PFOA / PFOS Analysis

Northern Lake Service
400 N. Lake Ave.
Crandon, WI 54520
800-278-1254
www.nlslab.com
Northern Lake Service

Founded in 1974
Wisconsin based / Family owned and operated
Over 450 years combined experience
>50% of municipalities have SDWA samples analyzed by NLS, either directly or by subcontract
PFOA / PFOS Analysis – Crandon, WI???

Unregulated Contaminant Monitoring Rule (UCMR)

• Currently about 100 SDWA targets
• Monitors for 20-30 currently unregulated compounds on a cyclical basis
• All municipalities over 10,000 and 800 small systems
• UCMR 1 2001 – 2003
• UCMR 2 2008 – 2010
• UCMR 3 2013 – 2015
• UCMR 4 2018 – 2020
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UCMR

• Laboratory pre-qualified by EPA
• Combination of method development, PT samples, and on-site audits
• No other lab has fully participated in all 4 UCMRs
• Chosen to perform small-system analyses directly for EPA
UCMR 3

- 6 Perfluorinated compounds included in UCMR3
- Expectation that these compounds could be found in Drinking Water due to their widespread use (4 of 6 compounds were found)
- For the first time, a UCMR analysis wasn’t mothballed at the conclusion of a study
How low is low?

Just to put some of these levels into terms that are easier to picture...

1 ppm = 1 second in about 11.5 days [think BOD]

1 ppb = 1 second in about 31.7 years [think VOCs]

1 ppt = 1 second in about 31,700 years! [PFOA/PFOS]
6 compounds included in UCMR3

Perfluorobutanesulfonic acid (PFBS)
Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)
Perfluorooctanoic acid (PFOA)
Perfluorononanoic acid (PFNA)
Perfluorooctanesulfonic acid (PFOS)

2 of these weren’t even found in UCMR 3
2 of these were rarely found
PFOA and PFOS were found most frequently
NLS New Market Potential Brainstorming
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PFOA / PFOS
post UCMR 3

More compounds added
Perfluorohexanoic acid (PFHxA)
Perfluorodecanoic acid (PFDA)
Perfluoroundecanoic acid (PFUnA)
Perfluorododecanoic acid (PFDoA)
Perfluorotridecanoic acid (PFTrDA)
Perfluorotetradecanoic acid (PFTA)
PFOA / PFOS
post UCMR 3

And even MORE compounds added

Perfluoro-2-propoxypropanoic acid (GenX)

N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)

1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2FTS)
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2FTS)

We are looking at 29 compounds as our likely list by years-end

Can be a 4 week process to validate an additional analyte
PFOA / PFOS - Methods

• Analysis by Method 537.1, Version 1.0
• LC/MS/MS
• Approved method for Drinking Water

• ASTM has written methods for soil and for ‘other matrices’
• SW846 has draft methods written, 8327 and 8328, for non-potable water and for solids, respectively
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PFOA / PFOS - Briefly

• Very water soluble
• Very mobile in water
• Unlike most Synthetic Organic Compounds (SOCs)

• Found in manufacturing locations
• Small communities have had contamination, not just large plants
• Fire retardant foam / military bases
There’s been a LOT of activity in Michigan, Vermont and New York regarding PFOA/PFOS.

Private citizen activity kicked this off.

We’re seeing many private citizens spending money on this.
PFOA / PFOS - Now

• Push for certification
• By what method and at what levels?
• Who would run all of those samples?
# PFOA / PFOS – What level?

<table>
<thead>
<tr>
<th>State</th>
<th>Compound</th>
<th>Level (ppt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut</td>
<td>Sum of PFOA, PFOS, PFNA, PFHxS, PFHpA</td>
<td>70</td>
</tr>
<tr>
<td>Maine</td>
<td>Sum of PFOA and PFOS</td>
<td>70</td>
</tr>
<tr>
<td>Minnesota</td>
<td>PFOA</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>PFOS</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>PFHxS</td>
<td>27</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>Sum of PFOA and PFOS</td>
<td>70</td>
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<tr>
<td>New Jersey</td>
<td>PFNA</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>PFOA</td>
<td>14</td>
</tr>
<tr>
<td>North Carolina</td>
<td>GenX</td>
<td>140</td>
</tr>
<tr>
<td>Vermont</td>
<td>Sum of PFOA and PFOS</td>
<td>20</td>
</tr>
<tr>
<td>West Virginia</td>
<td>Sum of PFOA and PFOS</td>
<td>70</td>
</tr>
</tbody>
</table>
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PFOA / PFOS – What method?

• LC/MS/MS
• Not used for any currently certified method in Wisconsin
• Presumably not a lot of capacity
• Sample collection is different from “normal”, in that it requires a field blank with each sample
PFOA / PFOS – Issues

• Standard availability
• Solvent compatibility
  • Solvent ratios
  • Solvent quality
• Contamination concerns
• Method development
  • Finding a standard source
  • Seeing how the compound reacts/extracts
  • Where does it show itself in relation to other compounds
Northern Lake Service

Paul Junio
Northern Lake Service
400 N. Lake Ave.
Crandon, WI  54520
715-478-6052

2420 N. Grandview Blvd.
Waukesha, WI  53188
262-547-3406
paulj@nlslab.com