Per- and Polyfluoroalkyl Substances in New Hampshire's Drinking Water

Brandon Kernen, PG

NH Department of Environmental Services

Brandon.Kernen@des.nh.gov / 603 271 0660

Emerging Contaminants

- USEPA tests for select unregulated contaminants every 5 years

- Often originate from everyday consumer products (pharmaceuticals, personal care products, coatings, fabrics, paint, etc.)

- Perceived, potential, or real threat to human health or the environment

- Lack of published health standards

- New source or new pathway to humans has been discovered

- New detection method or treatment technology has been developed

Introduction to PFAS

- A class of chemicals that are ubiquitous due to
  - Wide variety of uses
  - Persistence
  - High Mobility
- They are a concern due to:
  - Known or suspected toxicity, especially for PFOS and PFOA
  - Bioaccumulation
- Information on PFAS is rapidly evolving
  - EPA Health Advisory Levels for PFOA/PFOS have been substantially lowered recently
  - NH adopted a standard in 2016 for PFOA/PFOS

From: Hillary Thornton, USEPA Region 4

Uses & Sources of PFAS

PFAS are used in a wide variety of industries and commercial products for their valuable properties, including fire resistance, dust suppression, and oil, stain, grease, and water repellence. (Some examples of uses are on the following slides)

- Fire fighting foams (AFFF airports as well as some o

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Uses & Sources of PFAS

- Polishes, waxes, paints
- Stain repellants (carpets, clothing and upholstered furniture)
- Cleaning products

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Uses & Sources of PFAS

- Food surfaces (Teflon[1] pans, pizza boxes, popcorn bags, food wrappers)


[1] https://en.wikipedia.org/wiki/Polytetrafluoroethylene PFOA, which used to be a key ingredient in making Teflon, has been phased out, however there is little evidence that the chemicals that have replaced PFOA are much safer.

[2] Shaider, *Environ. Sci. Technol. Lett.*, Publication Date (Web): February 1, 2017 http://pubs.acs.org/doi/ipdf/10.1021/acs.estlett.6b00435

From: Hillary Thornton, USEPA Region 4

Uses & Sources of PFAS
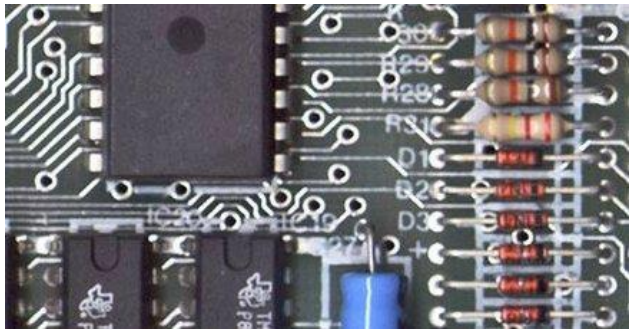
- Dust suppression for chrome plating
- Electronics manufacturing
- Oil and mining for enhanced recovery
- Performance chemicals (hydraulic fluid, fuel)
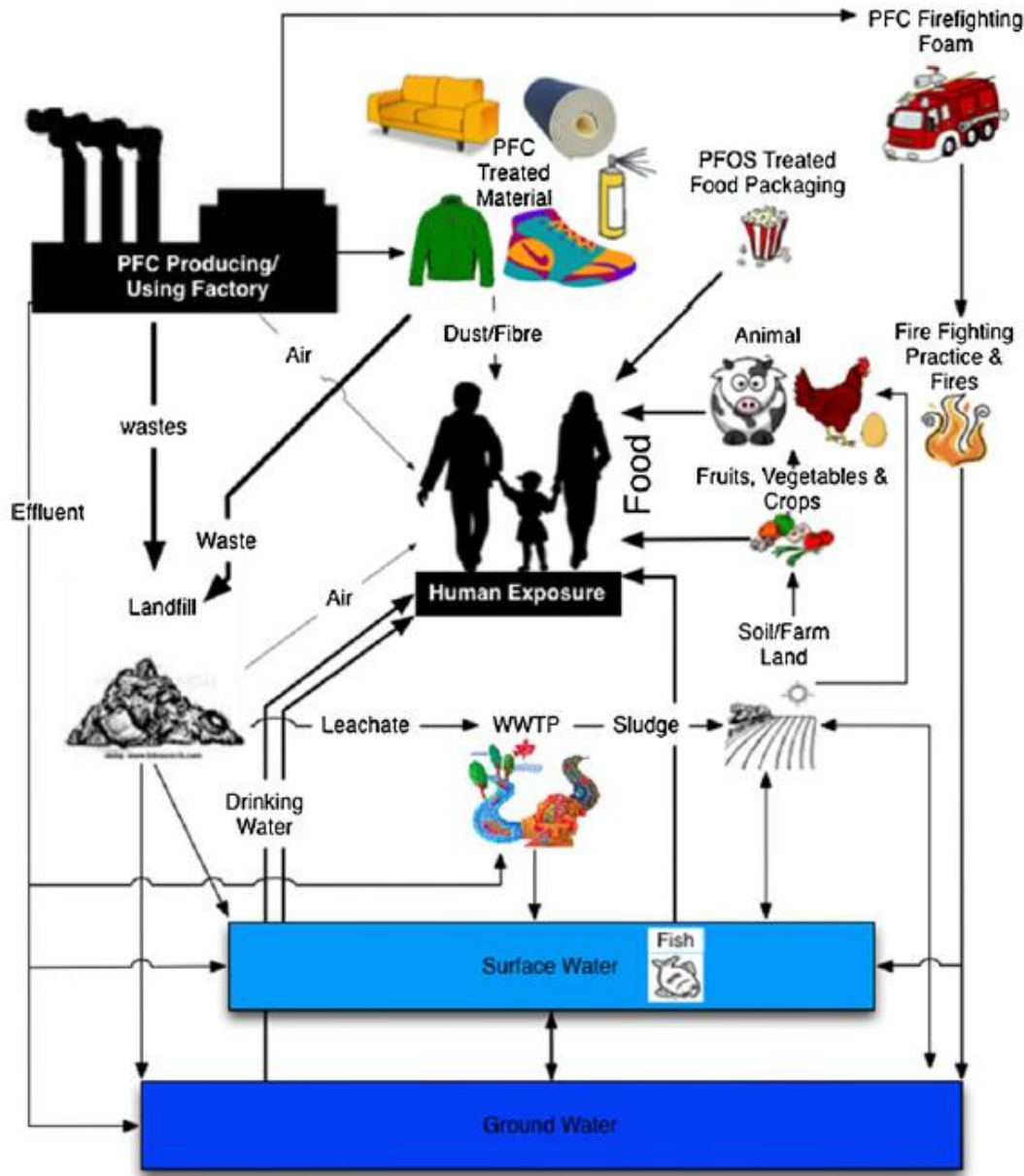
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Uses & Sources of PFAS

- Landfills
- Land where biosolids from wastewater treatment plants treating PFAS-containing wastewater was applied
- Direct release of PFAS products into the environment – such as use of AFFF in training and at crash sites

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Possible Sources of PFAS Releases

Used for decades to make products that resist heat, oils, grease, stains and water

‣ Textiles, Upholstery, Apparel and Carpets
‣ Paper, Packaging, Non Woven Fibers
‣ Metal Plating (mist suppressant)
‣ Semiconductor
‣ Wire Coating
‣ Firefighting Aqueous Film-Forming Foam

From Oliaei 2013, Environmental Science Pollution Research
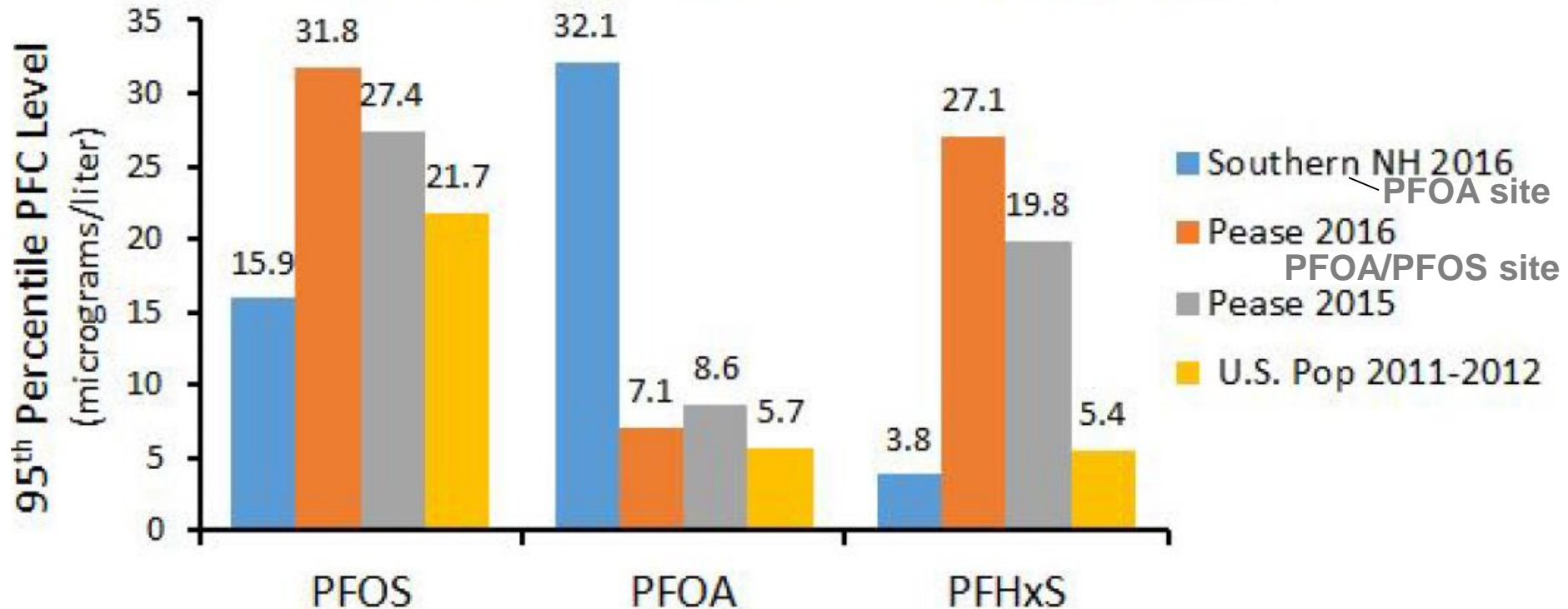
PFAS
Just Not Another New Contaminant

▸ Two sites in NH Contaminated by Air Emissions

  ◦ Undermines traditional waste site investigation/source water protection

  ◦ Has caused contamination over standard over 30-40 sq. miles

▸ Its presence in drinking water is measurable in our residents' blood – health implication is not known

▸ Currently have standards for two out of thousands PFAS

▸ Short-term exposure is considered a health risk

▸ Public in NH is demanding "0". Other states contemplating standards 3-5 times lower than EPA's recommended concentration

Magnitude of the Issue

- Over 30 million dollars has been allocated for addressing PFAS at a couple of sites in NH. A full state-wide assessment is just beginning………

- In the southern region of NH, groundwater/drinking water has been contaminated over a 30-40 square mile area

- Three significant water supply sources in NH contaminated over health standards

- Since March 2016 – NH has sampled over 2,000 sources of drinking water for PFAS
    - 600+ homes on private wells are being provided bottled water
    - Public water systems are being extended to these homes (20+ miles of pipe)
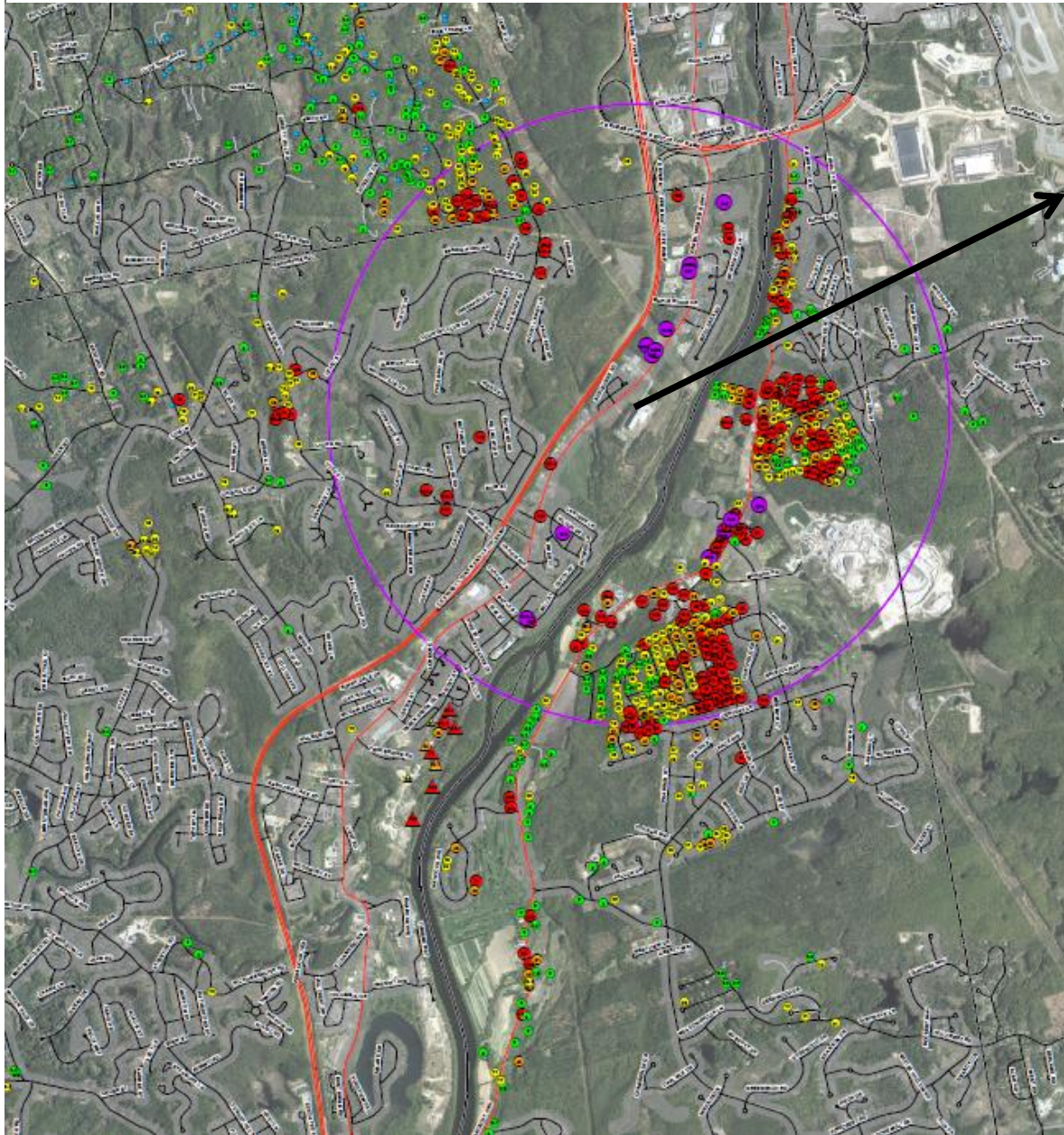
PFAS – Human Blood Sampling Results in NH
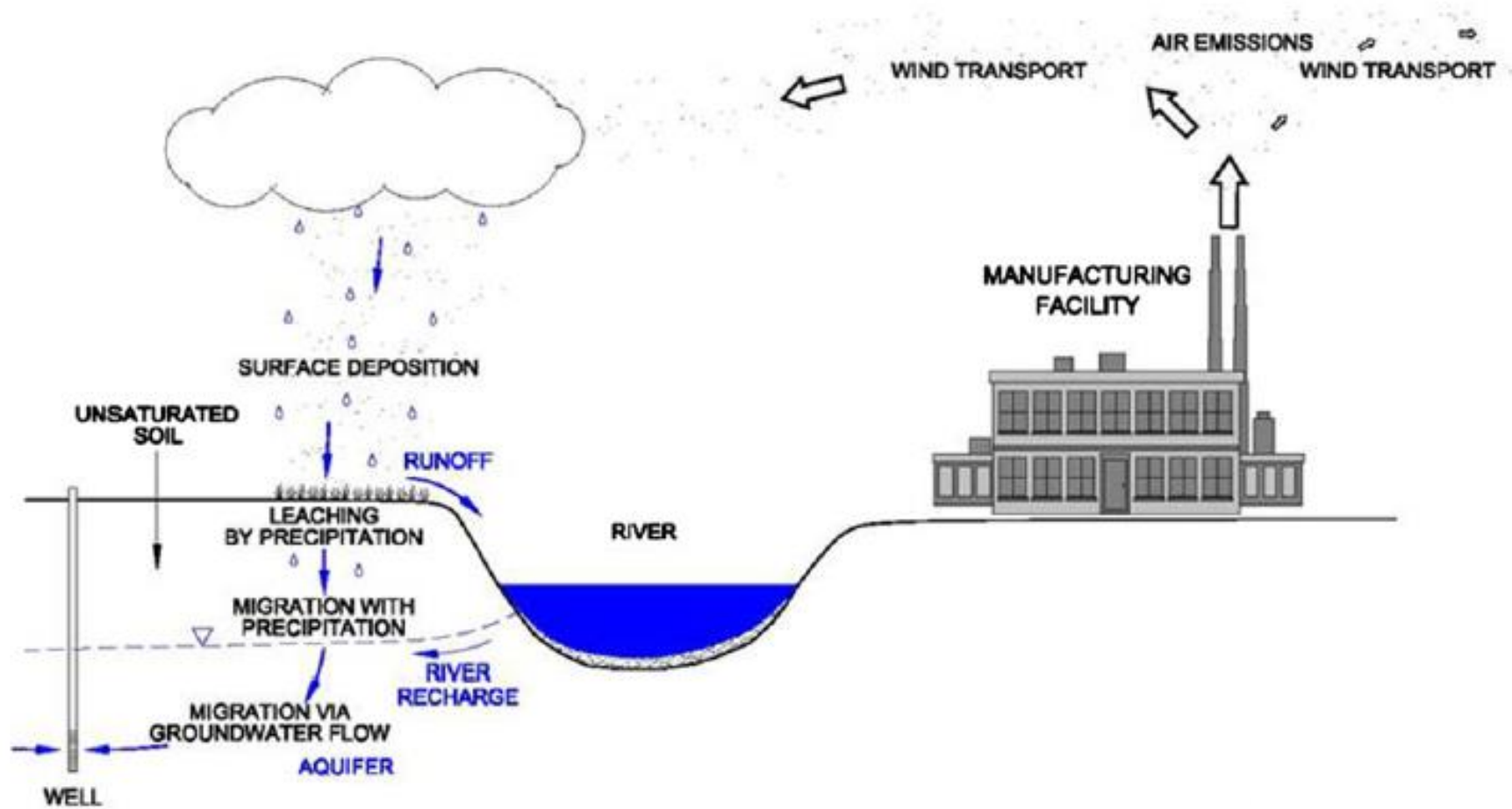

95th Percentile PFC Levels by Region

95th Percentile PFC Level (micrograms/liter)

PFOS
- Southern NH 2016: 15.9
- Pease 2016: 31.8
- Pease 2015: 27.4
- U.S. Pop 2011-2012: 21.7

PFOA
- Southern NH 2016: 32.1
- Pease 2016: 7.1
- Pease 2015: 8.6
- U.S. Pop 2011-2012: 5.7

PFHxS
- Southern NH 2016: 3.8
- Pease 2016: 27.1
- Pease 2015: 19.8
- U.S. Pop 2011-2012: 5.4

Legend:
- Southern NH 2016 — PFOA site
- Pease 2016 — PFOA/PFOS site
- Pease 2015
- U.S. Pop 2011-2012

# Investigation Around Saint-Gobain Performance Plastics

Davis et al., 2007, *Chemoshpere*

Alternate Water in Southern NH

▶ Short-term solutions
- ◦ 500 properties on bottled water
- ◦ POU systems ~60
- ◦ POE systems ~25

▶ Long-term solutions
- ◦ Litchfield: 400 connections; ~100 complete
- ◦ Manchester: 26 connections
- ◦ Merrimack: 15 connections
- ◦ Bedford: Design phase
- ◦ Amherst: 7 connections; design phase
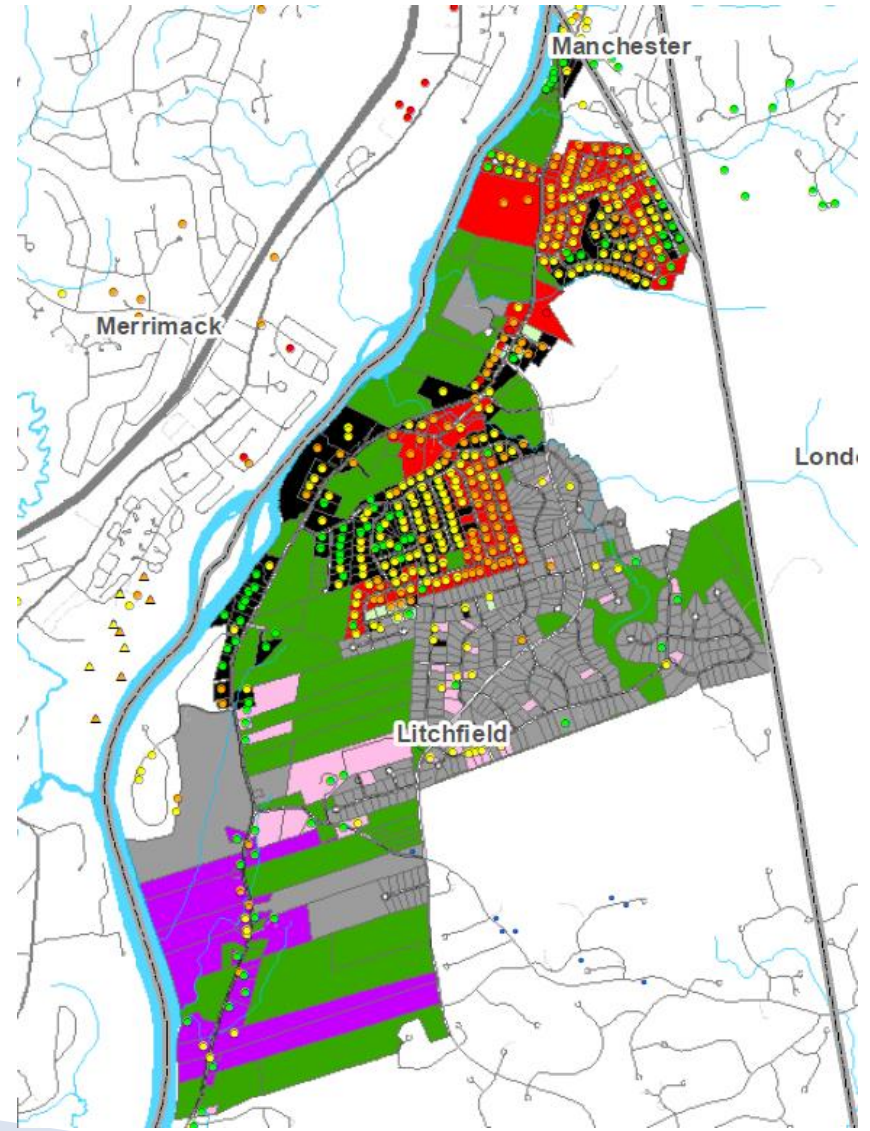
Concept of Regulating a Contaminant to "0"

‣ No state drinking water standard is set at 0 or non-detect.

‣ Detection limits keep getting lower. At some level there is no such thing as non-detect.

‣ Standards need necessary justification
  ◦ Public health improvement
  ◦ Consistent with public health protection approach for other contaminants

‣ NH provides information on how homeowners can treat to non-detect for $200-$3000.

‣ Standards must be based on real-world limitations
  ◦ Treatment technologies/Analytical limitations
  ◦ Simultaneous compliance with other safe drinking water regulations