PFAS in Synthetic Turf

An overview of concerns

March 18, 2021

Methods & Analytical Partners

- SGS AXYS
  - PFAS by SGS AXYS Method MLA-110 LC-MSMS
  - PFAS TOP Assay SGS AXYS Method MLA-110 LC-MSMS (Conversion/Oxidation & Post)
- Eurofins Lancaster Laboratories
  - PFAS by EPA 537 Isotope Dilution
- Galbraith Laboratories
  - Total F - F (E9-3). http://galbraith.com/wp-content/uploads/2015/08/E9-3-Total-Fluorine-by-Oxygen-Flask-Combustion-ISE-GLI-Method-Summary.pdf
  - Inorganic F - A09 (E9-1) http://galbraith.com/wp-content/uploads/2015/08/E9-1-Fluoride-Ion-by-ISE-GLI-Method-Summary.pdf
- PIGE analysis with Notre Dame University

Processing aids that contaminate synthetic turf with PFAS

In 2019 PEER and The Ecology Center collaborated to

- Tested a brand-new piece of turf being laid at Oliver Ames High School in Easton, Massachusetts for PFAS, and the lab found 300 ppt of 6:2-Fluorotelomersulfonic acid (6:2 FTSA), a short-chain Gen X PFAS, in the backing of the turf;
- Tested the backing from a discarded piece of artificial turf manufactured around 2004 in Franklin, Massachusetts that had 190 ppt of PFOS;
- Tested 8 different synthetic turf fiber samples (including Shaw and Turf Factory Direct brands) and found 100% of grass fiber contained total fluorine levels, suggesting the presence of PFAS (results indicated 44-255 ppm total fluorine), and;
- Found turf patents and industry literature discussing the widespread use of PFAS as a plastic processing aid (PPA) to enhance smoothness and reduce friction. We've identified this PFAS are in other plastic products.

Toxic chemicals are found in blades of artificial turf

By David Abel Globe Staff, October 9, 2019, 8:32 p.m.

Results PFAS vs “Total” and “inorganic fluorine”

Similar results for indoor residential and commercial carpet, biosolids and textiles. These are product types we have investigated in the last two years.

Synthetic turf fiber: Total fluorine - 44-255 ppm. PFAS (targeted testing) typically ~100 ppt. PFAS range from 0.039 to 0.2% of total organic fluorine.

Commercial biosolid fertilizer: Total fluorine - range 61 to 321 ppm. PFAS range from 0.019 to 0.17% of total organic fluorine.

Some of more common PFAS fluoropolymers are PTFE, PVDF-HFP and others

PFAS Fluoropolymer life cycle

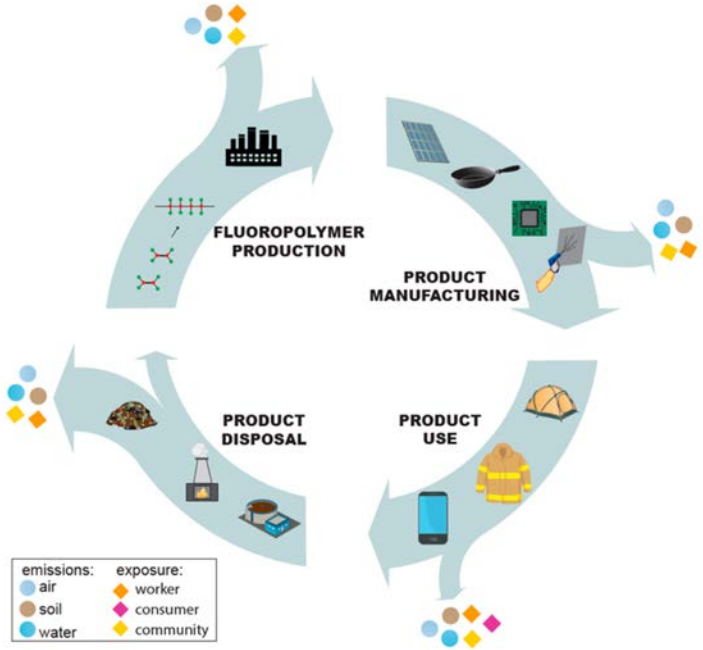
Production of some fluoropolymers is intimately linked to the use and emissions of legacy and novel PFASs as polymer processing aids.

There are serious concerns regarding the toxicity and adverse effects of fluorinated processing aids on humans and the environment.

A variety of other PFASs, including monomers and oligomers, are emitted during the production, processing, use, and end-of-life treatment of fluoropolymers.

There are further concerns regarding the safe disposal of fluoropolymers and their associated products and articles at the end of their life cycle.

While recycling and reuse of fluoropolymers is performed on some industrial waste, there are only limited options for their recycling from consumer articles.



Are Fluoropolymers Really of Low Concern for Human and Environmental Health and Separate from Other PFAS? Lohman, et. al. Environmental Science & Technology, 2020
https://pubmed.ncbi.nlm.nih.gov/33043667/

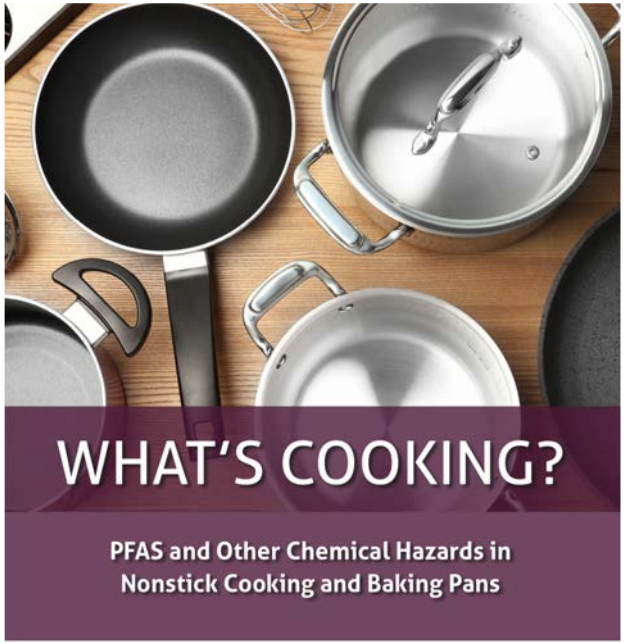
What do we know of the impact PFAS Fluoropolymers?

Teflon (PTFE) in Cookeware Case Study

We tested 14 nonstick cooking pans and 10 nonstick baking pans to identify their coatings. We found the following:

- 79% of the cooking pans were PTFE-coated.
- 20% of the baking pans were PTFE-coated.
- In some cases, product claims on the packaging could lead buyers to purchase PFAS-coated pans when they think they're buying an alternative.
- Some of the alternatives may also be hazardous. Surprisingly, we found undisclosed BPA-based coatings on two of the baking pans and one of the cooking pans.
- Safer, more durable alternatives are readily available and provide good cooking performance. The Ecology Center suggests opting for uncoated pans made from cast iron or stainless steel or, for baking, glass or ceramic.

https://www.ecocenter.org/healthy-stuff/reports/whats-cooking-nonstick-pan-study-2020



PFAS Pollution from Non-stick Pans...and turf?

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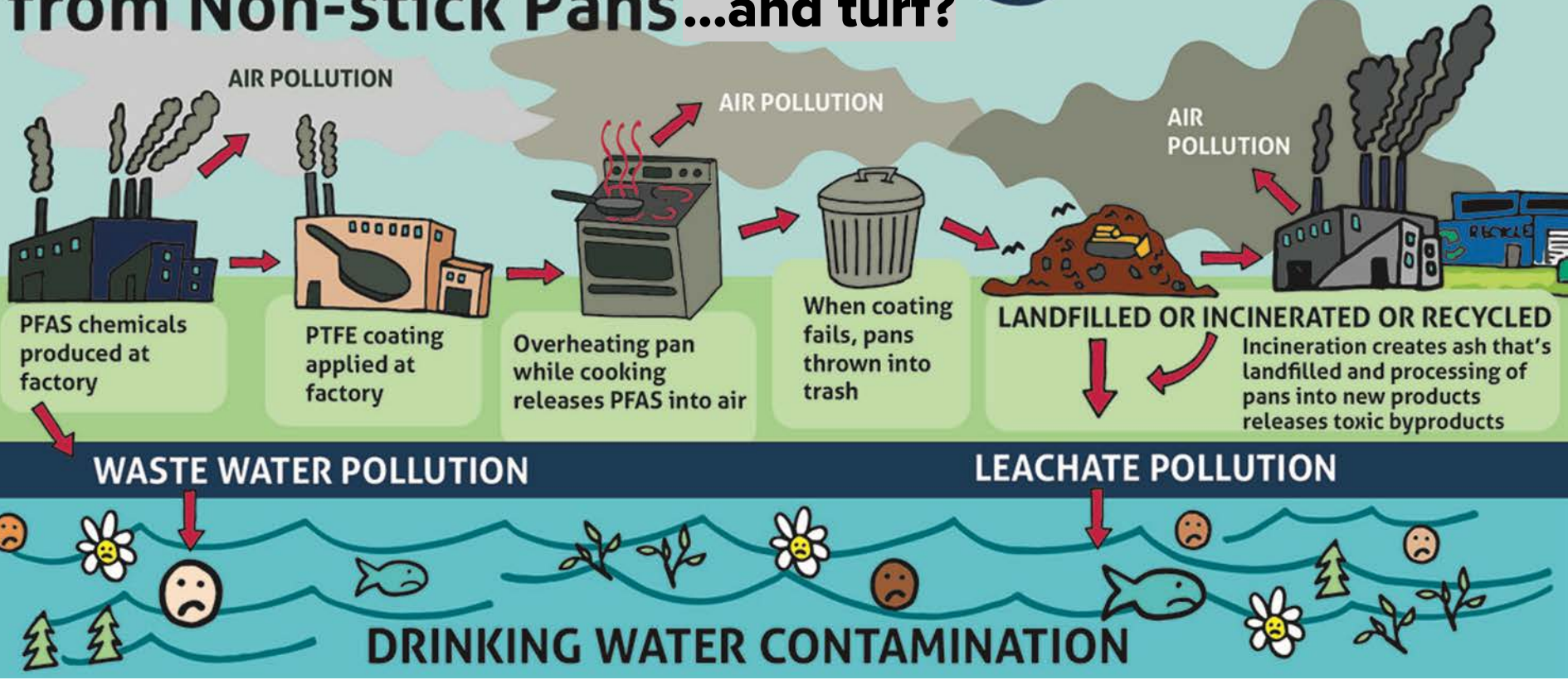


SUPPLY CHAINS OF NONSTICK PTFE PAN COATINGS: A CASE STUDY

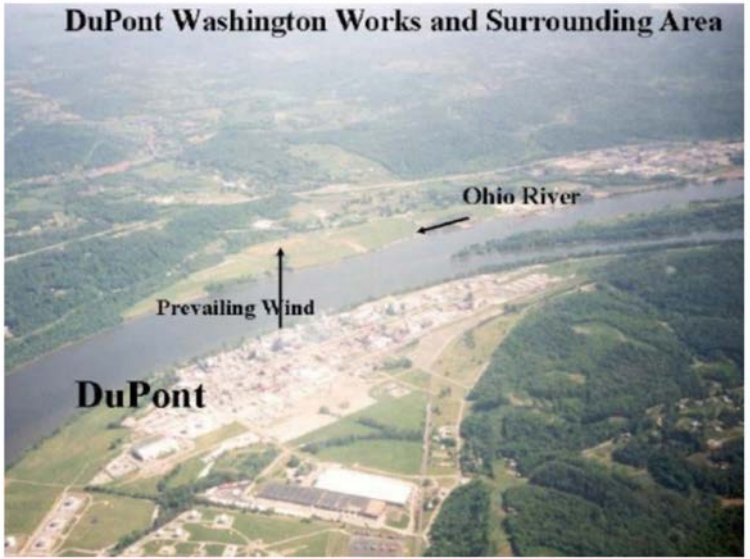
CASE STUDY I: A MUFFIN PAN MADE IN THE U.S.A. IS LINKED TO WATER POLLUTION IN THREE STATES

The ProBake Nonstick 12-Cup Muffin Pan by G&S Metal Company was one of two pans we tested that was made in the United States. It is labeled as "TEFLON Xtra Nonstick." The PTFE coating we identified on the muffin pan represents the end of a supply chain that releases highly toxic pollution in three states:

Fluoropolymer → Product

1. ***North Carolina:*** Chemours produces GenX, a surfactant necessary for making PTFE, at its Fayetteville Works plant. GenX is a substitute for PFOA, one of the best-studied toxic PFAS. The Fayetteville plant has discharged toxic GenX into the local river for decades. **It has contaminated residents' drinking water & Cape Fear River water flows from the Fayetteville plant to Wilmington in two to three days.**
2. ***West Virginia:*** Chemours ships GenX from Fayetteville to its Washington Works plant near Parkersburg, WV, where it uses the compound in the manufacture of Teflon™ (PTFE). The area's water is now contaminated with GenX in addition to the PFOA left from earlier decades. ***Contaminated the drinking water for 70,000 people***.
3. ***Connecticut:*** G&S purchases PTFE mixtures from Chemours and uses them to coat steel at a coil coating plant in Hamden, CT. This plant is a serial polluter of water, although we lack information on the fate of PFAS chemicals used at this plant because these chemicals are not monitored. The PTFE-coated steel is then shipped to Cleveland to be stamped into cookware like muffin pans and sold at retailers like Amazon and Walmart.

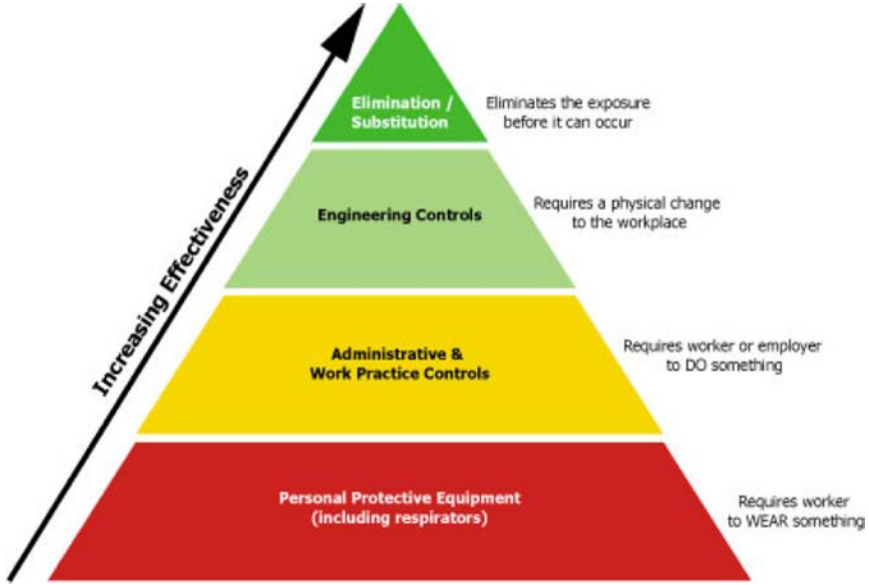
2. Chemours (Formerly Dupont) Parkersburg, West Virginia



Aerial view of the WV location. From a US CDC presentation.[8]

What is a “Safer Alternative”?

- A different, **less hazardous chemical** that achieves the same, or better, results
- An **alternative material, product or process** that eliminates the need for using hazardous chemical
- **Re-design or reformulation** of a product that eliminates need for a process or material requiring hazardous chemical



Next steps

- Completion of supply chain research to characterize environmental impacts of PFAS fluoropylmer production, use & end-of-life.
- Additional research on end products, including synthetic turf and other consumer products
- Promotion of safer alternatives for non-essential uses of PFAS fluoropoylmers
- Natural grass fields represent a proven, safer alternative.

Thank You

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