



Update on PFAS Efforts

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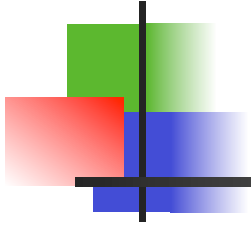
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North East Residuals & Biosolids Conference

Springfield, MA





Take a deep breath.

Let the air out slowly...

PeeeFffAaaaaaSsssssss...

We will get through this.



Where are we?

- New England is on the bleeding edge.
- Most states are nowhere near.
- PFAS has been with us 50+ years.
PFOA and PFOS have been phased out
and are down 70% in us.
- Why rush & disrupt important
environmental & public health programs?

This region's experts

on PFAS & biosolids, residuals, wastewater
(There are many! Apologies for omissions!)

- **ME** – Jeff McBurnie, Andrew Carpenter, Scott Firmin, Tim Haskell, André Brousseau (State: Carla Hopkins)
- **NH** – Shelagh Connelly, Barbara Reid (NHMA), Jennifer Palmiotto (GSRWA), Sarita Croce (Merrimack) (State: Ray Gordon)
- **MA** – Geoff Kuter, Brad Furlon, Natalie Sierra, Mary Barry, Jennifer Lichtensteiger (State: Jennifer Wood)
- **VT** – Bob Fischer (State: Eamon Twohig)

Etc...



We're getting national help...

- NACWA
- WEF
- Biosolids organizations: e. g. CASA (see their excellent fact sheet)



Next steps: MA

- Another meeting with MassDEP re sampling & testing for AOS holders... Will SPLP tests be required?
- MCP – site cleanup standards aiming at 20 ppt groundwater standard for 6 PFAS
- MCL process underway




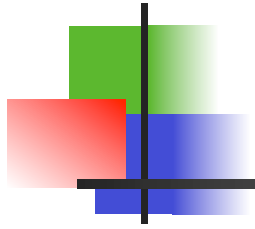
Next steps: NH

- Drinking water MCLs began Sept 30th: 11
– 18 ppt for PFOA, PFOS, PFHxS,,
PFNA.
- Legal challenge to rule adoption process
being heard today; NEBRA filed amicus
brief in support of plaintiffs yesterday
- NH DES must start development of
surface water standards.



Next steps: ME

- ME DEP is working on what will happen after June 30, 2019
 - Incineration? What? Where? How will that go over in Maine?
 - Carla Hopkins, ME DEP added at session:
 - Conducting study of corn uptake of PFAS
 - Historical biosolids data compiled & available
 - Etc.
- 



Next steps: Other states?





Some guiding principles:

- Comparative risk thinking:
 - Address the PFAS hot spots now.
 - Think carefully about chasing ambient background levels of PFAS (e.g. in wastewater, residuals): Is it necessary? What's the best approach with least disruption?
 - Consider attenuation. PFOA & PFOS are legacy now.



Some guiding principles:

- Focus on advancing understanding:
 - Collecting more of the same data may not be useful.
 - Define what data are lacking for helping come to practical solutions
 - E.g. Leaching potential – sorption, field testing
- Know full repercussions of any policy or regulatory action.



Where will we be in 10 years?

- Ambient background PFAS will be there.
- Society will not have the \$\$ to get it all.
- Drinking water treatment will be priority.
- Thermal destruction &/or other systems will be dealing with high-PFAS wastes.
- Biosolids will still be going to land, because it is a good solution. But how many programs will have been disrupted?
- Some PFAS will have been phased out.



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Demonstration of an Agricultural Chemical Fate and Transport Model to Determine Biosolids PFAS Screening Level Concentrations Required for Groundwater Protection

August 2nd, 2019 (with minor corrections August 20, 2019)

Michael Winchell, Marco Propato

Stone Environmental, Inc.

Separate complete set of slides available at <https://www.nebiosolids.org/pfas-residuals>. Contact NEBRA for access.

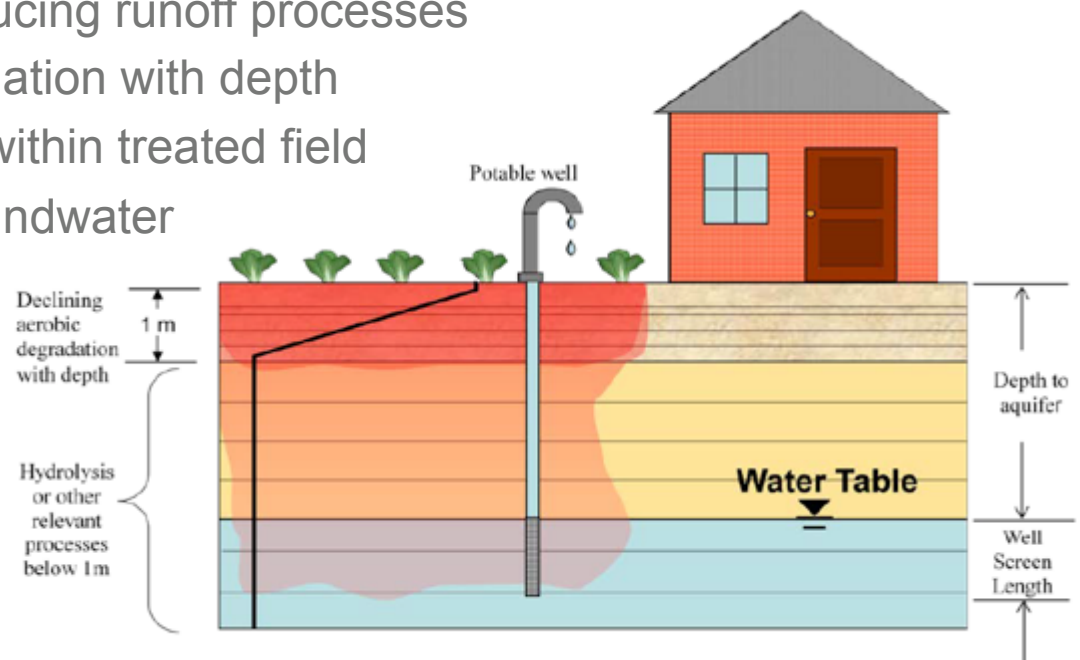
Modeling Approach: PRZM Groundwater Exposure Scenarios

The US EPA and Canada's PMRA (Pest Management Regulatory Agency) completed a research study in 2012 (Baris et al., 2012) that established a groundwater exposure conceptual model and scenarios for use in screening level modeling to evaluate pesticide registrations.

The conceptual model makes conservative assumptions that include:

- Maximizing infiltration by reducing runoff processes
- Reducing aerobic soil degradation with depth
- Setting groundwater source within treated field
- Ignoring potential lateral groundwater transport and dilution

PRZM serves as the physically based model applied to this regulatory modeling approach.



Modeling Approach: Application of PRZM Groundwater Scenarios for PFAS Biosolids Applications

Biosolids applications containing PFAS chemicals to agricultural fields are analogous to pesticide applications to agricultural fields.

Information required for each PFAS chemical includes:

- Application rate (mass/unit area)
 - Tons/acre of biosolids
 - Concentration of PFAS in biosolids
- Application timing (date)
- Application frequency (once per year, twice per year, once every other year)
- Application method (surface, incorporated, incorporation depth)
- Degradation rates
- Sorption (K_d or K_{oc})

Hydrology and crop-related inputs for a PFAS leaching simulation are the same as pesticide leaching simulation.

Biosolids Application Rate and Concentration Limits: Balancing Mass Loads to Protect Groundwater

The annual and long-term loading rate of PFOA/PFOS from land applied biosolids will determine the potential concentrations in groundwater. This requires management of both:

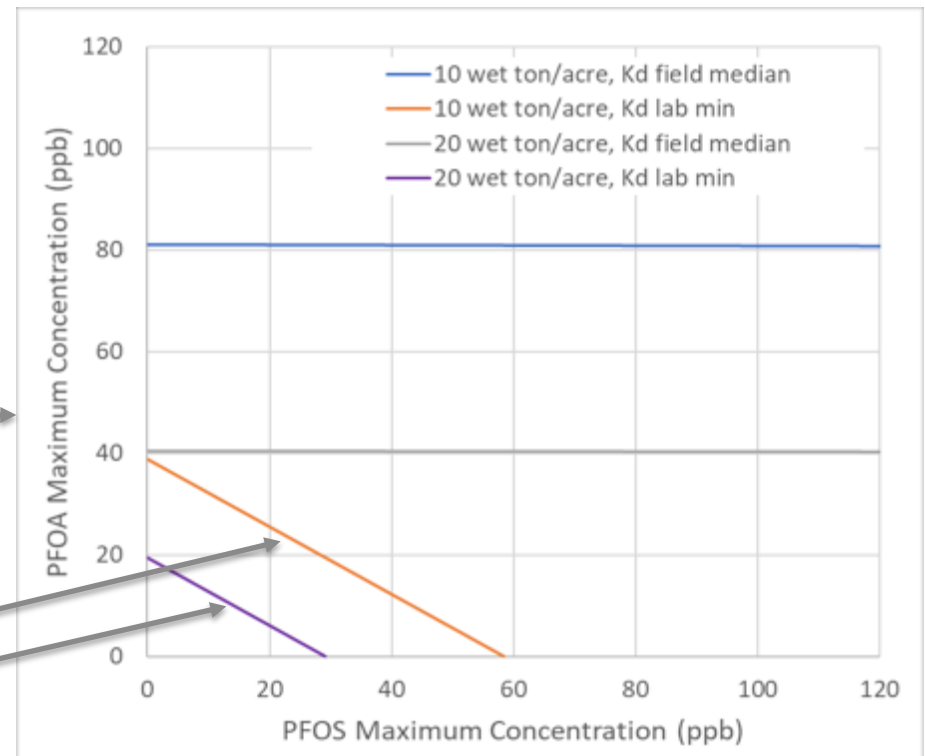
- Biosolids application rates (tons/acre)
- PFAS concentrations in biosolids

Given a high (20 ton/acre) rate, PFOA+PFOS concentrations below 19 – 29 ppb would limit peak groundwater concentrations to 70 ppt.

PFAS Concentrations and Biosolids Application Rates Required to Keep Peak PFOA+PFOS groundwater conc. below 70 ppt.

Worst case sorption scenarios:

- Low biosolids rate
- High biosolids rate

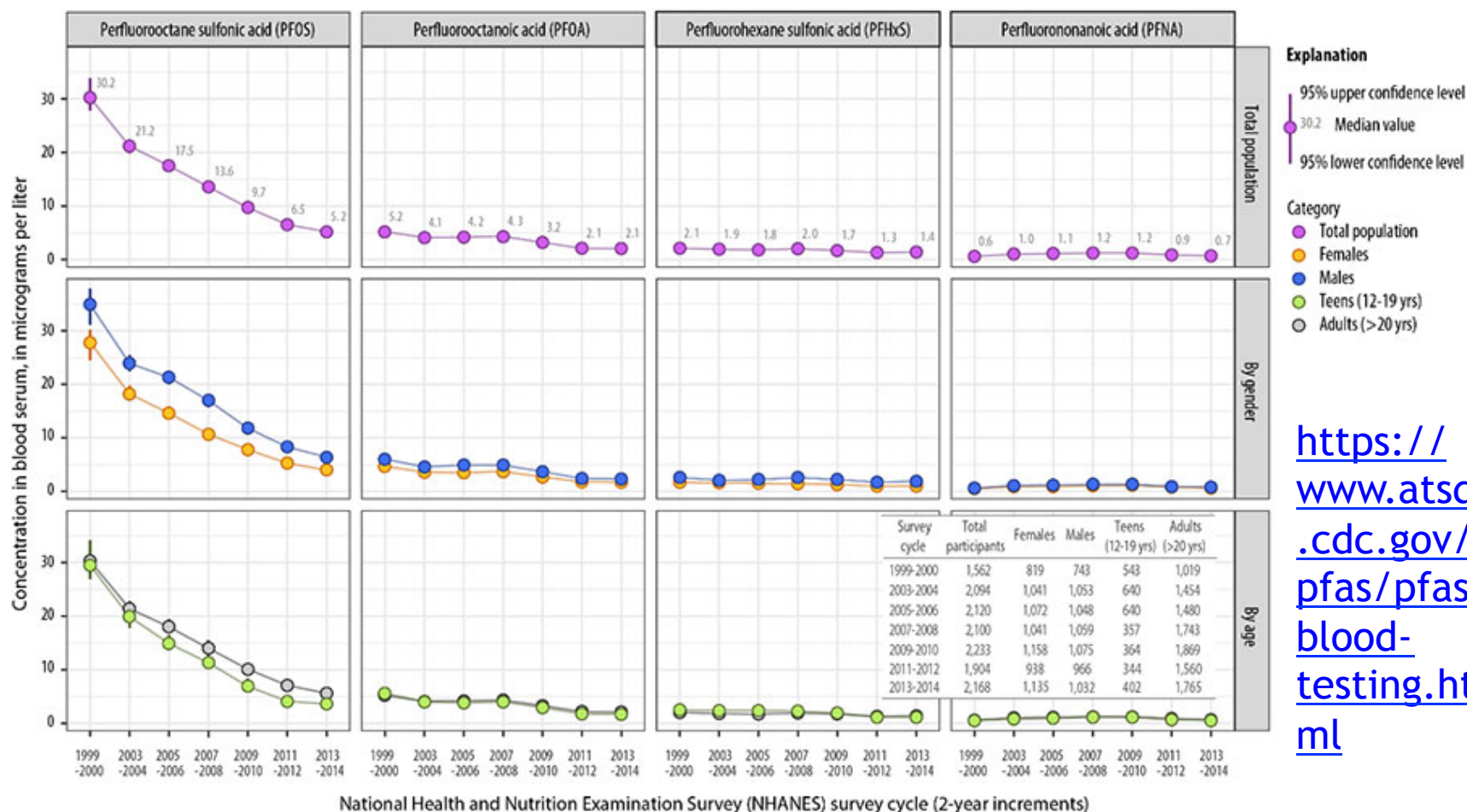


Key points:

- **Relatively minor amounts of PFAS are conveyed to the environment by typical municipal wastewater** (singles to tens of parts per trillion) & biosolids (singles to tens of parts per billion). This is part of ambient background cycling of these persistent, widely used chemicals.
- **PFOA & PFOS – the most concerning – have been phased out** and are down in human blood >70% and are down in wastewater & biosolids too. Phasing out use of concerning PFAS is the most efficient way to address potential concerns from such ambient background levels. PFOA & PFOS are becoming legacy issues.
- **Recycling municipal biosolids to soils has not caused known impacts to food products** and has only impacted groundwater above EPA's health screening value of 70 ppt in a very few rare cases – and only where there have been large industrial inputs to the sewer.
- **Receivers of PFAS - municipalities and utilities – cannot carry the major burden of addressing PFAS at the end of the pipe.** If stringent water quality standards (<70 ppt) are set, funding has to be provided and society will be paying large sums to reduce PFAS to such low levels in all waters.
- **WRRFs can proactively follow & update best practices to cost-effectively reduce potential risks & liability related to PFAS:** upstream source control, BMPs.
- **Regulatory agencies should be aware of unintended impacts** on WRRF programs when setting site cleanup and water quality standards for PFAS.

Blood serum levels declining...

Median concentration of selected per- and polyfluoroalkyl substances (PFAS) in blood serum (1999-2014) in the United States



<https://www.atsdr.cdc.gov/pfas/pfas-blood-testing.html>

Data source: Centers for Disease Control and Prevention. Fourth Report on Human Exposure to Environmental Chemicals, Updated Tables, (January 2017). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. <https://www.cdc.gov/exposurereport/>.

Note: In January 2006, the eight major PFAS manufacturing companies in the U.S. voluntarily committed to a 95% reduction of emissions and product content for PFOA and selected related PFAS species by 2010 and a complete elimination of these chemicals from emissions and products by 2015 (USEPA. 2010/2015 PFOA Stewardship Program). The major US producer of PFOS phased out production of PFOS precursors by 2002 (Prevedouros et al. ES&T 2006, 40:32-44).



Please call Congress.

- See your WEF and/or NACWA alerts.
- NDAA will be finalized very soon. Dingell and Pappas amendments are problematic:
 - Would impose CERCLA designation without any municipal activity exemption.
 - All our organizations could be responsible parties.



Thanks for... your invitation,
your attention, & your
comments.

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