ASBA 2024

ASBA TECHNICAL MEETING & TRADE SHOW

DECEMBER 3-6, 2024 | ORLANDO, FLORIDA

Synthetic Turf and PFAS: Perspectives from Owners, Designers, Contractors and Suppliers

Megan Buczynski P.E., LEED AP, Activitas, Inc.

Phil Lasker CFB, David W. White Sports Construction

Jeff Gentile, Firefly Sports Testing

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Introductions

Megan Buczynski

Activitas, Inc.

Dedham, MA

Phil Lasker

David W. White Sports Construction

Bow, NH

Jeff Gentile

Firefly Sports Testing

Hooksett, NH

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Agenda

- Quick Poll
- What are PFAS? What are the Risks?
- Current & Upcoming Regulatory Requirements
- PFAS in Athletic Fields: Grass -v- Turf
- Specifying / Documenting Compliance
- Experiences with PFAS in Design/Construction
  - Owner Experiences
  - Professional Consultant Experiences
  - General Contractor Experiences
  - Supplier Experiences
- Moving Forward

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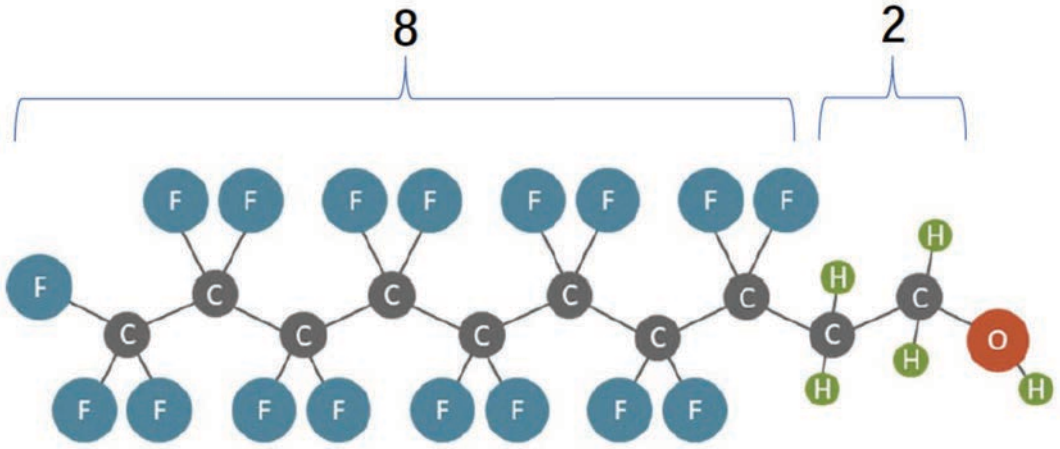
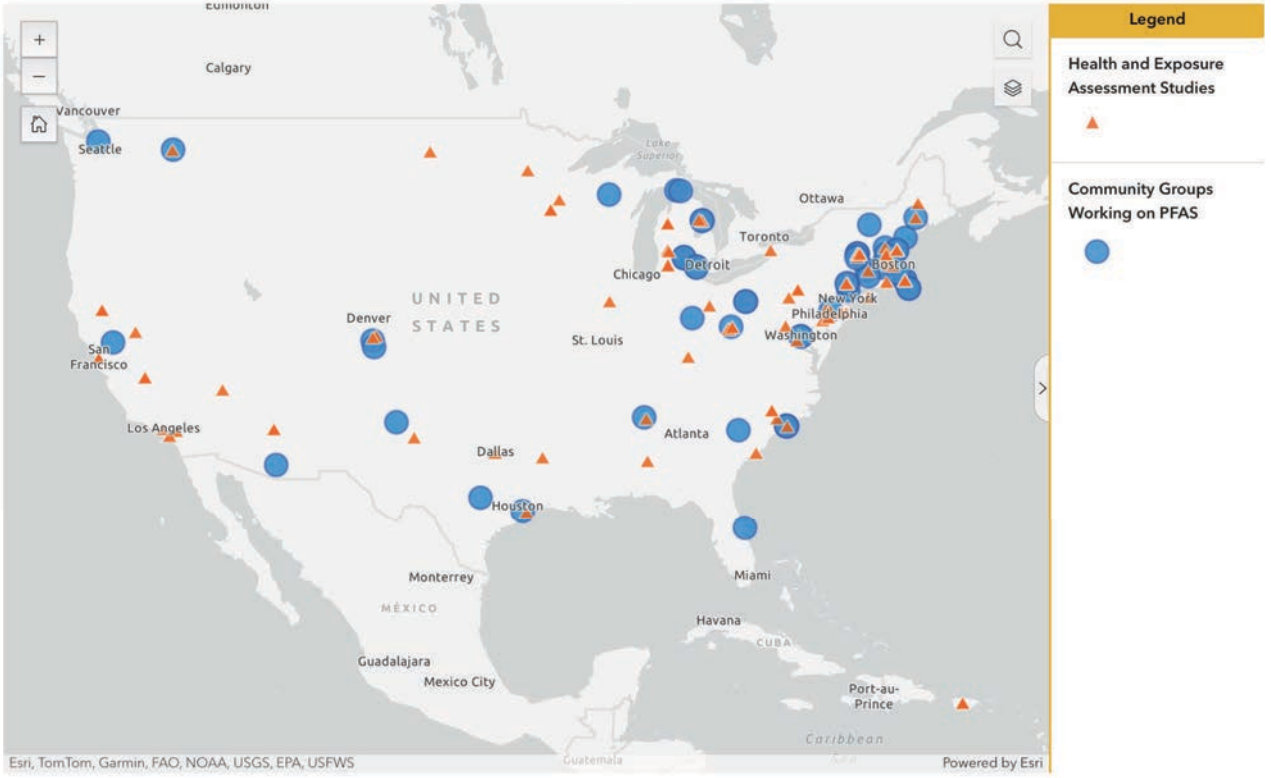
Quick Poll

- Designers / Contractors
- Suppliers: Chemists / Scientists / Lab Techs?
- Who has had to explain PFAS to a Client / Municipality / Owner?
- For those who have, where do you work?





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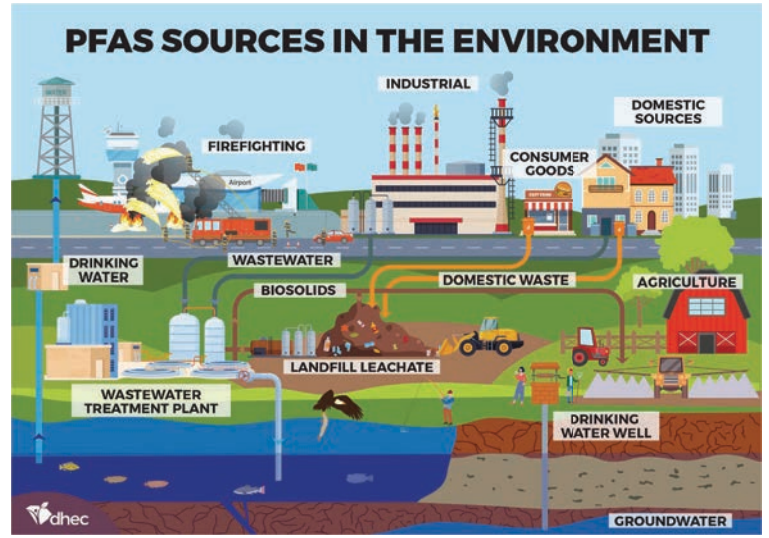
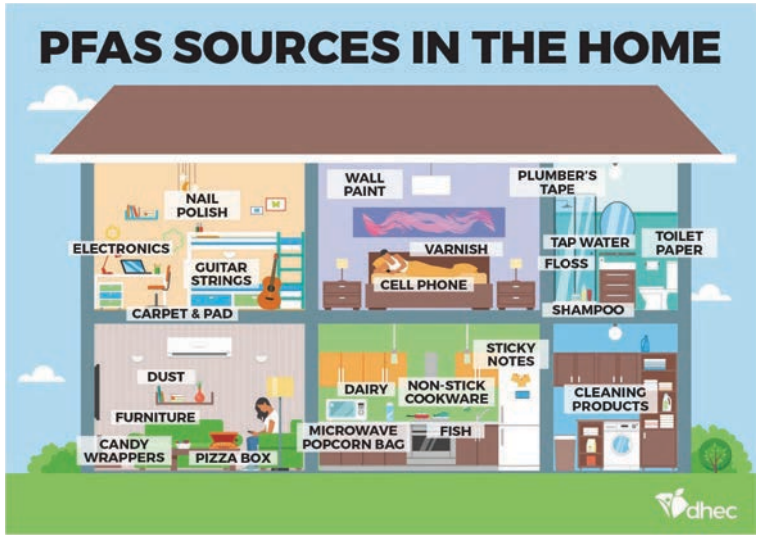
What are PFAS?

PFAS (Per- and Polyfluoroalkyl Substances) are a group of thousands of synthetic chemicals. Estimates range between 8,000 and 7 million, depending on the organization. The EPA's 2020 PFAS Master List estimated that there were more than 12,000 PFAS.



Where are PFAS Found?

- In the environment: soil, air, and water
- In living organisms: detected in people, wildlife, and fish
- Production, use, and disposal processes release PFAS, leading to contamination of soil, groundwater and surface water, air



PFAS	per- and polyfluoroalkyl substances Class of over 9,000 highly persistent and toxic substances used in many industrial processes and consumer products
PFOA	perfluorooctanoic acid One of the legacy long-chain contaminants in the class of PFAS, also known as C8
PFOS	perfluorooctane sulfonic acid One of the legacy long-chain contaminants in the class of PFAS, first used as the main ingredient in Scotchguard

Source: https://scdhec.gov/environment/polyfluoroalkyl-substances-pfas

JG

What are the Risks?

- PFAS are “forever chemicals” and may take hundreds of years to degrade in the environment
- Some PFAS are bioavailable – they can accumulate in body tissues and build up over time
- Studies suggest that elevated levels of certain PFAS may be linked to developmental effects in infants, effects on the renal system (e.g. liver and kidneys), and hormonal imbalances
- Potential links to cancer, research is ongoing

How Can PFAS Affect Your Health?

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

PFAS (per- and polyfluoroalkyl substances) are among the most ubiquitous synthetic chemicals in the world. Approximately 98 percent of Americans have PFAS in their bodies. People can be exposed to these chemicals in many different ways—through the water they drink, the products they use, the air they breathe, and the food they eat. During pregnancy, PFAS can pass from the mother to the fetus through the umbilical cord, and babies can be exposed through breast milk or formula made with contaminated water.

Their strong chemical bonds and unique structures make them very effective at repelling water and oil even at high temperatures. These same characteristics also make PFAS extremely persistent, meaning they don’t break down in the environment. Even more concerning, some PFAS can remain in the body for years, and people continue to be exposed to the chemicals.

Because of their persistence and because exposures are so widespread, scientists are concerned about the potential health impacts. Most health studies have looked at PFOA and PFOS, the two most commonly found PFAS. However, new research suggests other types of PFAS have similar health effects.

Learn more: www.pfas-exchange.org

Although the science on health effects is still evolving, scientists are increasingly concerned about low-dose exposures, as they continue to find health effects at lower and lower levels. More research is needed on other PFAS chemicals, in particular ones that companies have developed to replace PFOA and PFOS. Because people are exposed to multiple PFAS from multiple sources, researchers are beginning to investigate the effects of mixtures of PFAS on human health.

Scientific studies have linked exposure to PFAS with:

Human studies

- High cholesterol
- Ulcerative colitis
- Cancer (testicular, kidney)
- Preeclampsia
- Liver damage
- Thyroid disease
- Decreased vaccine response
- Asthma
- Decreased fertility
- Lower birth weight

Animal studies

- Cancer (testicular, liver, pancreatic)
- Liver damage
- Delayed mammary gland development
- Developmental problems
- Effects on brain development
- Immune system effects
- Changes in cholesterol levels
- Changes in thyroid hormones
- Low birth weight

NIH NIEHS
PFAS-REACH is a five-year project funded by the National Institute of Environmental Health Sciences (NIEHS) under grant R01ES028311.

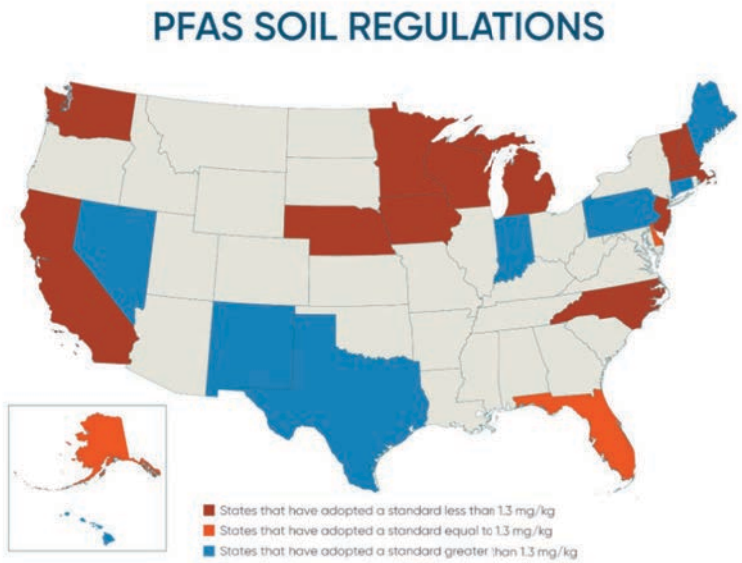
PFAS-REACH is led by Silent Spring Institute in collaboration with Northeastern University and Michigan State University. Community partners include Testing for Pease, Massachusetts Breast Cancer Coalition, and Toxics Action Center.

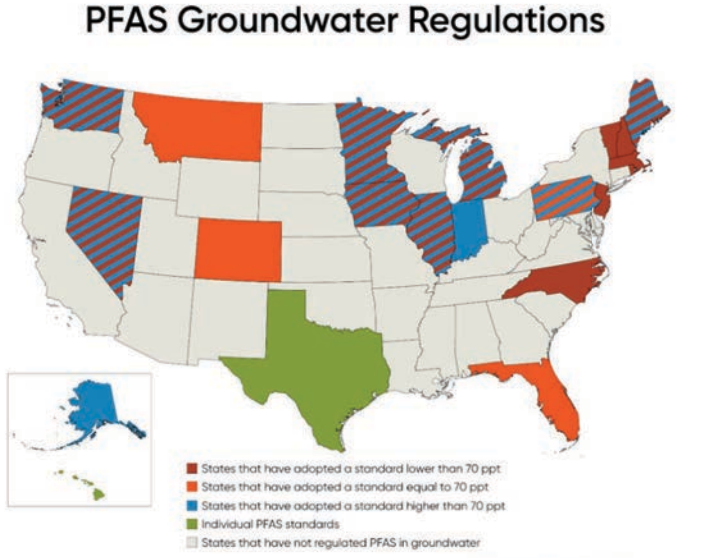
Current & Upcoming Regulatory Requirements, Testing Options

- Total Organic Fluorine (TOF): There is no standard test method of measuring Total Organic Fluorine in synthetic turf, so Total Fluorine analysis is used for synthetic turf. Total Fluorine measures all fluorine contained in the sample. This includes not only PFAS, but inorganic fluorides as well as fluorine containing organic compounds not classified as PFAS. If TF is used as a proxy for PFAS, this method may over report the estimated PFAS concentration.
- EPA Method 1633- Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS:
  - Current and proper method to use to understand PFAS in solids published Feb 2024
  - EPA 1633 currently includes 40 PFAS having labeled analogues for inclusion as extractable internal standards
- EPA 537.1 Determination of Selected Per- and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry:
  - Previously acceptable method for assessing PFAS, but specific to drinking water.
  - Does not specify an extraction method for solids resulting in different techniques.
  - Some EPA 537.1 tests are done with the recommended isotope dilution as the current EPA 1633.
  - This method should no longer be used going forward for solids.

Current & Upcoming Regulatory Requirements

- January 2024 EPA releases the final version of Test Method 1633.
  - First test method for low concentrations of PFAS in non-drinking water substrates. Will become the test of choice for testing solids.
  - Measures 40 targeted PFAS
- April 2024 EPA releases the National Primary Drinking Water Standard for PFAS.
  - Includes 6 PFAS in 4-10 ppt concentrations.
  - Mandates testing of water sources.
  - Many locations will require additional equipment to meet the standard.
- May 2024 EPA revises regional screening levels in soils for PFAS
  - Included 6 PFAS in 0.1 – 2.5 ppm concentration.
  - Regional screening levels help determine if remedial action is needed.
  - The EPA established regional screening levels for drinking water prior to publishing an enforceable national drinking water standard





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Current & Upcoming Regulatory Requirements (ASTM)

ASTM INTERNATIONAL

- ASTM F15.81 (Consumer Products) Ballot on Standard Guide for Selecting and Applying Analytical Methods to Evaluate PFAS in Consumer and Related Products
  - Did not pass.
  - The Guide is being revised for re-ballot.
- ASTM F08.65 (Artificial Turf) Ballot on Standard Test Method for Measuring PFAS in Synthetic Turf
  - Did not pass.
  - The document is being rewritten as a Standard Practice for sampling and measuring PFAS in synthetic turf for balloting in 2024.
  - Plans are to include a method for targeted PFAS and for Total Fluorine.

Current & Upcoming Regulatory Requirements

Recent PFAS related updates from RCRA (Resource Conservation and Recovery Act):

- January 2024 the EPA designated PFOA and PFOS as Hazardous Substances under CERCLA.
- February 2024 the EPA proposed changes to list 9 PFAS as hazardous constituents under CERCLA.

Recent PFAS related updates from State Specific Regulations:

- A number of states (CA, CO, CT, HI, ME, MD, NY, VT, WA) are establishing bans on products containing PFAS or contain intentionally added PFAS.
- Regulations usually do not define how to measure PFAS content.

PFAS in Athletic Fields: Grass -v- Turf

- Regarding athletics, people really aren't talking about PFAS in Grass/Soil, the focus has been on Turf as a manufactured product – but should we?
- A type of PFAS – complex fluoropolymers – have historically been used to lubricate synthetic turf fibers during the extrusion process
- Not bioavailable, cannot accumulate in the body
- With the introduction of new machinery and methods, many turf manufacturers no longer use PFAS in any part of their process, which is what is likely to be required by states moving forward.

For example, let's look to Maine.

PFAS in Athletic Fields: Synthetic Turf

Example of Upcoming Maine Regulations re: Synthetic Turf

Sales Prohibitions on Products Containing Intentionally Added PFAS

Effective Date	Product Category
January 1, 2023	• Carpet or rug • Fabric treatment • Fabric treatment that does not contain intentionally added PFAS, but is sold, offered for sale, or distributed for sale in a fluorinated container or in a container that otherwise contains intentionally added PFAS
January 1, 2026	• Cleaning product • Cookware product • Cosmetic product • Dental floss • Juvenile product • Menstruation product • Textile articles (with exception) • Ski wax • Upholstered furniture • Products listed that do not contain intentionally added PFAS but are sold, offered for sale, or distributed for sale in a fluorinated container or in a container that otherwise contains intentionally added PFAS.
January 1, 2029	• Artificial turf • Outdoor apparel for severe wet conditions unless accompanied with a disclosure: "Made with PFAS chemicals."
January 1, 2032	• Any products containing intentionally added PFAS sold in Maine unless the use of PFAS in the product is a currently unavoidable use. • Products that do not contain intentionally added PFAS but that are sold, offered for sale, or distributed for sale in a fluorinated container or in a container that otherwise contains intentionally added PFAS.
January 1, 2040	• Cooling, heating, ventilation, air conditioning or refrigeration equipment. • Refrigerants, foams or aerosol propellants.

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PFAS in Athletic Fields: Synthetic Turf

Example of Upcoming Maine Regulations re: Synthetic Turf

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January 1, 2040	• Cooling, heating, ventilation, air conditioning or refrigeration equipment. • Refrigerants, foams or aerosol propellants.

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D. "Intentionally added PFAS" means PFAS added to a product or one of its product components to provide a specific characteristic, appearance or quality or to perform a specific function. "Intentionally added PFAS" also includes any degradation by-products of PFAS.

Publications

Programs

Monitoring and Reporting

Laws

Rules

477, An Act To Stop

gislature). The program's

governing statute was recently amended by Public Law 2023, c. 630, An Act to Support Manufacturers Whose Products Contain Perfluoroalkyl and Polyfluoroalkyl Substances (LD 1537, 131st Legislature, effective August 9, 2024).

The recent legislation eliminates the general notification requirement that was previously scheduled to take effect January 1, 2025. This legislation also created a number of new sales prohibitions for products with intentionally added PFAS with varying effective dates, created some specific exemptions to the prohibitions, and established a new reporting program for those product categories that receive a Currently Unavoidable Use (CUU) determination from the Department.

Specifying / Documenting Compliance

PFAS FREE

Specifying / Documenting Compliance

~~PFAS FREE~~

Let's adjust the terminology to:

NO INTENTIONALLY ADDED PFAS

Testing does not let us say "Free" or "Zero"

The closest statement testing allows us to say is:
"Not detectable at the lowest method detection limit"
aka "Non-detect"

Specifying / Documenting Compliance

- As simple as requesting a letter?
- What if the Owner won't "take the company's word for it"?

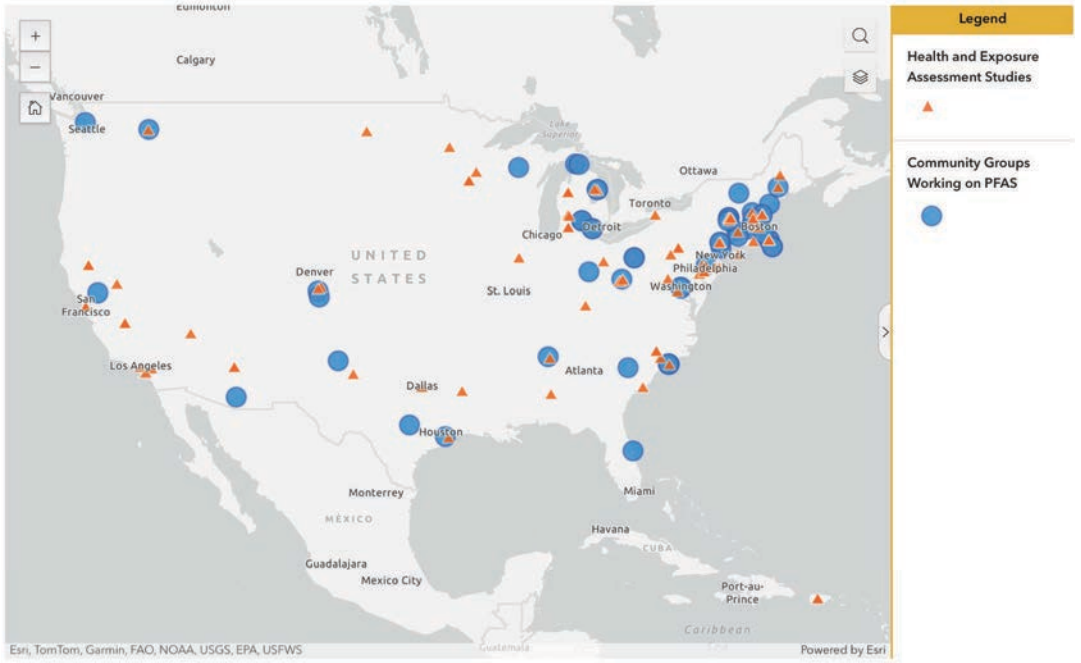
Testing:

1. (TF) Total Fluorine/(TOF) Total Organic Fluorine

   TOF=TF-TIF

   Used as a indicator of presence of PFAS. Breach of tolerance would lead to more precise testing

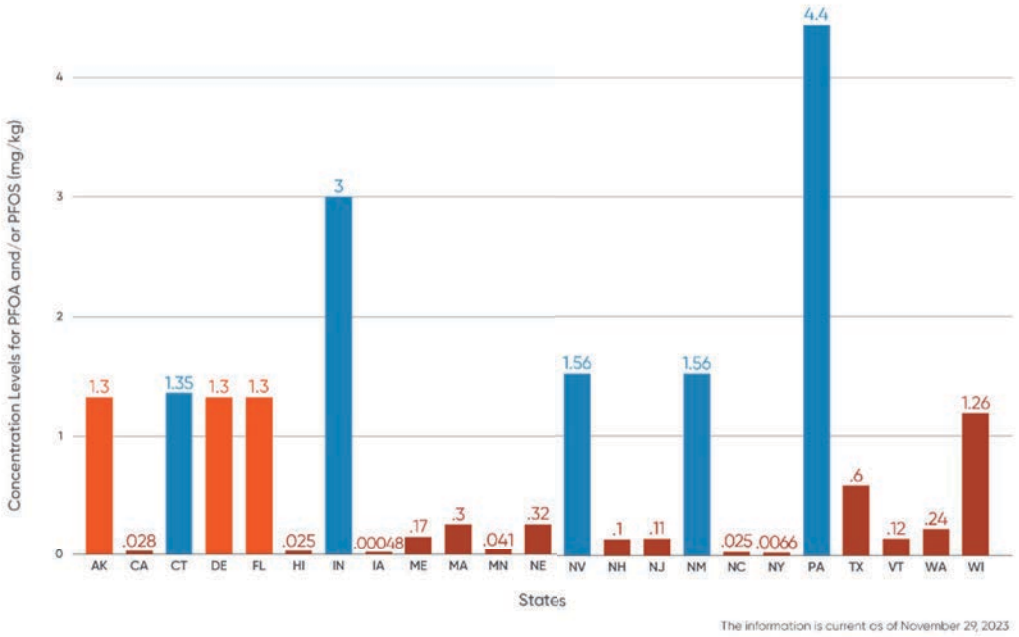
1. EPA 1633: Currently the only test applicable for solids. EPA 537.1 (drinking water method) can be used as equal assuming an Isotope dilution was used.



Remember: Not all fluorine is PFAS, but all PFAS are organic fluorine

Specifying / Documenting Compliance

- Limits for solids are currently being set by some states
- EPA has set Regional Screening Levels (RSL) for soils and drinking water
  - Soils: 6 PFAS in 0.1-2.5 PPM concentrations
  - Drinking water: 6 PFAS in 4-10 PPT concentrations
  - RSLs are developed using risk assessment guidance from the EPA Superfund program. They are recommendations and not requirements



Remember: Not all fluorine is PFAS, but all PFAS are organic fluorine

Experiences with PFAS in Design/Construction

Owner Experiences

When a project is beginning from the Owner side, what / where is the PFAS topic coming into play and how are you dealing with it?

(e.g. Town meeting, letter from residents, protests, etc.)

Owner via Park & Recreation Commission member experience

Experiences with PFAS in Design/Construction

Owner Experiences

Experiences with PFAS in Design/Construction

Owner Experiences

Experiences with PFAS in Design/Construction

Owner Experiences

Experiences with PFAS in Design/Construction

Professional/Consultant Experiences

- Widely varies between Owners on information required
- What is being suggested in order to satisfy the client / general public?
- In what other avenues is this topic coming up (e.g. public meeting for permitting), etc.?
- Examples of how Owner is provided with satisfactory information:

Before or after manufacturing?

Conclusion: Need more consistency in the industry

Experiences with PFAS in Design/Construction

General Contractor Experiences

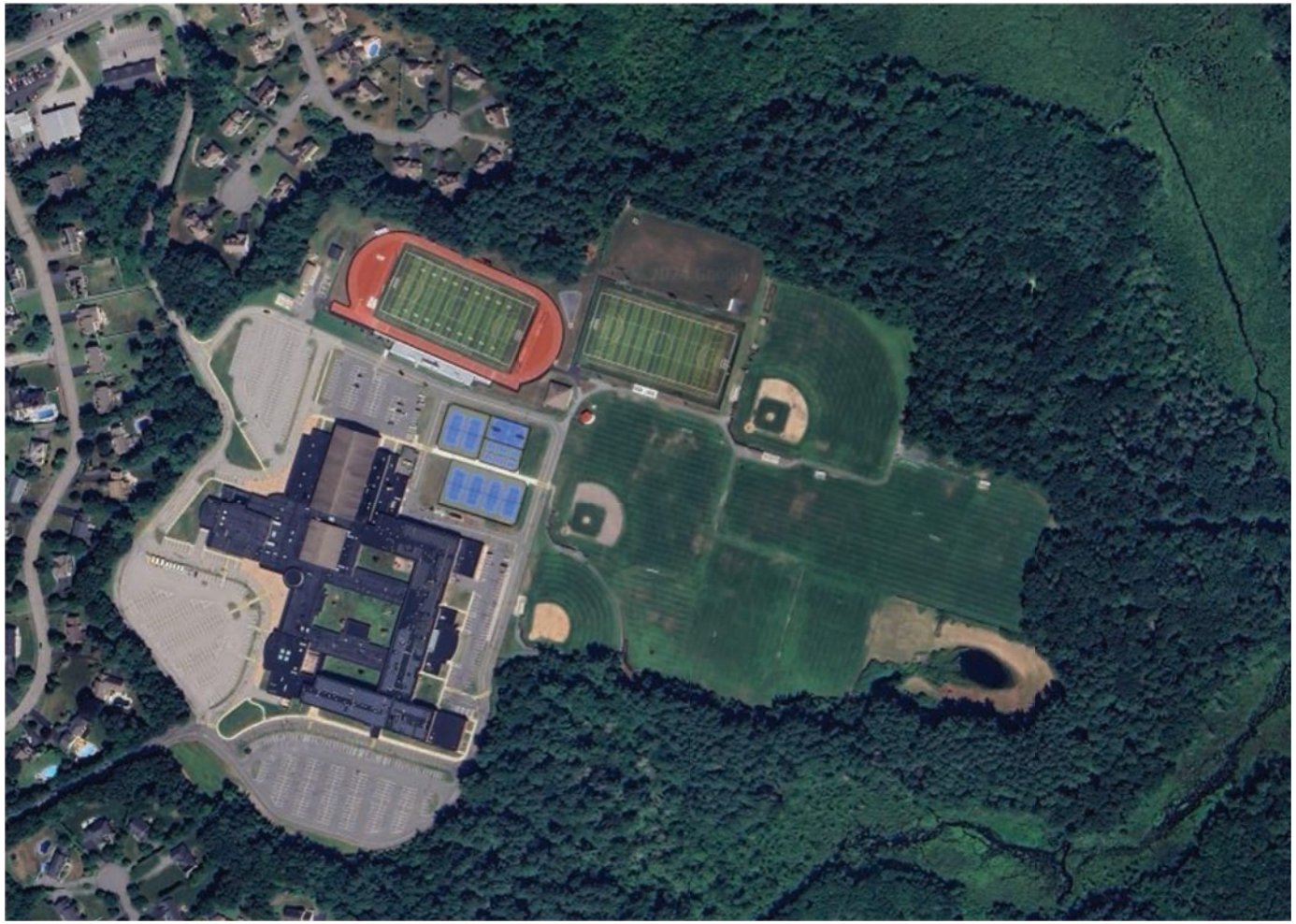
- When are contractors seeing PFAS questions / requirements come into play?
- What are they being asked to do through different specifications?
- How are these requirements affecting schedule / budget?

Experiences with PFAS in Design/Construction

General Contractor Experiences

Experiences with PFAS in Design/Construction

General Contractor Experiences



Experiences with PFAS in Design/Construction

General Contractor Experiences

Experiences with PFAS in Design/Construction

Supplier Experiences

Problems

- Proper collection to avoid contamination
- Testing frequency
- Testing turnaround time (4 weeks)
- Understanding testing reports (Customer/manufacture)
- Dealing with the phrase “PFAS FREE”

Solutions

Proper ASTM guides to sample and test properly:
F08 (Our industry) ASTM Work Item 71875 Standard Practice for Sampling and Testing Synthetic Turf Fiber and Fabric for PFAS.

- Technical Contact: Dr. Phil Stricklen
- Sample procedure applicable for synthetic turf
- Goal to prevent false detection as a result of contamination of materials
- Pre Shipment
- Arrival temperature

ASTM F15.81 (Consumer Products) Ballot on Standard Guide for Selecting and Applying Analytical Methods to Evaluate PFAS in Consumer and Related Products did not pass.
The Guide is being revised for re-ballot.

Moving Forward

- Ideally see standard limits set for solids (USEPA, CPSC)
  - Definition of No Intentionally Added PFAS (Non-detect -v- below a value considered safe) - the “Green Stamp”
- Standard for the best testing method to use to show compliance (ASTM)
  - Total Organic Fluorine -v- EPA 1633
- Recommendations on when these conversations need to begin so testing requirements won’t affect construction schedule
- Others from the audience?
- What can we learn from this experience for upcoming concerns that will / are arising? … MICROPLASTICS

DISCUSSION