

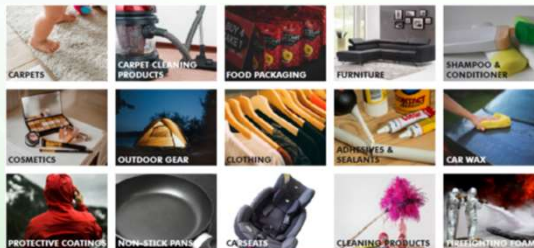
A General Discussion of Per- and Polyfluoroalkyl Substances (PFAS) and the Potential Impact to Drinking Water

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1

Sources of PFAS



According to the Agency for Toxic Substances and Disease Registry, "Most people in the United States have been exposed to PFAS and have PFAS in their blood, especially perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA)".

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2

How Does PFAS Enter the Environment

- Atmospheric deposition to the ground surface and/or surface water from smokestack emissions where PFAS was used in the manufacturing process;
- Releases to the ground surface, groundwater and/or surface water from industrial facilities where spills have occurred or where wastewater treatment methods were not designed to remove PFAS compounds from the waste stream;
- Littering of materials containing PFAS, like food wrappers
- Degradation of exterior surface coatings (i.e., waxes or 3M Scotchgard®) on materials containing PFAS;
- Releases to groundwater and/or surface water from landfills where PFAS containing wastes were disposed of;

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How Does PFAS Enter the Environment (continued)

- Releases to groundwater and/or surface water from wastewater treatment plants where wastewater treatment methods were not designed to remove PFAS compounds from the waste stream;
- Releases to groundwater and surface water from residential septic systems where PFAS compounds were used in the household;
- Releases to soil, groundwater and/or surface water from the application of biosolids obtained from wastewater treatment plants; and
- Releases to soil, groundwater and/or surface water from the application of Class B firefighting foams during training exercises, use in extinguishing a fire, or from incidental spillage.

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Considerations for PFAS Sampling

- No clothing or boots containing Gore-Tex® (Natural cotton fiber is the best option for clothing).
- All safety boots made from polyurethane and PVC.
- No materials containing Tyvek®.
- Do not use fabric softener on clothing to be worn in field.
- Do not use cosmetics, moisturizers, hand cream, or other related products the morning of sampling.
- Do not use sunscreen or insect repellent.
- All sampling materials must be made from stainless steel, HDPE, acetate, silicon, or polypropylene.
- No waterproof field books can be used.

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Considerations for PFAS Sampling (Continued)

- No plastic clipboards, binders, or spiral hard cover notebooks can be used.
- No adhesives (i.e. Post-It® Notes) can be used.
- Sharpies and permanent markers not allowed.
- regular ball point pens are acceptable.
- Aluminum foil must not be used.
- Coolers filled with regular ice only - Do not use chemical (blue) ice packs.

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A Case Study into PFAS Detections in Municipal Drinking Water Wells

- PFAS was detected above the Massachusetts Drinking Water Standard of 20 parts per trillion in municipal drinking wells.
- Activated carbon units were used to treat the groundwater extracted from the wells to meet the regulatory standard. According to the EPA, activated carbon treatment ion exchange resins and high-pressure membrane systems are the primary method used to remove PFAS from drinking water.
- An Airport located upgradient to the wells the suspected source of the PFAS impacts to the municipal drinking water wells relating to the use of Aqueous Film Forming Foam (AFFF).

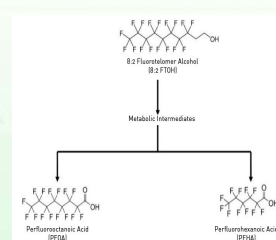


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7

Important Considerations when Assessing a PFAS Source

- PFAS moves in groundwater at a slower rate than the groundwater velocity. The slower rate varies and is known as the retardation factor.
- PFAS soil impacts do not necessarily correlate to PFAS impacts in groundwater. The reasons for these differences can include:
 - PFAS Solubility
 - PFAS Transformation (precursor analytes transform into measurable long chain PFASs such as PFCAs or PFASs).
 - Soil Total Organic Carbon Content



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8

Assessment of a PFAS Source....



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9

Assessment of a PFAS Source....



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10

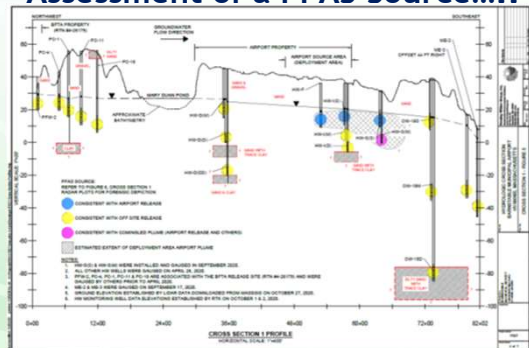
Assessment of a PFAS Source....



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11

Assessment of a PFAS Source....



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12

