Update on MECDC PFAS Work
Briefing of the Environment and Natural Resources Committee

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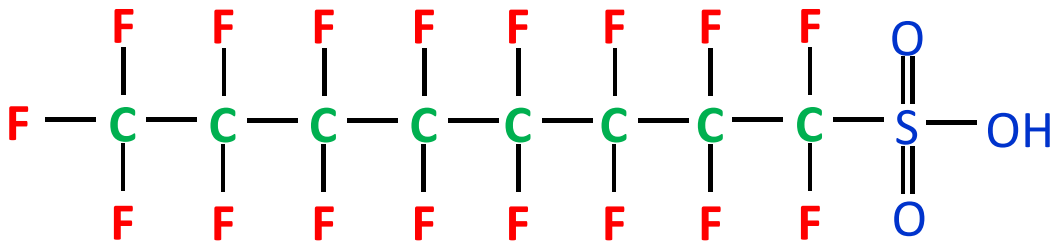
TOPICS

- Background on PFAS chemicals
- Water standards / guidelines and how derived
- Agronomic exposure pathways

Some Naming Conventions



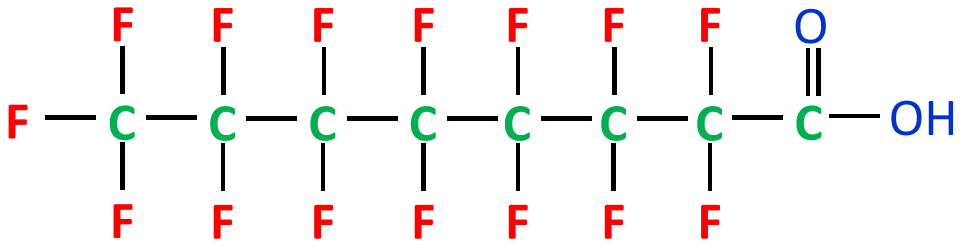
Perfluoro**octane**sulfonic acid (PFOS)

8 carbons

Perfluoro**hexane**sulfonic acid (PFHxS)

6 carbons

Some Naming Conventions



Perfluoro<u>octanoic</u> acid (PFOA)

8 carbons

Perfluoro<u>heptanoic</u> acid (PFHpA)

7 carbons

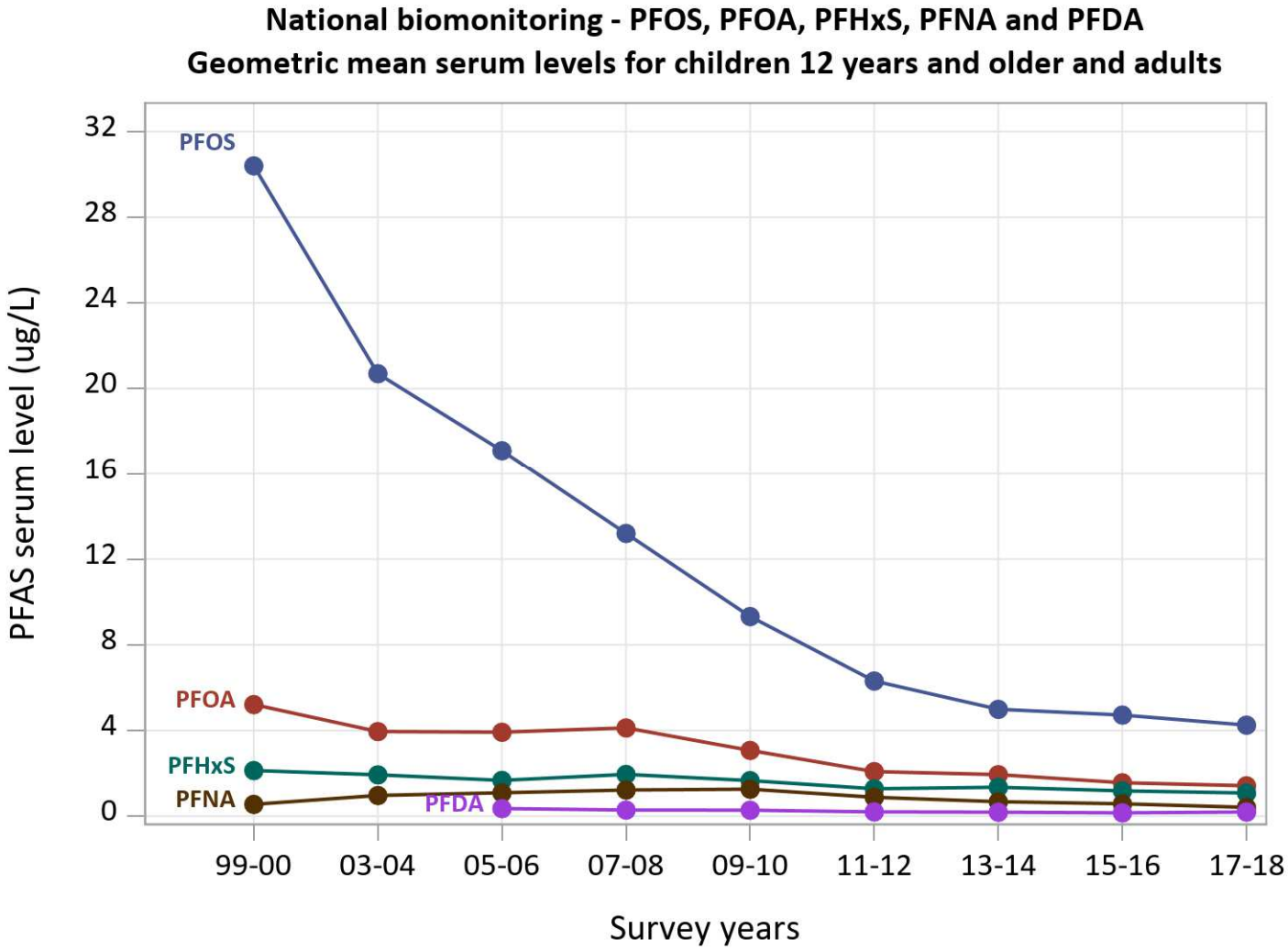
Perfluoro<u>nonanoic</u> acid (PFNA)

9 carbons

Perfluoro<u>decanoic</u> acid (PFDA)

10 carbons

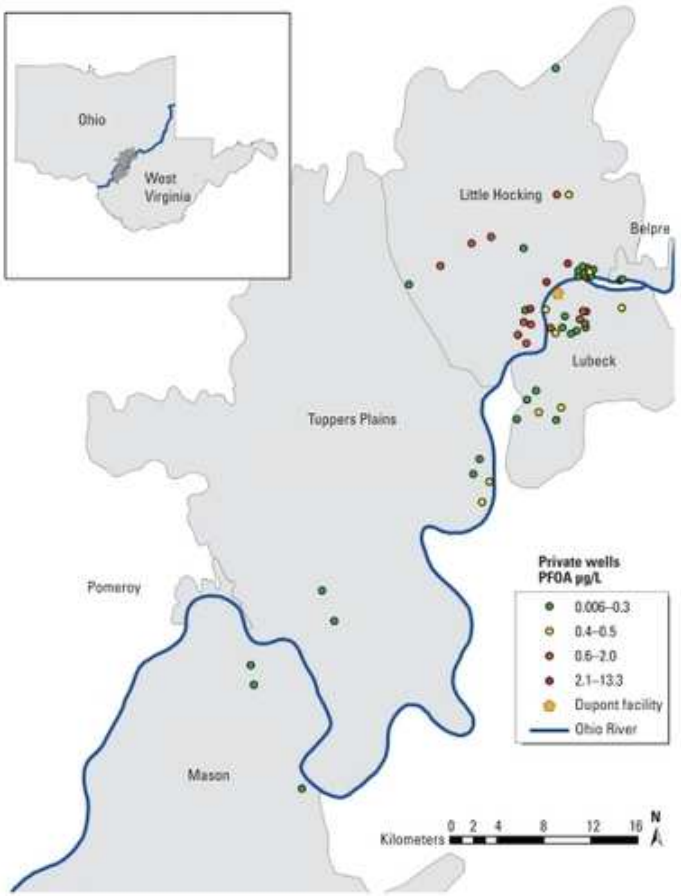
PFAS in our Blood (serum)



Source: National Report on Human Exposure to Environmental Chemicals – US CDC: https://www.cdc.gov/exposurereport/index.html

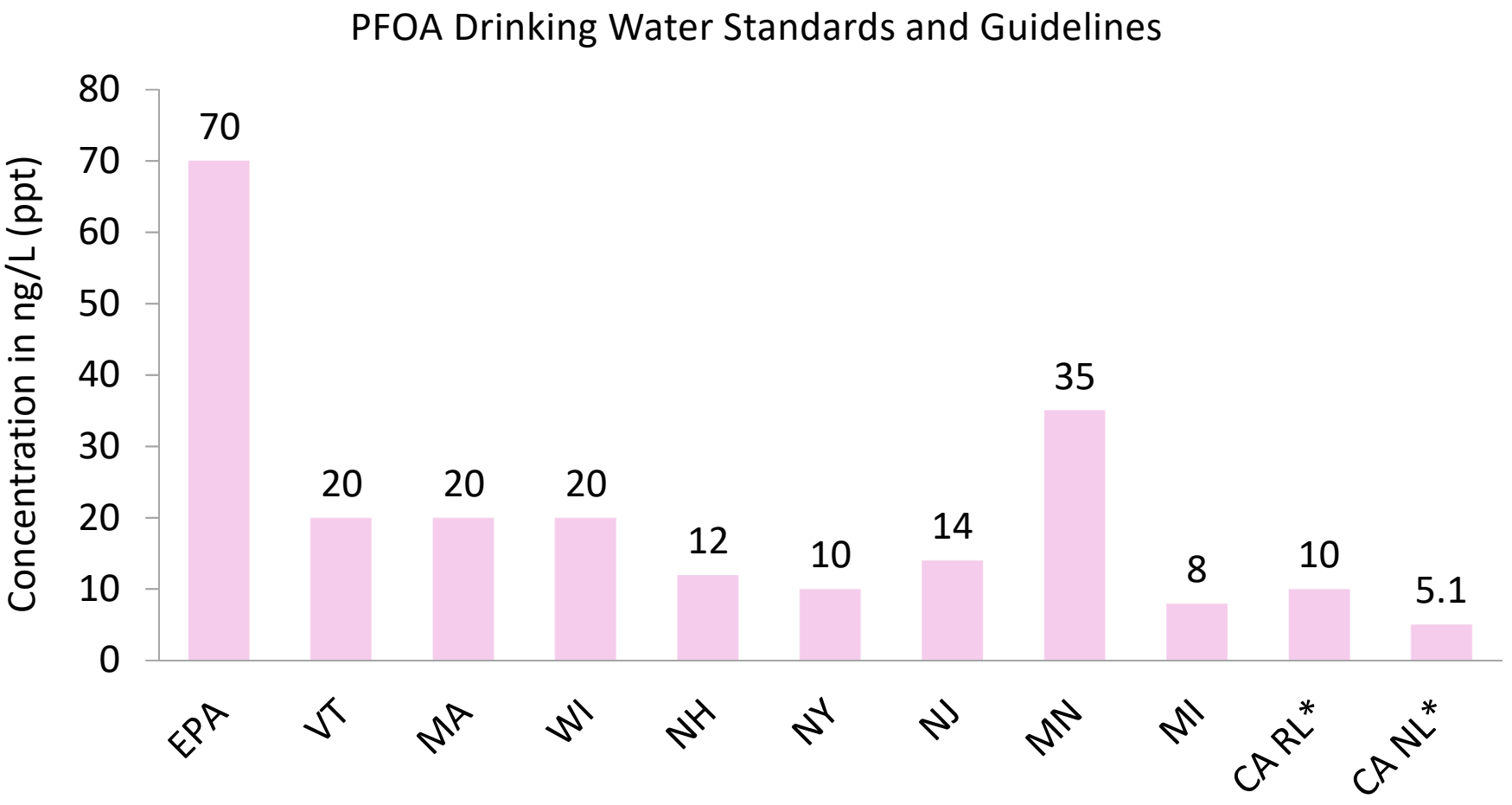
Health Effects Associated with PFAS

- increased cholesterol levels
- decreased vaccine response
- changes in liver enzymes
- increase risk of high blood pressure or preeclampsia in pregnant women
- small decreases in infant birth weight
- increased risk of kidney cancer or testicular cancer.



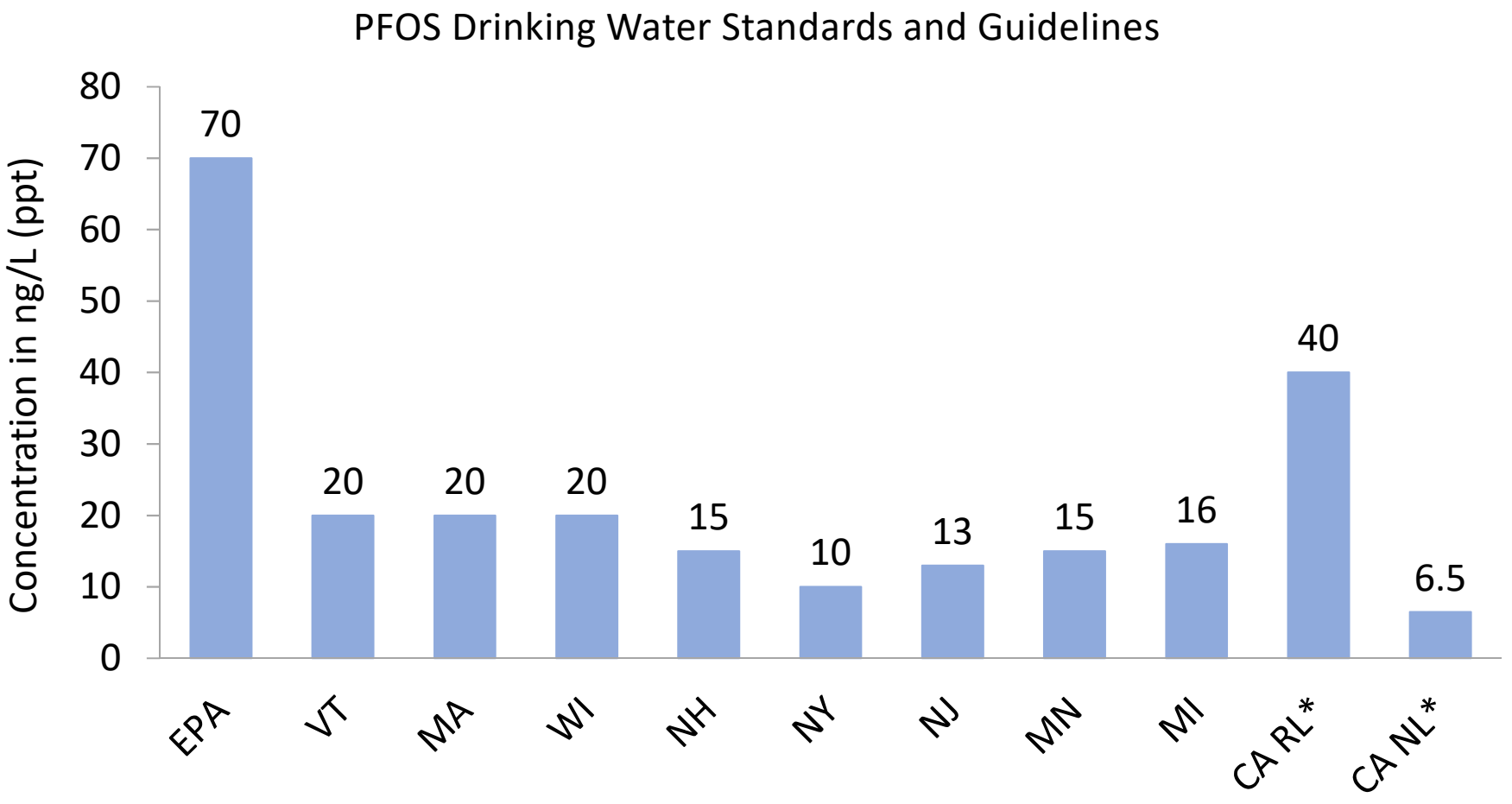
Source: https://www.atsdr.cdc.gov/pfas/health-effects/index.html

Federal and State PFOA Drinking Water Limits



* CA uses 10 ng/L for a response level (RL) and 5.1 ng/L for a notification level (NL)

Federal and State PFOS Drinking Water Limits



* CA uses 40 ng/L for a response level (RL) and 6.5 ng/L for a notification level (NL)

USEPA Health Advisory for PFOS and PFOA

Toxicity Value
20 ng/kg/day

90th Percentile
Water Intake
0.054 L/kg/day

370
ng/L

Drinking Water
Equivalent Level

Relative Source
Contribution
20%

70
ng/L

Health
Advisory

How States Differ on PFOA

0.5 | 2 | 4 | 5 | 6 | 18 | 20

Toxicity Value (ng/kg/day)

Water Consumption (L/kg/day)

0.03 | 0.05 | 0.10 | 0.18

8 to 370 ng/L

Drinking Water Equivalent Level

Relative Source Contribution %

20% | 50% | 60%

2 to 70 ng/L

Standard or guideline

How States Differ on PFOS

2 | 3 | 5 | 20

Toxicity Value (ng/kg/day)

Water Consumption (L/kg/day)

0.03 | 0.05 | 0.10 | 0.18

30 to 370 ng/L

Drinking Water Equivalent Level

Relative Source Contribution %

20% | 50% | 60%

7 to 70 ng/L

Standard or guideline

Chemical-by-Chemical Approach

Chemical-by-Chemical Approach
(treat each chemical separately, do not assume equally toxic and may or may not treat in an additive way)

- Michigan (PFAS Drinking Water Standards, ng/L)

PFOA	PFNA	PFHxA	PFOS	PFHxS	PFBS	GenX
8	6	400,000	16	51	420	370

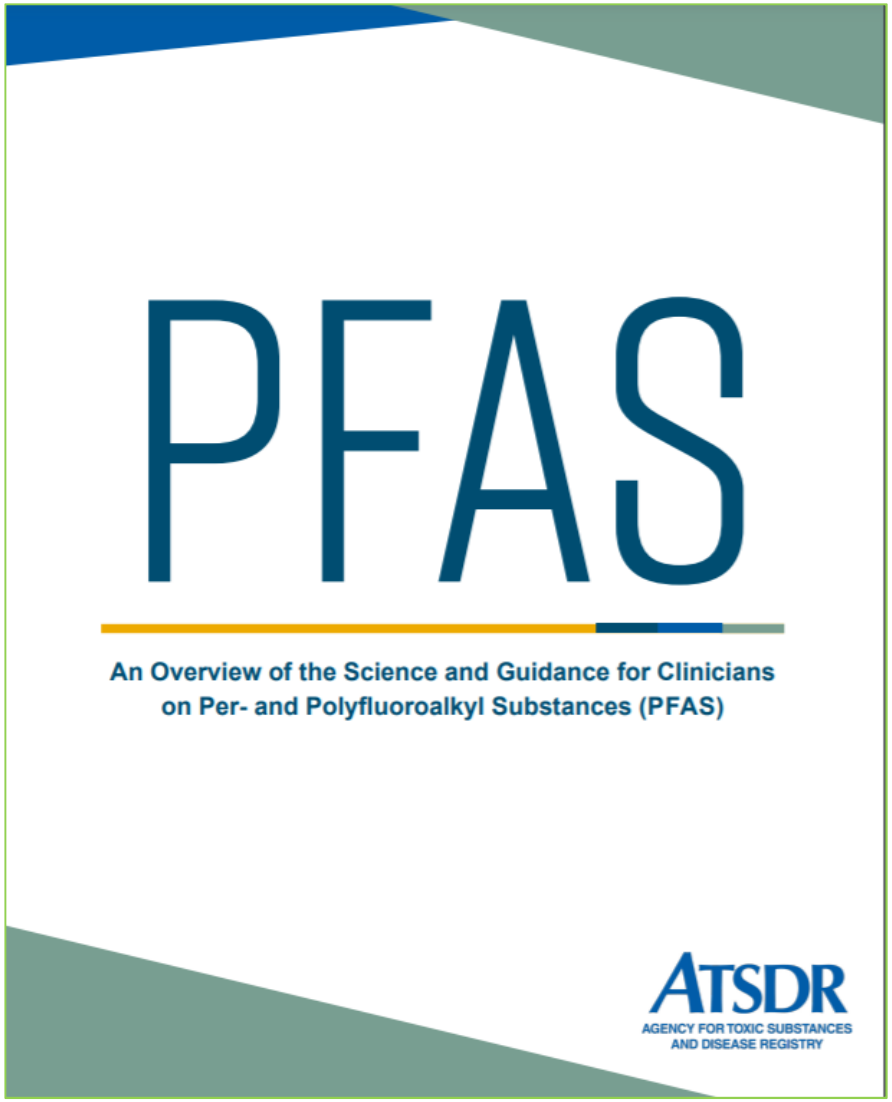
Source: https://www.michigan.gov/som/0,4669,7-192-47796-534660--,00.html

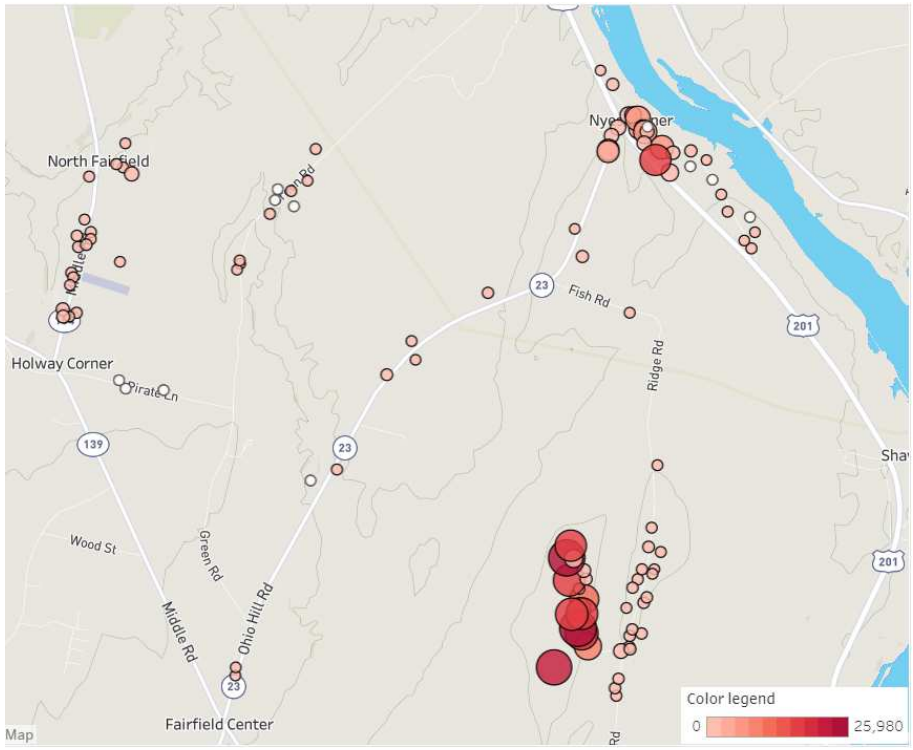
Summation Approach

Summation Approach
(treat each chemical as equally toxic and assume act in an additive way)

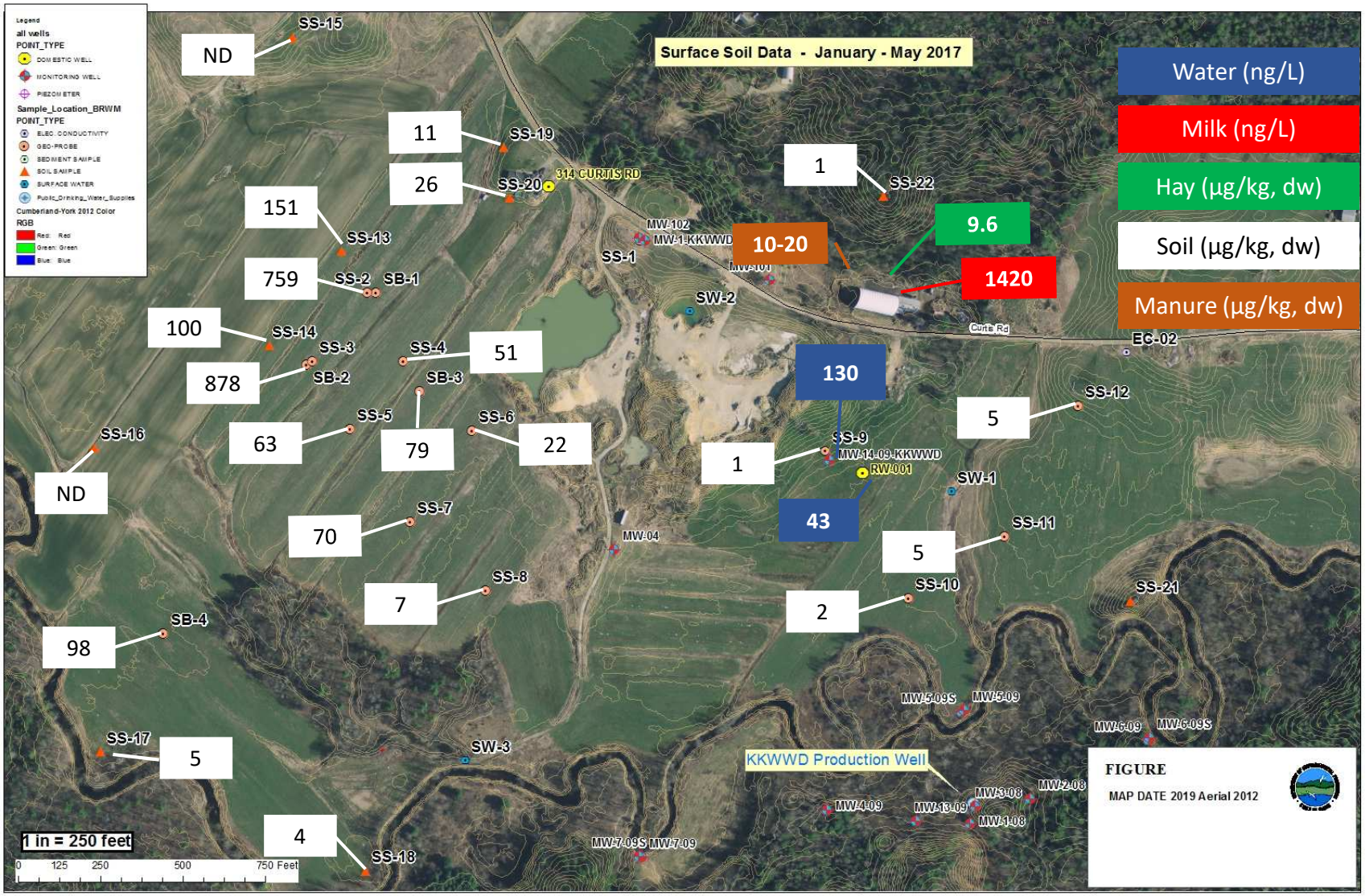
- PFOS + PFOA + PFHxS + PFHpA + PFNA ≤ 20 ng/L
- PFOS + PFOA + PFHxS + PFHpA + PFNA ≤ 70 ng/L

Fairfield

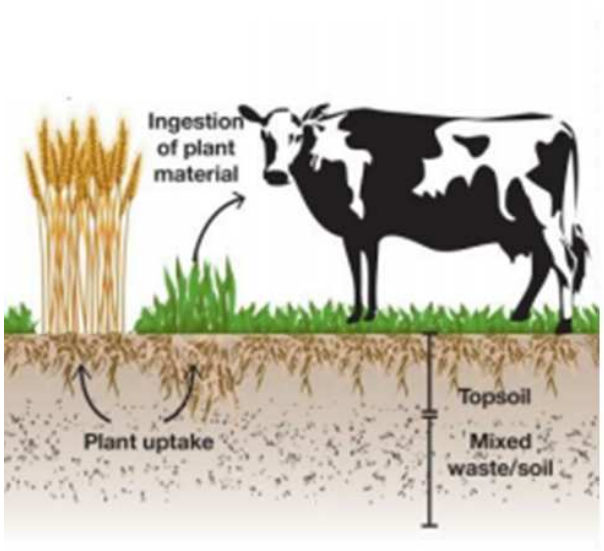

PFAS
An Overview of the Science and Guidance for Clinicians on Per- and Polyfluoroalkyl Substances (PFAS)
ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY


North Fairfield
Holway Corner
Fairfield Center
Fish Rd
Ridge Rd
Middle Rd
Ohio Hill Rd
Green Rd
Wood St
Color legend
0
25,980
Map

PFOS Contamination of Dairy Farms
- Stoneridge Farm, Maine -



Agronomic Exposure Pathway



Soil ⇨ Hay/Corn ⇨ Cow ⇨ Milk ⇨ Child

Action Level for “adulterated” Milk

Toxicity Value
20 ng/kg/day

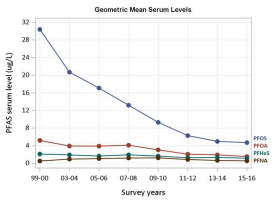
1-2 year old

90th Percentile
Milk Intake
0.074 L/kg/day

270 ng/L (0.27 µg/L)

Milk Exposure Limit

Relative Source Contribution
80%



210 ng/L (0.21 µg/L)

Action Level

Soil Screening Levels for Dairy Farm Scenarios

Grass-based dairy farm

SSL = 6 µg/kg, *dw*

"Average" Maine dairy farm

SSL = 11 µg/kg, *dw*

Corn Silage Study

Field studies

$TF_{corn} = 0.05 \pm 0.03\ (SD)$

Other Agronomic Exposure Pathways

For more Information

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