Environmental and Safety Hazards on DPR Properties

PFAS 101 & The Current Science

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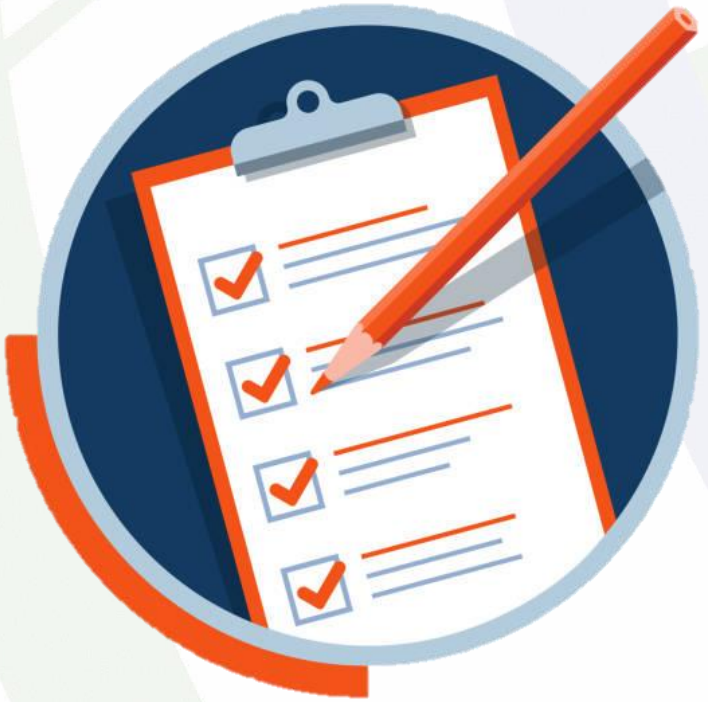
Topics

- EEC Introduction
- PFAS 101
- PFAS in the Environment
- PFAS Content vs. PFAS Exposure
- Potential Products of Concern (e.g., Artificial Turf)
- Product Replacement vs. Other Mitigation Measures



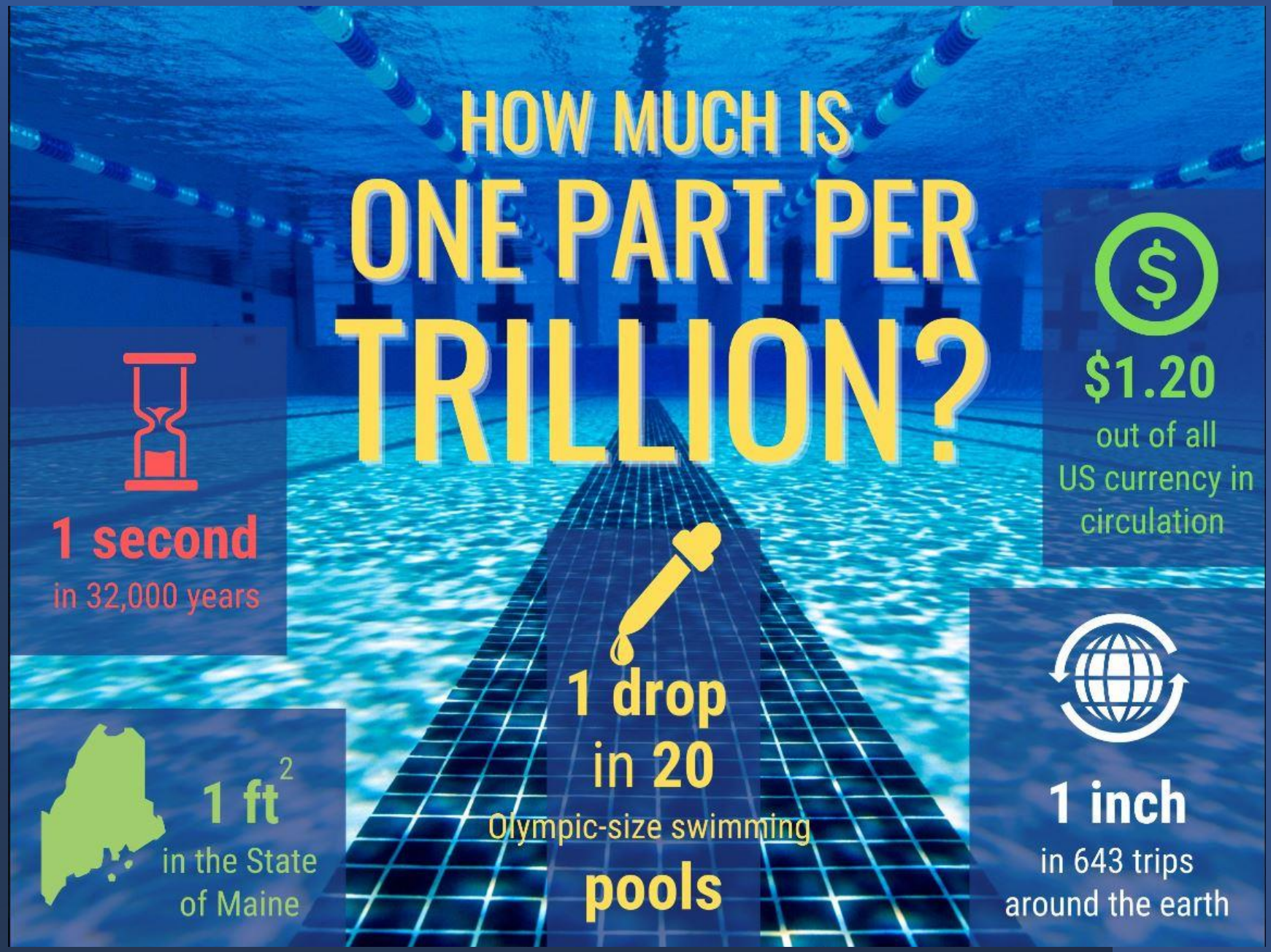
Introduction

EEC Environmental

- National environmental engineering consultant
- Chemists, engineers, geologists, regulatory experts
- PFAS characterization and treatment
- PFAS guidance for municipalities like DGS
  - EEC is currently working with SaLUT on PFAS research, facts sheets and SOPs to provide scientifically-based guidance to DGS

John Shaffer

- EEC CEO and Principal Chemist
- Emerging contaminant focus
- PFAS group leader (water, wastewater and products)


HOW MUCH IS
ONE PART PER
TRILLION?
1 second
in 32,000 years
$1.20
out of all
US currency in
circulation
1 drop
in 20
Olympic-size swimming
pools
1 ft²
in the State
of Maine
1 inch
in 643 trips
around the earth

Products Containing PFAS

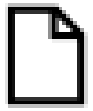
Cleaning products: Degreasers, glass cleaners, detergents, dust removers

Water or grease resistant textiles and coatings: Food packaging, clothing, carpet and floor coverings, upholstery, artificial turf, kitchen towels, medical equipment

Nonstick cooking surfaces (especially older equipment): Fry pans, cooking utensils, grills

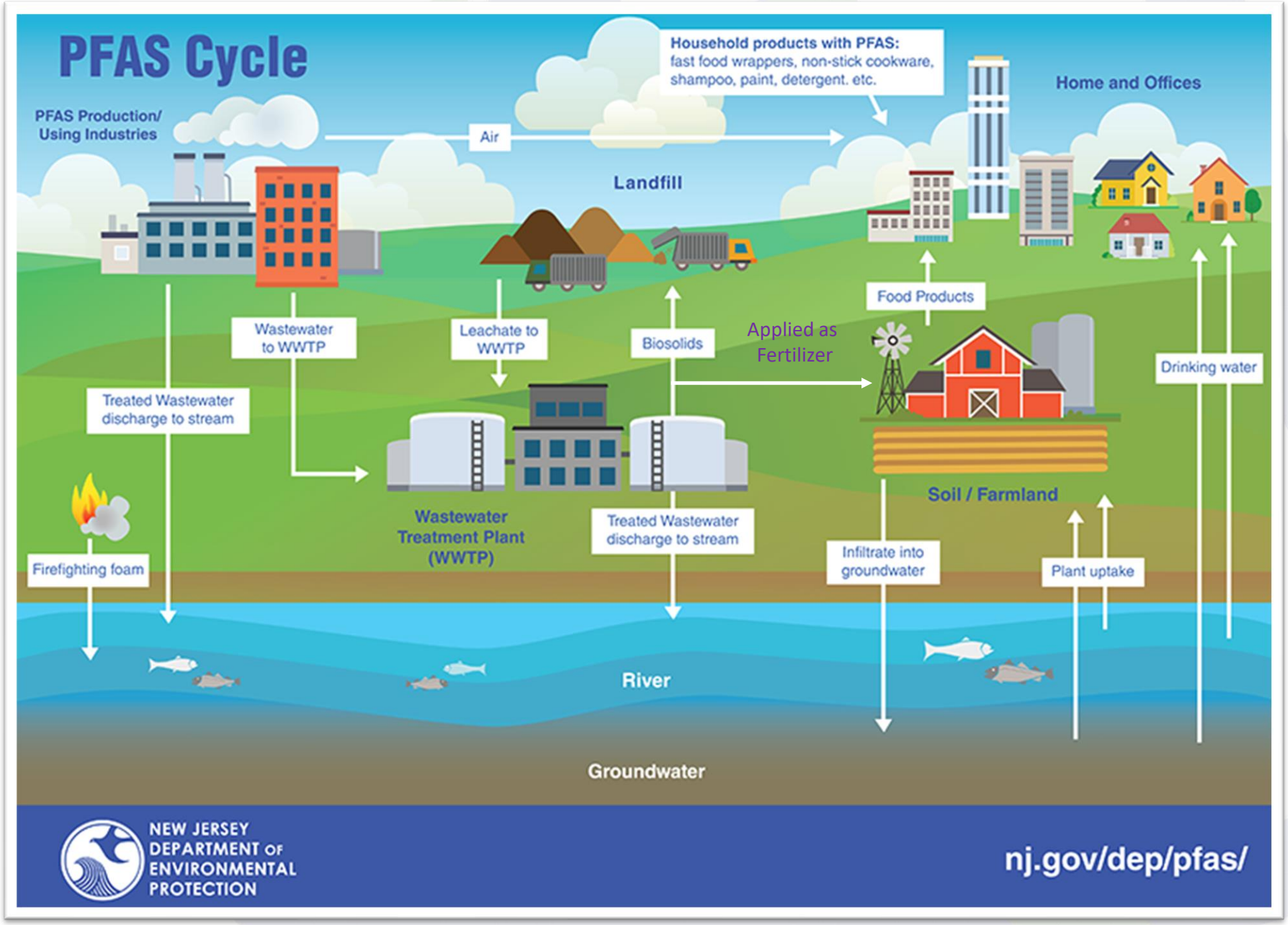
Personal care products: Cosmetics, feminine hygiene products, first aid, floss

Heat or fire-resistant chemicals and coatings: Firefighting foams, roofing materials, sealants and adhesives, wiring (especially in older buildings)



Office products: Some paper, tape, markers

Building Products: Roofing, flooring, adhesives, coatings, glass, pesticides


PFAS Cycle
Household products with PFAS:
fast food wrappers, non-stick cookware, shampoo, paint, detergent. etc.
Home and Offices
PFAS Production/
Using Industries
Air
Landfill
Food Products
Wastewater
to WWTP
Leachate to
WWTP
Biosolids
Applied as
Fertilizer
Drinking water
Treated Wastewater
discharge to stream
Wastewater
Treatment Plant
(WWTP)
Treated Wastewater
discharge to stream
Soil / Farmland
Infiltrate into
groundwater
Plant uptake
Firefighting foam
River
Groundwater
NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION
nj.gov/dep/pfas/

PFAS Human Exposure Routes

Three primary routes:

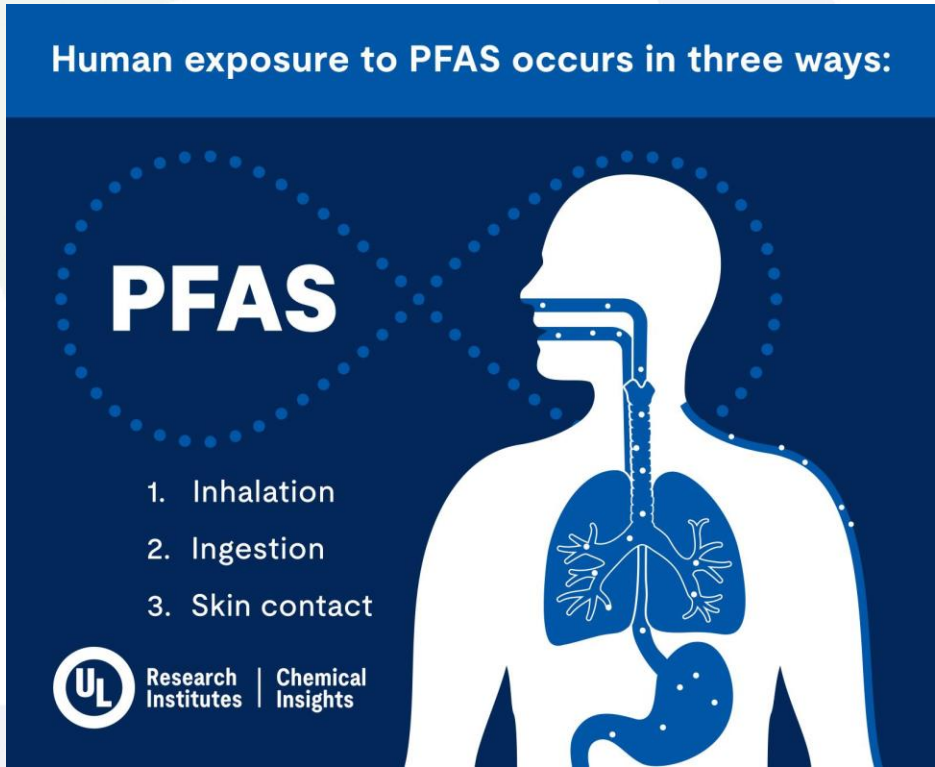
1) Ingestion of contaminated drinking water and food
2) Inhalation of contaminated air and dust
3) Dermal absorption through the skin

High risk factors:

- Ingestion poses highest risk of bioaccumulation
- Long term repeated exposure
- High concentration (depending on the media)

Bio availability:

- The way a substance is introduced to the body will determine the degree to which it is available to have an active impact



PFAS Content vs. PFAS Exposure

- Products like Scotch-gard™ have, or had, very high PFAS content, but:
  - The typical person has little direct exposure to PFAS due to Scotch-gard™ use
  - Not much Scotch-gard™ made its way into the environment to impact soil and water
- Most fire fighting foams (AFFF) still have very high PFAS content, but:
  - Only fire fighters have direct exposure to the use of the product
  - Lots of AFFF made its way into the environment to impact soil and water
- Drinking water has extremely low PFAS content, but:
  - People ingest it every day
  - Drinking water becomes wastewater, some wastewater becomes drinking water
  - Stormwater runoff impacts surface water, aquifers, and other drinking water sources

Product Replacement or Other Mitigation?

Example:

- Artificial turf:
  - Human health risks:
    - Low likelihood of ingestion
    - Limited information on skin adhesion leading to prolonged topical exposure
    - Limited information on whether exposure to PFAS in turf leads to bio accessible PFAS
  - The infill is likely the highest exposure risk of all the layers
    - If a PFAS hazard is identified, an assessment would be conducted to determine if infill replacement would mitigate the risk or if field replacement is required

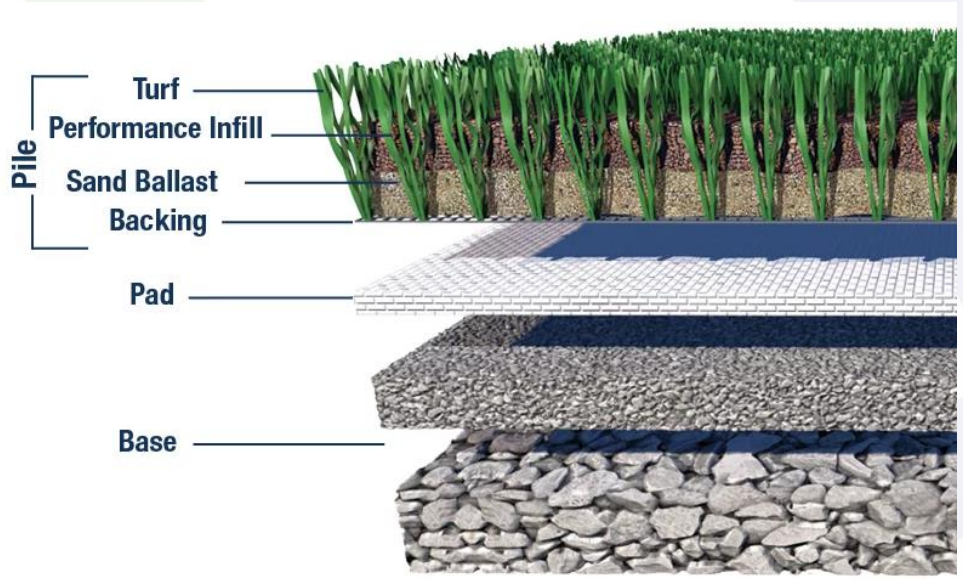


Photo Credit: https://themotzgroup.com/sport_blog/synthetic-turf-systems-explained/

Product Replacement or Other Mitigation?

Example:

- Carpeting or rugs
  - The resulting dust is believed to be the highest human health exposure risk related to carpets and rugs
    - Can the risk be mitigated enough through different vacuuming and washing techniques to remove the need to replace the carpet?
    - Are carpet replacement or other mitigation measures are only needed in children's spaces?

Takeaways

PFAS is almost everywhere and is in thousands of products

- It's measured in parts per trillion, unlike most other toxic substances

PFAS content is important, but PFAS exposure is more important

- Short term dermal contact is currently considered low risk

Can the PFAS exposure risk of a product be mitigated successfully without complete replacement?

- Are there cost effective mitigation measures that reduce the PFAS exposure risk by >90% (or >99%)?

Following the most current science, we will evaluate the PFAS risks of products and materials at DPR sites

- If mitigation is warranted, we will recommend the appropriate mitigation strategy

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Questions?