PFAS in Artificial Turf Fields: Uncertainties and Cause for Concern

PFAS Project Lab
Northeastern University

PFAS-REACH
PFAS Research, Education, and Action for Community Health

What is Artificial Turf?

Artificial Turf (AT) fields are synthetic fields used for athletic arenas and landscaping that are meant to look like natural grass. These fields have a typical lifespan of 8-12 years depending on use and maintenance. AT is made up of 3 layers: infill, fibers, and shockpad. Common infill materials include crumb rubber made from end of life tires, sand, cork or walnut shells. Common types of fibers include nylon, polyethylene, and polypropylene. Foam is most commonly used for the shockpad.

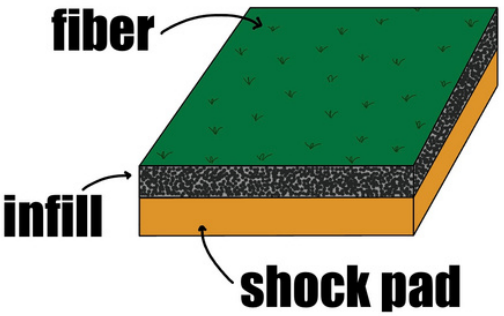
What are PFAS?

PFAS (per- and polyfluoroalkyl substances) are a class of over 12,000 chemicals used in a diverse range of products and industrial processes. PFAS do not naturally degrade in the environment and have been linked to numerous human health effects. PFAS are widely used in AT manufacturing to release plastic fibers from molds and to prevent clogging in the extrusion process. Current U.S. regulations have largely failed to protect public and environmental health from exposure to PFAS. According to the U.S. EPA, there is no safe level of exposure for certain PFAS.

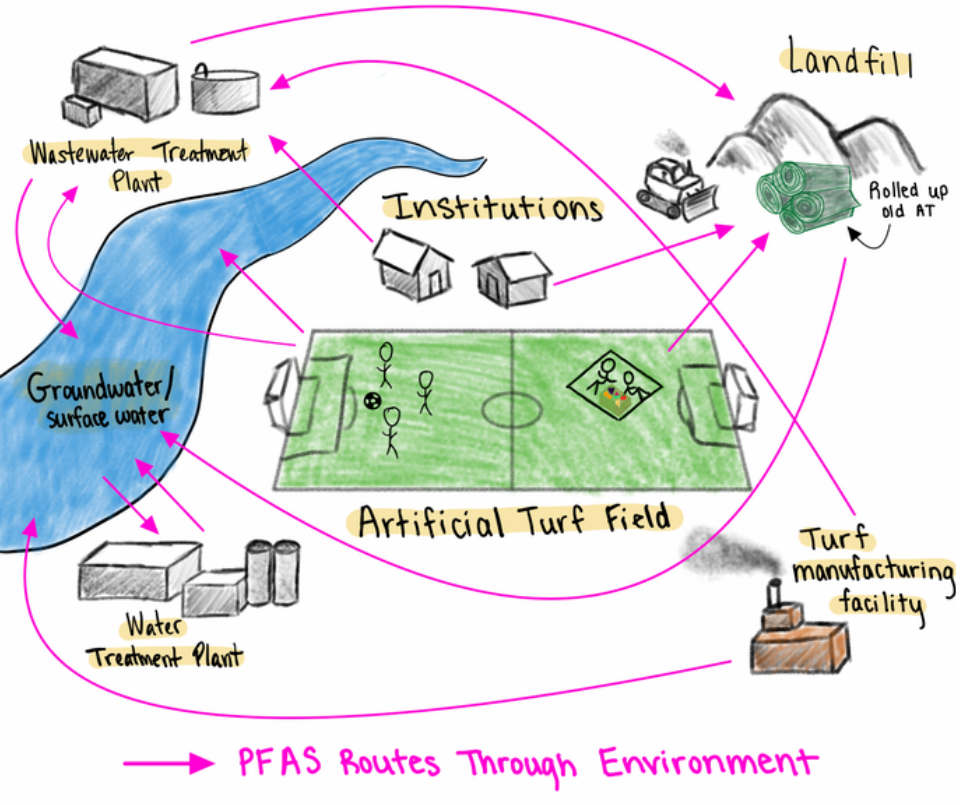
What are general concerns about AT?

Communities, scientists, and athletes are concerned about AT for several reasons:

- **Health concerns** related to heat hazards, injuries, infections and toxic chemical exposure to VOCs, PAHs and heavy metals found in crumb rubber
- **Disposal and claims of "recycling"**
  - An estimated 1,200-1,500 new AT fields are installed every year
  - Old AT becomes plastic waste or is sold in unregulated secondhand markets
  - Some companies claim to have developed tools to recycle materials into new AT. This raises environmental concerns due to melting or incinerating plastic
- **Occupational and local community exposures** from production process
- **Uncertainty about ingredients** due to outsourcing raw materials from other manufactures to make AT and components
- **Chemical runoff** from fields may carry chemical contaminants that leach from AT into nearby groundwater, waterways, and habitats
- **Off-gassing** of VOCs, PAHs, and other toxic chemicals into the atmosphere



Access online version here



PFAS and AT

PFAS in AT have been getting more attention in recent years. However, uncertainties remain regarding the extent to which AT contributes to PFAS contamination of water and to PFAS exposures among people who use AT fields.

- Testing by scientists, NGOs, industry, and municipalities has found fluorine - an indicator of PFAS presence - in AT, through intentional use and/or unintentional contamination.
- Many uncertainties remain surrounding exposure through inhalation, ingestion, and dermal routes. Health impacts from PFAS exposure via AT are also unstudied at this time.

Cities and states are responding: Boston will not be installing new AT fields. States including CA and VT have also introduced bills banning PFAS in AT. Many municipalities and communities including Portsmouth, NH, Nantucket, MA, and Martha's Vineyard, MA have held hearings regarding PFAS in AT and the concerns that these communities have.

References and More Information

Contact us: pfasproject@gmail.com

Artificial Turf graphic designed by Alana Caluwe, Northeastern University
PFAS Through the Environment graphic designed by Anthony Minichiello, Worcester Polytechnic Institute

Amarelo, Monica. California makes strides to ban toxic 'forever chemicals' in artificial turf. *EWG*, https://www.ewg.org/news-insights/news-release/2023/04/california-makes-strides-ban-toxic-forever-chemicals-artificial

Bennett, Kyla. False Artificial Turf Recycling Claims Ripped. Public Employees for Environmental Responsibility (PEER), https://peer.org/false-artificial-turf-recycling-claims-ripped/

Claudio, Luz. Synthetic Turf: Health Debate Takes Root. *Environmental Health Perspective,* https://ehp.niehs.nih.gov/doi/10.1289/ehp.116-a116

Cotton, Emma. Senate approves bill that would ban PFAS from menstrual and cosmetic products, textiles and turf fields. *VT Digger*, https://vtdigger.org/2023/04/05/senate-approves-bill-that-would-ban-pfas-from-menstrual-and-cosmetic-products-textiles-and-turf-fields/

Crunden, E.A., Ariel Wittenber. 'Our community has been deceived': Turf wars mount over PFAS. *E&E News*, https://www.eenews.net/articles/our-community-has-been-deceived-turf-wars-mount-over-pfas/

Ecology Center. Toxic "Forever Chemicals" Infest Artificial Turf, https://www.ecocenter.org/toxic-forever-chemicals-infest-artificial-turf

Environmental Protection Agency (EPA). Per- and Polyfluoroalkyl Substances (PFAS) Proposed PFAS National Primary Drinking Water Regulation, https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

Lauria et al. Widespread Occurrence of Non-Extractable Fluorine in Artificial Turfs from Stockholm, Sweden. *Environmental Science & Technology Letters*. https://pubs.acs.org/doi/10.1021/acs.estlett.2c00260

Lerner, Sharon. Toxic PFAS Chemicals Found in Artificial Turf. *The Intercept*, https://theintercept.com/2019/10/08/pfas-chemicals-artificial-turf-soccer/

Mount Sinai Children's Environmental Health Center. Artificial Turf: A Health--Based Consumer Guide, https://drive.google.com/file/d/1T-VUzG1NiXv2o8ZWI9l2tDIfv51pP1tO/view

Neltner, Tom. Beyond Paper, Part 2: PFAS Intentionally Used to Make Plastic Food Packaging. Environmental Defense Fund, https://blogs.edf.org/health/2021/08/12/beyond-paper-part-2-pfas-intentionally-used-to-make-plastic-food-packaging/

Peaslee, Graham, Kristen Mello. Slide Deck from NEWMOA Conference: PFAS in Artificial Turf. University of Notre Dame, https://drive.google.com/file/d/1EHXowcrl73po4MuXqVE82IE468nBpSEk/view

Perkins, Tom. Boston bans artificial turf in parks due to toxic 'forever chemicals'. *The Guardian*, https://www.theguardian.com/environment/2022/sep/30/boston-bans-artificial-turf-toxic-forever-chemicals-pfas

Perkins et al. Evaluation of Potential Carcinogenicity of Organic Chemicals in Synthetic Turf Crumb Rubber. *Environmental Research*, https://www.sciencedirect.com/science/article/pii/S0013935118305528?via%3Dihub

PFAS Exchange Resources, https://pfas-exchange.org/resources/

PFAS Project Lab, https://pfasproject.com/

PFAS REACH. How Can PFAS Affect Your Health? https://pfas-exchange.org/how-can-pfas-affect-your-health/

Ragnarsdóttir, Oddný, Mohamed Abou-Elwafa Abdallah, Stuart Harrad. Dermal uptake: An important pathway of human exposure to perfluoroalkyl substances? *Environmental Pollution*, https://www.sciencedirect.com/science/article/pii/S0269749122006923?via%3Dihub#bib64

Toxics Use Reduction Institute (TURI). Per- and Poly-fluoroalkyl Substances (PFAS) in Artificial Turf Carpet, https://drive.google.com/file/d/17xMVfczYFljiV8FMb-eBCgyhUhNa3j9i/view

TRC. Technical Memorandum Evaluation of PFAS in Synthetic Turf, https://drive.google.com/file/d/1EfxeL5GYju-9lEiOKxLcCaGX8Cw0e6vc/view