PFAS in Biosolids: Investigations in Maine & Vermont
May 27, 2020

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Residuals Management Unit

PFAS Screening Concentrations

• Chapter 418, Appendix A adopted July 8, 2018
  • Established screening concentrations for 3 PFAS
    - PFBS - 1,900 ng/g
    - PFOA - 2.5 ng/g
    - PFOS - 5.2 ng/g
  • Based on Maine Remedial Action Guidelines (RAGs)
  • Leaching to groundwater – endpoint 200 ppt
  • No plan to require residuals testing at that time
History

- 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, drinking water, groundwater, surface water, hay, manure, purchased feed, milk

Dairy Farm 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>476 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>
Governor’s PFAS Task Force

- **March 6, 2019** Governor Mills signs Executive Order 5 FY 19/20 – “An Order to Study the Threats of PFAS Contamination to Public Health and the Environment”

- Purpose of Task Force:
  - Identify the extent of PFAS exposure in Maine
  - Examine the risks of PFAS to Maine residents and the environment
  - Recommend State approaches to most effectively address risk

- Public health experts, DHHS, DEP, DACF, MEMA, industry experts, drinking water sector

- 8 meetings held from **May 2019 through December 2019**

Residuals Testing

- Biosolids Land Application Programs and Composters notified March 22, 2019:
  - Required updated sampling plan by April 12, 2019
  - Required sampling by May 7, 2019

- Paper Mill Residual Land Application Programs notified April 16, 2019:
  - Required updated sampling plan by May 6, 2019
  - Required sampling by June 3, 2019

- No land application of biosolids/paper mill residuals or distribution of biosolids compost **until approved by DEP**
PFAS Testing Program

• 73 facilities notified of the requirement to test:
  – 23 composting facilities
  – 41 land application program licensees
  – 9 paper mills/former paper mills

• Some didn’t test for various reasons (not producing residuals, out of business, etc.)

• If over the screening concentrations, were required to perform pollutant loading rate calculations and some required to test site-specific soils

PFAS Testing Program

• 52 sludges:
  – Data from some not required to test
  – 3 heat-dried pellet products

• 17 composting facilities:
  – 10 WWTP sludge composters
  – 5 dewatered residential septage only composters
  – 2 mixed WWTP sludge/dewatered septage

• 8 different paper mill residuals

• 86 site-specific soils
PFAS Testing Program
Sludge and Compost Sampling Locations

Sludge PFOA Data

Samples
Concentration in ng/g

- PFOA Conc.
- PFOA Screening Conc.
- PFOA Median Conc.
Compost PFOA Data

Compost PFOS Data
**Biosolids Compost PFAS Data**

- **Compost PFOA Data**
  - 94% Does Not Exceed Screening Conc.
  - 6% Exceeds Screening Conc.

- **Compost PFOS Data**
  - 61% Does Not Exceed Screening Conc.
  - 39% Exceeds Screening Conc.

- **Compost PFOA and PFOS Data**
  - 97% Does Not Exceed Screening Conc. for PFOA and/or PFOS
  - 3% Exceeds Screening Conc. for PFOA and/or PFOS

**PFAS Results**

- PFBS not approaching the screening concentration
- **No** paper mill residuals exceeded for PFOA or PFOS
- 15% of site-specific soils exceeded for PFOA
- 56% of site-specific soils exceeded for PFOS
- 58% of site-specific soils exceeded for PFOA, PFOS, or both
- Site-specific soil data skewed because of targeted testing
PFAS Results

• Sludge
  – Average concentration PFOA 8.2 ng/g and PFOS 24.3 ng/g
  – Median concentration PFOA 3.6 ng/g and PFOS 18.5 ng/g
  – Maximum concentration PFOA 46 ng/g and PFOS 120 ng/g

• Compost
  – Average concentration PFOA 14.1 ng/g and PFOS 16 ng/g
  – Median concentration PFOA 7.5 ng/g and PFOS 7.8 ng/g
  – Maximum concentration PFOA 60 ng/g and PFOS 81.8 ng/g

• Site-Specific Soils
  – Average concentration PFOA 1.8 ng/g and PFOS 9.1 ng/g
  – Median concentration PFOA 1.2 ng/g and PFOS 6.3 ng/g
  – Maximum concentration PFOA 12.9 ng/g and PFOS 36.6 ng/g

Spring/Summer 2019

• 13 composts approved for distribution
• 3 Class A pelletized products approved for distribution
• 7 Class B programs approved to land-apply on some fields
• 3 Class B programs not able to land-apply
• All paper mill residuals approved for distribution
• Bureau of Water Quality provided grants
  – Emergency dewatering grants
  – Planning grants for dewatering infrastructure
  – Possible construction grants
Septage

- 9 samples
- 3 types of facilities
  - Septage dewatering facilities
  - Septage storage at land application sites
  - Septage at WWTP receiving stations
- Results
  - Average concentration PFOA 9.5 ng/g and PFOS 6.7 ng/g
  - Median concentration PFOA 3.9 ng/g and PFOS 2.1 ng/g
  - Maximum concentration PFOA 49.6 ng/g and PFOS 24 ng/g
Septage PFOS Data

![Bar chart showing PFOS concentration in ng/g for various samples.]

- PFOS Conc.
- PFOS Screening Conc.
- PFOS Median Conc.

Septage PFAS Data

- Septage PFOA Data:
  - Exceeds Screening Conc.: 44%
  - Does Not Exceed Screening Conc.: 56%

- Septage PFOS Data:
  - Exceeds Screening Conc.: 22%
  - Does Not Exceed Screening Conc.: 78%

- Septage PFOA and PFOS Data:
  - Exceeds Screening Conc. for PFOA and/or PFOS: 44%
  - Does Not Exceed Screening Conc. for PFOA or PFOS: 56%
Task Force Recommendations

• Final Report Issued January 2020
  – See full report at: http://www.maine.gov/pfastaskforce
  – Caution: this is not a complete list of all recommendations

• Providing Safe Drinking Water:
  – Test all Community Water Systems (378) and all schools and
daycare facilities regulated as Non-Transient Non-Community
Water Systems (~223) for PFAS
  – Test private drinking water in areas where groundwater likely to
have been impacted by PFAS at unsafe levels due to land
application of residuals
  – Use EPA Health Advisory Level as action threshold and apply
sum of PFHxS, PFNA, PFHpA, PFOA, and PFOS to threshold

Task Force Recommendations

• Protecting Our Food Supply:
  – Restrictions on the agronomic utilization and land application of
PFAS-containing residuals
  – Investigation and remediation of PFAS contamination
  – Greatly expand testing of agricultural produce and products
grown and/or raised in soils where residuals have been
agronomically utilized
Task Force Recommendations

• **Identifying and Reducing Uses of PFAS:**
  – Require manufacturers to report intentional use of PFAS in consumer products
  – Report discharges of Class B AFFF and locations of past fire training activities that utilized AFFF or other PFAS-containing material
  – State procurement guidelines should discourage purchase of PFAS-containing products

• **Investigating PFAS Contaminants in the Environment:**
  – Prioritize locations for sampling where residuals were spread on fields that produce crops for human consumption or feed
  – Amend Uncontrolled Sites Law which would give State authority to require removal and treatment of PFAS when they are a danger to public health (LR 3002)
  – Maine CDC to finalize agronomic uptake model
  – Continue to rely on federal agencies to establish toxicity values
Task Force Recommendations

• Managing Waste and Waste Residuals Responsibly:
  – Require regular testing of all wastewater residuals for PFAS prior to land spreading or commercial distribution in Maine (industrial, WWTP sludge, septage)
  – Modify testing frequency when concentrations diminish over time
  – Investigate availability of treatment and disposal technologies that minimize PFAS contamination

• Public Education:
  – Develop/identify educational materials at appropriate literacy levels for intended audience
  – Using websites, social media, training events, fairs
  – For healthcare providers, farmers, drinking water and wastewater utility customers, firefighters, educators/students, residential well owners
  – Different materials for general public and those at higher risk due to occupational exposures
Task Force Recommendations

**Federal Action:**
- Source reduction (reduce and report PFAS uses)
- Add PFAS to CERCLA with exceptions for water and wastewater utilities
- ATSDR – finalize toxicity values
- EPA – establish MCLs, certify test methods for other matrices, and support states in addressing PFAS in residuals
- USDA – funding to support farmers impacted by PFAS contamination
- Research
- Funding

Task Force Recommendations

**Funding for State Actions:**
- State is expending significant funds to investigate and control PFAS exposures
- Substantial additional funding needed to implement recommendations
- Municipalities, drinking water and wastewater utilities, farmers, businesses, property owners, Maine citizens bearing costs
- Use funding/resources as available
- Bond initiative for costs of PFAS sampling, analysis, remediation, and drinking water treatment
- Damage claims to apply costs of PFAS contamination to responsible parties
Ongoing Testing Requirements

- Notified licensees February 25, 2020

- Facilities with Program License
  - If send for disposal – 1X per year
  - If send for composting – 1X per year
  - If land-apply material – 2X per year

- Composting Facilities
  - Finished compost – 2X per year
  - Sludge feedstocks – 1X per year

Ongoing Requirements

- Site-Specific Soil Testing at Class B Sites
  - Required if sludge over screening concentration and haven’t tested fields for PFAS previously

- Pollutant Loading Rate Calculations
  - If over screening concentration
  - Class B land application, Class A pellet products, and compost

- Updated BMP/Information Sheets
  - Class A pellet products
  - Compost
  - Whenever PFAS levels increase
  - Must reflect [actual] recommended loading rates (agricultural uses [and] manufactured topsoil)
Moving Forward

• Corn Uptake Study – reviewing and validating data
• Limited Groundwater Study at Current and/or Former Land Application Sites – still identifying sites; have begun taking some samples
• Budget constraints due to economic downturn related to COVID-19?

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