemicals are moving from 3M sites out into the environment.

In 2003, she requested \$140,000 for PFOA and PFOS research, combined with unrelated studies into flame-retardants and pharmaceuticals. When her MPCA boss rejected that proposal, she lowered her request to \$14,000. That, too, was rejected.



Research requests were denied

In 2004, she submitted five more research proposals to her supervisors. All five were rejected.

Oliaei says she took her case directly to Commissioner Sheryl Corrigan.

"I went to her with a copy of my proposals for fiscal 2004, and I told her, 'I know your priorities, according to what you say, are water issues,'" Oliaei recalls. "'These are emerging contaminants, regardless of where they are coming from. Ultimately they are going to go in the water and accumulate about the aquatic life, and go back again to humans and so forth. And there is a lot of information about toxicity, and for us as a Pollution Control Agency, we should do the monitoring of this stuff.'"

"And she told me that she would look at those and let me know later, which she never got back to me," says Oliaei. "But in her conversation with me she said, 'Fardin, what do you want me to do?' And I said, 'I want you to support this project.' And she told me, 'Let me tell you -- if you like to do scientific work, this agency is not a scientific institution. I strongly suggest you go somewhere else to do science work.' And that was my first, maybe, and last conversation with her."

"Dr. Oliaei has done some great work on occurrence. But that's as far as we want to go," responds Corrigan. "Now we need to start looking to the involved agencies around how to fix it. I'm not sure that research scientists belong at the Minnesota Pollution Control Agency."

Oliaei's relationship with the agency has been strained in recent years. She's brought two discrimination complaints against the agency. The first one, in 1999, resulted in a promotion she had been seeking. The second one, filed in 2004, is still pending.

**Dr. Oliaei has done some great work on occurrence. But that's as far as we want to go. ... I'm not sure that research scientists belong at the Minnesota Pollution Control Agency.**

**- MPCA Commissioner Sheryl Corrigan**

No one is disputing Oliaei's skill as a scientist. A principal engineer with the MPCA confirmed to us that Oliaei is respected by her peers and is considered a very good scientist. An expert in toxic reductions at the federal Environmental Protection Agency office in Chicago described her as a "cutting edge scientist" who pushes hard for her work.

But Oliaei couldn't persuade Corrigan that her research should be funded.

Corrigan disputes that she and Oliaei ever discussed perfluorochemicals specifically. She acknowledges they may be a problem, but she says doing the research is not the MPCA's job -- it's the Environmental Protection Agency.

"There are a plethora of challenges for us here at the agency on what's the most important thing to look at. And while fluorochemicals certainly are at the front burner for EPA, that's because EPA's been charged with determining the risk around these. So they're madly working to determine how these chemicals work in the environment," says Corrigan.

"We have some problems that are right in front of us. Right in front of us," Corrigan says. "There are fine particles in our air today that we need to deal with. There's phosphorus in our waters today that we need to deal with. And there might very well be fluorochemicals in our waters that we need to deal with. But until we have the right science to move forward on, it doesn't make sense."

The EPA has opened a major investigation of perfluorinated chemicals. But not in Minnesota.

"We're not specifically looking into the facilities in Minnesota," says Lawrence Libelo, a senior environmental engineer with the EPA. "That's being done by the state folks. We're relying on them to do the work in their area."

The EPA isn't looking for the chemicals in Minnesota, because they're not made here anymore. The EPA investigation is focused on Alabama and West Virginia, two places where PFOA continues to be used.

Mary Dominiak coordinates the EPA's investigation of fluorochemicals. She says the most important question the EPA still can't answer is -- what threat do the chemicals pose to human health?

"The jury is still out on that one," says Dominiak. "We're looking at trying to assemble the information that will let us know whether we're dealing with a risk now, or one that might develop over time, if these chemicals would continue to be manufactured and used in the quantities that they were in the past."

## **Part 4: The company**

by Mike Edgerly, Minnesota Public Radio  
by Sasha Aslanian, Minnesota Public Radio  
February 22, 2005



*3M is financing new research to determine the extent of PFOA and PFOS in Minnesota's environment, five years after the original Scotchgard formula was taken off the market. (MPR Photo/Melanie Sommer)*

St. Paul, Minn. — Much of what the EPA knows about these chemicals comes from the manufacturers. 3M's studies tend to focus on male plant workers rather than pregnant women, the children of workers or the people who live near the plants.

In 1981, DuPont found evidence of birth defects in babies born to female workers in West Virginia. DuPont now faces more than \$300 million in fines for allegedly not turning over that information to the EPA.

A study 3M published on American children in 2004 showed that children and adults in the general population have similar levels of perfluorinated chemicals in their blood. 3M concluded that the chemicals are passed from mother to child in utero.

According to Rich Purdy, the former 3M eco-toxicologist, children have another possible route of exposure.

"These chemicals are put onto sleepwear and put onto carpets," says Purdy. "Well, babies are put onto carpets and into sleepwear, and what do they do? They suck on their sleepwear and put their saliva-covered hands onto the carpet. And these chemicals are on the carpet, so they can be extracting it. They can get huge amounts there."

### **3M BEGINS RESEARCH**

Purdy says the 1997 discovery that low levels of the chemicals were widespread in the human population prompted 3M to begin amassing a huge base of information.

"When they found it, then they started doing a lot more testing -- of everything. We initiated studies with fish. We initiated studies with invertebrates. We initiated studies on rats for cancer -- maybe they were started even earlier than that," says Purdy. "They started other studies for human toxicology. They initiated studies on quail and mallards and birds. They initiated studies for how long it lasts in the atmosphere and biodegradation. So there was a lot of testing started."



[Former 3Mer](#)

Purdy says he found it unsettling when the chemicals were found in baby eagles -- birds that had never left the nest. This finding signaled to Purdy that the chemicals had entered the food chain. Other tests showed the chemicals were present in fish from the Atlantic Ocean.

"I calculated how much seals and killer whales higher up the food chain would be exposed to, and it was huge amounts. And they were amounts that were, in my estimation, higher than the concentrations we knew would affect animals," says Purdy. "I was concerned about that, and wanted 3M to report the concern to EPA under the Toxic Substances Control Act, because if you find data that it's hazardous, you need to report it to the Environmental Protection Agency."

Purdy says his managers weren't ready to report it. 3M medical director Dr. Larry Zobel says the company had to be satisfied the research was right before taking it to the EPA.

"We certainly were going to report everything that we had. We'd gather stuff up and send it in, on somewhat of a periodic basis, to the agency. We'd get some results in and they'd be initial lab results," says Zobel. "I wasn't working with Rich at that time, so I can't speak to the particular circumstance -- but I know we had a lot of discussions in our department (that) we need final data. Before we send something in it's going to be final data, it's going to be validated, and we're not going to send it in until we're sure of what we've got."



[Zobel: No attempt to conceal info](#)

During this time, Rich Purdy says he was pressured not to put his concerns about the findings into writing. He says the company feared lawsuits.

"There wasn't a memo, because they didn't want you to write it down. And they didn't want to write it down because they knew there may be legal discovery coming," Purdy says. "My concerns with one sample -- I did put it in an e-mail and they were quite concerned about that. I said, 'Well, there's a reason I put it in an e-mail that way. This might well be open to discovery.' And the management had us stamping anything we wrote down as 'attorney-client privilege.' It wasn't proper, but they wanted everything stamped with that stamp."

"I actually had forgotten about that," says 3M's Zobel. "I can remember having a stamp that said 'attorney-client privilege' as well, for a brief period of time. Quite honestly, we were trying to make decisions about the management of information, and I think it was probably during that time. It obviously didn't have much of an impact. We always knew everything would be transparent."

The stamping practice was short-lived. Nevertheless, Rich Purdy decided to leave 3M in February 2000. He'd been with the company for 19 years, and thought it was time to move on. Three months later, in May 2000, 3M announced its phaseout of the original Scotchgard and most other products the company made with PFOA and PFOS.



[Purdy raises horses](#)

Rich Purdy now runs a farm in western Wisconsin, where he breeds draft horses. Because of what he learned at 3M, Purdy says he doesn't have carpets in his house. His farm is all organic.

"Don't fool with chemicals if you don't have to," says Purdy.

But he says there's not much you can do to avoid perfluorochemicals in the environment.

Purdy isn't bitter toward his former employer. In fact, he speaks with pride about the company's investment in science -- and ultimately, the job it did on these chemicals.



He compares 3M favorably to other companies in the perfluorinated chemicals business -- DuPont, for example, which continues to make and use the chemicals.

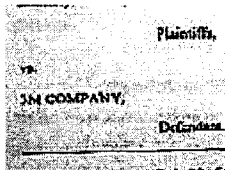
"3M is like somebody who ran the stop sign, got through the stop sign, 'Oh my God,' and stopped," says Purdy. "Well, DuPont didn't stop, didn't care, hit-and-run, just keeps rolling down the road."

DuPont claims "no known adverse human health effects have been reported in connection with levels of PFOA measured in workers or the general population."

### LEGAL ACTION IS PENDING

Even though 3M is no longer in the business of making PFOA and PFOS, it faces lawsuits for its past practices.

In 2002 a 3M worker in the Decatur, Alabama, plant where Scotchgard was produced sued the company, alleging the company didn't disclose the health risks of working with the chemicals. That suit has now expanded to include other former and current workers and their children. The case is pending.



Two years later, in September 2004, neighbors of the Decatur plant sued. They claimed chemicals had contaminated their soil and groundwater, and lowered their property values. In October 2004, 3M faced a new lawsuit, this time in Minnesota.

Gale Pearson is the attorney bringing the class action suit.

#### Cottage Grove lawsuit

"The complaint is alleging that 3M has manufactured a chemical that is dangerous to the community in their plant," says Pearson. "And they have not taken steps to protect this chemical from leaking into the groundwater to the community outside of their plant."

The Cottage Grove suit claims increased risk of cancer and asthma to people exposed to these chemicals. It is seeking environmental cleanup, health monitoring and monetary damages.

The company says the lawsuit is without merit. 3M spokesman Rick Renner says the allegations in the complaint misrepresent extensive scientific research, and many other facts.



When asked about risks to residents near the Cottage Grove plant, 3M's medical director Larry Zobel says if those with the highest exposure -- workers -- aren't sick, the rest of the community probably isn't either.

#### James Kelly

"Workers who worked directly with precursor materials have much higher exposure, and have blood levels that are 60 to 100 to 1,000 times more than what is seen in the general population," Zobel says. "We have not been able to attribute any health effects in those employees to the presence of these chemicals at those concentrations. So the combination of what we've seen in employee medical surveillance and monitoring, and the laboratory studies, give

us pretty good assurance that at the low levels in the general population, there are no effects to be concerned about."

Before the Minnesota lawsuit was filed, the state Health Department tried to assess the health risk from perfluorochemicals at the 3M Cottage Grove plant. The report concluded there was insufficient data to say if the plant was a risk or not.

"At this point we can't say a whole lot," says health assessor Jim Kelly, the author of that report.

Kelly made a series of recommendations in order to fill these gaps, modeled on the investigation at 3M's Alabama plant.

"There's been a great deal of effort to investigate 3M's Decatur, Alabama, plant. And what appeared to me, at least, a not quite as comparable effort to investigate 3M's plant in Cottage Grove. Therefore we

recommended that the scope of the investigation that's being proposed for their Decatur Plant be applied to this facility as well," says Kelly.

### **OLIAEI'S RESEARCH GOES FORWARD, WITHOUT HER**

Now, almost five years after 3M announced it would quit making PFOA and PFOS, the MPCA, the Minnesota Health Department and 3M are embarking on an open-ended, comprehensive plan to test soil, groundwater, and wastewater treatment facilities at the Cottage Grove plant. Fish and surface water from the Mississippi River will also be tested. 3M is investigating more landfills where it may have disposed of fluorochemical wastes.

Some of the work is already underway, like the test that turned up the contamination in the Oakdale water supply. At this point, there is no plan to test the blood of residents. 3M told MPR the company would be open to biomonitoring, if environmental data indicated a significantly greater risk of exposure around the plant.



Dr. Oliaei, the MPCA's expert on new chemicals, is not involved with this research. It will be carried out and paid for by 3M.

The kind of research spelled out in the new work plan is what Oliaei proposed doing two years ago -- and was never given permission to do so by her bosses at the MPCA. The MPCA's deputy commissioner told MPR Oliaei's research was not turned down for financial reasons.

#### Regrets delay on study

And as for why the agency didn't start studying 3M's fluorochemicals until two years after the phaseout began, Michael Kanner, the head of the MPCA's Superfund division, expresses some regret.

"There was no evil intent. ... We have good people here, and it's easy to say, 'Four years ago, you should have.' To hindsight, 20-20 is always great," Kanner says. "In retrospect, we wish we had probably started earlier. We wish we had more information from EPA, from 3M, from the Health Department on what all the numbers should be in terms of health values and so on. But we didn't."

When the agency did get going on its investigation in 2002, MPCA records show it was Dave Douglas, the Cottage Grove Superfund manager, who made it happen.



#### Dave Douglas, MPCA's 3M expert

Douglas got the Health Department to develop safe drinking water standards. He followed a tip from the EPA that led to the discovery of 3M fluorochemical waste at area landfills. And he urged a co-worker in the water quality division to calculate how many pounds of PFOA and PFOS were going into the river.

In November 2004, just as the MPCA was about to sign off on the environmental monitoring plan with 3M, Douglas was pulled from the case. When MPR asked why the MPCA official with the most experience on the 3M case was reassigned, Douglas' manager said it was routine.

The fluorochemical issue has been a costly one for 3M. It's spent millions studying the effects of these chemicals. Michael Santoro says it's also changed the way 3M works.

"We have established new policies in the company to look at persistent materials, so that is something new. And we are able to catch these things, if you will, as new chemicals and new products are developed," Santoro says.

When you go to the store, you can still buy a can of Scotchgard. 3M still makes the product, but with a different chemical formulation. 3M's Larry Zobel says the new Scotchgard is safer.

"First of all, it doesn't stay in the body. It's excreted, eliminated, from lab animals. And some limited information from people tells us that it leaves the body very quickly. So in terms of safety with regard to health, it's extraordinarily safe," says Zobel.

When Santoro was asked whether the new Scotchgard is as good as the old, he laughed, "Of course it is!"

## Part 5: The future

by Mike Edgerly, Minnesota Public Radio  
by Sasha Aslanian, Minnesota Public Radio  
February 22, 2005



*Fardin Oliaei says she's demoralized by her long fight with the higher-ups at the MPCA to do more research on perfluorochemicals. Someone once joked that she's more persistent than the chemicals she works with. The description pleased her. (MPR Photo/Mike Edgerly)*

St. Paul, Minn. — DuPont continues to produce PFOA at its plant in West Virginia. In Decatur, Alabama, Dyneon, a subsidiary of 3M, reported to the EPA it continues to use small amounts of PFOA in certain products.

The Centers for Disease Control and Prevention has now added PFOS and PFOA to its chemical surveillance list. The 2007 report will provide more comprehensive data about how much of these substances are in Americans' bodies.

The Old Cottage Grove Concerned Citizens Group has disbanded. Its leader, Stanley Hale, says he burned his filing cabinet of documents and news clippings seven years ago, and moved to western Wisconsin. His son continues to work for 3M.



Just  
coincidence?

The EPA says it doesn't know yet if PFOA and PFOS can cause cancer in humans, but current studies don't rule out the possibility, either. The EPA is investigating how the chemicals affect the body, including potential problems with reproduction, the immune system and the liver.

The general lack of information about the chemicals leads people in Washington County to speculate. Susan Berndt, who grew up near the Woodbury landfill, runs down a long list of health problems facing people on her street.

"We sat down and starting counting them up, and it was unbelievable. Steve died of cancer. He was younger than I am. Happy has cancer right now. Then we go on to Jim and Nancy, and then another Nancy, and Tony," Berndt says. "The lady that lives next door here died of breast cancer, and the lady that lives two doors over died of cancer. And then to the west there's a farm, and I know both of the parents of those children died of cancer. Seems like so many people who have had cancer -- and is it just coincidence? It just makes you wonder."

Dr. Fardin Oliaei attempted to resubmit her research proposals at the MPCA last month, but she says she couldn't get support from her managers.

The results of her Washington County landfill samples came back from the lab and showed very high levels of PFOS, PFOA and other related chemicals.

**Oliaei say it's time to stop looking at chemicals in isolation. PFOA and PFOS have similar chemical cousins, but no one is studying how widely they may have spread through the environment and what harm they may pose.**

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The public relations staff at the MPCA wanted to write about Oliaei's perfluorinated chemicals research. But internal e-mails obtained by Minnesota Public Radio show the staff killed the article, because they were "convinced that the editorial board or other leaders would cut the story at this time." The publications coordinator told MPR her bosses suggested she select another contaminant to focus on -- one not so controversial within the agency.

Oliaei says she is demoralized, but not defeated. She says someone once joked that she's more persistent than the chemicals she works with. The description pleased her.

The bottom line, Oliaei says, is that taxpayers have funded her work at the MPCA for 16 years, and deserve the benefit of all she has learned about these chemicals.

"They are in the environment. They are most probably in the blood and serum of any of them, or their children or their parents," says Oliaei. "They have a right to know about how toxic they are, what is the level of science available, in a meaningful manner -- not to panic, but awareness."

3M broke no laws producing PFOS and PFOA for more than half a century. 3M's phaseout was voluntary, and to this day, no other company has followed its lead. The chemicals remain unregulated, and circulate through the air, water and soil.

An EPA scientist we spoke with said there are thousands of chemicals like PFOA and PFOS that should be regulated, but probably won't be. It takes years to prove how chemicals behave in the environment and in our bodies. It's even more difficult to prove that exposure to such chemicals causes human harm.

Scientists like Rich Purdy and Fardin Oliaei say it's time to stop looking at chemicals in isolation. PFOA and PFOS have chemical cousins with very similar properties, but no one is studying how widely these other chemicals may have spread through the environment, and what harm they may pose.

The lawsuit brought by Cottage Grove residents suing 3M has its first court date Feb. 22, in Stillwater. On the federal level, an EPA panel of scientific experts meets the same day in Washington to consider the human health risks of PFOA.

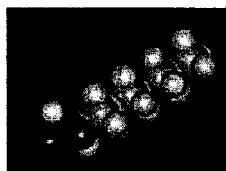
## The long reach of perfluorochemicals

by Mike Edgerly, Minnesota Public Radio  
by [Sasha Aslanian](#), Minnesota Public Radio  
February 22, 2005



*U of M researcher Matt Simcik is looking at why perfluorochemicals have spread throughout the environment. (MPR Photo/Mike Edgerly)*

St. Paul, Minn. — The mysteries are many when it comes to perfluorochemicals.



*QA PFOS model*

Not the least of which is this -- how is it that chemicals no longer made in the U.S. are turning up in the bloodstreams of creatures found nowhere near chemical plants?

Matt Simcik, an assistant professor of environmental science at the University of Minnesota, is researching how they travel through the atmosphere. In 2001, a Michigan State University study conducted by John Giesy found PFOS in the blood of 400 different mammals, fish and birds on all seven continents.

At the time, Simcik said if animals in remote northern Minnesota lakes tested positive for the chemicals, it would be the "nail in the coffin" that the chemicals are moving through the air.



*QA Where PFOS was found*

Simcik collected and tested a group of northern pike in Voyageurs National Park -- the same fish samples tested by Fardin Oliaei of the Minnesota Pollution Control Agency -- and found they showed traces of fluorochemicals. The lakes were wholly cut off from other water sources, and were miles from the closest road.

Simcik had found his "nail in the coffin" on atmospheric transport.

Atmospheric transport isn't the sole source for fluorochemicals in the environment, however. According to Simcik, the chemicals also "leach out of fabric during washing and directly enter the wastewater."

Simcik and other scientists believe PFOA and PFOS were also released into the environment from manufacturing plants where the chemicals were made or used.

## Toxic Traces: Timeline

|                  |                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1953</b>      | 3M scientist Patsy Sherman's accident leads to creation of Scotchgard. She spills a mixture on a lab assistant's tennis shoe. The stain turns out to be impervious to water, soap and scrubbing.                                                                                                                                                                                           |
| <b>1956</b>      | 3M introduces Scotchgard line of fabric protectors.                                                                                                                                                                                                                                                                                                                                        |
| <b>1978</b>      | 3M becomes aware perfluorinated chemicals are present in the blood of its plant workers.                                                                                                                                                                                                                                                                                                   |
| <b>1978</b>      | 3M lab studies show perfluorinated chemicals are toxic to rhesus monkeys.                                                                                                                                                                                                                                                                                                                  |
| <b>1981</b>      | DuPont finds evidence of birth defects in babies born to female employees who worked in its chemical plant in West Virginia.                                                                                                                                                                                                                                                               |
| <b>1981</b>      | Rich Purdy joins 3M as an eco-toxicologist. His job is to research 3M's products' impact on the environment. Purdy becomes concerned about perfluorinated chemicals, as soon as he sees them.                                                                                                                                                                                              |
| <b>1989</b>      | Fardin Oliaei joins the MPCA after doing research on acid rain and dioxins in Lake Superior. She would later become the agency's lead scientist on new chemical threats to the environment.                                                                                                                                                                                                |
| <b>1997</b>      | 3M learns that the blood supply contains traces of PFOA and PFOS. Company expands testing to include human toxicology and wildlife.                                                                                                                                                                                                                                                        |
| <b>1999</b>      | 3M becomes aware that PFOA and PFOS are toxic, bio-accumulate and are persistent in the environment.                                                                                                                                                                                                                                                                                       |
| <b>Feb 2000</b>  | Scientist Rich Purdy quits 3M, in part, over unhappiness that 3M hasn't reported all its findings on PFOA and PFOS to the Environmental Protection Agency.                                                                                                                                                                                                                                 |
| <b>May 2000</b>  | 3M announces it is pulling Scotchgard, a \$325 million a year product, off the market on "principles of responsible environmental management." The company informs MPCA Commissioner Karen Studders of its decision. The agency does not pursue questions about contamination at 3M's Cottage Grove plant or locations where 3M wastes were disposed. Federal EPA begins an investigation. |
| <b>2001</b>      | Michigan State University toxicologist John Giesy's research shows perfluorinated chemicals are present in birds and wildlife around the planet.                                                                                                                                                                                                                                           |
| <b>2002</b>      | Former and current 3M workers in the Decatur, Alabama, plant where Scotchgard was produced sue the company, claiming exposure to chemicals made them sick. That case is pending.                                                                                                                                                                                                           |
| <b>2000-2002</b> | 3M phases out original Scotchgard formula and PFOA production at its Cottage Grove plant. Minnesota Pollution Control Agency estimates the plant released 10,000 pounds of fluorocarbon compounds into the Mississippi River in 2001. The estimate includes 2,794 pounds of PFOS and 2,303 pounds of PFOA.                                                                                 |
| <b>Mar 2002</b>  | 3M tells MPCA the drinking water at 3M Cottage Grove plant is contaminated with PFOA and PFOS. MPCA's Superfund managers begin investigation.                                                                                                                                                                                                                                              |
| <b>Nov 2002</b>  | Minnesota Department of Health develops health-based values for drinking water of one part per billion for PFOS, and seven parts per billion for PFOA.                                                                                                                                                                                                                                     |

|                    |                                                                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2002</b>        | Fardin Oliaei and a University of Minnesota researcher get MPCA funding to test fish in Voyageurs National Park for perfluorinated chemicals. She says half the fish test positive for the chemicals.                                                               |
| <b>Dec 2002</b>    | Gov. Tim Pawlenty appoints Sheryl Corrigan of 3M as commissioner of the Minnesota Pollution Control Agency.                                                                                                                                                         |
| <b>2003</b>        | Environmental Protection Agency releases preliminary draft risk assessment for PFOA.                                                                                                                                                                                |
| <b>2003</b>        | Centers for Disease Control and Prevention adds PFOA and PFOS to its national biomonitoring surveillance study.                                                                                                                                                     |
| <b>2004</b>        | 3M publishes results of blood tests on children. It shows children and adults have similar levels of perfluorinated chemicals, indicating the chemicals cross the placenta while a fetus is in utero.                                                               |
| <b>Jun 2004</b>    | MPCA Commissioner Sheryl Corrigan files a letter with Gov. Pawlenty and his senior managers, recusing herself from 3M matters, 18 months after being appointed.                                                                                                     |
| <b>Jun 2004</b>    | Minnesota Department of Health releases health consultation for 3M plant, declaring the plant poses an indeterminate public health hazard. MDH recommends a more comprehensive investigation, on the scale of the one underway at the 3M plant in Decatur, Alabama. |
| <b>Aug 2004</b>    | Minnesota Department of Health finds seven residential wells near the Washington County landfill contaminated with low levels of perfluorinated chemicals.                                                                                                          |
| <b>Sept 2004</b>   | Neighbors of the Decatur plant sue 3M. They claim perfluorinated chemicals from the plant contaminated their soil and groundwater, and lowered their property values.                                                                                               |
| <b>Oct 2004</b>    | Minnesotans file a class action lawsuit against 3M, claiming chemicals from 3M's Cottage Grove plant made them sick.                                                                                                                                                |
| <b>Winter 2005</b> | MPCA, Minnesota Department of Health and 3M embark on a work plan to investigate PFOA and PFOS releases from the 3M Cottage Grove plant and 3M landfills into the Mississippi River and groundwater.                                                                |
| <b>Jan 2005</b>    | EPA releases draft risk assessment for PFOA.                                                                                                                                                                                                                        |
| <b>Jan 2005</b>    | Public drinking water in Oakdale, Minnesota, tests positive for trace amounts of PFOS and PFOA. The suspected sources of the contamination are two landfills where 3M disposed of wastes from its perfluorinated chemical operations.                               |