

Vermont's Response to the PFAS Crisis

Vermont Legislature Presentation
State House
March 22, 2017

Vermont's Experience

Outline

What are Perfluoroalkyl Substances (PFASs)
(PFOA) & (PFOS)

What are their Health Effects

Review current sites with PFASs

- North Bennington/Bennington/Pownal

Review Statewide Plan

Review challenges

Share lessons learned

Perfluoro alkyl substances (PFASs)

PerfluoroOctanic Acid (PFOA)

Perfluorooctanoic acid
Chemical Compound



Perfluorooctanoic acid, also known as C8, is a synthetic perfluorinated carboxylic acid and fluorosurfactant. One industrial application is as a surfactant in the emulsion polymerization of fluoropolymers. [Wikipedia](#)

Formula: $C_8HF_{15}O_2$

Molar mass: 414.07 g/mol

Boiling point: 372.2°F (189°C)

Density: 1.8 g/cm³

Perfluorobutanesulfonate (PFOS)

Perfluorooctanesulfonic acid



Perfluorooctanesulfonic acid is an anthropogenic fluorosurfactant and global pollutant. PFOS was the key ingredient in Scotchgard, a fabric protector made by 3M, and numerous stain repellents. [Wikipedia](#)

Molar mass: 500.13 g/mol

Formula: $C_8HF_{17}O_3S$

Boiling point: 271.4°F (133°C)

Classification: Sulfonic acid

What are PFASs /What are their Health Effects

What are PFASs in?

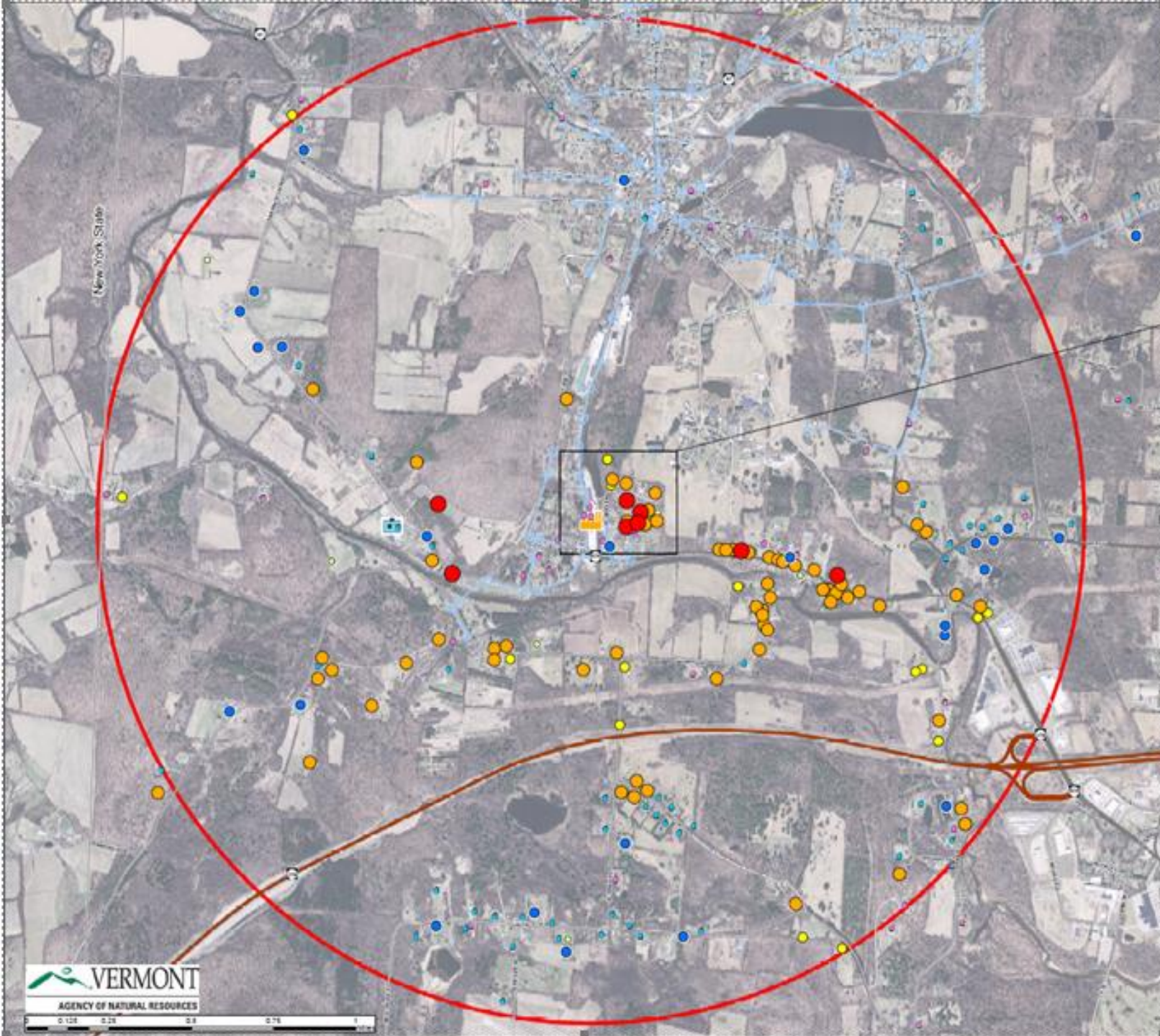
- Teflon production
- Electronics coatings
- Scotchguard/Gortex
- Fire fighting foam (AFFF) (PFOS)
- Textile coating (Chemfab) (PFOA)

PFASs Health Effects

- Concentrates in Blood Serum
- May cause hypertension, low birth weight, some immune systems effects, thyroid disease, kidney cancer, and testicular cancer
- Vermont Health Advisory at **20 ng/l (ppt)** for PFOA/PFOS combined

Textile Coating Made at Chemfab





Initial PFOA Results

- 50 samples
- 22 results : ND
- 9 results : 0–20 ppt
- 8 results : 20–100 ppt
- 11 results : > 100 ppt

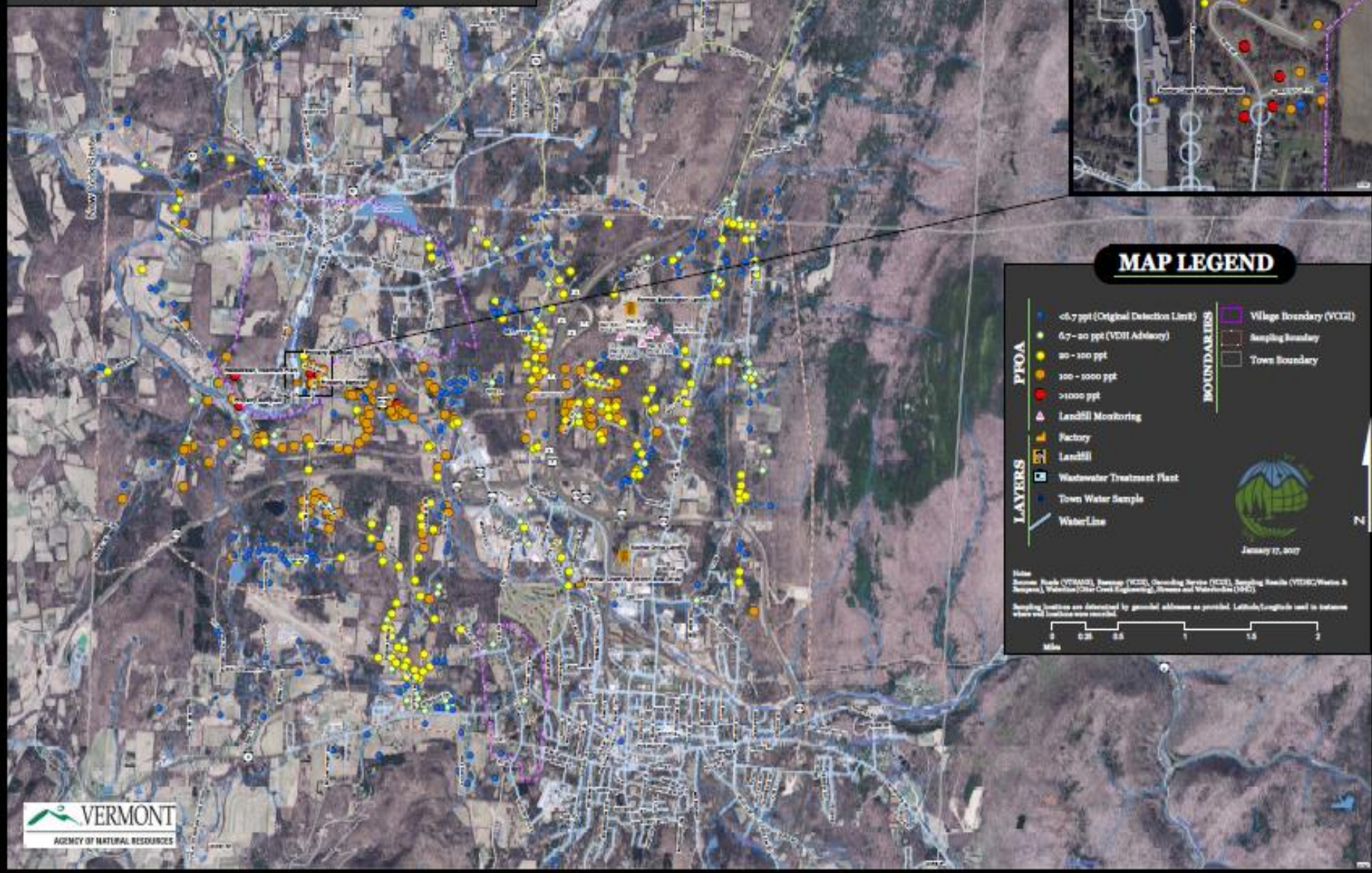
Immediate notification to sampled parties

Governor's Press Conference

Public Meeting

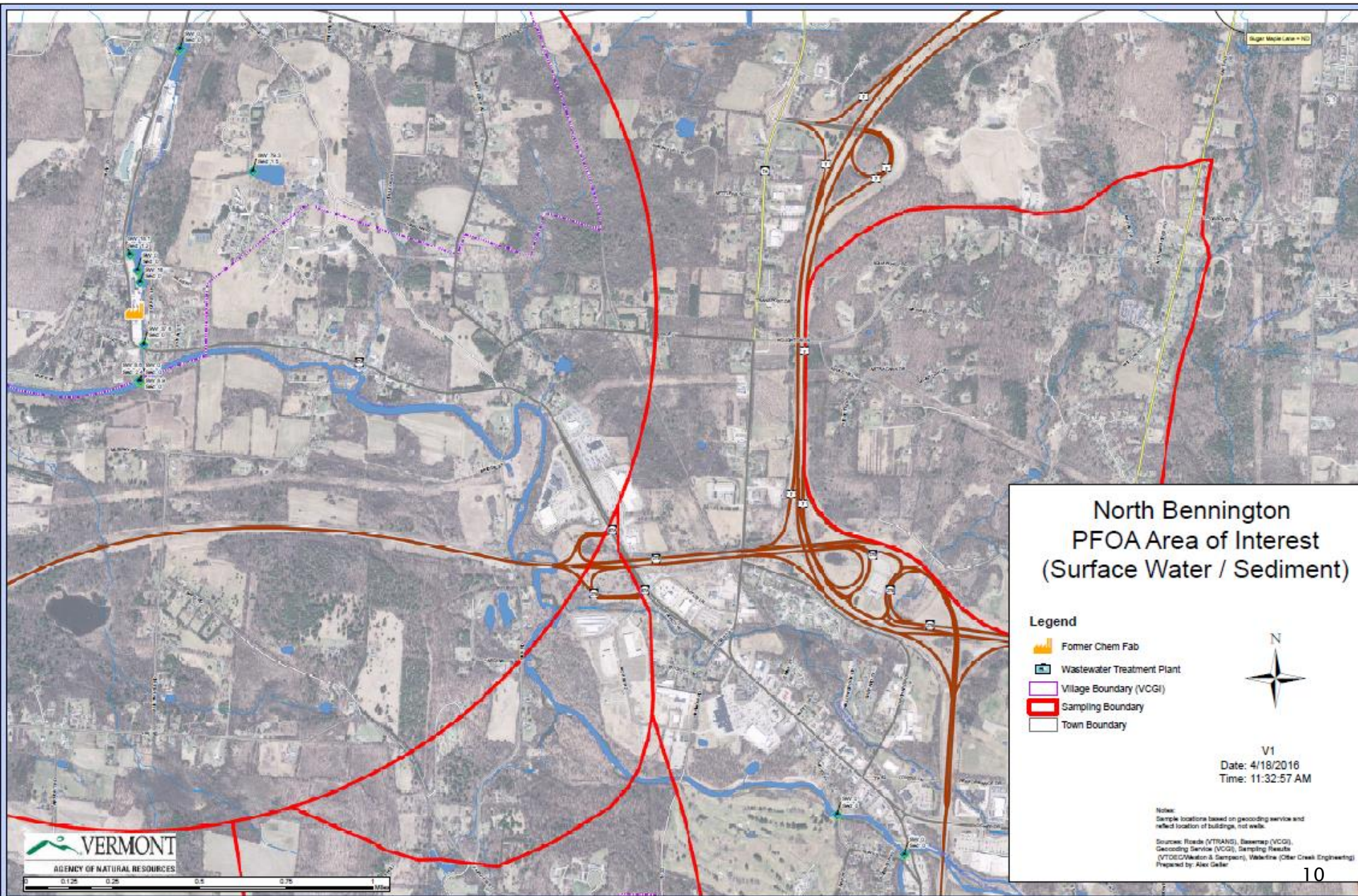
North Bennington/Bennington PFOA

Sampling Test Results (Highest Concentration) - December 7, 2016



Bennington PFOA Private Well Results

- 551 samples collected from private wells
- >60% of all wells had some level of PFOA
- 203 results : ND (37%)
- 79 results : 0–20 ppt (14%)
- 269 results : >20 ppt (49%)
- Recent Re-sampling efforts have changed these results



North Bennington PFOA Area of Interest (Surface Water / Sediment)

Legend

- Former Chem Fab
- Wastewater Treatment Plant
- Village Boundary (VCGI)
- Sampling Boundary
- Town Boundary



V1
Date: 4/18/2016
Time: 11:32:57 AM

Note:
Sample locations based on geocoding service and
called location of buildings, not wells.
Source: Roads (VTRANS), Basemap (VCGI),
Geocoding Service (VCGI), Sampling Results
(VTOCC/Watson & Sampson), Waterline (Other Creek Engineering)
Prepared by: Alex Geller

Surface Water/Sediment Results

- Surface Water (10 samples)
 - Results ranged from ND – 79 ppt (additional samples taken by Bennington College show higher levels)
- Sediment (7 samples)
 - 4 samples ND
 - 3 samples ranged from 1.2 – 2.4 ppb
- Results show no risk to human health or most sensitive aquatic species
- Fish Tissue samples collected, results show PFCs in Fish, but not at a level of concern

Sample location 01 - 010

FWDA Depth	VT Soil Screening Value Limit
01	NA
02	NA
03	NA
04	NA
05	NA

Sample location 02 - 010

FWDA Depth	VT Soil Screening Value Limit
01	NA
02	NA
03	NA
04	NA
05	NA

Sample location 03 - 010

FWDA Depth	VT Soil Screening Value Limit
01	NA
02	NA
03	NA
04	NA
05	NA </tr

Sample location 04 - 010

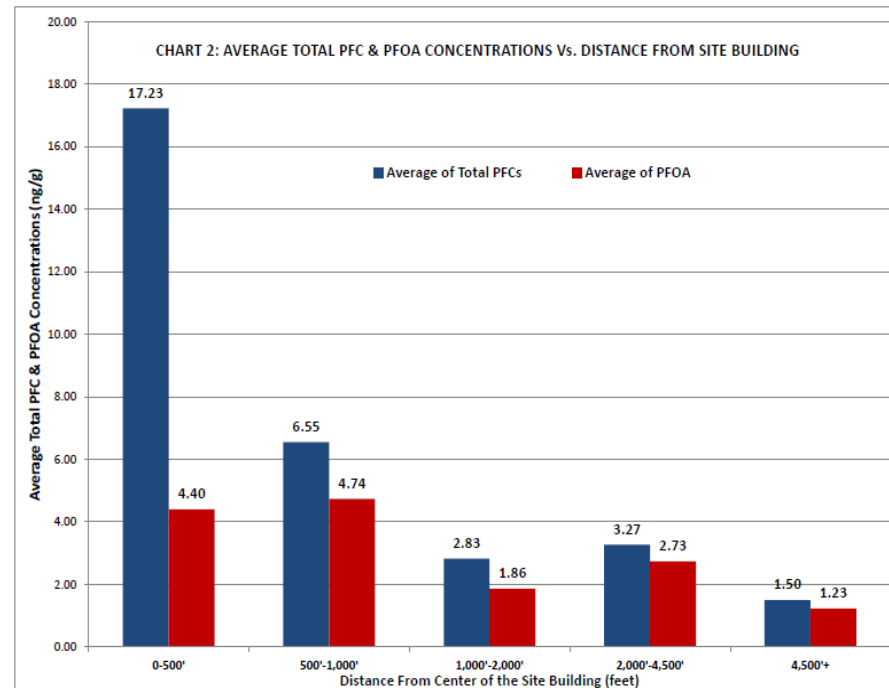
FWDA Depth	VT Soil Screening Value Limit
01	NA
02	NA
03	NA
04	NA
05	NA

Sample location 05 - 010

Sample Depth	FWDA Depth	VT Soil Screening Value Limit
01 - 02'	0.1	NA
02' - 03'	1.4	NA
03' - 04'	2.8	NA
04' - 05'	5.6	NA

Soil Results

- Collected over 100 samples
 - Results ranged from ND – 45 ppb
 - Majority of results < 10 ppb
- VDH soil screening level : **300 ppb**
- Surface soil remediation deemed not necessary for direct contact



Gardening and Farming

- Do not expect to find measurable levels of PFOA in produce
- Recommendations
 - Use clean water for irrigation
 - Amend soil with clean compost
 - Wash your produce after harvest
 - Peel root vegetables
- Livestock
 - Should be given clean water
- Maple Syrup Tested free of PFOA !

Sludge and Septage Sampling

- Collected sludge samples from WWTP and septic tanks
 - Results from WWTP influent 350 ppt
 - 5 pressed sludge samples from WWTP
 - Average 8 ppb
- 3 septic tank samples showed PFOA and PFOS
 - SPLP (leaching study) shows PFASs in water
- Compost shows no PFASs in compost sample
 - some PFASs in SPLP sample

Immediate Challenge



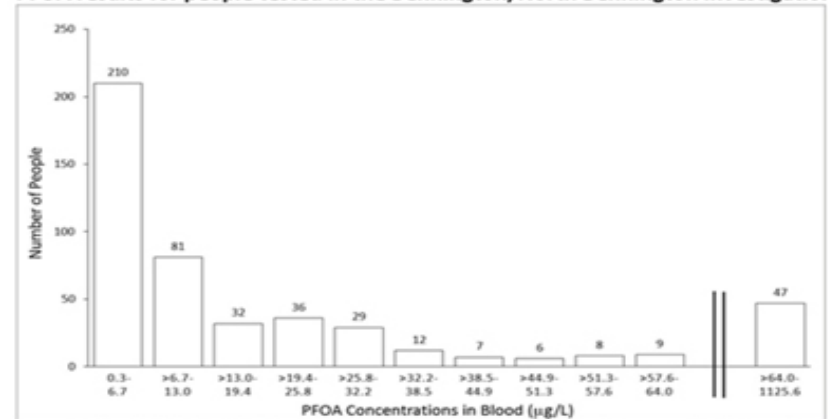
Getting Homes Clean Water

- Bottled water delivered immediately to all residents
- 11 homes/business connected to municipal system where water line nearby
- 255 systems Point of Entry Treatment (POET) systems installed
 - Connecting to municipal system is best long term solution

VDH Blood Testing

- VDH tested more than 400 people
- PFOA in blood 0.3 – 1,126 ppb
- Average for Bennington – 10 ppb
 - 2.1 ppb – United States average
 - 33 ppb – Ohio workers
 - 1,130 ppb – Alabama workers
- PFOA half-life in blood: 2–4 years

PFOA results for people tested in the Bennington/North Bennington investigation



Note: The double black line (||) signifies a change in the PFOA concentration interval width in order to present all of the results on one chart – the range of test results represented in the bar on the far right is greater than the others presented. There is no clinical significance to this distinction.

Work Performed

- State sampled 551+ drinking water wells
- POET systems installed on all wells >20 ppt
- POET systems sampled 3 times, O&M Manual
- Resampling performed for wells ND or <20 ppt
- Soils sampled around the former Chemfab
- Surface water, sediment, and fish sampled
- Maple syrup, milk, garlic (planned) sampled
- Facility Site Investigation performed, no results
- Engineering Study for Municipal Water line extension North Bennington and Bennington
- Evaluation for Treatment of Groundwater (CSM)
- Negotiation for Universal Site Consent Decree

Contaminated Wells in Pownal



Picture of Pownal Water Filtration System



Statewide PFOA Response

- Reviewed limited state information on use of PFASs
- Prioritized industries to target
 - Semiconductor, wire coating, fire fighting training centers
- Also prioritized based on sensitive receptors (# of drinking water wells within ½ mile of facility)
- Phased sampling over 4–8 week period
- 11 Locations chosen for sampling
- Results showed 6 of these sites have PFASs released to the environment
- Include IBM, Air Guard Base, Pittsford Fire Training Center, etc

Challenges to PFOA Response

- Magnitude of effected area
- Developing health advisory levels for water, soil, crops, fish, etc.
- Messaging of health advisory level in Vermont
 - Blood sampling results
- Understanding the fate and transport
- Presence of Arsenic from point-of-entry treatment systems
- Superfund sites – do we reopen?

Lessons Learned

- 2-1-1 support
- Importance of immediate public meetings
- Weekly emails to community
- Importance of establishing clear Incident Command Structure
 - (assistance from VEM, DOH, Ag)
- Importance of reaching out to neighboring states
 - (NY, NJ, NH, MN)

Questions?

Thank you!

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