PFAS Update
January 2020

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Maine DEP - BRWM
Overview

• What is PFAS?
• Where are they found in the environment?
• Why did they come to our attention?
• What has the DEP done so far?
• Sludge/biosolids impacts
• Other PFAS testing
• Task Force and the future
Emerging Issue

PFAS Terminology

P  per and poly
F  fluoro
A  alkyl
S  substances

PFAS

Non-polymer

Perfluorinated
- PFAAs
- PFCAs
- PFSAs
- FASAs

Polymer

Polyfluorinated
- Precursors
  - FTSAs
  - FTCAs
  - FTOHs
  - FASEs
  - FASAAAs

ITRC Naming Conventions, 2017
PFAS – What Are They?

- Stable, C-F bond strength
  - Low volatility
  - High molecular weight

- Thermally stable
  - Hydrophobic
  - Lipophobic
  - Surfactant properties

- Focus on small percentage of
  - the total number of PFAS compounds (3,000+)
# Where Used

## Previous and Current Uses:

### Industrial and Consumer Products

**PFOA**
- Cooking surfaces (Teflon)
- Fire fighting foams
- Toothpaste, Shampoos, cosmetics
- Polishes and waxes
- Electronics
- Lubricants/surfactants/emulsifiers
- Pesticide
- Plumbing Tape
- Food containers and contact paper
- Textiles (Gore-Tex) and Leather
- Paints, varnishes, sealants
- Cleaning products
- And more...

**PFOS**
- Metal plating and finishing
- Fire fighting foams
- Photograph Development
- Semiconductor industry
- Aviation Fluids
- Flame repellants
- Packaging Papers
- Oil and Mining
- Stain repellants on carpets and upholstery (e.g. Stainmaster, ScotchGard)
- Cleaning products
- Paints, varnishes, sealants
- Leathers, textiles
- And more...

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ASWDA (2016)
Where Are PFAS Found in the Environment

Figure 3. Conceptual site model for landfills and WWTPs.
(Source: Adapted from figure by L. Trozzolo, TRC, used with permission)
PFAS at a Dairy Farm

• Dairy farm in southern Maine showing impacts from PFAS
  • Site had received paper mill residuals and biosolids
    – Paper mill sludge and bioash ~1983-1985
    – Biosolids licensed in 1986, received biosolids 1989-2004
  • DEP became involved in early 2017
    – Tested soil, groundwater, surface water, hay, manure, purchased feed, milk
PFAS Results

• Dairy farm PFAS sampling results:

<table>
<thead>
<tr>
<th>Matrix</th>
<th>Highest PFOA Conc.</th>
<th>Highest PFOS Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Water</td>
<td>8.9 ng/L</td>
<td>42.1 ng/L</td>
</tr>
<tr>
<td>Surface Water</td>
<td>7.67 ng/L</td>
<td>33.4 ng/L</td>
</tr>
<tr>
<td>Groundwater</td>
<td>41.2 ng/L</td>
<td>2.5 ng/L</td>
</tr>
<tr>
<td>Milk</td>
<td>&lt;50 ng/L</td>
<td>938 ng/L</td>
</tr>
<tr>
<td>Soil</td>
<td>23.6 ng/g</td>
<td>878 ng/g</td>
</tr>
<tr>
<td>Manure</td>
<td>3.2 ng/g</td>
<td>20.3 ng/g</td>
</tr>
<tr>
<td>Hay</td>
<td>2.1 ng/g</td>
<td>9.7 ng/g</td>
</tr>
<tr>
<td>Purchased Feed</td>
<td>&lt;0.5 ng/g</td>
<td>&lt;1 ng/g</td>
</tr>
</tbody>
</table>
Agency Work

• Worked with ME CDC to evaluate risk by establishing screening levels as well as to evaluate risk at individual remediation sites.

• In conjunction with ME CDC, established limited PFAS screening levels in RAGs and Chapter 418 (PFOA, PFOS, & PFBS)

• April 2, 2017 – DEP established a hierarchy to prioritize investigation of PFAS in drinking water
Agency Work

- Utilizing EPA’s 70 ppt health advisory level for drinking water supplies
- Established meetings with Maine’s Drinking Water Program staff
- March 2019 requirement for testing sludge that is land applied or composted
- Worked closely with MECDC & ACF
2019 Sludge Test Requirements

- All sludge/biosolids headed for land application sites
- All sludge/biosolids compost facilities required to test finished compost
- Compare results to screening concentrations
  - If over the screening concentrations, were required to perform pollutant loading rate calculations and some required to test site-specific soils
2019 PFAS Results Summary

• Compost Facilities
  – 23 licensed facilities
  – Results from 19 facilities

• Land Application
  – 41 facilities with agronomic utilization program licenses
  – Results from 34 facilities

• Papermills
  – 9 facilities with agronomic utilization program licenses
  – Results from 7 facilities
2019 PFAS Results Summary

- PFBS not an issue
- 65% of sludge samples exceeded for PFOA
- 93% of sludge samples exceeded for PFOS
- 89% of composts exceeded for PFOA
- 74% of composts exceeded for PFOS
- No paper mill residuals exceeded for PFOA or PFOS
- 19% of site-specific soils exceeded for PFOA
- 57% of site-specific soils exceeded for PFOS
PFAS Results

• Sludge Concentrations
  – Average PFOA 8.5 ng/g and PFOS 25.5 ng/g
  – Median PFOA 3.8 ng/g and PFOS 22.9 ng/g
  – Maximum PFOA 46 ng/g and PFOS 120 ng/g

• Compost
  – Average concentration PFOA 14.2 ng/g and PFOS 16 ng/g
  – Median concentration PFOA 7.7 ng/g and PFOS 7.3 ng/g
  – Maximum concentration PFOA 60 ng/g and PFOS 81.8 ng/g

• Site-Specific Soils
  – Average concentration PFOA 2 ng/g and PFOS 9.6 ng/g
  – Median concentration PFOA 1.3 ng/g and PFOS 7.1 ng/g
  – Maximum concentration PFOA 12.9 ng/g and PFOS 36.6 ng/g
Other PFAS Testing

- Biosolids compost used in a home garden
- Closed, unlined landfill sites
- Remediation sites
- AFFF Class B firefighting foam sites
- 4 polymers used at treatment plants
- Septage
- Fish tissue
Where to find the Information

• All PFAS data located at:

• Historical Records for Biosolids located at:

• PFAS mapping tool located at:
  – https://maine.maps.arcgis.com/apps/webappviewer/index.html?id=731ba8744cbe4de69abc5bfc33d5ede5

• Feed back requested: mailto:pfas.dep@maine.gov
PFAS Task Force

- Governor’s task force formed by Executive Order March 2019
- Purpose to identify the extent of PFAS exposure in Maine, examine risk of PFAS to Maine residents and the environment, and recommend State approaches to most effectively address this risk
- Report to Governor’s Office anticipated soon
- https://www.maine.gov/pfastaskforce/
Future?

• Continue with requirements in Chapter 419, agronomic utilization of residuals, for the near term

• Follow-up with licensees will occur regarding testing and use requirements for 2020

• DEP, MECDC, and DACF working to gather information to support or modify our model for agronomic utilization
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www.main.gov/dep