

# Sources of PFAS Impacts to New Hampshire Groundwater

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Northeast Waste Management Officials' Association (NEWMOA)

Webinar Series

July 29, 2020



# Agenda

- I. Introduction to PFAS in New Hampshire
- II. NH Regulatory Setting and PFAS Timeframe
- III. Water Supply Data
- IV. Waste Site Sources
- V. Closing



# Data collected since 2016 shows PFAS impacts to a wide range of environmental media

## Statewide Water Quality Data

- Public water supplies
- Private drinking water
- Groundwater
- Surface water

## Statewide Waste Quality Data

- Wastewater
- Wastewater sludge and biosolids
- Landfill leachate

## Site-Specific Data

- Soil
- Sediment
- Stormwater
- Fish
- Shellfish
- Loon eggs
- Air
- Stack residue

# ***PFAS Impacts are Present Throughout New Hampshire***

Updated: April 30, 2020

## **PFAS SAMPLES**

Data in NHDES' Environmental Monitoring Database (EMD) ~ 9602 samples

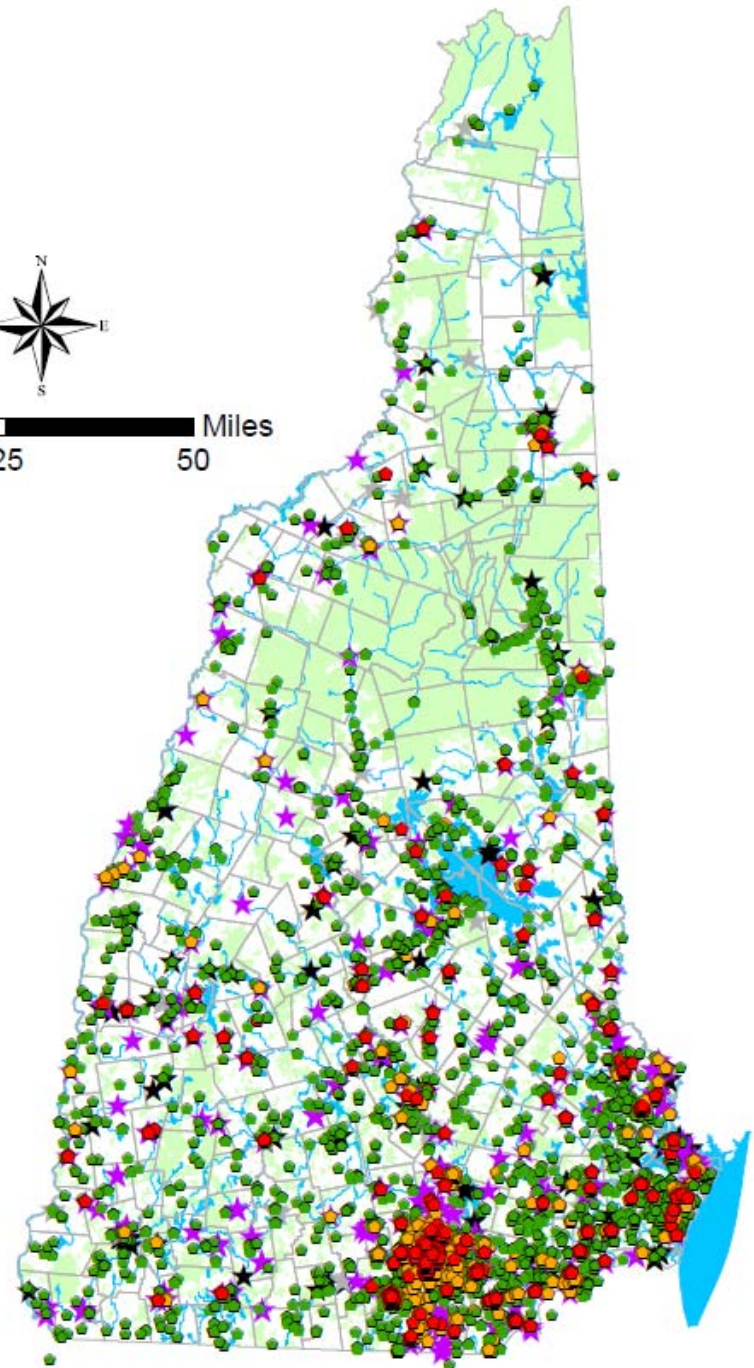
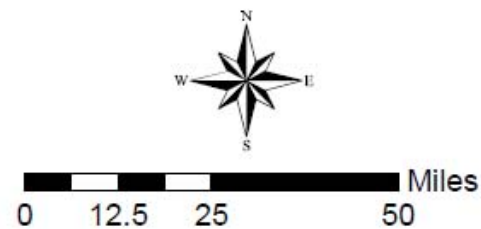
- ◆ > Existing AGQS
- ◆ > One or More Health Based Levels
- ◆ < All Health Based Levels

## **PFAS SITES**

Data in NHDES' Onestop Database ~ 415 sites

- ★ Site with PFAS Detections  
> One or More Health Based Levels
- ★ Site with PFAS Detections  
< All Health Based Levels
- ★ Site with PFAS Screening  
No Detections

- Political Boundary
- Major Waterbody
- Conservation Land



# NH's Regulatory Timeframe for PFAS in Groundwater

- MCLs: health-based drinking water standards or Maximum Contaminant Levels (MCLs) are standards associated with drinking water quality
- AGQS: Ambient Groundwater Quality Standards (AGQS) are standards associated with groundwater quality



# NH's Regulatory Timeframe for PFAS in Groundwater

2013-2015

UCMR3 Sampling (18 systems – 80 samples, 3 systems with detections)

April 2014

PFOS at Pease AFB

Feb - April  
2016

PFOA at Industrial facilities in Merrimack and Amherst

# NH's Regulatory Timeframe for PFAS in Groundwater



May 2016

USEPA LHA Issued / NH Adoption as AGQS  
(PFOA [70 ppt] and PFOS [70 ppt])

# NH's Regulatory Timeframe for PFAS in Groundwater



2019

Rulemaking for MCLs/AGQS for PFOA, PFOS, PFNA, & PFHxS - Effective 9.30.19, enjoined by lawsuit effective 12.30.19



# NH's Regulatory Timeframe for PFAS in Groundwater



<u>PFAS</u>	<u>MCL and AGQS</u>
PFOA	12 ppt
PFOS	15 ppt
PFHxS	18 ppt
PFNA	11 ppt

July 2020

HB 1264 amended to include PFAS MCL /  
Governor signed bill that reinstates MCLs /  
AGQS

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## III. Water Supply Data

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- V. Closing



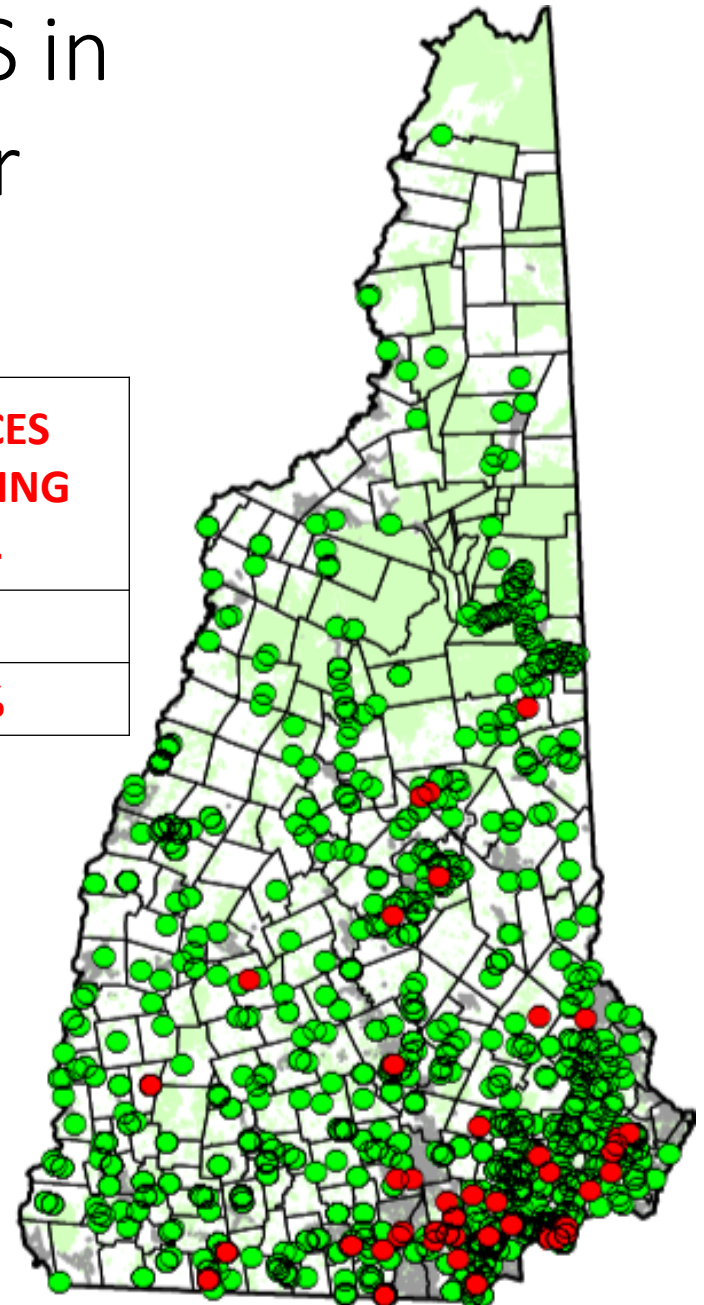
Recent sampling shows PFAS in sources of drinking water for public water systems.

SOURCES SAMPLED	SOURCES REMAINING	SOURCES WITH DETECTIONS	SOURCES EXCEEDING MCL
1095	785	350	89
58%	42%	~ 32%	~ 8%

- State Boundary
- Town Boundary
- Conservation Land
- Public Water
- PFAS < Health Based Level
- PFAS > Health Based Level



0 12.5 25 50 Miles



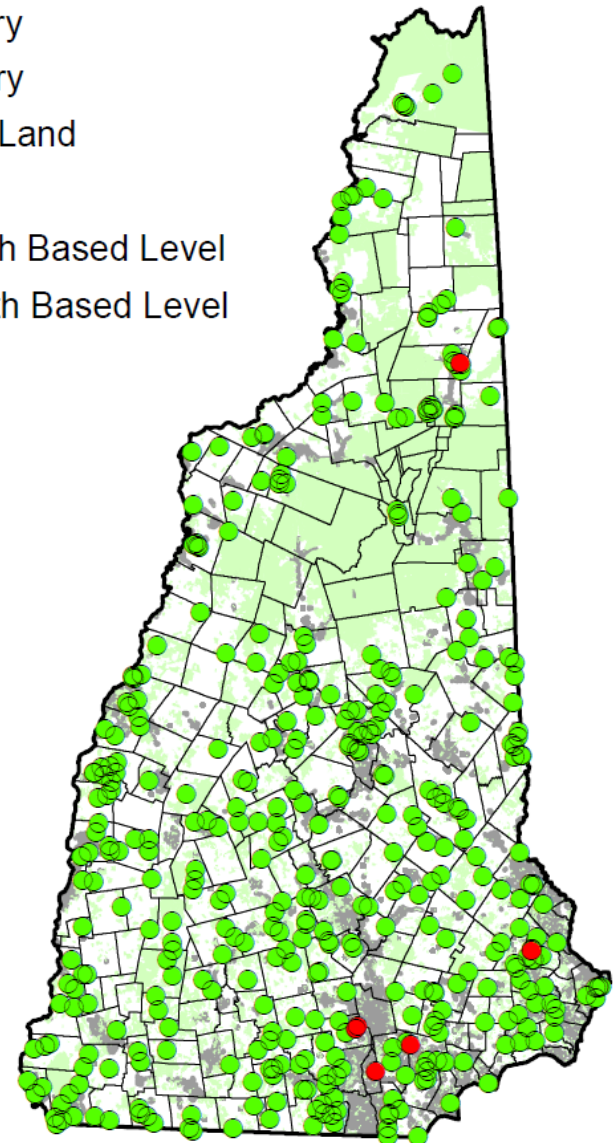
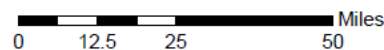
# PFAS data for private groundwater supplies are limited.

- About 250,000 private wells serve ~ 46% of NH's population
- Focused sampling based on proximity to intensive PFAS uses/releases and sensitive receptors



# Background Study - Occurrence of PFAS in NH's Drinking Water

- ~ 500 random wells
- ~ 100 co-located biomonitoring samples
- Only 6 wells > MCLs/AGQS, but 3 in So. NH were tied to a specific site.
- ~ 20 wells remaining to be sampled
- Report is pending





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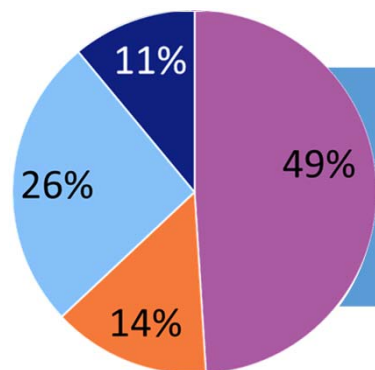


# NH Waste Sites Required to Screen for PFAS

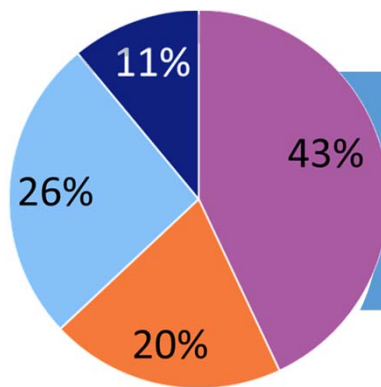
- ✓ All sites with Groundwater Release Detection Permits
- ✓ All landfills that are subject to groundwater monitoring
- ✓ All active hazardous waste sites or sites with environmental assessments where:
  - *A thorough review of site history reveals activities have involved use of PFAS-containing products, and releases have occurred from those activities*
  - *Class B firefighting foam has been used*



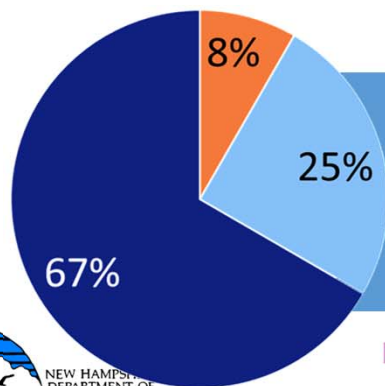
# PFAS Screening Compliance at Waste Sites



Hazardous Waste Sites  
(~ 220 sampled)



Landfill Sites (Lined and Unlined)  
(~ 182 sampled)



Groundwater Release Detection (RD)  
(~ 18 Lined Lagoons )



■ > Former AGQS (70 ppt)

■ < New AGQS/MCLs

■ < 70 ppt and > AGQS/MCLs (HBLs)

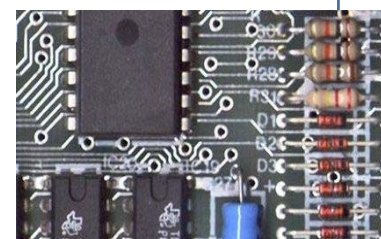
■ Non-Detect

Approximate data through 03/30/2020

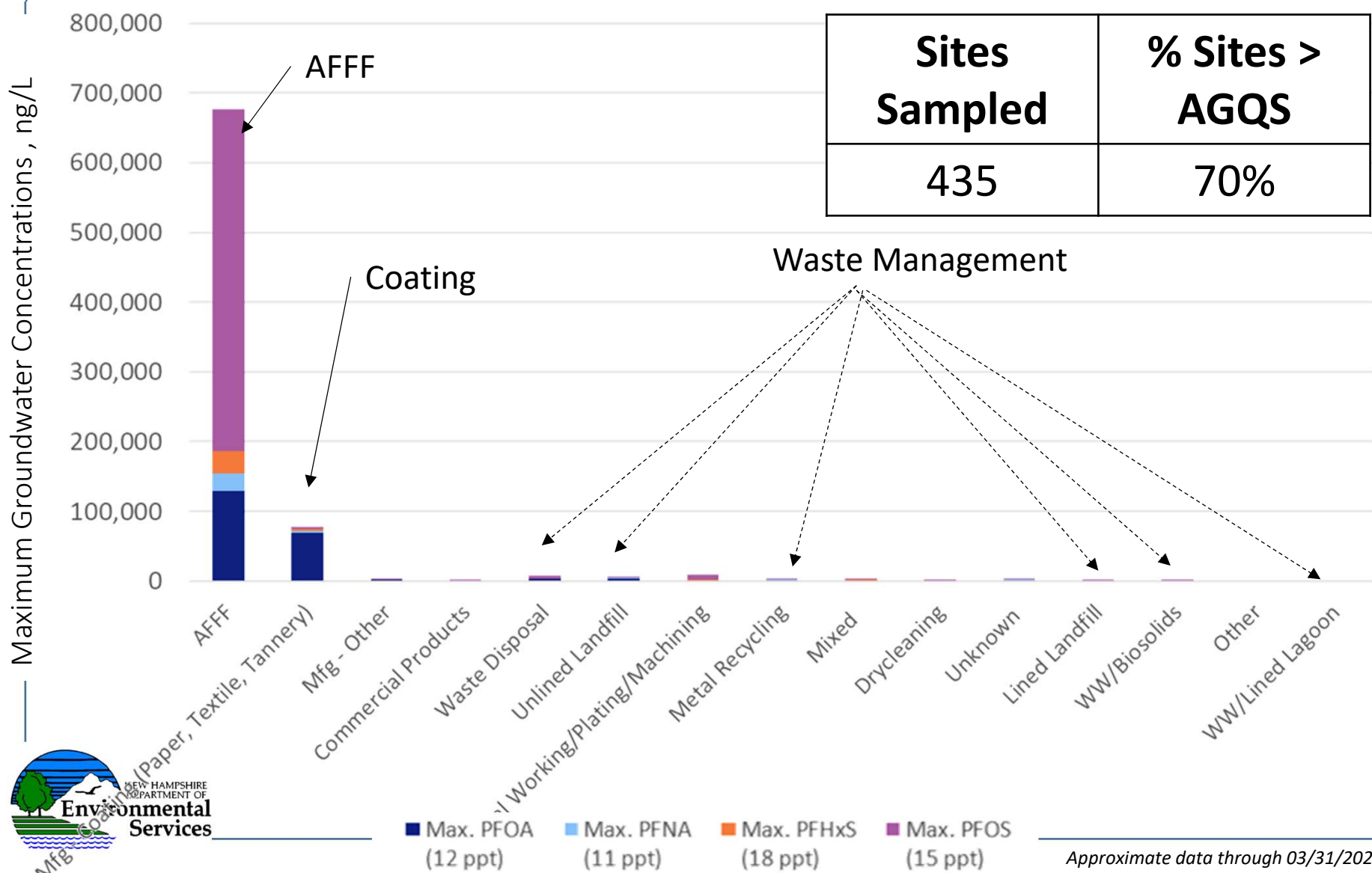


NH's groundwater data are variable, but suggest that more significant PFAS impacts may be associated with:

- Aqueous Film Forming Foam (AFFF)
- Industrial sources
  - Manufacturing products (e.g., coating)
  - Use in manufacturing (e.g., plating)
- Commercial Sources
- Management of Wastes
  - Landfills
  - Wastewater effluent, sludge and biosolids



AGQS exceedances are present at each type of site, although the magnitude varies.



Suspected PFAS Release / Use	Sites Sampled	% Sites > AGQS (MCLs)	Max. PFOA (12 ppt)	Max. PFNA (11 ppt)	Max. PFHxS (18 ppt)	Max. PFOS (15 ppt)
AFFF	23	100%	130,000	25,000	31,000	490,000
Manufacturing - Coating (Paper, Textile, Tannery)	10	90%	69,500	2,960	2,400	2,560
Manufacturing - Other	20	65%	2,510	110	150	850
Commercial Products	4	100%	242	102	69	405
Waste Disposal	26	65%	3,200	161	89	4,750
Unlined Landfill	161	77%	3,700	828	663	1,700
Metal Working/ Plating/Machining	23	61%	1,070	31	806	7,080
Metal Recycling	12	67%	1,700	100	630	1,440
Mixed	24	79%	1,230	78	769	2,410
Drycleaning	24	78%	401	568	88	1,800
Unknown	64	50%	1,090	960	229	240
Lined Landfill	13	62%	350	30	88	79
WW/Biosolids	4	75%	560	13	81	230
Other	15	67%	129	9	24	470
WW/Lined Lagoon	12	8%	18	0	14	7

Approximate data through 6/1/2020

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## IV. Waste Site Sources

### I. AFFF

- II. Industrial
- III. Commercial
- IV. Landfills

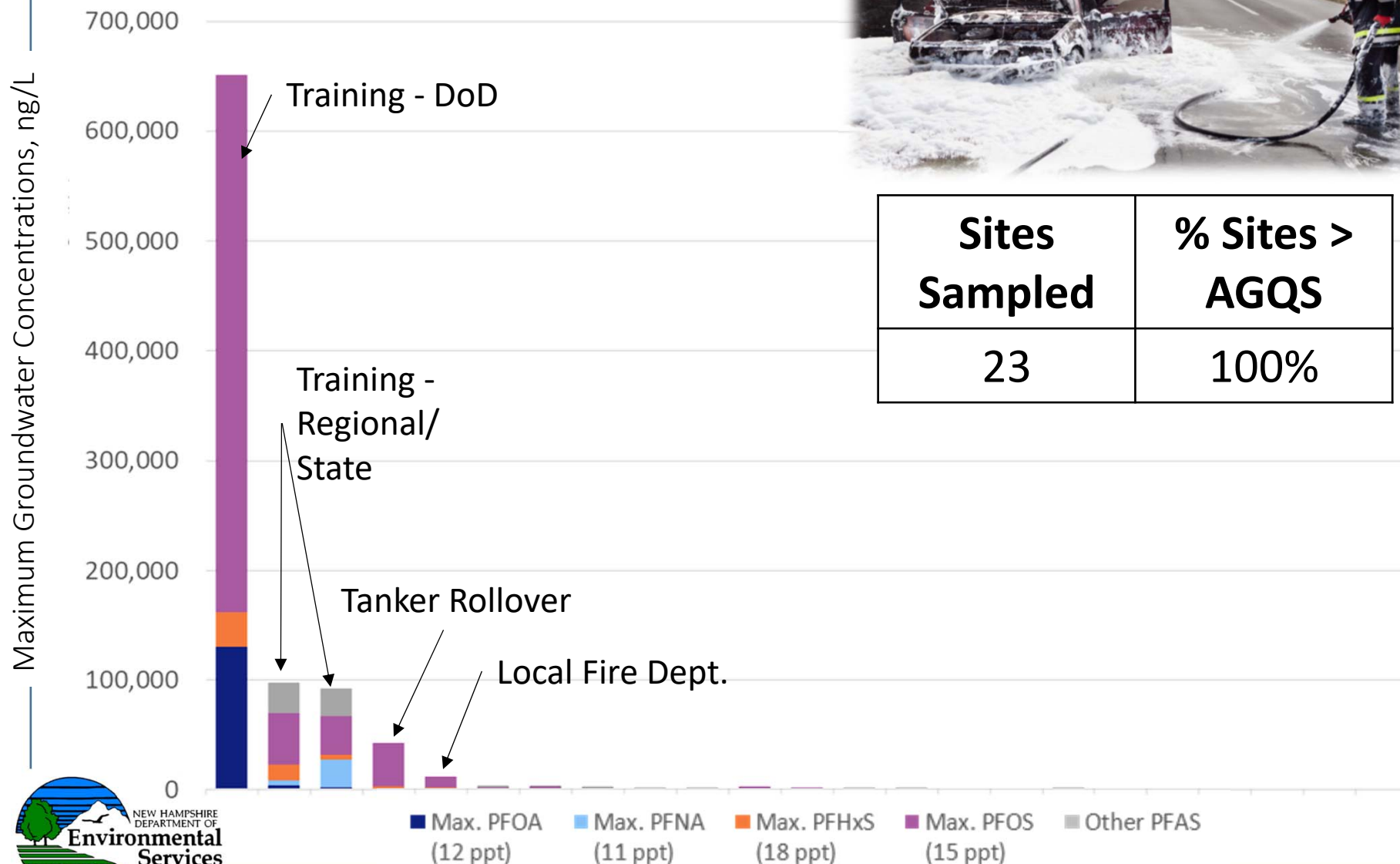
### V. Closing



# AFFF Sites

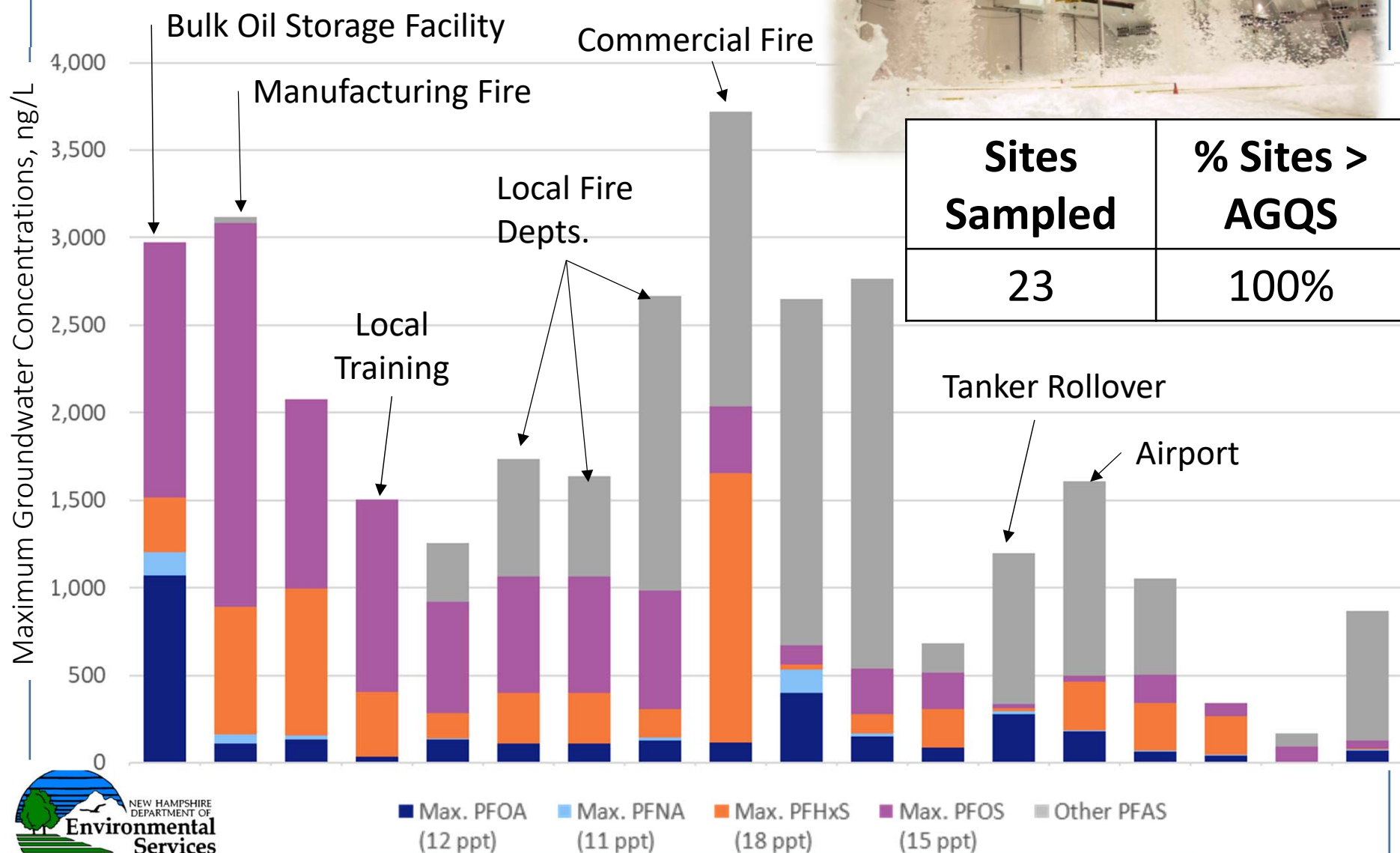


Sites Sampled	% Sites > AGQS
23	100%



Approximate data through 6/1/2020

# AFFF Sites *(excluding top 5)*



Approximate data through 6/1/2020

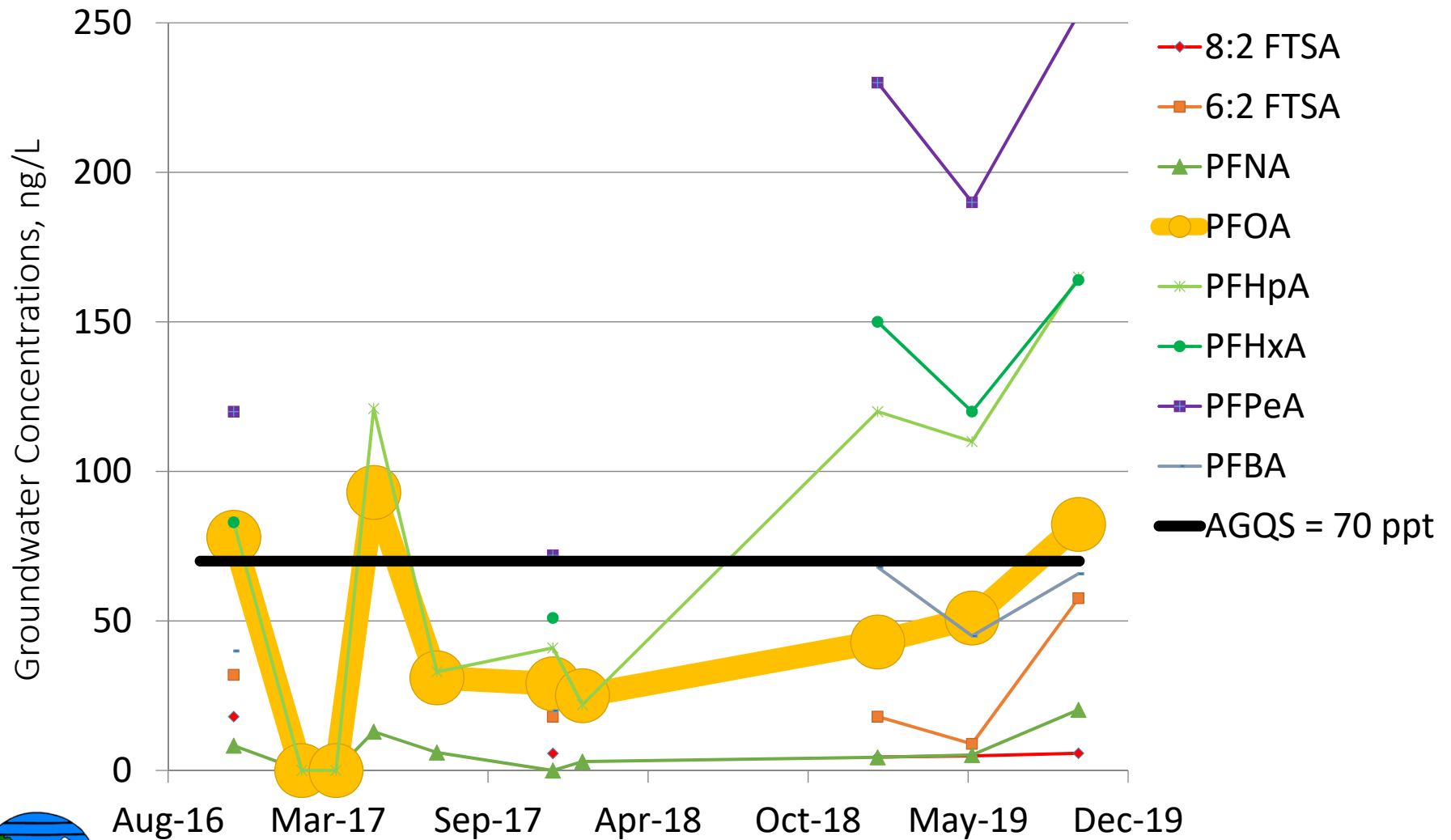


- 
- ▲ ■ ● PFAS  $\geq$  AGQS  
▲ ■ ● PFAS  $\geq$  HEALTH BASED LEVEL  
▲ ■ ● PFAS < HEALTH BASED LEVEL

FIRE STATION

GROUNDWATER FLOW

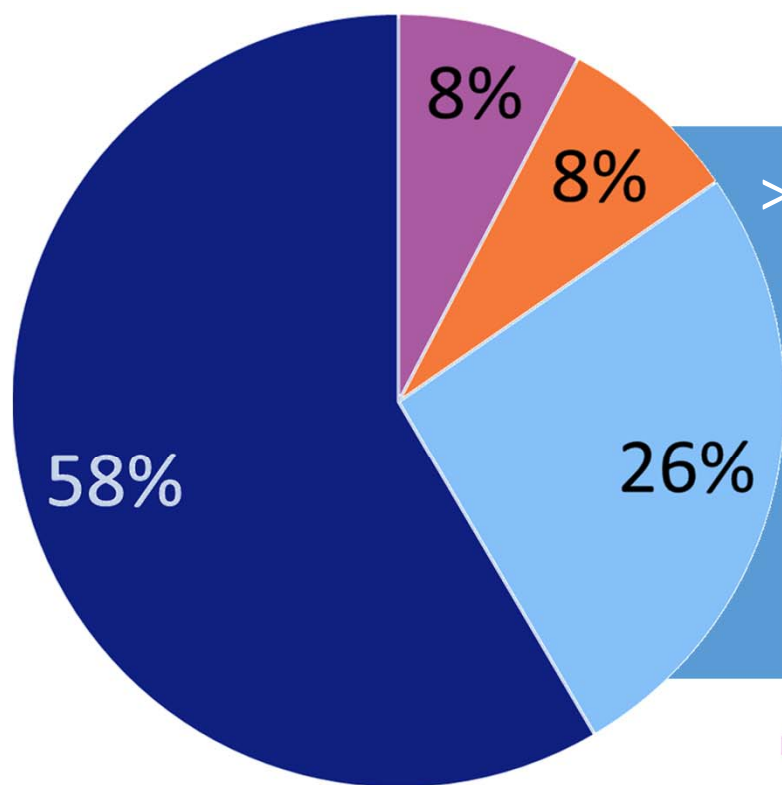
# Variable PFAS concentrations observations in a shallow water supply well.





# PFAS screening for water supply wells at fire stations

*Private Wells Serve 171 (of 237) Stations*



> 65 Stations Have Screened for PFAS

2016: Foam use survey

2017: Recommendation to test

2019: Screening effort

2020: Legacy foam ban

■ >Former AGQS (70 ppt)

■ <New AGQS/MCLs

■ > AGQS/MCLs and Former AGQS (70 ppt)

■ Non-Detect



Approximate data through 6/1/2020

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- I. AFFF

### II. Industrial

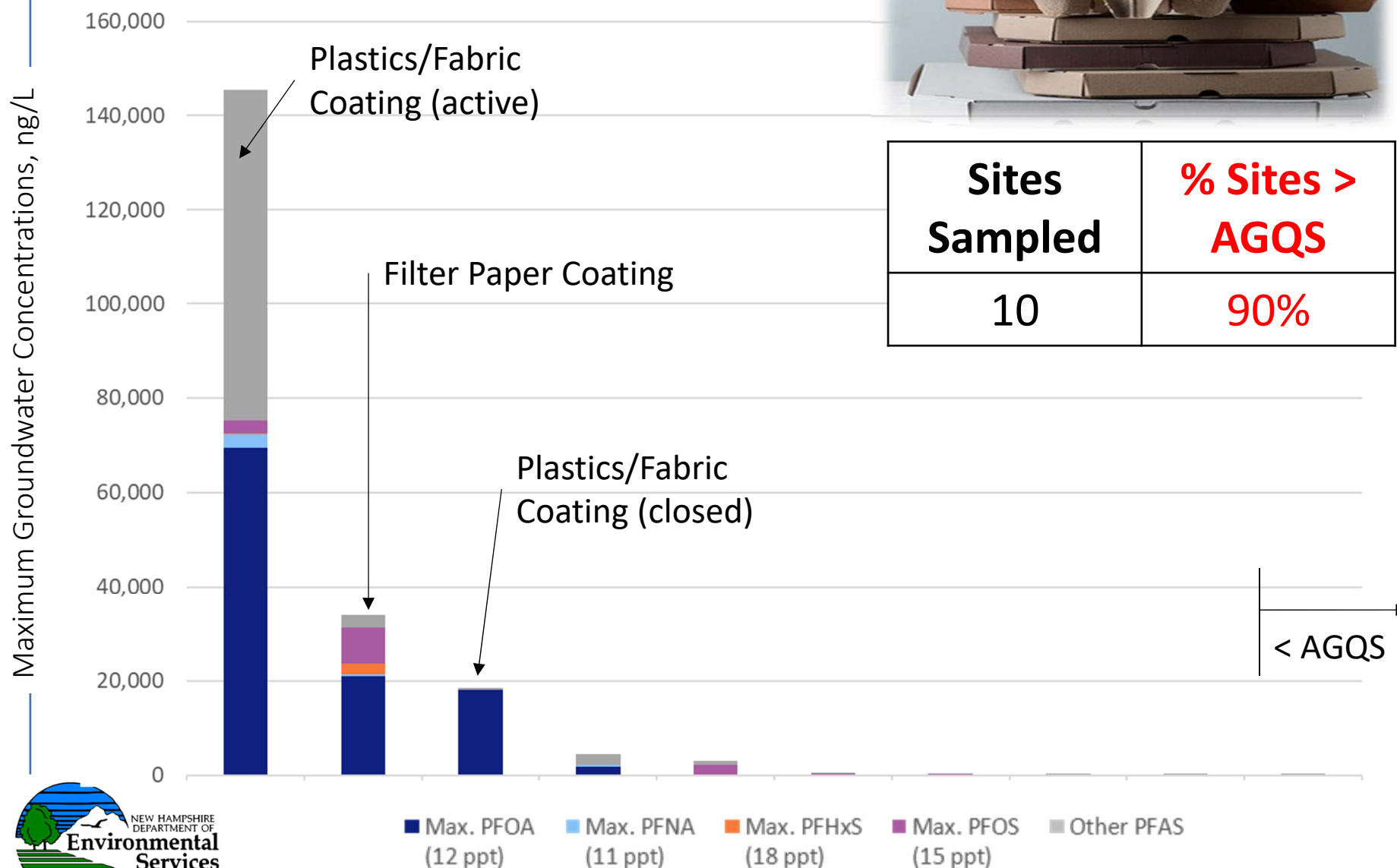
- III. Commercial

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# Textile / Paper Coating Sites



Approximate data through 03/31/2020



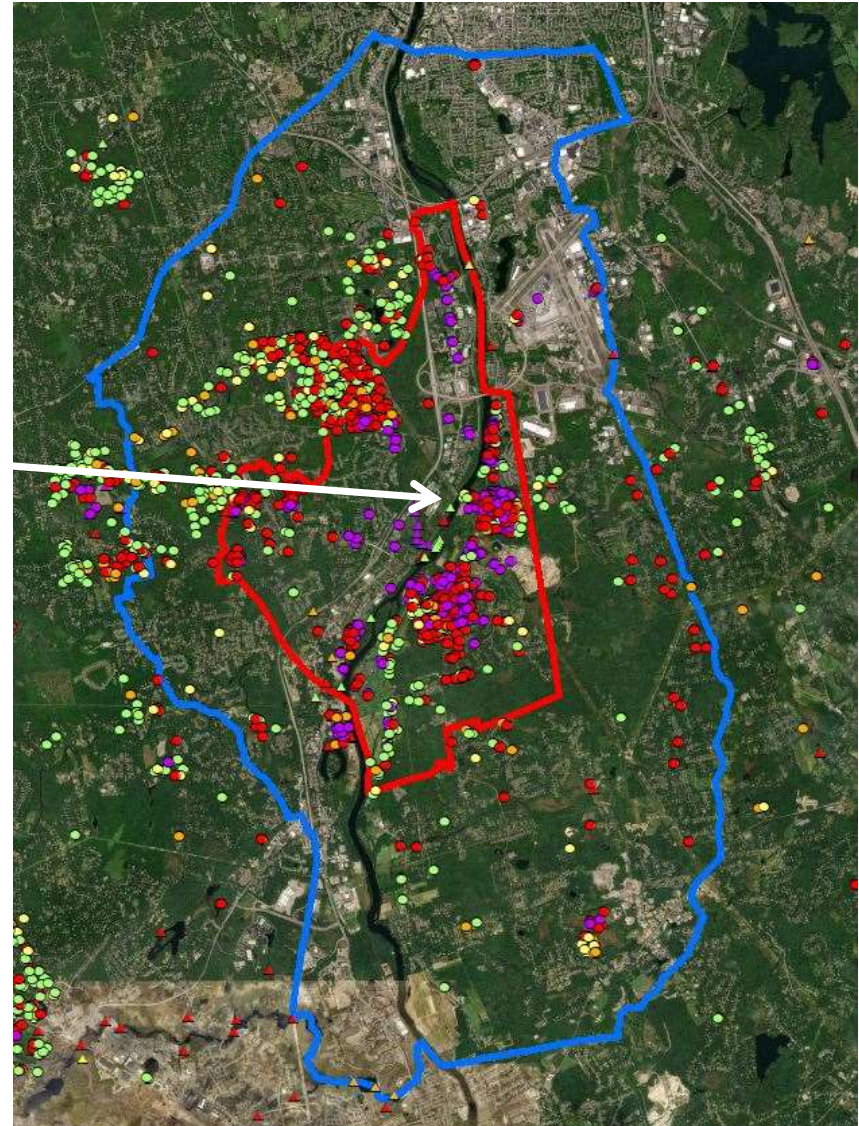
Some investigations cover larger geographical areas than other historic areas of contamination.



**Groundwater Sample PFOA Results**

PFOA Concentration (ng/L)

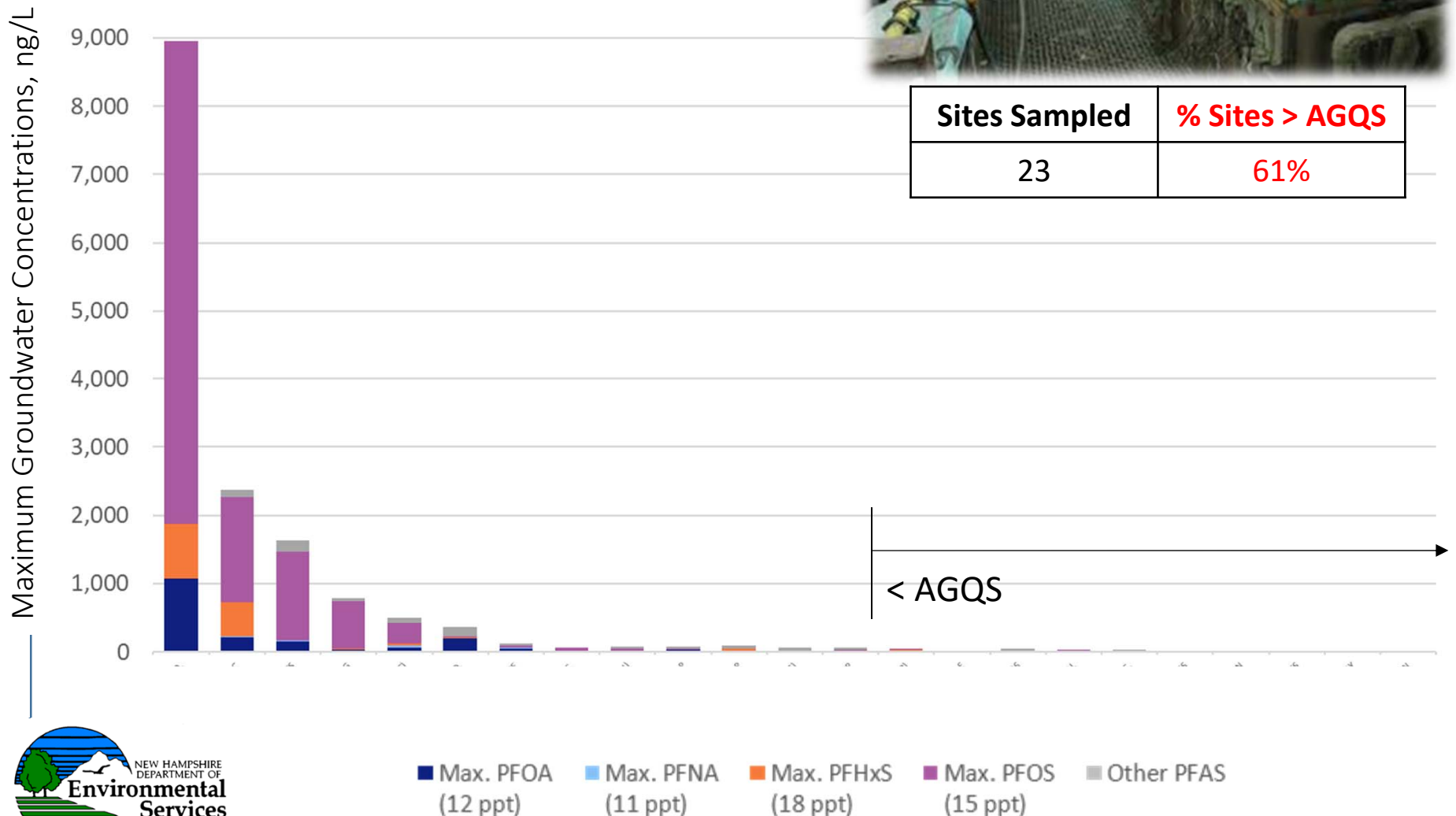
- 0 - 6
- >6 - 9
- >9 - 12
- >12 - 70
- >70



# Metal Working, Plating, & Machining Sites



Sites Sampled	% Sites > AGQS
23	61%



Approximate data through 6/1/2020



# Chrome plating facility



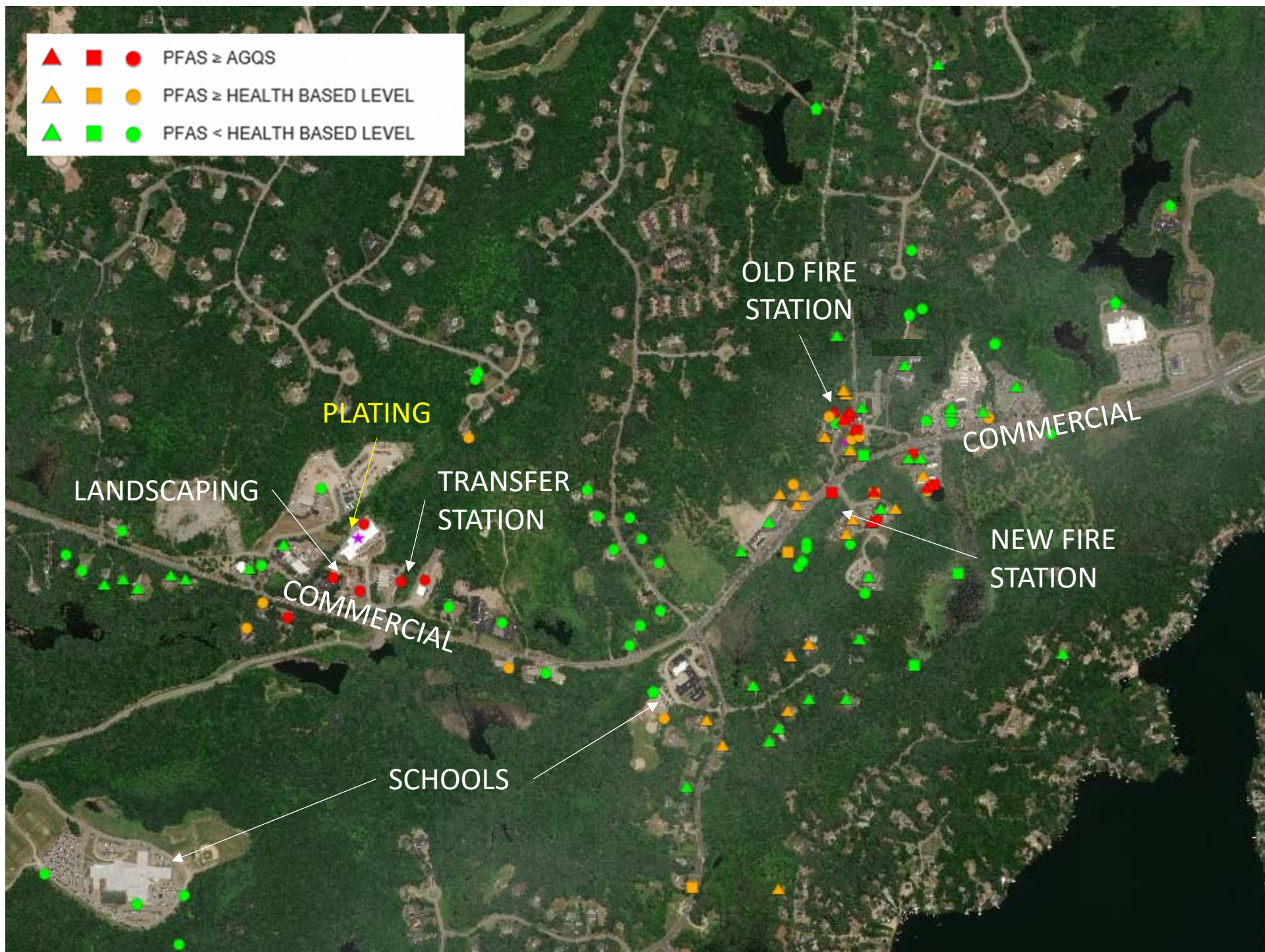
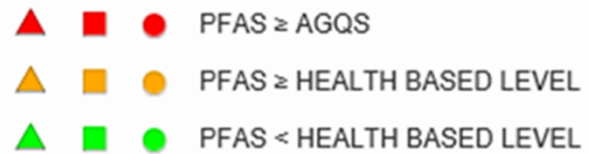
**PFOA: 1,070**  
**PFOS: 90**  
**Total PFAS (12): 3,461**

**PFOA: 44**  
**PFOS: 3,130**  
**Total PFAS (12): 3,437**

*Results in ng/L (ppt)*

*Adapted from Ransom, August 2017 and  
Sanborn Head, October 2017*





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- I. AFFF
- II. Industrial

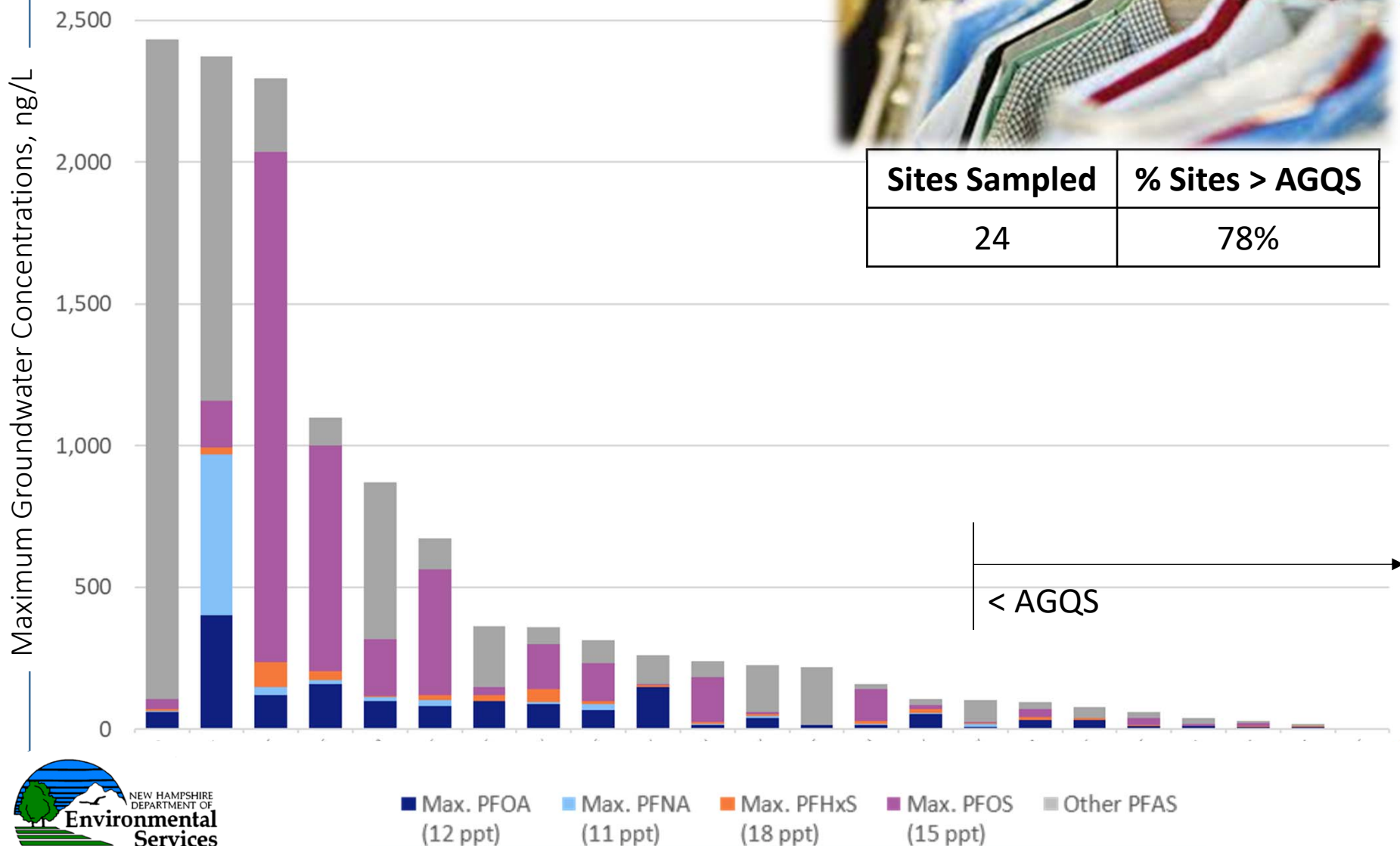
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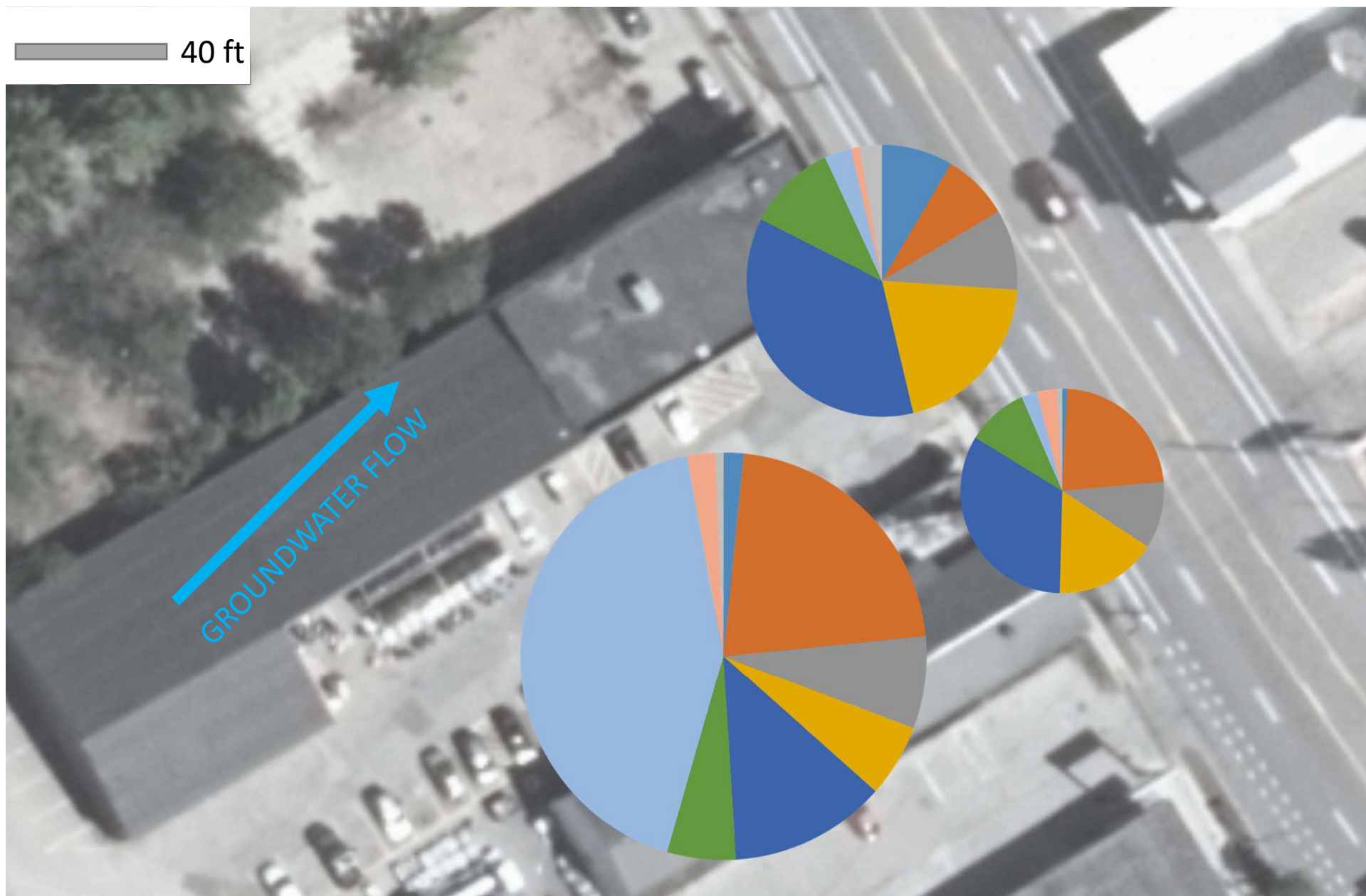


# Dry Cleaning Sites



Approximate data through 6/1/2020

# Distribution of PFAAs at a former dry cleaner



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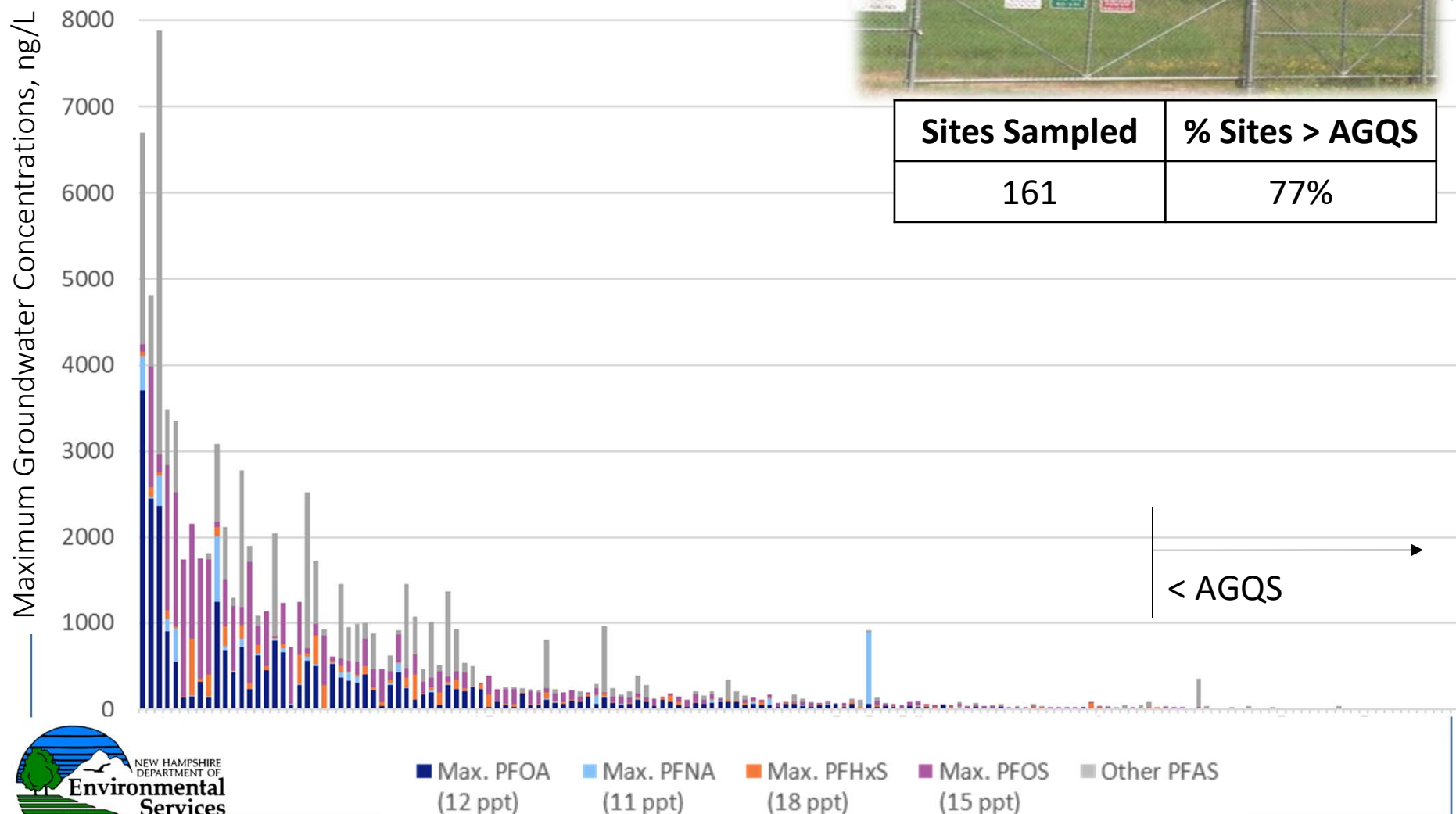
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# Unlined Landfills



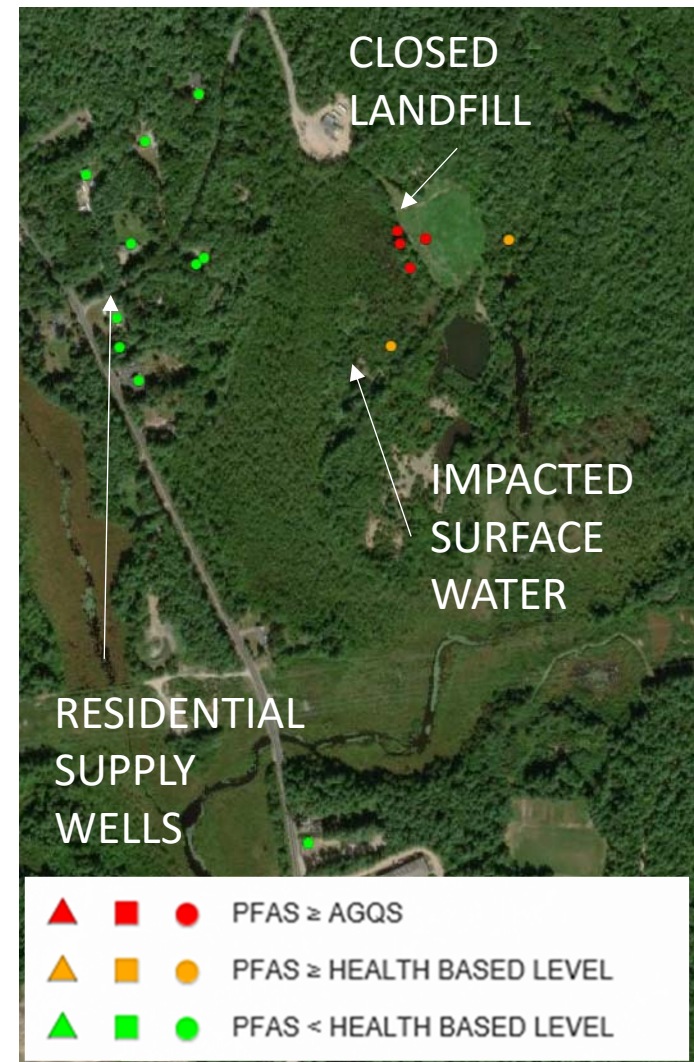
Sites Sampled	% Sites > AGQS
161	77%



Approximate data through 6/1/2020

# PFAS are detected at 92 percent of unlined landfills.

- No defined mixtures
- Consider
  - Age, nature of waste (MSW, C&D, etc.)
  - Other site activity (e.g., FTAs)
  - Construction, operation, and closure
    - Short-paper fiber and biosolids
    - Amended soils
- Leachate management
- Surface water – influences from stormwater runoff and/or groundwater discharge
- About 18 percent of unlined landfills have impacted drinking water wells, but only about 3 percent of sites have impacts > AGQS





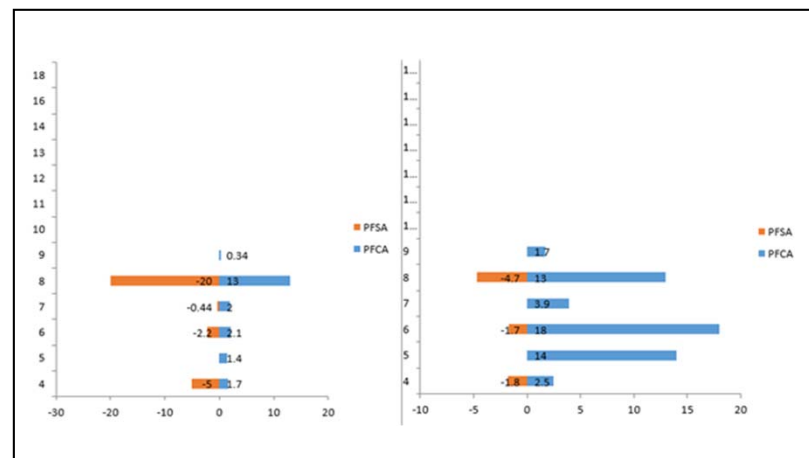
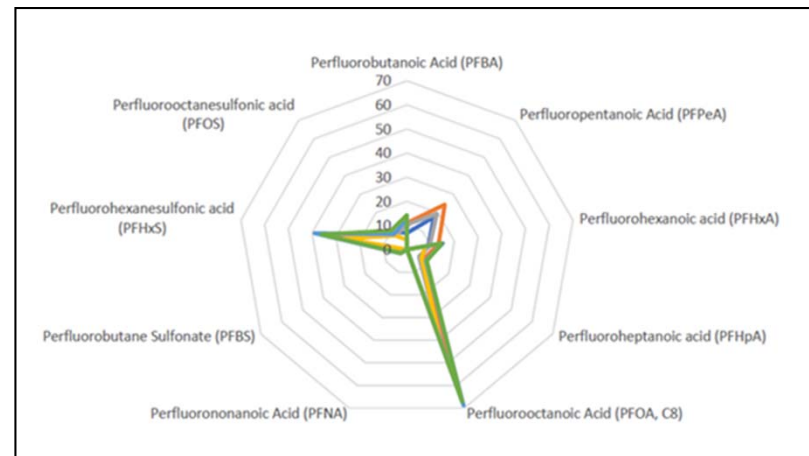
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# Some considerations for evaluation of PFAS screening data...

- Revisit site history
- Graphic review of the distribution between PFAAs, and between PFAAs and precursors
  - Radial diagrams
  - Bar graphs
  - Pie charts
- Consider wastewater influences
  - Review cleaning products
  - Test sludge, wastewater
  - Test other tracers (e.g., caffeine, pharmaceuticals)
- Geochemical analyses
- Multi-depth surface water sampling



# Evaluating PFAS screening data can be challenging.

PFOA, PFNA, PFHxS, PFOS

Common Analytes (2 to >30)

- Site age, funding
- PFAS proprietary mixtures
- Phase-outs and replacements
- Precursor transformation
- Unique chemical properties
- Evolving analytical capabilities
- Target standards changing

Other PFAS  
(>4,700)



There are many other ongoing NHDES initiatives related to the occurrence of PFAS in NH.

- Surface water sampling
- Fish tissue sampling
- Landfill leachate assessments
- Shallow soil occurrence and leaching evaluations
- Source identification initiatives
- Legacy Class B firefighting foam collection & disposal initiatives, BMPs
- BACT for air emissions
- Registered Groundwater Discharge permitting
  - *Non-domestic wastewater discharges to septic systems*
  - *Floor drains discharging to the environment*
- Wastewater (influent and effluent) sampling
- PFAS reduction initiatives for wastewater plants
- Residuals (sludge and biosolids) permitting



# References

## NHDES PFAS Website

<https://www4.des.state.nh.us/nh-pfas-investigation/>



## ITRC PFAS Resources



- Technical Guidance Document
- Training Videos
- Fact Sheets

<https://pfas-1.itrcweb.org/>

ITRC (Interstate Technology & Regulatory Council). 2020. PFAS Fact Sheets PFAS-1. Washington, D.C.: Interstate Technology & Regulatory Council, PFAS Team.



# Contact Information

New Hampshire Department of Environmental Services  
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