

# Vermont's PFAS Quest Continues: from Village Greens to Land Application Sites

#### Acknowledgements

- Joshua Burns, John Schmeltzer, Kasey Kathan, VTDEC
  - Steven LaRosa, Weston & Sampson
  - Johanna Palmer, Laura Woodard, Joe Hayes, ATC
  - Vermont WWTF operators, municipal managers
    - septage haulers
    - myriad of environmental consultants

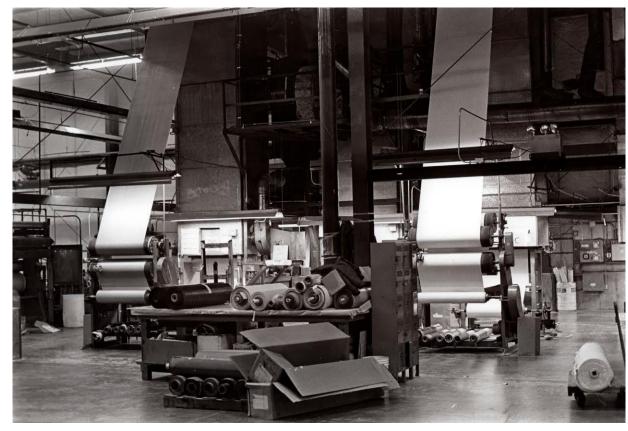






#### North Bennington/Bennington PFOA

#### Teflon Town: ChemFab's toxic legacy



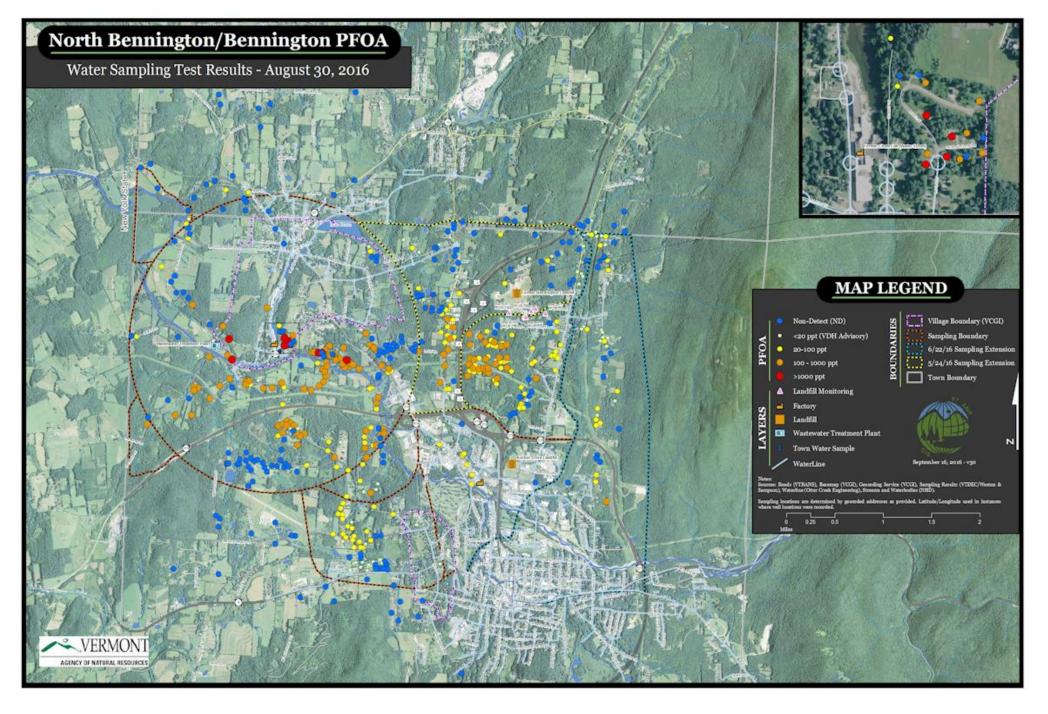
File photo/Bennington Banner

## Once The Pride Of North Bennington, Chemfab Made Fabrics Used Worldwide, And In Space



DAVID ZALUBOWSKI / AP





- 700 samples collected from private wells
- >60% wells with PFOA detected
- ~ 50% wells with > 20 ppt PFOA
- POET systems installed
- New municipal water supply lines extended to ~400 homes



VT Regulated PFAS	Health Advisory/ MCL (ng/L)	Groundwater Enforcement Std (ng/L)	Residential Soil (mg/kg)	Recommended Limit for Landfill Leachate to WWTP (ng/L)
PFHxS (C6)				
PFHpA (C7)				
PFOA (C8)	20 ppt (*)	20 ppt (*)	1.22 ppm (sum)	120,000
PFOS (C8)			(Jann)	1000
PFNA (C9)				

(\*) = any combination of the 5 compounds







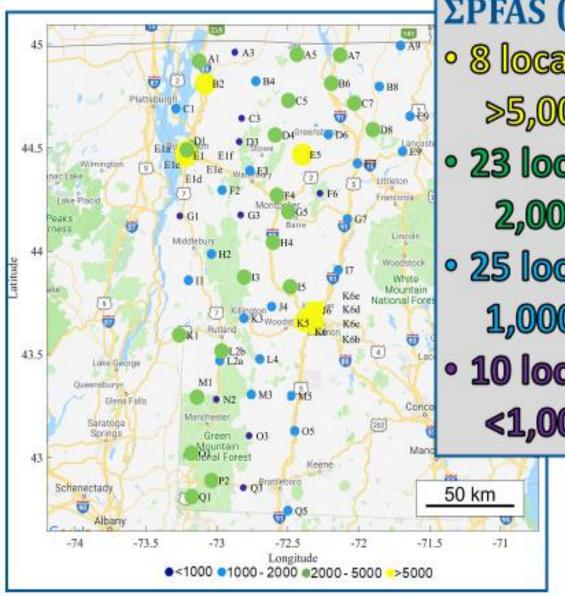
# Per- and Polyfluoroalkyl Substances (PFAS) in Vermont Shallow Soils

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> Harrison Roakes, P.E. Sanborn, Head & Associates

- Summer 2018
- 66 samples collected
- Analyzed for 17 PFAS





### **ΣPFAS** (n=66)

8 locations>5,000 ng/kg

23 locations
 2,000-5,000 ng/kg

25 locations

1,000-2,000 ng/kg

10 locations<1,000 ng/kg</li>

#### ng/kg or ppt

Analyte	Mean	Mean
PFHxA	520	400
PFHpA	260	250
PFOA	520	500
PFNA	270	190
PFDA	310	180
PFUnDA	150	93
PFBS	230	210
PFHxS	200	200
PFOS	1,100	970
PFDS	140	110

Σ VT-5: 2350 2110





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## REPORT

January 30, 2020

Poly- and Perfluoroalkyl Substances at Wastewater Treatment Facilities and Landfill Leachate

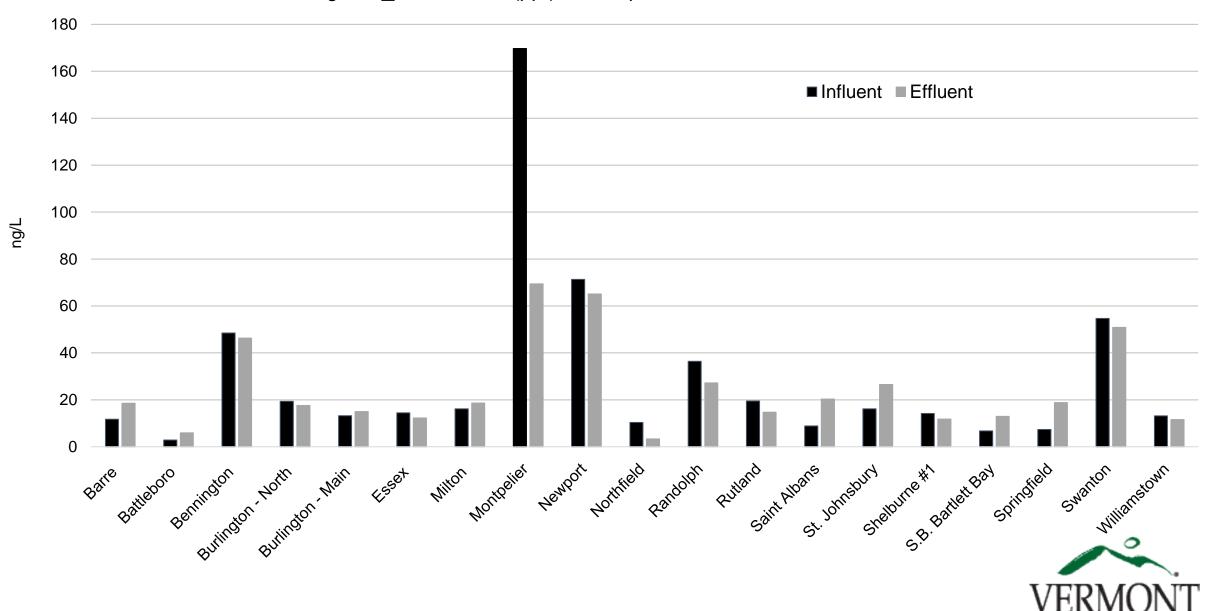
2019 Summary Report

#### **Statewide** evaluation of PFAS in:

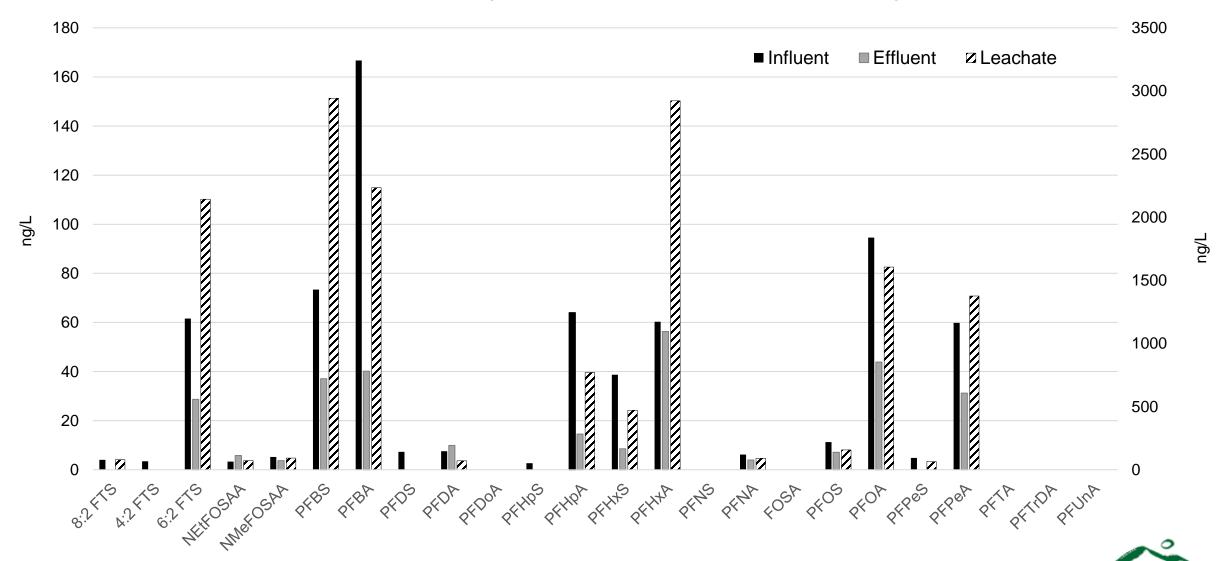
- ~400 samples. Analyzed for 24 PFAS. Modified 537.
- Landfill leachates (4)
- WWTF influent, effluent (19), sludges/biosolids (22)
- Industrial discharges (2)



Average of ∑ VT-5 PFAS (ppt) in Samples of WWTF Influent and Effluent



#### PFAS (ppt) Signature, LF Leachate and WWTF Receiving





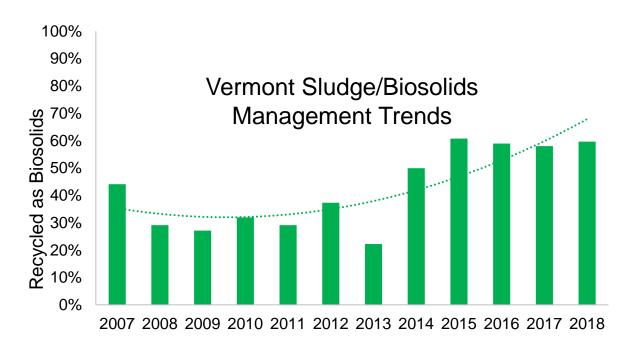
Springfield, Class A biosolids

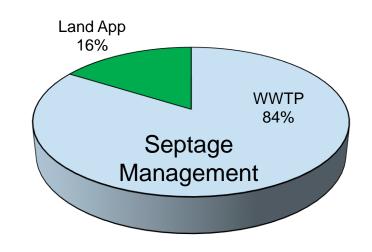
Swanton, Class B biosolids

Waterbury, sludge drying beds

Туре	Pathogen Reduction	Vector Attraction Reduction	Pollutant limits	Management
Class A	Further Reduced (PFRP)	Required	Metals, PCBs	Distributed under Permit
Class B	Significantly Reduced (PSRP)	Required	Metals, PCBs	Land Applied at Permitted Sites
Septage	PSRP – Lime Stabilization	Required	Metals, PCBs	Land Applied or WWTP
Sludge	None	None	Metals, PCBs, TCLP	Landfill, Transfer to Facility





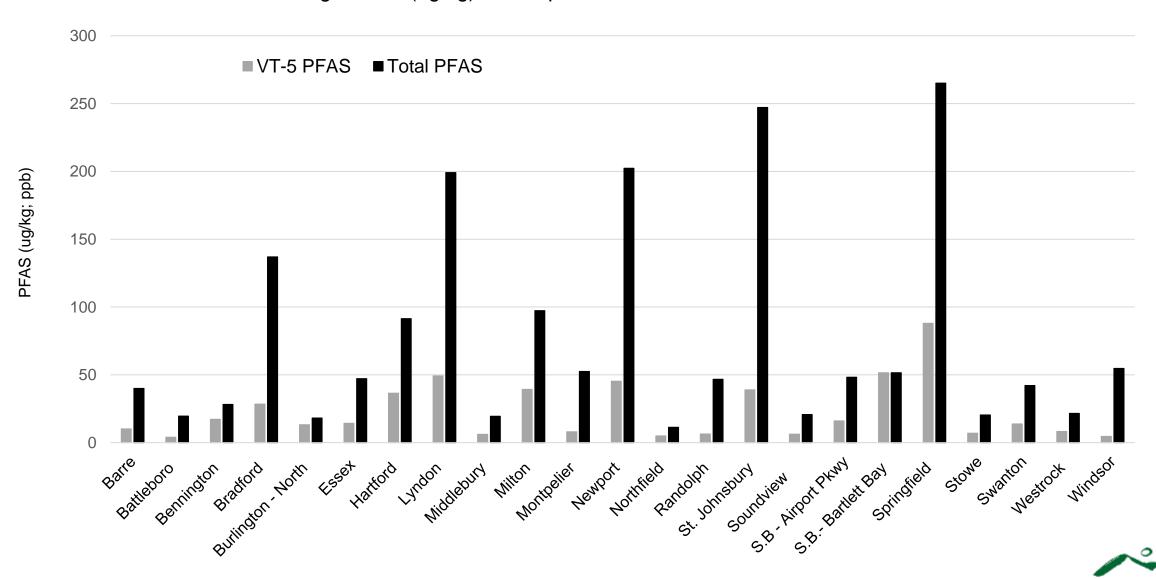




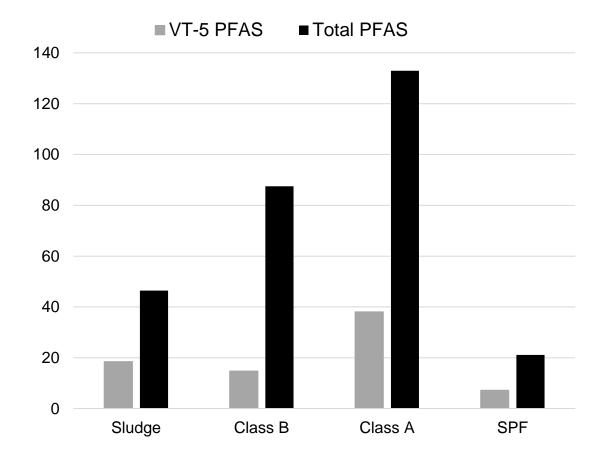




#### Average PFAS (ug/kg) in Samples of Solids Collected at WWTFs



#### Average PFAS (ppb) in Samples of Residual Materials

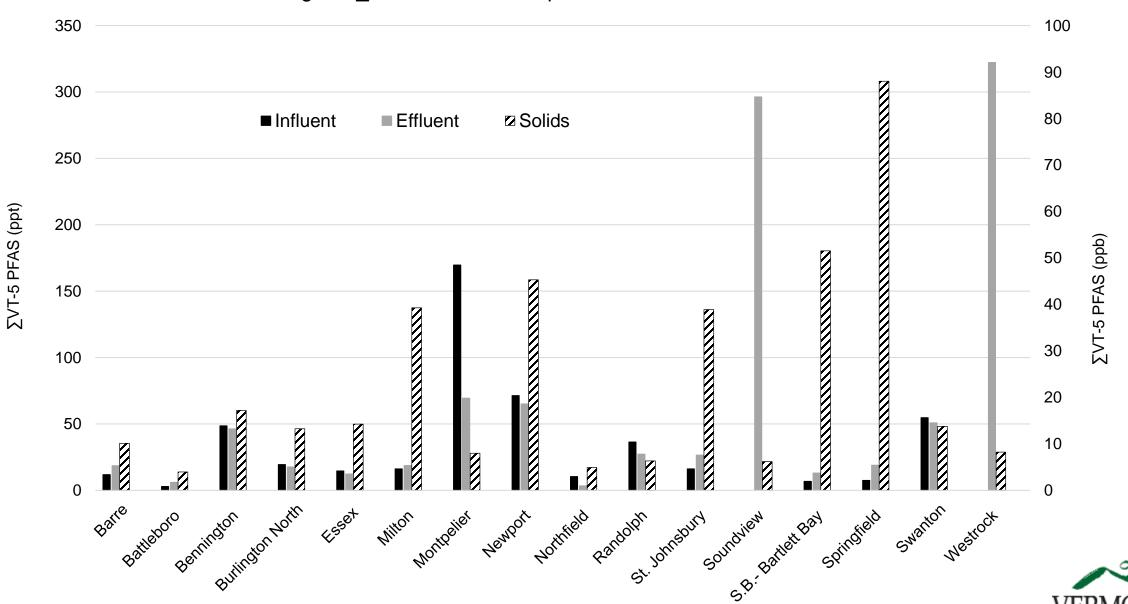




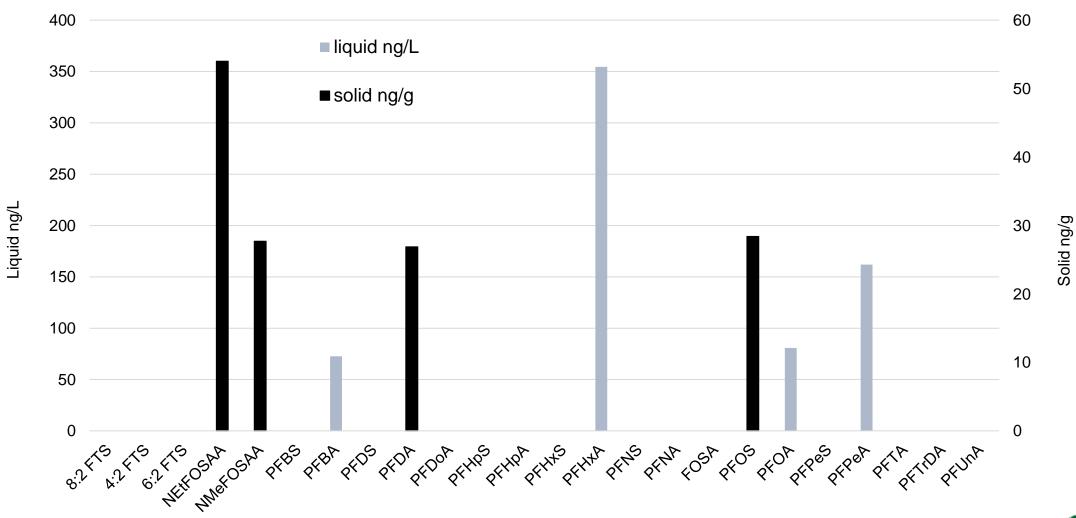




#### Average of ∑VT-5 PFAS in Samples of Influent, Effluent and Solids



#### Comparing PFAS Signatures in Biosolids Analyzed as Liquid (ng/L) vs Solid (ng/g)

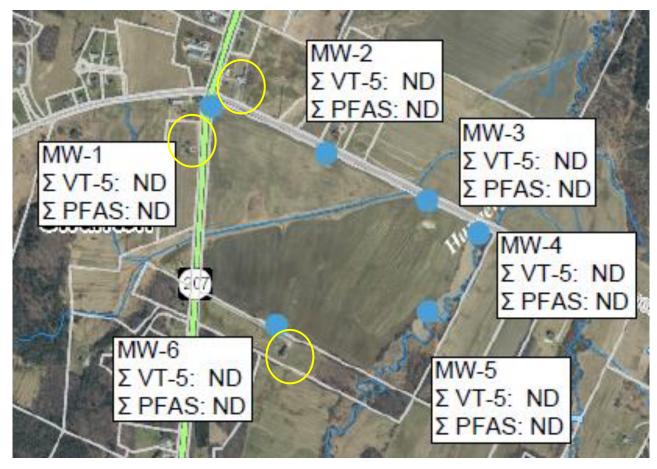


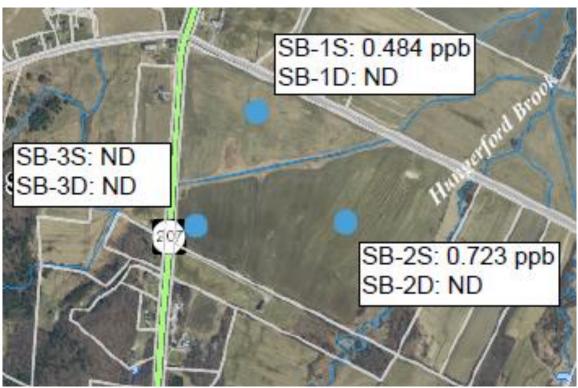




- August October 2019
- 4 Land App Sites (Class B biosolids, stabilized septage)
- Soil Sampling Cores at 0-6" and 24-30"
- Samples of Groundwater from Onsite Monitoring Wells (low flow)
- Drinking water supply wells within an approximate 0.25-mile radius

#### Class B Biosolids, lime-stabilized/dewatered, broadcast applied biennially since 2010





Groundwater Results (ng/L; ppt)

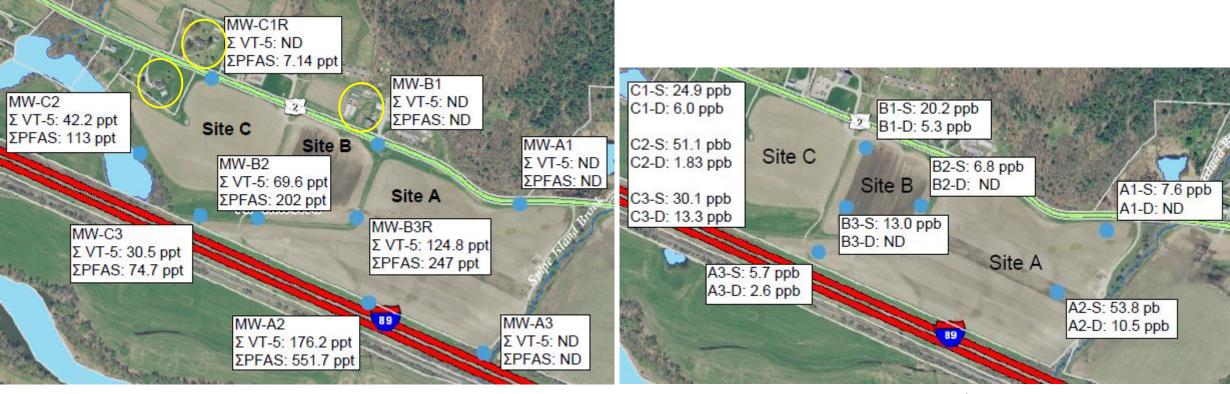
Soil Results (ug/kg; ppb)



Site A - stabilized septage, broadcast, routinely during growing season

Site B - stabilized septage, occasional class B biosolids (lime stabilized), biannually

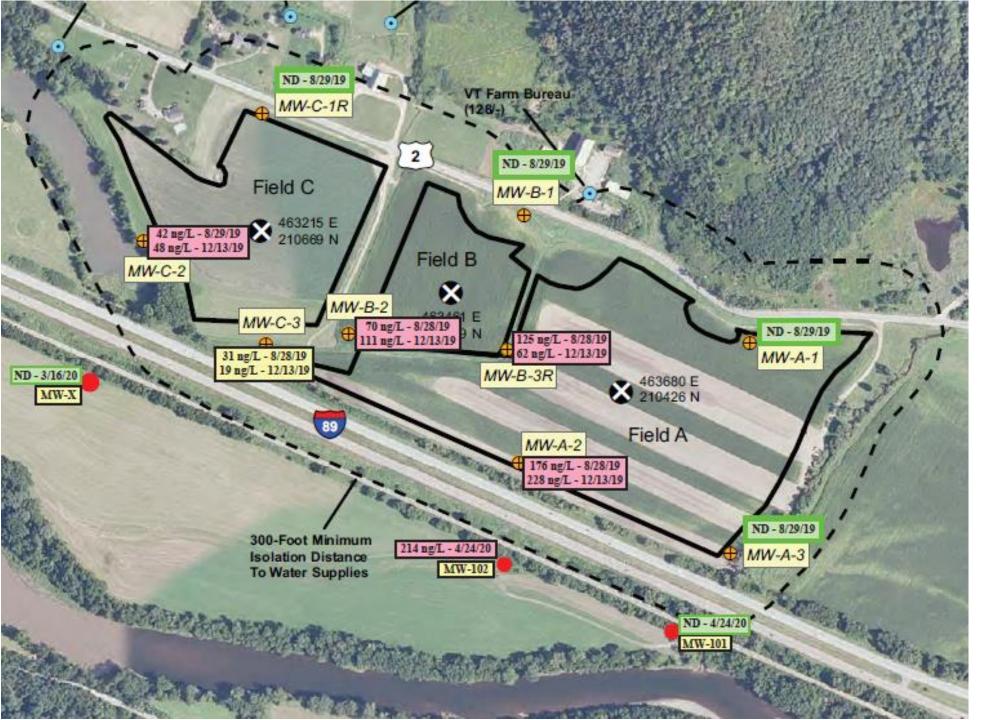
Site C - stabilized septage/class B biosolids (lime stabilized), broadcast, biannually



Groundwater Results (ng/L; ppt)

Soil Results (ug/kg; ppb)

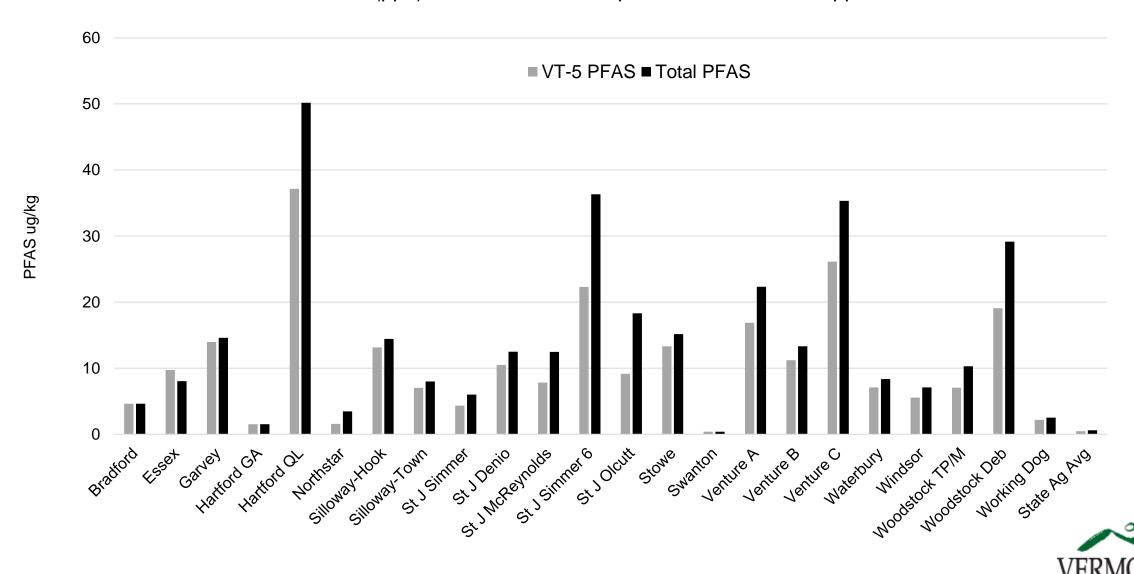




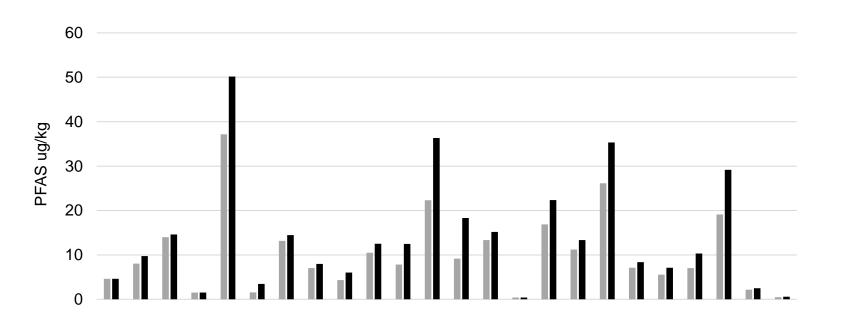
- Confirmation GW Sampling
- Compliance Point Sampling @ 300'
- Land application on hold at this site



PFAS (ppb) in Shallow Soil Samples at Vermon Land App Sites



#### Soil PFAS (ppb) in Land App Sites vs Background



Avg ∑ VT-5 across VT Land App sites: 10,900 ng/kg or 10.9 ppb

ng/kg or ppt

Analyte	Mean	Mean
PFHxA	520	400
PFHpA	260	250
PFOA	520	500
PFNA	270	190
PFDA	310	180
PFUnDA	150	93
PFBS	230	210
PFHxS	200	200
PFOS	1,100	970
PFDS	140	110

∑ VT-5: 2350 2110 (no outlier)



# Perfluoroalkyl Substances (PFAS) Statewide Sampling Plan

**JUNE 2019** 

https://dec.vermont.gov/pfas/pfoa



