



PFAS Distribution and Transport in Soils and Groundwater at a DOD Site

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Protecting Maine's Air, Land and Water

What is PFAS?

- Per- and PolyFluoroAlkyl Substances
- Also known as PFC
- PFOA, PFOS
- Manmade, ubiquitous
- Organic compounds, H is replaced with F, has a functional group
- C-F bond, strongest covalent bond
- More than 200 different chemicals



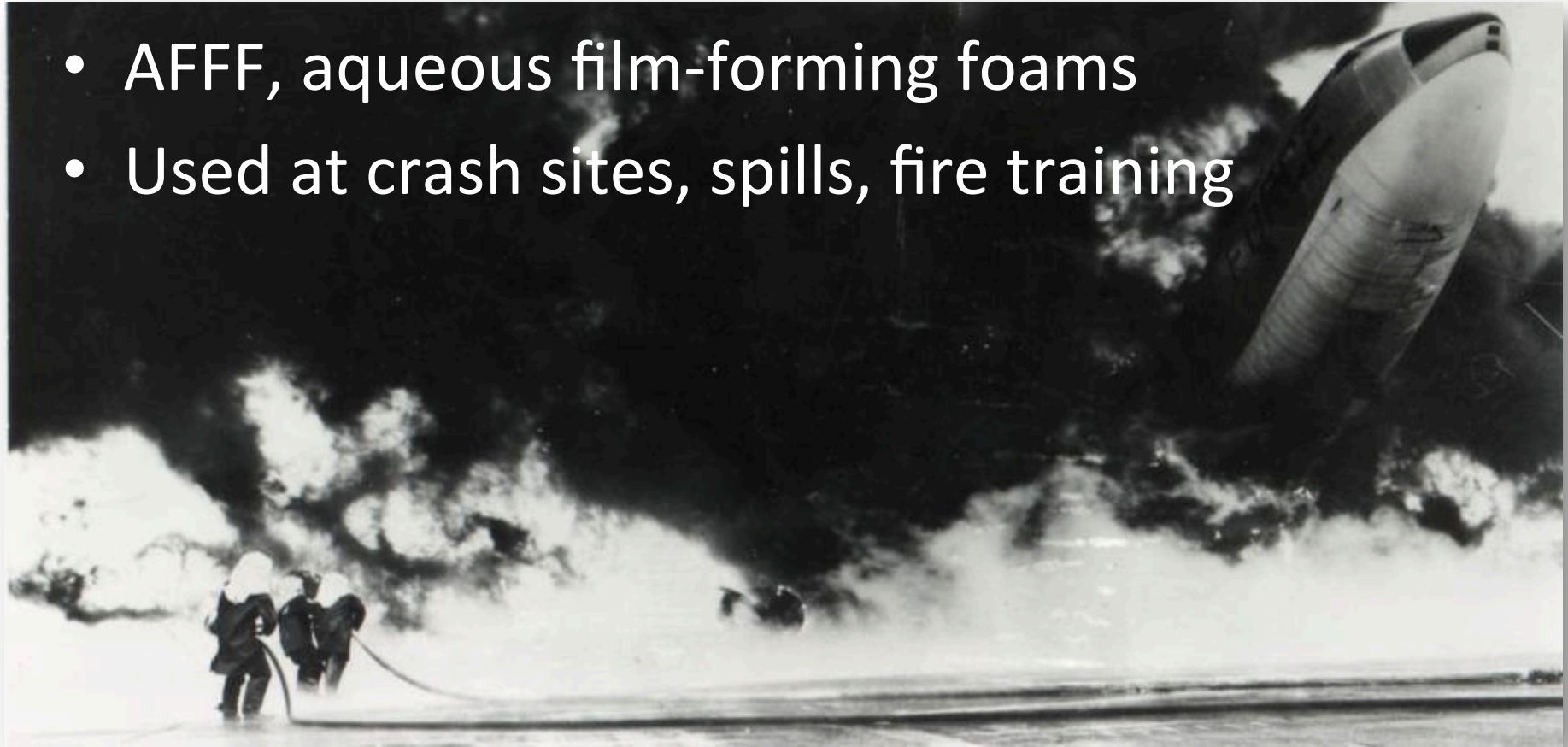
What is PFAS?

- Hydrophobic and lipophobic
- Resists stains, heat, water, oil
- Very mobile, very persistent
- Bioaccumulates

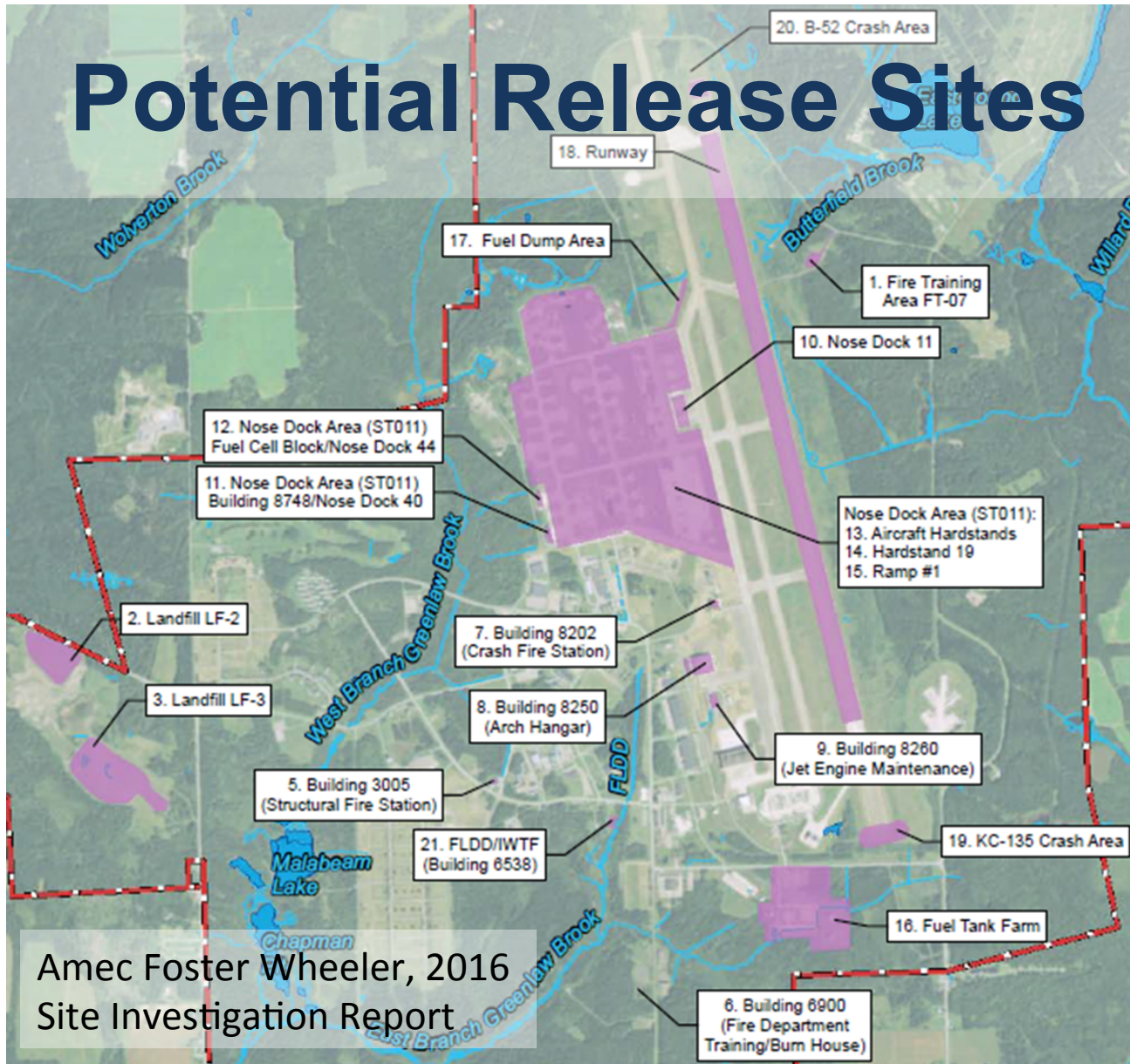


Why are they at DOD sites?

- AFFF, aqueous film-forming foams
- Used at crash sites, spills, fire training



Potential Release Sites



Amec Foster Wheeler, 2016
Site Investigation Report

Site Investigation

- 2015
 - 20 Soil borings, 58 samples
 - 13 Drinking water samples
 - 50 Monitoring well samples
- 2016
 - 37 Soil borings, 104 samples
 - 35 Monitoring well samples



Groundwater Regulatory Guidelines

- EPA, Public Health Advisory, PHA = 70 ng/L.
- Maine Exposure Guidelines, MEG = 70 ng/L.
- Applicable for PFOA, PFOS, and total PFOA + PFOS.
- MeCDC has screening levels for surface water, soils, sediment, fish.



Drinking Water Supplies

PHA = 70

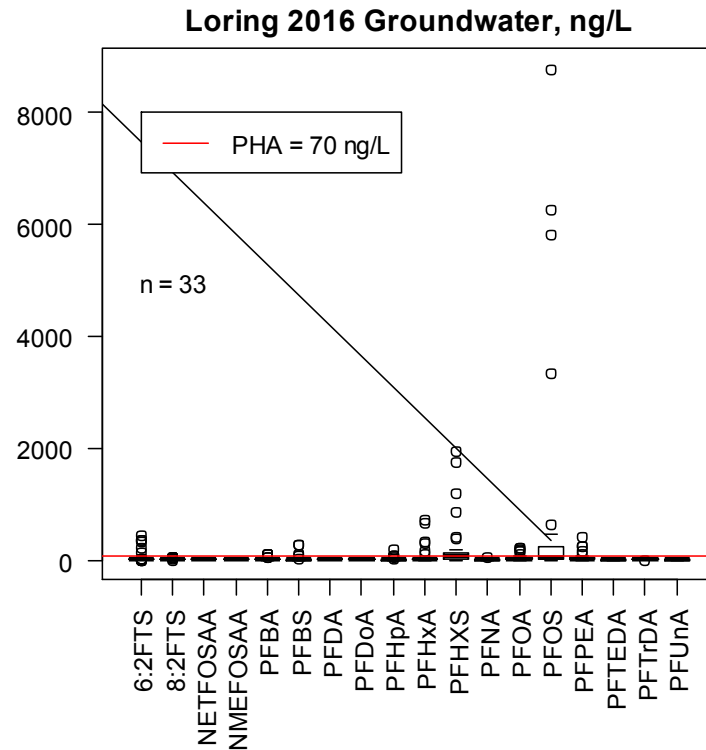
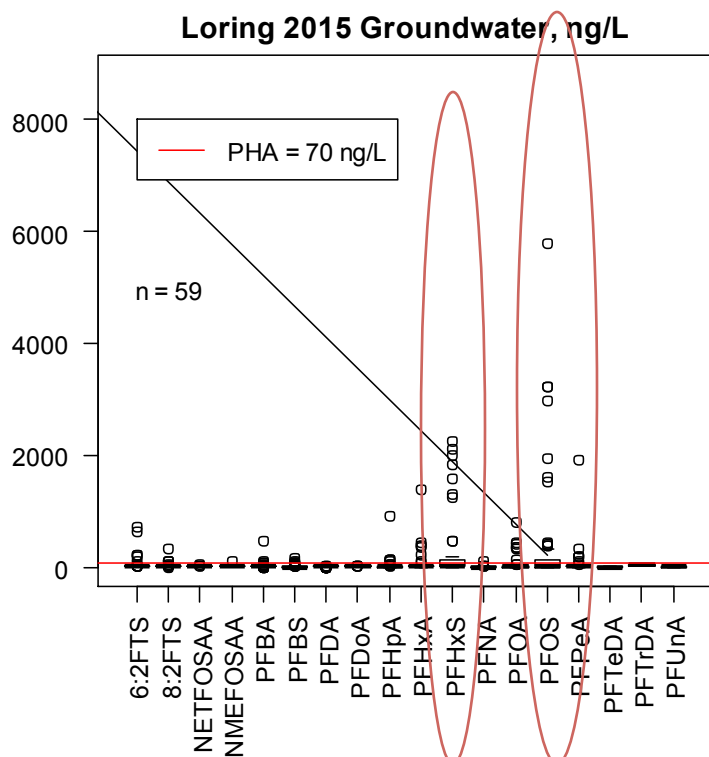
Well	Date	PFOS, ng/L	PFOA, ng/L
LF2RES	Aug-15	2.25 J	3.88 U
LF2RES	Aug-15	8.34	2.33 J
LF3RES	Aug-15	11.4	7.24
EGRES	Nov-15	0.895 J	8.02 U
EGRES	Nov-15	1.32 J	7.77 U
RRRES	Nov-15	2.73 J	1.62 J
RRRES	Nov-15	2.32 J	1.69 J
WGRES	Nov-15	9.99	4.05 J
WGRES	Nov-15	11.4	7.85 U



Monitoring Well Results

MeCDC Human Health Risk-Based Screening Levels

	Resident	Construction Worker
PFOA	70	740
PFOS	70	1330

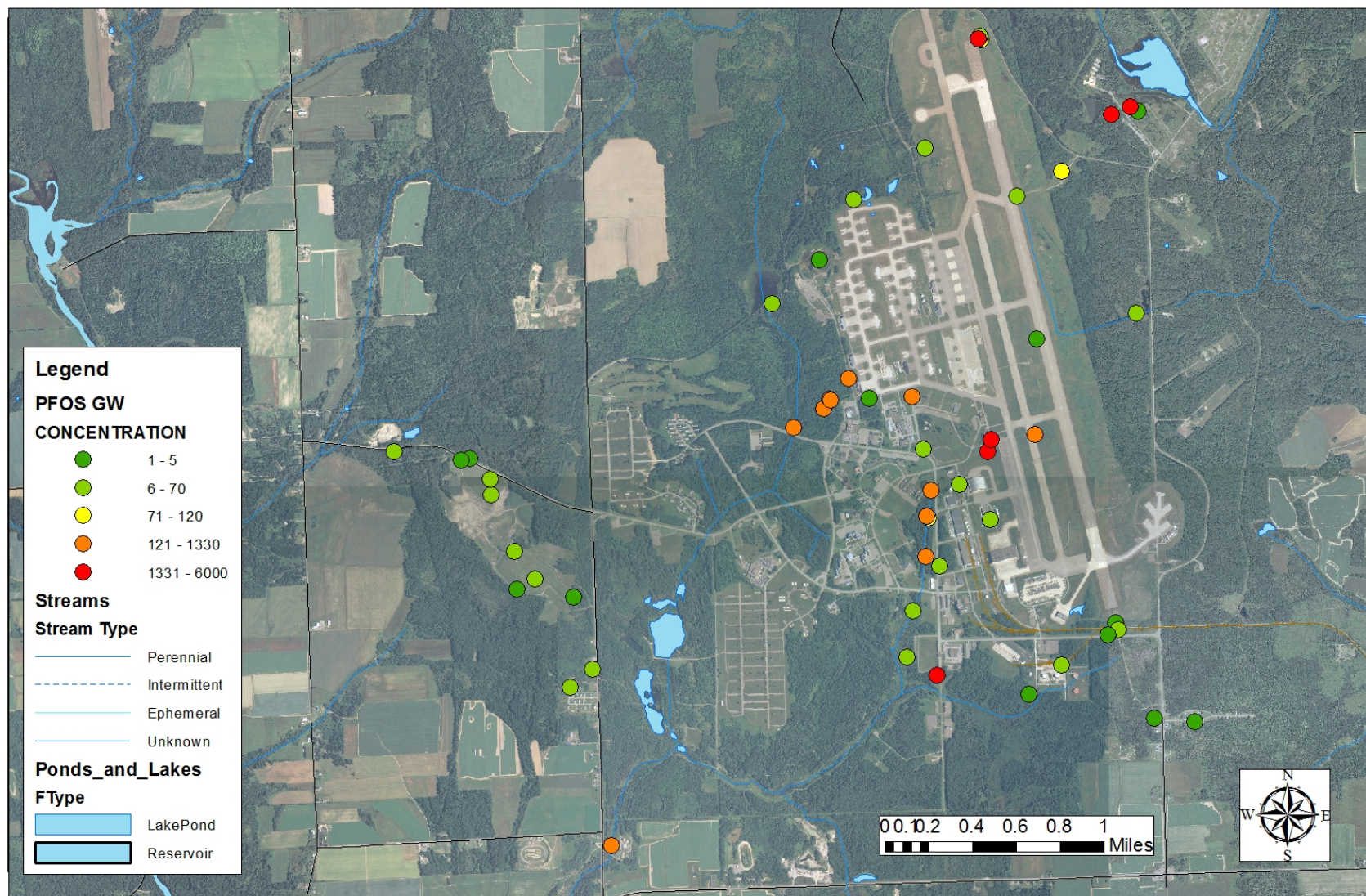


Monitoring Well Results

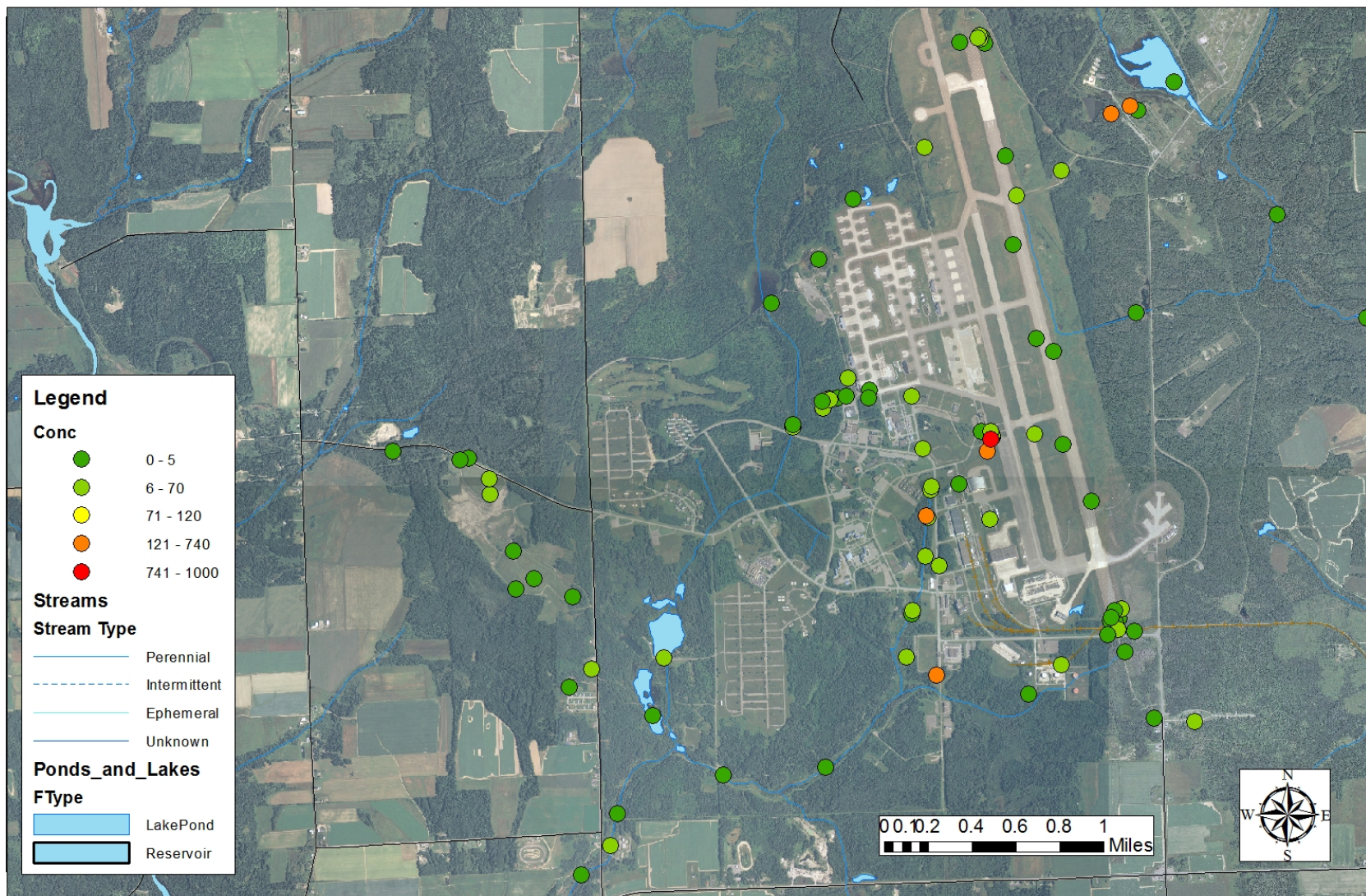
- PFOS, PFHxS, PFHxA had highest concentrations
- PFOS had 51 exceedances (92 total)
- PFOA had 31 exceedances (92 total)



Groundwater PFOS, ng/L, 2015 Results



Groundwater PFOA, ng/L, 2015 Results



Groundwater Results

- No exceedances in drinking water supplies.
- PFOS, PFOA exceedances within the base.
- Highest concentrations near fire station, fire training site, crash site.

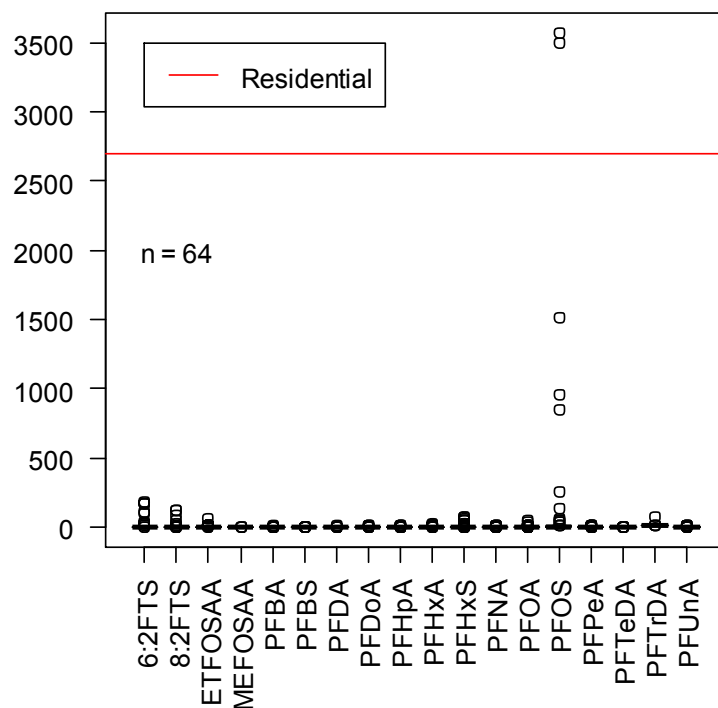


Soil Results

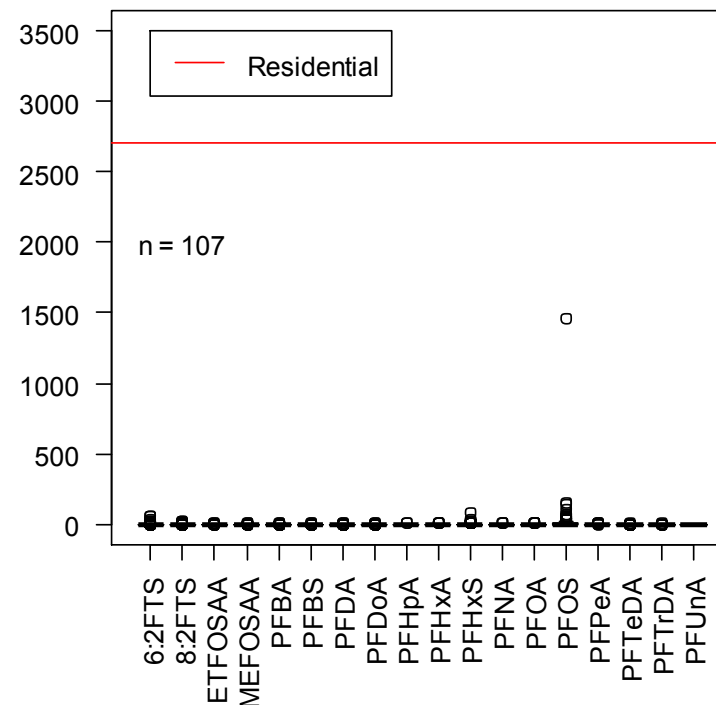
MeCDC Human Health Risk-
Based Screening Levels

ng/g	Resident	Outdoor Commercial Worker
PFOA, PFOS	2,700	21,000

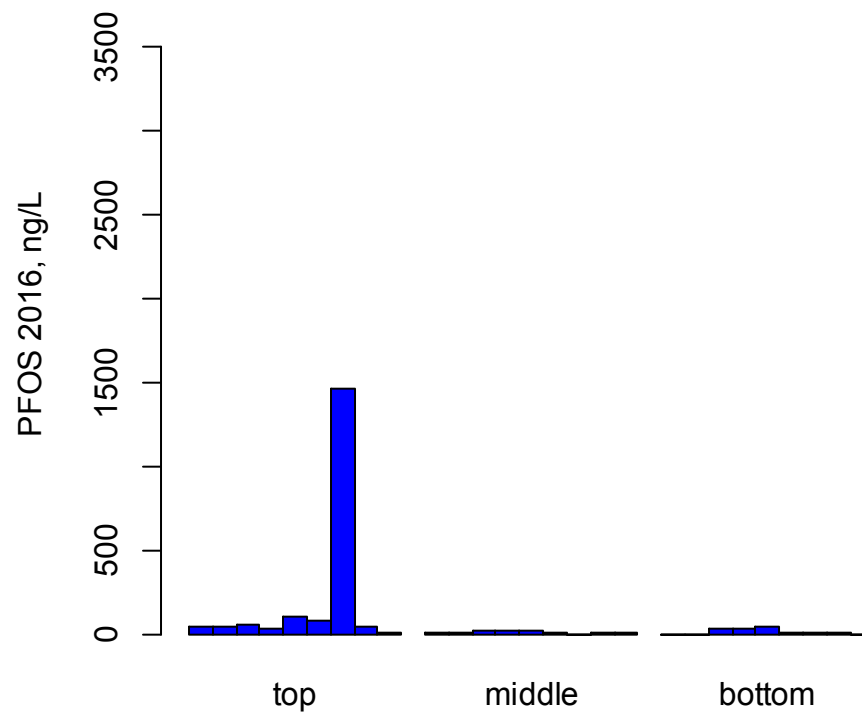
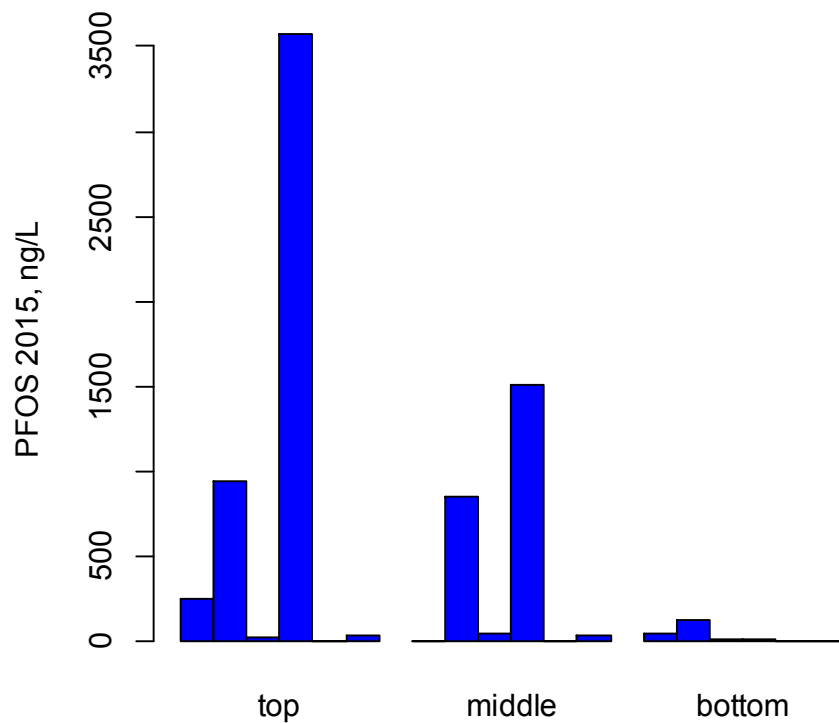
Loring 2015 Soil, ng/g



Loring 2016 Soil, ng/g



PFOS in soils with depth



Soil Results

- PFOS is most commonly detected, greatest concentrations.
- 1 exceedance of PFOS at Crash Fire Station.
- Possible decrease in PFOS concentrations with depth.



Conclusions

- PFOS is most commonly detected PFAS in all media.
- Groundwater:
 - PFOS, PFOA, PFHxS, PFHxA, most common, greatest concentrations.
 - PFOS, PFOA exceedances on base.
- Soils:
 - PFOS most common, greatest concentrations.
 - 1 PFOS exceedance.
 - Possible PFOS decrease with depth.
- Drinking water:
 - No exceedances in drinking water, but detections.
- Likely sources: fire training area, fire station, crash sites.





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