Credibility Gap: Toxic Chemicals in Food Packaging and DuPont’s Greenwashing

How Green is DuPont’s Replacement for Teflon Chemical?

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In 2006, under pressure from the U.S. EPA, DuPont and 7 other companies promised to phase out by 2015 a cancer-causing chemical called PFOA, used to make Teflon and also found in grease-resistant coatings for food packaging. In its place, the chemical industry is pushing new, supposedly “green” food package coatings.

But an investigation by Environmental Working Group (EWG) finds no evidence that the industry-touted replacement chemicals being rushed to market are safer -- and plenty of evidence that DuPont and other manufacturers are continuing a decades-long pattern of deception about the health risks of PFOA and related chemicals.

Like PFOA-based coatings, the new compounds are also made from, contaminated with, or break down into perfluorochemicals (PFCs), including new coatings for household products like stain-resistant fabrics and carpet, waterproof clothing, and food packaging. Like PFOA, they persist in the environment and can cross the placenta to contaminate babies before birth. But unlike PFOA - for which there are dozens of peer-reviewed studies showing links to cancer, reproductive problems and immune disorders - for the replacement chemicals there are almost no publicly available data on their health risks, leaving in question whether food packaging and other PFC-containing products are any safer.

EWG’s investigation is the first review of health data and industry greenwashing since the phaseout agreement was announced. We examined federal reports on food packaging toxicity; industry-funded health studies in Environmental Protection Agency files; and company e-mails unearthed in a lawsuit over PFOA pollution of drinking water near a DuPont facility in West Virginia, and found:

- Despite agreeing to phase out PFOA, DuPont and other makers of perfluorinated chemicals continue to maintain that it is safe. A DuPont press release from March 2008 said “... PFOA exposure does not pose a health risk to the general public. To date, there are no human health effects known to be caused by PFOA.” This is not only contradicted by the EPA Science Advisory Board’s 2005 finding that PFOA is a likely human carcinogen, but by DuPont’s own scientific advisors. In 2005, in response to a similar statement by the company, an ethics advisor on DuPont's Epidemiology Review Board wrote: “The claim of no health effects is not supported by available facts (factual inappropriateness) ... Such a statement is misleading, whether intentionally or not, and it is unacceptable to mislead in this way (moral inappropriateness).” In fact, to date at least 10 studies of people show significant health risks of PFOA, including elevated risk for obesity, heart disease, endocrine disorders, and infectious diseases in a study of
4538 children younger than 10 years of age living near a DuPont plant in West Virginia.

- From January 2007 to April 2008, chemical manufacturers reported to the EPA 19 studies on PFC chemicals that showed “substantial risk” to human health or the environment under section 8(e) of the Toxic Substance Control Act (TSCA). The health effects reported in these studies of anonymous PFCs include the deaths of laboratory animals as well as damage to the liver, thyroid and prostate. Yet under EPA regulations shielding confidential business information, in 17 of 19 cases the exact name of the chemical is not identified and in 13 of 19 cases the manufacturer is not identified. This information is secret not only from the public, but from health officials in states, like California, that are considering laws to ban PFCs in food packaging. These reports are doubly troubling: Not only is information being hidden that is important to public health, but by their own admission companies are finding substantial health risks for chemicals they may well be using as PFOA replacements.

- From 2005 through November 2007 FDA approved 8 new food packaging fluorochemicals that may replace older, PFOA-contaminated or C8-based PFCs. These approvals were granted with no public record of any health risk assessment from exposures to the contaminant residues and breakdown products of greatest concern, according to documents EWG obtained from the Food and Drug Administration. Since that time FDA has approved 2 additional substitute chemicals, and DuPont has announced that its new PFOA replacement, the CapstoneTM grease-proofing chemicals, will be available for packaging products beginning in 2009. This dramatic shift in the market and in human exposures has occurred with no public assessment of the safety of the replacements.

- A similar pattern of unproven claims and secrecy is found in reports filed by chemical makers on the progress of the PFOA phaseout. Since the phaseout is voluntary, EPA has no authority to verify claims of reduced PFOA use or releases. Some companies report little or no progress. Others claim significant reductions, but again hide the details as confidential business information. Worse, the industry’s claims that the phaseout will eliminate PFOA by 2015 are shattered by the fact that no company from China, the third-largest producer of packaging in the world, is a party to the agreement.

The industry’s contention that its PFOA replacements are safer rests on two atoms of carbon. PFOA is sometimes called C8 because it has 8 carbon atoms. A key replacement chemical, perfluorohexanoic acid (PFHxA), contains 6 carbon atoms and is often called C6. The chemical industry would have us believe that the removal of two carbon atoms removes human health risks.

On April 23, 2008, a scientist representing the Telomer Research Program, a chemical industry group that includes DuPont and other PFC makers, testified before the Health Committee of the California State Senate against a bill to ban both PFOA/C8 and PFHxA/C6 in food packaging. He repeated the claim that PFOA is not harmful to humans, and that a ban is not needed because of the voluntary phaseout program. He also repeatedly described C6 as an example of the “green chemistry” approach the state is developing to encourage the production of safer alternative chemicals:

[The bill] would derail a promising example of green chemistry at work . . . [B]y targeting perflourinated compounds with chain links of 6 or higher in this legislation, the bill would frustrate the conversion from the C8 based products, that are the source of the PFOA, to a set of effective C6 based compounds whose breakdown products are much, much less toxic and don’t have the same persistence issues that PFOA and some of the C8s have. . . . [O]ur companies are addressing the concerns about PFOA; we’re aggressively doing so. And we believe the proposed legislation would actually do harm to an effective green chemistry strategy for reducing the concerns about this chemical. (Lawyer 2008)

This is greenwashing – claiming environmental benefits for a product that’s little better than its replacement – at its worst. PFOA is so remarkably persistent in the environment and broadly toxic to living organisms that using it as a bar against which to judge "green
chemistry” is like calling anything under 200 miles per hour a safe speed limit. For C6 replacements, the full extent of the public record on their safety consists of a PowerPoint presentation delivered by Asahi Glass Company to the Environmental Protection Agency. Public records show that DuPont, Asahi, and Clariant are all shifting from PFOA to C6 chemistries despite an absolute dearth of public safety data, and despite the fact that on 3 critical counts, C6 may be as great a concern as PFOA:

- C6, like all the other PFCs, is extraordinarily persistent in the environment (NAS 1972).
- C6 is potentially 3 to 5 times more toxic than C8 to aquatic organisms (Asahi 2006).
- C6 crosses the placenta to contaminate children before birth, according to an EWG study of umbilical cord blood from 10 newborn babies (EWG 2005). While many studies of thousands of people by CDC, industry, and academic university researchers show that PFOA contaminates nearly the entire U.S. population, industry has failed to publish even a single study of C6 in people. EWG’s tests of cord blood show it to be potentially as great a concern as PFOA.

Truly green chemistry is sustainable chemistry with products and processes that reduce or eliminate the use and generation of hazardous substances. Much remains unknown about C6, but what is known - that it is bioaccumulative, persistent and crosses the placenta to pollute human blood - is enough to disqualify it as green chemistry. Promoting a PFOA replacement that raises such serious safety concerns while simultaneously withholding critical toxicity data violates the spirit of the PFOA phaseout agreement and undermines the credibility of the entire industry.

New Food Packaging Chemicals: No Health Data

In March 2008 EWG received from the FDA Center for Food Safety and Applied Nutrition FDA’s safety assessments for all 8 new fluorochemical-based food packaging chemicals approved by the agency between 2005 and November 2007, including four based on C6 chemistry. A substantial amount of information in these documents was redacted by FDA as alleged confidential business information, but EWG’s review of the remaining information finds no evidence that FDA adequately assessed the safety of people’s exposures to C6 from these coatings. In particular, the information provided to EWG demonstrates that:

- FDA failed to assess how quickly these food coatings would break down into C6, and no mention is made in the FDA documents of companies submitting such data.
- FDA failed to require industry to submit any safety studies on C6 itself (perfluorohexanoic acid or PFHxA). Of the 4 C6-based chemicals approved by the FDA for food packaging and reviewed by EWG, only Asahi Glass submitted a C6 toxicity study. Even though Asahi research showed smaller than normal growth, lower cholesterol and calcium in PFHxA-exposed test animals (Asahi 2006), FDA did not take into consideration the C6 health effect data when approving the chemical for food packaging.
- FDA approved the C6-based and other fluorochemical replacements for C8- and larger PFC-based food packaging based on its assessment that since C6 is not C8 (PFOA), there would be little chance of C8 residues in the food package coatings.
- In all of its new approvals of fluorochemicals for food packaging, FDA failed to consider the long-term health and environmental consequences of the continued use of vast amounts of PFC-based food packaging chemicals that are extraordinarily persistent in the environment and that can cross the human placenta.

In addition to the food packaging chemicals FDA has already approved, DuPont marketing materials indicate that another new, grease-proof paper coating will be available in 2009, made from C6 and related chemicals (see DuPont’s Capstone™ “Paper packaging” factsheet available for download at DuPont 2008a). If the last 3 years of FDA approvals are any indication, DuPont could likely win FDA approval of this product for food packaging with no assessment of the safety of C6.

Although FDA and industry chemists know that food packaging chemicals are not without hazard and can migrate into food, most consumers are surprised to learn that the inner lining of their favorite fast food wrapper may expose them to chemicals linked to potential health
consequences ranging from developmental problems to heart disease, stroke and cancer. This includes a wide variety of food packaging that for decades has been treated with fluorochemicals to increase its resistance to oil and water stains (Begley 2005).

Federal records for food packaging fluorochemicals go back to 1969 when a Scotchban paper coating manufactured by 3M was approved as “safe” by the FDA (FDA 1969). Since that time, FDA continued to sanction various kinds of fluorochemicals to be used directly in contact with food. However, much has changed since 1969. We now know that perfluorochemicals (PFCs) contaminate the bodies of 98% of Americans (Calafat, Wong 2007). These are long-lasting, toxic chemicals that, once ingested with food or water, will linger in human bodies for years (Conder 2008). And - unknown to consumers - these chemicals can and do migrate from food packaging into food and then into human bodies (Begley 2005; Deon and Mabury 2007; Sinclair 2007; Tittlemier 2007). One could argue that the time has come for close public and regulatory scrutiny of fluorochemicals in food packaging. Are the purported convenience (however slight) and manufacturers’ profits (however big) worth the dangers of getting an extra helping of PFCs into our bodies, already assailed with so many other toxic industrial chemicals from other sources?

Fortunately, the tide is changing as more and more people clearly state that they don’t want PFCs on their food packaging. And companies are listening: Burger King, for instance, stopped using PFC-coated take-out boxes in 2002. However, food packaging PFCs are still on the market and are still covered by summary approvals from the FDA, even though their effects, in an assessment by the FDA’s own scientists, “may only become apparent many years later” (Begley 2005). Indeed, we are not talking about doses that are immediately harmful after a single helping of microwaved popcorn. Instead, we need to be concerned about on-going, continuous ingestion of small quantities of these chemicals, their documented build up in the human body over the years - and the subsequent health effects with which these chemicals are unambiguously associated.

Of particular concern is the fact that there are no publicly available market surveys quantifying PFC use in packaging. As a result, consumers are unfairly deprived of their essential right to know and to make informed, independent decisions. Meanwhile, two studies detected PFCs leaching out of food packaging under normal cooking temperatures (Begley 2005; Sinclair 2007). However, a consumer going to the store would not know which brands to avoid because manufacturers are conveniently withholding this crucial information. And it is not only the consumers who are in the dark. When the FDA scientists conducted their small-scale survey, they noted that the “paper products [tested by the FDA] were not necessarily treated with perfluoro paper coatings” (Begley 2005). As a result of the secrecy about PFC content in packaging, consumers don’t know what to buy and what to avoid, while FDA does not know what market products to test. Manufacturers know but they will not tell anyone.

Following the EPA scrutiny of PFOA (perfluorinated chemical with an 8-carbon backbone, thus also known as C8) and general public outrage over the widespread contamination with this noxious chemical, fluorochemical manufacturers are shifting to smaller PFCs, especially C6 PFC replacements. Clariant Corporation, for example, states in its Annual Report that its “new generation of fluorocarbons [is] based on C6 Chemistry” (Clariant 2008) and will be used for food packaging as well as other end uses (Clariant 2008, Sanitized AG 2008, Nanowerk 2008). Similarly, DuPont has just introduced a new generation of PFC products intended to be used in various applications including paper packaging “where the fluorochemical portion is made up of six or fewer perfluorinated carbons” (DuPont 2008a). And Asahi Glass company has also developed a series of C6-based PFCs for food packaging paper and textile applications (Asahi Glass Co 2007). In fact, of the 10 fluorochemicals that FDA has approved for food contact uses since 2005, 6 of them were based on C6 PFC building blocks (Food Contact Substance Notifications (FCNs) 542, 599, 604, 628, 746, 783) (FDA 2008).

Since the voluntary PFOA phaseout was announced, FDA and the PFC manufacturers seem most interested in claiming that the replacement products are not PFOA, while failing to make public even the most basic health and safety data on the C6 replacements. Unfortunately, DuPont’s statements about the glowing promise C6 (Capstone™) chemistry being the answer to PFC contamination of consumer products and the environment are sorely lacking in credibility. We know that PFCs as a class undergo hardly any natural degradation (NAS 1972), so claims about their not being persistent in the environment are likely not true.
We know that while the shorter-chain length PFCs may be less bioaccumulative (Martin 2003), they are better able to cross the placenta and transfer from the mother’s body to the fetus (Midasch 2007). We know that these chemicals are already found in people and babies: biomonitoring studies have already found C6 chemicals in adult and cord blood, proving that they do indeed cross the placenta (EWG 2005; Frisbee 2008). We know that the FDA has concerns about the biopersistence of PFCs, including C6-based PFCs (FDA 2006). And we know that shorter-chain PFCs have been already been detected as contaminants in drinking water due to emissions from fluorochemical manufacturing facilities (MDH 2008).

And what we certainly don’t know is that these C6 chemicals are safe. With the exception of one presentation from the Asahi Glass Company delivered at the EPA’s PFOA Information Forum (Asahi 2006), there are no published studies on the toxicity of C6 compounds. The FDA’s toxicology reviews of approved C6 food contact substances are cursory. For example, they typically consider only the toxicity of the coating compounds and not the chemicals they break down into over time. Furthermore, companies’ claims of negligible PFOA contamination in their new C6 PFC products are taken as evidence of safety - in the absence of any substantiating data that would look at the toxicity of C6 itself.

Meanwhile, industry is aggressively promoting the C6 replacements for every imaginable application. On April 23, 2008, a scientist representing the Telomer Research Program, a chemical industry group that includes DuPont and other PFC makers, testified before the Health Committee of the California State Senate against a bill to ban both perfluorooctanoic acid (PFOA/C8) and perfluorohexanoic acid (PFHxA/C6) in food packaging. He repeated the claim that PFOA is not harmful to humans, and that an outright ban would be unnecessary in the presence of the voluntary phaseout program. He also repeatedly described C6 as an example of the “green chemistry” approach the state is developing to encourage the production of safer alternative chemicals:

[The bill] would derail a promising example of green chemistry at work . . . [B]y targeting perflourinated compounds with chain links of 6 or higher in this legislation, the bill would frustrate the conversion from the C8 based products, that are the source of the PFOA, to a set of effective C6 based compounds whose breakdown products are much, much less toxic and don’t have the same persistence issues that PFOA and some of the C8s have. . . . [O]ur companies are addressing the concerns about PFOA; we’re aggressively doing so. And we believe the proposed legislation would actually do harm to an effective green chemistry strategy for reducing the concerns about this chemical. (Lawyer 2008)

Green chemistry is sustainable chemistry with products and processes that reduce or eliminate the use and generation of hazardous substances. In the absence of transparent, independently conducted toxicity studies, replacement PFC chemicals in food packaging may very well become new, emergent contaminants whose health consequences will be directly tested on people. And while much remains unknown about C6, what is known - it is bioaccumulative, persistent and crosses the placenta to pollute human blood - is enough to disqualify it as green chemistry.

New Chemicals & Risks are Confidential

In the wake of the voluntary PFOA phaseout agreement, US industries are shifting the kinds of chemicals they are using in consumer products, including in food packaging. But when it comes to the new fluorochemicals manufacturers are developing at a breakneck speed, the only available data on toxicity come not from published scientific studies but from “substantial risk” notifications that federal law requires companies to submit to the Environmental Protection Agency (EPA). Though the submissions are publicly available, an EWG review shows that companies are claiming as confidential the chemical name in 90% of the studies and the company name in 70% of the studies.

Redacted studies that conceal the chemical name and the company name and that contain no information on the range of consumer products the chemicals might be used in are of little use to the public. This lack of transparency means, in effect, that DuPont, 3M and other companies are either already manufacturing or gearing up to produce millions of pounds of chemicals for application to food packaging in place of PFOA but that have no openly
accessible and scientifically supported safety data.

A key section of the federal Toxic Substances Control Act (TSCA), known as section 8(e), requires U.S. chemical manufacturers, importers, processors and distributors to notify the EPA within 30 calendar days of any new, unpublished information on their chemicals that may lead to a conclusion of substantial risk to human health or to the environment (US EPA 2008).

These TSCA 8(e) notices are the only glimpse that anyone outside of the EPA and the chemical industry may have into the potential toxicity of the replacement fluorochemicals. But when EWG analyzed the industry studies submitted to EPA’s 8(e) docket between January 2007 and April 2008, what we found was startling.

During this eighteen-month period, EPA received at least nineteen notices from chemical manufacturers that reported toxicity of fluorochemicals (US EPA 2008). All of these notices report at least one health effect seen in test animals, and the health endpoints themselves were often quite serious. Deaths of exposed animals were reported in five studies. In one 2007 study submitted by 3M, every single female animal tested died after 4-5 exposures to the chemical. [PDF file submitted by 3M on December 14, 2007]

Overall, these 19 studies found a staggering array of different health effects, including irregular breathing, muscle incoordination, lowered fertility, birth defects, increased numbers of stillborn pups, absence of pupillary light reflex in the eye, lack of normal startle response, dermal sensitization, and changes in the weights and/or size of vital organs such as the heart, kidney, liver, spleen, thymus, prostate, ovaries, and adrenal glands.

Yet, despite these reams of troubling health data, 90% of the time the public has no way of knowing what compound was responsible: EWG found that for 17 of the 19 notices submitted to the EPA from January 2007 to April 2008 the name of the chemical has been redacted from the text under the claim of confidential business information.

For example, while we know that there is a fluorochemical that was associated with death of a dam, reduced pup weight per litter, increased percentage of dams with all pups dying, reduced live-born pups per litter, and increased number of stillborn pups per litter, but all we know about the chemical’s identity is that it is a “fluorinated surfactant salt.” [PDF file submitted by 3M on December 14, 2007]

Similarly, a different study found that gestational exposure to a fluorochemical was associated with abnormal/difficult birth, lower fertility, reduced offspring body weights, skeletal abnormalities in offspring (effects on teeth, appearance of bent rib and 7th cervical rib), and lower maternal and offspring viability during lactation, but all we know is that the chemical was a “hydrofluorocarbon.” [PDF file 1 and PDF file 2 submitted by an unnamed manufacturer on 15 August 2007]

Table. Manufacturers’ submissions to TSCA 8(3) docket

<table>
<thead>
<tr>
<th>Date</th>
<th>Submitter</th>
<th>Chemical Description</th>
<th>Health effects reported</th>
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<tr>
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<td>Unknown</td>
<td>Hydrofluorocarbon</td>
<td>Increased kidney weight</td>
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<td>Increased liver weight</td>
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<td></td>
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<td>Increased spleen weight</td>
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<td></td>
<td></td>
<td></td>
<td>Increased cardiomyopathy</td>
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<tr>
<td>15-Jan-08</td>
<td>Unknown</td>
<td>Perfluorinated aliphatic carboxylic acid, Ammonium salt</td>
<td>Decreased body weight gain</td>
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<td></td>
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<td></td>
<td>Decreases in red blood cells</td>
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<td>Increased liver weight</td>
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<td></td>
<td></td>
<td></td>
<td>Decreased heart weight</td>
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<tr>
<td></td>
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<td>Increased kidney weight</td>
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<tr>
<td>15-Jan-08</td>
<td>Unknown</td>
<td>Perfluorinated aliphatic carboxylic acid</td>
<td>Decreases in red blood cells</td>
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<tr>
<th>Date</th>
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<th>Substance Description</th>
<th>Effects</th>
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<td>Unknown</td>
<td>Decreases in serum lipids (triglycerides and/or cholesterol)</td>
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<td></td>
<td></td>
<td>Increased liver weight</td>
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<td></td>
<td>Increased liver b-oxidation</td>
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<td></td>
<td></td>
<td>Hepatocellular hypertrophy</td>
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<td>14-Dec-07</td>
<td>3M</td>
<td>[Fluorinated surfactant salt]</td>
<td>Death of dam</td>
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<td></td>
<td></td>
<td>Reduced pup weight per litter</td>
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<td></td>
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<td>Increased percentage of dams with all pups dying</td>
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<td>Reduced live-born pups per litter</td>
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<td></td>
<td></td>
<td>Increased stillborn pups per litter</td>
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<td>20-Nov-07</td>
<td>3M</td>
<td>[Fluorinated surfactant salt]</td>
<td>Dermal sensitization</td>
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<td>30-Oct-07</td>
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<td>Perfluorinated aliphatic carboxylic acid, Ammonium salt</td>
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<td>Erythema</td>
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<td>30-Oct-07</td>
<td>Unknown</td>
<td>Polyfluorosulfonic acid</td>
<td>Substantial cytotoxicity</td>
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<td></td>
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<td>Reduced body weight</td>
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<td>18-Oct-07</td>
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<td>Ammonium salt of fluoroalkyl carboxylic acid</td>
<td>Substantial cytotoxicity</td>
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<td>17-Oct-07</td>
<td>DuPont</td>
<td>Poly[oxy[trifluoro(trifluoromethyl)-1,2-ethanediyl]_a-(1-carboxy-1,2,2,2-tetrafluoroethyl)<em>ω- [tetrafluoroethyl(trifluoromethyl)ethoxy]</em></td>
<td>Dermal sensitization</td>
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<td>10-Oct-07</td>
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<td>Death</td>
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<td></td>
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<td>Ataxia</td>
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<td>15-Aug-07</td>
<td>Unknown</td>
<td>Hydrofluorocarbon</td>
<td>Reduced motor activity</td>
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<td></td>
<td></td>
<td></td>
<td>Reduced forelimb grip strength</td>
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<td>Reduced hindlimb grip strength</td>
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<td>Reduction in live born index</td>
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<td></td>
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<td></td>
<td>Lower food efficiency</td>
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<tr>
<td>15-Aug-07</td>
<td>Unknown</td>
<td>Hydrofluorocarbon</td>
<td>Dystocia (abnormal or difficult birth)</td>
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<td></td>
<td></td>
<td></td>
<td>Lower fertility</td>
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<td></td>
<td>Lower maternal and offspring viability during lactation</td>
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<td></td>
<td>Effects on teeth</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Reduced offspring body weights</td>
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<tr>
<td>15</td>
<td>Unknown</td>
<td>Hydrofluorocarbon</td>
<td>Decreased maternal</td>
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<td>Date</td>
<td>Sponsor</td>
<td>Chemical Name</td>
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<td>------------------------------------------------------------------------</td>
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<tr>
<td>Aug-07</td>
<td>Unknown</td>
<td>Ammonium salt of fluoroalkyl carboxylic acid</td>
<td>Increased occurrence of skeletal malformations in offspring (bent rib and 7th cervical rib)</td>
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<td>26-Jul-07</td>
<td>Unknown</td>
<td>Fluorinated aliphatic alcohol</td>
<td>Death</td>
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<tr>
<td>11-Jul-07</td>
<td>3M</td>
<td>[Fluorochemical intermediate]</td>
<td>Reduced prostate and seminal vesicle size Reduced absolute epididymes weight Reduced absolute adrenal weight Reduced absolute ovary weight Reduced absolute thymus weight Reduced absolute spleen weight Reduced relative thymus weight</td>
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<tr>
<td>12-Mar-07</td>
<td>Unknown</td>
<td>Fluorocarbon</td>
<td>&quot;Became anesthetized&quot; Irregular breathing No startle response Body weight losses</td>
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<td>26-Feb-07</td>
<td>3M</td>
<td>[Fluorinated surfactant salt]</td>
<td>Death (six out of six female rats died after 4-5 doses; no mortality in male rats)</td>
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<tr>
<td>5-Jan-07</td>
<td>3M</td>
<td>Ammonia perfluorobutanoate (PFBA)</td>
<td>Absence of pupillary light reflex in both eyes Increase in hepatocellular hypertrophy Increased incidence and/or severity of hypertrophy/hyperplasia of follicular epithelium of the thyroid glands Increased liver weight</td>
</tr>
</tbody>
</table>

It should also be noted that in the vast majority (70%) of cases, the public also doesn't even know what company sponsored the study and submitted to the EPA: in 13 of 19 submissions, this information has been redacted under claims of confidential business information. Essentially, the only piece of information that the general public is usually allowed to know is how hazardous an anonymous chemical may be. But what the identity of that chemical is, which company manufactures it, how much is being produced, and what consumer products it might be used in, remains a secret. This is hardly an assurance for safety.

While we obviously don’t know the identities of the fluorinated compounds that were tested in these studies, we can be reasonably certain that they are not PFOA, PFOS, or their higher homologues, which are the chemicals subject to the voluntary phaseout DuPont, 3M, and...
other manufacturers have agreed to under pressure from EPA. Animal testing is expensive, and chemical companies would have no incentive to pay for testing of compounds that had few remaining uses. And since TSCA requires companies to report the results of new studies indicating significant health concern within 30 days, there is also little chance of these being old PFOA or PFOS studies that are only now being submitted to the EPA.

What this means is that these studies showing dramatic adverse health effects are probably PFCs designed to be replacements for PFOA, PFOS and/or their higher homologues. And there is a decent chance that they are C6 fluorinated chemicals since market trends and FDA records indicate that many fluorochemical producers and secondary business users are shifting to the C6 PFC chemistry (Asahi Glass Co 2007; Clarant 2008; DuPont 2008a; DuPont 2008b; FDA 2006; FDA 2008; Nanowerk 2008; Sanitized AG 2008). But we will likely never know. Because the identity of the compounds found toxic in these 8(e) TSCA studies are held secret, not only from the general public, but even from regulators in state agencies that may be making decisions about these same compounds.

**DuPont Claims at Odds with Science**

No matter how strong the evidence that PFOA may be harming human health, DuPont spokespeople refuse it, year after year: "...PFOA does not harm human health or the environment." (See DuPont press quotes) Normally, this might be dismissed as a typical corporate interpretation of study results or just another example of a company over-zealously defending a profitable chemical. But in this case DuPont has gone beyond spin, to a much higher level of deception.

Documents obtained from litigation against DuPont for PFOA contamination of water supplies in West Virginia and Ohio show that DuPont’s own ethicists and medical experts found the company’s spin on PFOA science to be “misleading”, “disingenuous”, “unacceptable”, and “not supported by the available facts” (DuPont’s Epidemiology Review Board 2005-2006).

DuPont’s mischaracterizations of the science have long raised concerns from environmental advocates and communities affected directly by their pollution and neglect. But in 2005 and 2006, this misinformation campaign ran into a serious buzzsaw in the form of DuPont’s own Epidemiology Review Board (ERB), a group of independent scientists, medical doctors, and ethicists from Harvard, Yale, Georgetown, Johns Hopkins and other prestigious universities, chosen by DuPont to review PFOA epidemiology studies, including several studies of workers at their Parkersburg, West Virginia fluorochemical plant.

Beginning in 2005, ERB members raised serious ethical and scientific concerns about the manner in which DuPont was deliberately mischaracterizing the results of studies of workers in Parkersburg. Over the course of the next two years the committee was extremely critical of DuPont’s public presentation of this and other scientific information.

For example, DuPont’s presentation of the results a worker study to plant workers and the press in 2005, concluded, among other things, that:

> Based on an evaluation of human health and toxicology studies, DuPont believes that the weight of evidence suggests that PFOA exposure does not cause cancer in humans and does not pose a health risk to the general public... To date, no human health effects are known to be caused by PFOA, even in workers who have significantly higher exposure levels than the general population.

-- *Washington Post, June 29, 2005*

This interpretation was far from an objective reading of the study results, and in response, DuPont’s Epidemiology Review Board (ERB) member, Thomas Beauchamp PhD, of Georgetown University called DuPont’s conclusion:

"Somewhere between ‘misleading’ and ‘disingenuous’ has red-flag written all over it;"

The entire committee shared this opinion, as expressed by David Wegman, MD, and chair of
the ERB:

“We were unanimous in believing that, contrary to the statement at the start of
the [employee] letter, we believe that the results do show a health effect”...”it is
certainly not appropriate to say ‘... no human health effects;’”

Beauchamp, commenting on the specific nature of DuPont’s ethical lapses, further stated:

“The claim of no health effects is not supported by available facts (factual
inappropriateness)... such a statement is misleading, whether intentionally or not,
and it is unacceptable to mislead in this way (moral inappropriateness).”

Overall, the ERB concluded that DuPont’s presentation of the study results:

“Was considered by us all to be misleading;”

(See PDF file for ERB February 2005)

This was not the last time that the ERB would catch DuPont ignoring or twisting the facts for
their own benefit. Throughout 2005 and 2006, things got worse for PFOS manufacturers. In
December 2005 EPA settled its PFOS case against DuPont for the largest environmental
administrative penalty under the Toxic Substances Control Act in agency history (US EPA
2005).

The charge against the company was that for 20 years it had failed to disclose important
study results, as required by law, showing that PFOS crossed the placenta, as demonstrated
in a study showing that two out of seven female DuPont workers tested for PFOS during
pregnancy gave birth to babies with severe facial birth defects (US EPA 2004). In DuPont’s
view, these findings, which were reported by company scientists in 1981, did not indicate a
substantial risk to human health, even though they represented the first evidence ever that
PFOS could make its way to the fetus and potentially cause serious birth defects. In the end,
DuPont was forced to pay a record $16.5 million fine for failing to report these findings to the
EPA (US EPA 2005). But despite this record fine for concealing critical data in a study showing
severe birth defects in babies exposed to PFOS, the company did not change in any way its
claim that no human health effects are known to be caused by PFOS.

One month later, in January 2006, the PFOS Review Panel of EPA’s Science Advisory Board
(SAB) issued its draft report recommending that, based on its review of available PFOS
carcinogenicity data, PFOS should be considered a “likely human carcinogen” (SAB 2006).
DuPont responded with their stock claim that “to date no human health effects are known to
be caused by PFOS” (DuPont 2006a).

In February 2006, members of DuPont’s ERB, who were apparently becoming increasingly fed
up with DuPont spin, submitted two consecutive memoranda to DuPont, stating: “Given the
many gaps in understanding of population exposures to PFOS and of possible health
consequences, we strongly advise against any public statements asserting that PFOS does not
pose any risk to health... We also question the evidential basis of DuPont’s public expression
asserting, with what appears to be great confidence, that PFOS does not pose a risk to
health” (DuPont’s Epidemiology Review Board 2005-2006). (See PDF file for ERB February
2006)

In March 2006 eight fluorochemical manufacturers, including DuPont, agreed to participate in
EPA’s PFOS Stewardship Program aimed at reducing facility emissions and product content of
PFOS and related chemicals on a global basis (US EPA 2006a).

In July 2006 members of the ERB panel stated again that DuPont’s ongoing reports continue
to avoid or downplay the significant findings” (DuPont’s Epidemiology Review Board 2005-

Later that year, in October 2006, DuPont publicly announced preliminary results of its own
study of death rates among PFOS-exposed workers at the Washington Works plant, indicating
increased rates of death for heart disease, kidney cancer and diabetes (DuPont 2006b).
Members of the ERB panel were very concerned about DuPont’s press release that “appears
written to leave the impression ‘don’t worry’” (DuPont’s Epidemiology Review Board 2005-
In November 2006 DuPont entered into a Consent Order with EPA for additional tests on PFOA under which EPA noted that new PFOA studies have raised a "concern for public health" and that PFOA "may present an imminent and substantial endangerment to the health of persons" (US EPA 2006b).

The company's response continued in the same vein, "So DuPont's position on this is, to date, there are no known health effects from exposure to PFOA." [Fort Worth Star Telegram, December 5, 2006]

One month later, DuPont Spokesman David Booth offered this riff on the same propaganda, adding that PFOA is "essentially a high-tech detergent" that has been used for 50 years in manufacturing plastic and "as there are no known health effects from PFOA." [Biloxi Sun Herald, January 26, 2007]

Throughout 2007, a series of human studies were released unambiguously demonstrating adverse health effects linked to PFOA exposure. These include two studies that observed association between PFOA blood levels and smaller birth weight and size in newborn babies (Apelberg, Witter 2007; Fei 2007); two DuPont worker studies showing increased levels of cholesterol and liver damage related to PFOA exposure (Sakr, Kreckmann 2007; Sakr, Leonard 2007); a DuPont study demonstrating increased mortality from diabetes, cancers of kidney and bladder, all cardiovascular disease and ischemic heart disease in fluorochemical plant workers (Leonard 2007); and two 3M studies indicating abnormal thyroid hormones, elevated cholesterol and increased blood levels of liver enzymes as well as increased risk of mortality due to stroke and prostate cancer for PFOA-exposed employees (Lundin 2007; Olsen 2007).

One of the studies, carried out by researchers at the Johns Hopkins Bloomberg School of Public Health in Baltimore, Maryland, found the chemical in every single one of the 299 umbilical cords analyzed, suggesting that every baby is born in the US already contaminated with PFOA. Similar levels have been found in babies in Europe and Japan. It also found that the babies whose cords had the highest concentrations of PFOA were born lighter, thinner and with smaller head circumferences than others. The second study - carried out in the US and Denmark, with babies drawn from the Danish National Birth Cohort - came up with similar findings for birth weight, the only measurement the scientists made.

Not surprisingly this new science has not swayed the DuPont public relations machine. Commenting on this wave of new science that has repeatedly shown adverse health effects of PFOA exposure in newborn babies, DuPont once again stated that "there are no human health effects known to be caused by PFOA", adding that "Our position is that the studies have not changed our position." [The Independent, August 26, 2007]

### The ERB members

- **Thomas Beauchamp PhD** Professor of Philosophy and Senior Research Scholar, Georgetown University's Kennedy Institute of Ethics
- **Mark Cullen MD** Director, Section of Occupational and Environmental Medicine, Yale University School of Medicine
- **Ellen Eisen PhD** Adjunct Professor, Department of Environmental Health, Harvard University
- **Jonathan Samet MD** Chairman of the Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health
- **Noah Seixas PhD** Professor, Department of Environmental and Occupational Health Sciences, University of Washington
- **ERB Chair David Wegman MD** Dean, School of Health and Environment, University of Massachusetts Lowell

**Voluntary Phaseout Not Working**

In May 2000, the Environmental Protection Agency (EPA) announced it was “examining its options” regarding the toxic and persistent chemical PFOA. In reality a toothless, 30-year-old federal law left EPA with few options to examine. The Agency could not even ban asbestos, a known human carcinogen, under the 1976 Toxic Substances Control Act. For PFOA, EPA settled on a voluntary phase-out agreement in lieu of an enforceable ban.

In January 2006 DuPont, 3M and six other chemical companies entered into the EPA-brokered Voluntary Stewardship Program, in which companies committed to phasing out by 2015 the use of the Teflon chemical PFOA and other closely related chemicals (“higher homologues”) (US EPA 2006a). These companies have pointed to this agreement to argue against actions proposed since that would further reduce the public’s exposures to PFCs. But unlike an enforceable ban, which would have been the ideal outcome for a chemical as hazardous and persistent as PFOA, the voluntary phase-out agreement leaves open the possibility that consumers will continue to be exposed to PFOA for decades to come. Because of significant gaps in the agreement, it failed to obviate the need for additional actions to reduce the public’s exposures to PFOA and other perfluorochemicals.

First and foremost is the simple fact that the stewardship program is voluntary. Under the EPA agreement, companies only “commit to working toward the elimination” of the targeted perfluorochemicals by 2015 with no EPA enforcement mechanism in place and no penalties if deadlines are not met. This means that consumers and EPA essentially have to trust chemical companies to do the right thing. When one considers the track record of the industry for complying with legally enforceable statutes with steep penalties - take DuPont and their record-setting fine, for failing to report pollution data to EPA as required by federal law (US EPA 2005), for example - this is not a particularly encouraging option.

That the stewardship program is voluntary also means that companies can choose whether they want to opt in at all - and not a single company from China is participating. Biomonitoring data from China where production of PFOS and other PFCs continues indicate that the levels of these chemicals are increasing in the bodies of Chinese citizens (Jin 2007; Olsen 2008). These disconcerting findings are evidence that a US-only voluntary program will likely not be sufficient to protect American consumers from PFC contamination of everyday products given the massive quantity of goods the US imports from China. This is especially a concern when it comes to food packaging, for China is the third largest producer of packaging in the world (Packaging Expo 2008), and food packaging is considered to be an important source of exposure to PFCs (Begley 2005; Tittlemier 2007).

The voluntary nature of the program also means that companies face no penalties for failing to comply with the agreement, and that the EPA has no authority to require companies to submit to independent verification of the data and claims they are providing to EPA to document their efforts. EWG’s analysis of the first year of progress reports from companies participating in the stewardship program revealed mixed results. A number of companies have reduced their use of PFOA only minimally or not at all. The submitted data are neither clear nor transparent, and thus fail to provide the information needed to assess companies’ progress. For example, many companies list a 10-fold range for emissions, making it impossible to determine if there has been any progress. Some companies report PFOA and higher homologues separately, obscuring the true state of the industry.

Table I. Summary data on emissions from fluoropolymer (FP) and fluorotelomer manufacturing facilities and PFOA product content

<table>
<thead>
<tr>
<th>Company and chemical</th>
<th>Emissions from FP and telomer manufacturing facilities, kg</th>
<th>PFOA (and higher homologues) product content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emissions from FP and telomer manufacturing facilities, kg</td>
<td>PFOA (and higher homologues) product content</td>
</tr>
<tr>
<td></td>
<td>Dispersions (ppm wet weight)</td>
<td>Other fluoropolymers (ppm dry-weight)</td>
</tr>
<tr>
<td>Company and chemical</td>
<td>Baseline^2</td>
<td>2006</td>
</tr>
<tr>
<td>Arkema, PFOA+HH^3</td>
<td>&gt;10,000-100,000</td>
<td>&gt;1,000-10,000</td>
</tr>
</tbody>
</table>
Asahi
PFOA+HH  5,230    4,922     6%  1,364  500-1,570  12%  CBI  0.12  NA

Ciba
Baseline PFOA total for emissions and product content reported at 30 kg; 2006 reported as 0.05 kg

Daikin
CBI  CBI  92-94%  420  280  34%  14  Plastics: 2  Elastomers: 300

DuPont
PFOA  49,400  1,100  98%  970  547  44%  340  69  80%

3M/Dyneon
PFOA  1,700  0  100%  4,300  0  100%  not reported  not reported  not reported

Solvay
Solexis
PFOA, 1000-10,000  PFOA+HH  1,500-1,700 PFOA + HH
higher homologues, 1000-10,000  600-700 PFOA + HH  59%

1. Data from the US EPA website http://www.epa.gov/oppt/pfoa/pubs/preports.htm#summary. Eight companies signed up to participate in the stewardship program; One signer, Clariant declared both baseline and follow up data as “Not applicable”.
2. Baseline values were collected around 2000 (Arkema 1999; Asahi Glass Co 2000; Ciba 2002; Daikin 2000; Dupont 2000; 3M/Dyneon 1999; Solvay Solexis 2000).
3. Higher homologues (HH) of PFOA.
4. Ciba reported emissions and product content in the same category, making it impossible to determine the extent of progress in decreasing of PFOA product content or PFOA emissions.

For example, Daikin claims its PFOA emissions have been reduced by 92-93% but then lists their actual emission numbers as confidential business information (CBI), calling into question the reliability of their claims. Similarly, Arkema reports its emissions as a 10-fold range, making it impossible to estimate change between baseline and reporting years. Arkema also reported unchanged PFOA content in dry-weight fluoropolymers, which raises questions about its claim of 30% product content reduction.

Furthermore, for at least four different companies, no significant progress has been observed so far. Asahi Glass Co. only reduced its emissions by 6%, and the company’s product content for wet fluoropolymer dispersions was only reduced by 12%. Arkema did not report any reduction in PFOA content in wet dispersions, while Daikin reported no reduction in PFOA content in dry-weight fluoropolymers. Meanwhile, Solvay Solexis reported a 17% increase in PFOA content in dry-weight fluoropolymers.

The Year 1 summary does, of course, report some positive steps. Dupont, for example, reported a 98% reduction of emissions and 80% PFOA reduction in dry-weight fluoropolymers. Reductions in PFOA content in wet dispersions were reported by Daikin, Dupont, and Solvay Solexis. But when talking about toxic chemicals that will never break down in the environment, such piecemeal positive steps are not enough to call a program successful. Especially when it is hampered by unreliable data and no possibility of enforcement.

New scientific research shows PFC-related health effects in people

For decades, health surveys of workers at DuPont and 3M fluorochemical plants indicated that exposure to PFCs poses serious health dangers. In 1992, employee surveillance data at the DuPont Washington Works fluorochemical plant revealed a statistically significant excess of
cancers of the buccal cavity and pharynx, kidney and other urinary cancers, and leukemia among the workers (DuPont 1992). The next year, a retrospective cohort mortality study was conducted by 3M at the Cottage Grove, Minnesota plant that produced PFOA, reviewing the employee records for the 1947-1983 period. The study found that occupational exposure to PFOA was associated with two-fold higher rate of death from prostate cancer (Gilliland 1993). And in 1998, Cottage Grove workers occupationally exposed to PFOA were found to have abnormal levels of reproductive hormones (higher levels of estradiol in workers with highest PFOA blood levels) (Olsen 1998). In addition DuPont has known since the 1980s that PFOA can cross the placenta and cause developmental abnormalities in children of women exposed to this toxic chemical at work (US EPA 2004; reviewed in EWG 2004).

Despite this evidence of health problems in fluorochemical plant workers, industry did not take any precautionary action to protect public health. For decades, data on human health effects of PFOA was suppressed and not submitted to the EPA (US EPA 2004).

This is especially egregious considering that animal studies have long linked PFCs with a striking and diverse array of health problems. This incredibly long list includes: a broad range of developmental effects, from smaller birth weight, developmental delays, and organ abnormalities, to stillborn pups and whole litter loss (Andersen 2008; Lau 2007; Lau, Butenhoff 2004); severe liver toxicity (Guruge 2006; Martin 2007; Rosen 2007; Yeung 2007); suppression of the immune system and predisposition to allergies (DeWitt 2008; Fairley 2007; Peden-Adams 2008; Yang 2002; Yang 2000); behavioral changes (Johansson 2008); altered hormonal function, especially thyroid and sex hormones (Lau 2007; Biegel 1995; Bookstaff 1990; Cook 1992; Liu 1996); as well as liver, pancreatic, testicular, and mammary cancers (Sibinski 1987).

Everything changed, however, when the studies by both industry and academic researchers revealed that PFOA, PFOS, and other PFCs had become widespread, global contaminants that polluted bodies of humans and wildlife world-wide (Houde 2006; Kannan 2002; Kannan 2004; Prevedouros 2006; Sinclair 2006). Now, not only occupationally exposed workers were at risk from PFCs (Olsen 2004; Joyce 2007), but every American (Calafat, Wong 2007). Especially worrisome, children, the most vulnerable population, appeared to have higher levels of PFCs in their bodies compared to adults (Emmett 2006; Olsen 2004).

While the scientific evidence linking PFCs to a wide range of health effects was more than strong enough in 2006 for the EPA to elicit a phaseout of many of these compounds, new studies published in the last two years show even greater cause for concern. Of particular note are three epidemiological studies, all conducted by independent scientists looking at people exposed to PFCs through consumer products and/or through contaminated drinking water, and all showing that exposure to these chemicals may be particularly dangerous for the developing fetus and children.

Previous studies from the US, Canada, Germany and Japan have shown that PFCs can cross the placenta and transfer from mother’s body to the fetus (Apelberg, Goldman 2007; Inoue 2004; Midasch 2007; Tittlemier 2004), and are also found in breast milk (Karrman 2007; Kuklenyik 2004; So 2006; Tao 2008; Volkel 2007). Since there have been numerous animal studies demonstrating developmental toxicity of PFCs (Lau 2007; Lau, Butenhoff 2004; Andersen 2008; Fenton 2007) and the links between early developmental problems and health consequences later in life (Lau and Rogers 2004; Needham 2008), the next obvious question was whether any of these same health effects might be seen in human populations.

Two sets of researchers set out to answer this question. Unfortunately, both found that the answer was ‘yes.’

The first study, conducted by researchers from Johns Hopkins University and the Centers for Disease control, looked at PFOS and PFOA levels in 293 randomly collected samples of fetal cord blood from babies born in Baltimore, Maryland. The scientists found a statistically significant relationship between the levels of these two compounds and low birth weight and size – even though the blood levels of PFOS and PFOA were within the range found in general population (Apelberg, Witter 2007). These results were featured in the November 2007 issue of the prestigious journal Environmental Health Perspectives (EHP), published by the National Institute of Environmental Health Sciences.
The second paper, published in the same issue of EHP, was an even larger study conducted by scientists from University of California, Los Angeles in conjunction with the Institute of Public Health at Aarhus University in Denmark (Fei 2007). The researchers enrolled a randomly selected group of 1,400 Danish women and followed them throughout their pregnancy and birth. They found that levels of PFOA in the mothers’ blood were correlated with their baby having a higher chance of being born with low birth weight.

While the term “low birth weight” sounds relatively innocuous, it is a well known harbinger of more serious medical problems. For example, in 2001 a study published in the British Medical Journal (Matte 2001) found that there was a proportional relationship between birth weight and average IQ by age 7, with low birth weight babies scoring lower on IQ tests during development. Another study found a statistically significant link between low birth weight and adverse developmental effects including learning disabilities (Sauve 1998). And a 1999 study found much higher risks of mortality for infants born far underweight (Chye 1999).

The most troubling aspect of these two new PFOA studies is that the negative effects of PFOA were seen at levels present in the general population. The participating mothers in these studies were exposed through simple, everyday activities: through contact with PFC-containing products, food, and food packaging that is coated with fluorochemicals. With research conducted by the Centers for Disease Control and chemical manufacturers alike showing that the blood of more than 98% of Americans are contaminated with PFCs (Calafat 2006; Calafat, Kuklenyik 2007; Calafat, Wong 2007; Olsen 2004), these two studies show that there is real reason to be concerned about the ubiquity of PFC exposure.

The C8 Health Project: largest PFC study to date

The third key epidemiological study would be important if for no other reason because of its sheer size. With 69,000 study subjects, and known as the C8 Health Project, it is by far the largest study ever of PFC health effects in people. But the story of how it came about and its striking findings may make it the most important PFC study to date.

In 1981 two of seven children born to PFOA-exposed female workers in DuPont’s Washington Works plant chemical plant in Parkersburg, West Virginia were found to have birth defects involving the eye. But DuPont never told the EPA, even after it learned from 3M that PFOA had been linked to birth defects of the eye in studies of laboratory animals (reviewed in EWG 2004).

Three years later, between March and June 1984, DuPont tested for, and found, PFOA in tap water taken from a store in Little Hocking, Ohio, not far from the Washington Works plant. Again, DuPont failed to inform U.S. EPA of the finding. Nor did it inform the Little Hocking Water Association of this finding until seventeen years later in 2001, when it was revealed during the course of establishing a consent order between DuPont and the West Virginia Department of Environmental Protection (reviewed in EWG 2004).

These two events were just the beginning of a several decade long cover-up that eventually landed DuPont with a $16.5 million fine, by far the largest in EPA’s history (US EPA 2005). But due to the company’s negligence, unsafe chemical disposal practices, and decades of deception and cover-ups, tens of thousands of people living in Ohio and West Virginia communities near the DuPont plant have been exposed to contaminated drinking water. The C8 Health Project was created to determine what, if any, health effects these community members might be suffering from as the result of this PFC exposure.

A number of worrisome trends emerged from the initial analysis of the C8 Health Project data first presented to the public in May of this year (Frisbee 2008; West Virginia University School of Medicine 2008):

- Children in the study had higher median levels of PFOA in their blood. Among the 69,000 enrolled participants, serum PFOA levels ranged between 0.5 ppb and 22,412 ppb, with a median concentration of 28 ppb (West Virginia University School of Medicine 2008). Among the enrolled children under 10, serum PFOA concentrations ranged between 0.7 ppb and 2,070 ppb, with median concentration of 34 ppb.

- Higher PFOA concentrations in study children were correlated with higher total cholesterol levels, predisposing these children to future weight problems and
accompanying risks of heart disease as well as other illnesses. Similarly, in industry studies elevated cholesterol was one of the hallmark health findings observed in PFC-exposed workers (Olsen 2003; Sakr, Kreckmann 2007; Sakr, Leonard 2007). The problem of obesity in children has now become so severe so as be considered an epidemic. Several prior biomonitoring studies indicated that children tend to have higher serum levels of PFCs compared to adults (Emmett 2006; Olsen, Church 2004). A link between PFCs and elevated lipids thus presents an especial danger to children's health.

- Higher PFOA levels in study participants were correlated with lower levels of serum immunoglobulin, the key protein that helps the body fight bacteria, viruses, and other pathogenic microorganisms. Similarly, EPA researchers reported PFOA-exposed mice had low immunoglobulin levels (DeWitt 2008). And in animal studies PFC exposure has been linked with death of immune cells and weakening of the body's ability to protect itself from infection (DeWitt 2008; Peden-Adams 2008; Yang 2002; Yang 2000).

- Higher PFOA concentration in study participants was also correlated with elevated levels of alanine transaminase (ALT) and aspartate transaminase (AST), two key enzymes used in clinical blood assays to detect liver problems. When the liver is damaged, hepatocytes (liver cells) leak these enzymes into the blood, where higher levels of ALT and AST are then detected. Similar to findings of the C8 project, workers occupationally exposed to PFOA have increased levels of ALT (Olsen and Zobel 2007) and AST (Sakr, Leonard 2007). In addition, serum concentrations of the liver-secreted C-reactive protein, an important element early defense system against infections, decreased with higher PFOA levels in the C8 Health Project cohort.

- Finally, thyroid function was affected in PFOA-exposed cohort participants. There are two types of thyroid hormones easily measurable in the blood, thyroxine (T4) and triiodothyronine (T3). In the study, researchers analyzed free thyroxine index (FTI), which indicates how much thyroid hormone is free in the blood stream to work on the body. Unlike the T4 alone, FTI is not affected by estrogen levels and can thus be used to assess thyroid function in both genders. FTI is elevated in hyperthyroidism and depressed in hypothyroidism. In the study, FTI response followed an inverted U curve (higher at moderate-high PFOA levels and decreasing again at the highest PFOA levels). This trend is in agreement with worker studies that demonstrate negative association between PFOA serum concentration and free T4 and positive association between PFOA and T3 (Olsen and Zobel 2007).

In summary, C8 Health Project scientists concluded that this pilot analysis of C8 health data points to the association between PFOA and a wide range of adverse health effects including immune function, liver function, cholesterol (especially in children), and thyroid (Frisbee 2008). Results of studies of this size and complexity often take years to make their way into the scientific literature, and the researchers have cautioned that they are preliminary. The trends, however, are so clear and so consistent with previous worker and animal studies that they are deeply worrisome.

EWG’s Guide to PFCs

Perfluorochemicals, or PFCs, are widely-used water, grease and stain repellents.

What are perfluorochemicals?

They’re found in carpets and on clothes, on fast-food wrappers, and on the inner lining of pet food bags. You might know them as Teflon®, Scotchgard™, Stainmaster® and Gore-Tex®. They pollute water, are persistent in the environment, and remain in the human body for years. Companies that manufacture PFCs have agreed to phase out one variety, called PFOA, by 2015. Unfortunately, there’s no evidence that the chemicals being used to replace it are any safer.

What problems are associated with PFCs?
PFCs are associated with smaller birth weight and size in newborn babies, elevated cholesterol, abnormal thyroid hormone levels, liver inflammation, and weaker immune defense against disease—all good reasons to reduce your exposure.

**HOW TO AVOID PFCS**

- **Forgo the optional stain treatment on new carpets and furniture.**
  Find products that haven't been pre-treated, and if the couch you own is treated, get a cover for it.

- **Choose clothing that doesn't carry Teflon® or Scotchgard™ tags.**
  This includes fabric labeled stain- or water-repellent. When possible, opt for untreated cotton and wool.

- **Avoid non-stick pans and kitchen utensils.**
  Opt for stainless steel or cast iron instead.

- **Cut back on greasy packaged and fast foods.**
  These foods often come in treated wrappers.

- **Use real plates instead of paper.**

- **Pop popcorn the old-fashioned way on the stovetop.**
  Microwaveable popcorn bags are often coated with PFCs on the inside.

- **Choose personal care products without “PTFE” or “perfluoro” in the ingredients.**
  Use EWG's Skin Deep at cosmeticsdatabase.com to find safer choices.

### DuPont Press Quotes

In public statements, press releases, and on its website, DuPont continuously reiterated the same statement that “there are no human health effects known to be caused by PFOA.” (DuPont 2007a, 2008a). DuPont’s persistence in holding on to these statements is especially disingenuous in light of the extensive body of scientific literature that demonstrates toxicity of PFOA and other PFCs both in humans and in all other mammals tested to date. However, all of these findings have been hushed up, disregarded or minimized by DuPont for years.

DuPont has repeatedly said there is no evidence that PFOA causes adverse health effects and that data recently generated by the company will show that the chemical has a higher margin of safety than was determined in EPA's draft assessment.

-- *Pesticide & Toxic Chemical News, April 14, 2003*

“One reason is that C-8 persists in the environment for a long time; blood samples from around the country have found it in measurable quantities in more than 80 percent of the population. Some 3M tests showed toxicity in rats; DuPont dismisses those tests as not applicable to humans... DuPont apparently is too dependent on C-8 for Teflon manufacture to phase it out quickly, so its Web site explains, “There is no evidence or data that demonstrates PFOA causes adverse human health effects” at low levels of exposure.”

-- *News Journal, April 17, 2003*

“DuPont defends its actions in not disclosing the test results because it said it "acted with the absolute confidence that the low or nondetectable levels of C8 found in the Little Hocking water samples in the mid-1980s posed no risk to the health of Little Hocking residents or our own employees in the area.”

-- *Plastics News, June 16, 2003*

“By 1991, DuPont had information that C-8 was in the water supplies, according to company documents. But the EPA said DuPont did not inform federal regulators. DuPont asserts that there is no legal basis for the EPA's allegations. The company contends that it has fully complied with statutory reporting requirements and disputes any association between C-8 and harmful effects on human health or the environment.”

DuPont General Counsel Stacey J. Mobley said the company would "vigorously defend our position" that no laws were broken and that the chemical was safe. "The evidence from over 50 years of experience and extensive scientific studies supports our conclusion that PFOA does not harm human health or the environment," Mobley said."

"DuPont is contesting the accusations, and insists that neither PFOA nor Teflon poses risks to humans. "The evidence from over 50 years of experience and extensive scientific studies supports our conclusion that PFOA does not harm human health or the environment," said Stacey J. Mobley, general counsel of DuPont, in a statement responding to the E.P.A. ruling."

The company (DuPont) says it has broken no laws and has sharply reduced emissions of PFOA. And studies on plant workers have shown PFOA to be safe, said Don Duncan, president of the Society of the Plastics Industry, and industry group. "It's not as if we've got people dropping in the streets out there," he said.

In a study awaiting publication, DuPont scientists say they find no risk associated with the everyday use of coated clothing, carpets and cookware, among other products. "We can say unequivocally that those articles are safe," said Robert C. Buck, a Ph.D chemist and senior research scientist with the company.

Although to date, no human health effects are known to be caused by PFOA, the company recognizes that the presence of PFOA in human blood raises questions that should be addressed," the company (Dupont) said in a statement. Dupont has said that 50 years of use and study support its conclusion that the chemical poses no danger to people.

"DuPont remains confident that based on over 50 years of use and experience with PFOA there is no evidence to indicate that it harms human health or the environment," [stated] company spokesman R. Clifton Webb.

DuPont documents, though, show company officials were worried the public would learn the PFOA had contaminated local water supplies... "Biggest potential downside: plant contamination issues surface, case becomes class action," DuPont attorney concluded in a March 2000 e-mail.

"Based on an evaluation of human health and toxicology studies, DuPont believes that the weight of evidence suggests that PFOA exposure does not cause cancer in humans and does not pose a health risk to the general public," DuPont spokesman R. Clifton Webb said. "To date, no human health effects are known to be caused by PFOA, even in workers who have significantly higher exposure levels than the general population."

The information demonstrating that PFOA moves across the placenta "should have been reported immediately to EPA," Nakayama says. DuPont also allegedly failed to report the results of blood tests, done at the company's request, of plaintiffs in a class-action lawsuit who live near the West Virginia plant. Those people drank water drawn from wells near the plant and had blood levels of PFOA that were significantly higher than that of the U.S. population. Other data DuPont allegedly
did not turn over to EPA as promptly as required by law include three studies showing that an unidentified perfluorochemical was “significantly lethal” when inhaled by laboratory rats.

-- *Chemical and Engineering News, December 19, 2005*

DuPont, which manufactures Teflon and has used the chemical for more than 50 years, says there is no evidence that PFOA is harmful to humans. "The chemical does have an effect on animals that are fed high doses of it. But animals respond differently to PFOA than people, and there is no evidence that there are any health effects in people," said David Boothe, a DuPont manager.

-- *Baltimore Sun, February 6, 2006*

"We think the weight of evidence and science says, look, the things that are happening in rats don't happen in people," Boothe said. He also said the EPA has ignored company studies that did not find health problems in workers "exposed to thousands of times higher levels than in the general population." "So DuPont's position on this is, to date, there are no known health effects from exposure to PFOA," Boothe said."

-- *Fort Worth Star Telegram, December 5, 2006*

DuPont Spokesman David Booth testified PFOA is "essentially a high-tech detergent" that has been used for 50 years in manufacturing plastic and "as there are no known health effects from PFOA."

-- *Biloxi Sun Herald, January 26, 2007*

"Dan Turner, a spokesman for DuPont, which uses PFOA in the production of Teflon, said the company is convinced its products pose no threat to human health. "DuPont believes and maintains that consumer products sold with trace levels of PFOA are safe for their intended use," he said. He added that he was familiar with the Johns Hopkins research. "To date, there are no known human health effects known to be caused by PFOA," he said."

-- *Cox News Service, Atlanta Journal-Constitution, May 26, 2007*

One of the studies, carried out by researchers at the blue-chip Johns Hopkins Bloomberg School of Public Health in Baltimore, Maryland, found the chemical in every single one of the 299 umbilical cords analyzed, suggesting that every baby is born already contaminated by it. Similar levels have been found in babies in Europe and Japan. It also found that the babies whose cords had the highest concentrations of PFOA were born lighter, thinner and with smaller head circumferences than others. The second study - carried out in the US and Denmark, with babies drawn from the Danish National Birth Cohort - came up with similar findings for birth weight, the only measurement it made. "DuPont has long insisted that "there are no human health effects known to be caused by PFOA," and now adds: "Our position is that the studies have not changed our position."

-- *The Independent, August 26, 2007*

**Dupont statements on its website (2007)**

DuPont Position on PFOA: "To date, there are no human health effects known to be caused by PFOA. Based on health and toxicological studies conducted by DuPont and other researchers, DuPont believes the weight of evidence indicates that PFOA exposure does not pose a health risk to the general public" (DuPont 2007a).

PFOA Facts: "Occupational exposure to PFOA has been associated with small increases in some lipids (e.g. cholesterol). It is not known whether these are causal associations. These associations were not observed in a community study. Based on health and toxicological studies, DuPont believes the weight of evidence indicates that PFOA exposure does not pose a health risk to the general public. To date, there are no human health effects known to be..."
caused by PFOA, although study of the chemical continues” (DuPont 2007b).

PFOA - Safety: “PFOA has been used safely by DuPont and others for more than 50 years with no known human health effects to date” (DuPont 2007b).

“Still, DuPont -- which paid a heavy fine to the EPA for failing to report internal studies on the health risks of PFOA and settled a lawsuit that alleged PFOA-contaminated drinking water near a DuPont plant -- insists that PFOA does not pose a health risk to the general public.”

-- Chicago Tribune, March 11, 2008

“DuPont has stated that there is no evidence of health threats from PFOA, but a federal advisory panel recommended classifying it as a probable carcinogen.”

-- AP, May 7 2008

Dupont website and press releases (2008)

“DuPont believes the weight of evidence indicates that PFOA exposure does not pose a health risk to the general public. To date, there are no human health effects known to be caused by PFOA” (DuPont 2008a, 2008b).

“Based on health and toxicological studies, DuPont believes the weight of evidence indicates that PFOA exposure does not pose a health risk to the general public. To date, there are no human health effects known to be caused by PFOA, although study of the chemical continues” (DuPont 2008c).

Notably, the same stance is adopted by other fluorochemical manufacturers:

3M website, 2008

“In more than 25 years of medical surveillance we have observed no adverse health effects in our employees resulting from their exposure to PFOS or PFOA. This is very important since the level of exposure in the general population is much lower than that of production employees who worked directly with these materials.” “The extensive research to date shows no adverse human health effects resulting from exposure to PFOS or PFOA. This is supported by observational research involving thousands of 3M production employees” (3M 2008).

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Recommendations

For more than 50 years DuPont, 3M and other companies produced PFOA for a stunning range of consumer products and dumped it into the environment in amounts that have left a long-term legacy of pollution. PFOA contaminates 98% of the American population, taints drinking water supplies in at least 11 states around the country, and pollutes people and wildlife the world over, including polar bears in the Arctic. It crosses the placenta to contaminate nearly every baby before the moment of birth, and is now linked to a broad range of health problems in ten studies of the general public and workers at fluorochemical plants.

Since this tragedy was uncovered beginning in 2000, public pressure forced 8 companies, including DuPont and 3M, to sign a voluntary agreement with EPA to phase out the use of PFOA by 2015. Outcomes in the government and courts have not been voluntary, and include DuPont's obligation to fund health studies of people with contaminated drinking water, and to pay to EPA the largest administrative fine of its type in the Agency's history for failing to divulge, as required by federal law, that PFOA crosses the placenta to pose significant risks to the health of the child developing in the womb.

Yet despite the embarrassment that DuPont's public thrashing must have brought, all indications are that the company and their competitors are launching a repeat performance,
replacing PFOA with a chemical called C6 that, like PFOA, is extraordinarily persistent in the environment and crosses the placenta to pose risks to babies during development. DuPont is calling this "green chemistry." And the fluorochemical industry is engineering this wholesale shift in the market without publishing a single study on the safety of this alternative.

Companies place human health and the environment at risk when they expose the population to chemicals that haven't been proven safe, that get into people's bodies, and that pollute the environment indefinitely. To remedy this situation, we recommend the following:

- The California legislature should pass SB1313, a bill that would prohibit the use of food packaging chemicals that are contaminated with or break down into C6, PFOA, PFOS, and/or related chemicals. This bill would have national and potentially global benefits as market changes filter out from California. And when passed, it will be the only enforceable ban of PFOA and related chemicals in the country. Eight companies are phasing out their use of PFOA by 2015, but chemical companies in China and many other parts of the world have expressed no such intention. As a result, the United States could still import PFOA-containing food packaging for years to come. SB1313 would keep these toxic food packaging products out of the state. C6, a key PFOA replacement chemical, has not been proven safe. Instead, it has already been shown to cross the placenta to contaminate babies in utero. Its inclusion in the final SB1313 bill is critical.

- The U.S. Congress should close the loophole that allows EPA and other federal public health agencies to deny states access to critical public health data on industrial chemicals, and that allows chemical companies near carte blanche to claim as confidential business information any health and safety data submitted to the government, including even the identity of the chemical. This lack of transparency severely hampers the ability of states to set policies that protect public health when the federal government fails to do so. This gap must be closed.

As well established by science and acknowledged by the FDA, food packaging chemicals can migrate into food. People ingest them, and can be exposed to significant amounts that pose risks. Persistent chemicals that pollute human blood have no place in food packaging.

The health risks from food packaging chemicals add to the risks from hundreds of other industrial chemicals that contaminate the human body. EWG studies show an average of 200 industrial chemicals, pollutants and pesticides in newborn babies. Federal law fails to require that companies test industrial chemicals for safety before they are sold and does not mandate that FDA, EPA or any other public health agency consider the totality of human exposures to toxic chemicals when assessing potential health risks, including risks from food packaging chemicals like PFOA and C6-based chemicals. Ultimately, it will take broad reform of public health protections at the federal level to fix this badly broken system; such reform must require that companies test chemicals for safety before they are sold in order to protect the health of children and others who are most vulnerable to the harmful effects of chemical exposures.

Credibility Gap: Are New Food Packaging Chemicals Any Safer?

WASHINGTON, June 9 - DuPont and other chemical companies have promised to phase out a cancer-causing chemical found in grease-resistant coatings for food packaging. But the new, supposedly green chemicals the industry is pushing as a replacement may be no safer.

An investigation by Environmental Working Group (EWG) found there are almost no data publicly available on the health risks of the new chemicals, leaving in question whether food packaging and other products using them are any less hazardous to people and the environment. EWG found that DuPont and other manufacturers are continuing a decades-long pattern of deception about the perfluorinated chemicals known as PFCs.

“Calling these replacement chemicals ‘green’ is like saying you’re safer driving a car at 150 miles an hour instead of 200,” said Olga Naidenko, PhD, an EWG senior scientist. “Just like the chemicals they’re replacing, these new compounds are extraordinarily persistent in the environment, they are already found in people’s blood and they cross the placenta to contaminate babies before birth.”

In 2006, DuPont and 7 other companies, under pressure from the EPA, agreed by 2015 to phase out PFOA, a persistent breakdown product of perfluorinated chemicals in fast-food wrappers, pizza boxes, microwave popcorn and other food packaging. PFOA has been termed a “likely human carcinogen” by the EPA’s Science Advisory Board. Even as it agreed to a phase-out, however, DuPont has insisted - in the face of overwhelming scientific evidence to the contrary - that PFOA does not harm human health or the environment. But EWG’s investigation found:

- DuPont’s own scientific advisors disagree with the company’s repeated assertions that PFOA is safe, calling them “Somewhere between ‘misleading’ and ‘disingenuous’” and adding that “Such a statement is misleading, whether intentionally or not, and it is unacceptable to mislead in this way.”

- Since 2007, various PFC manufacturers have reported to the EPA 19 different new, unpublished studies showing “substantial risks” to human health and the environment from fluorochemicals, but under EPA rules shielding “confidential business information,” in 17 cases the companies redacted the name of the specific chemical and did not disclose its intended uses.

- There is little reason to believe that the industry’s voluntary phaseout program will effectively reduce human exposure to PFCs because it excludes packaging made in China and because, again, significant portions of the data on the program’s progress are shielded as proprietary.

“DuPont and the rest of the chemical industry are continuing a decades-long pattern of cover-ups and non-disclosure about the serious hazards of these chemicals,” said Naidenko. “When the industry talks about the safety of existing PFCs or their replacements, they have very little credibility.”

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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.

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