

Underground Storage Tanks: How They May Impact Small Drinking Water Systems

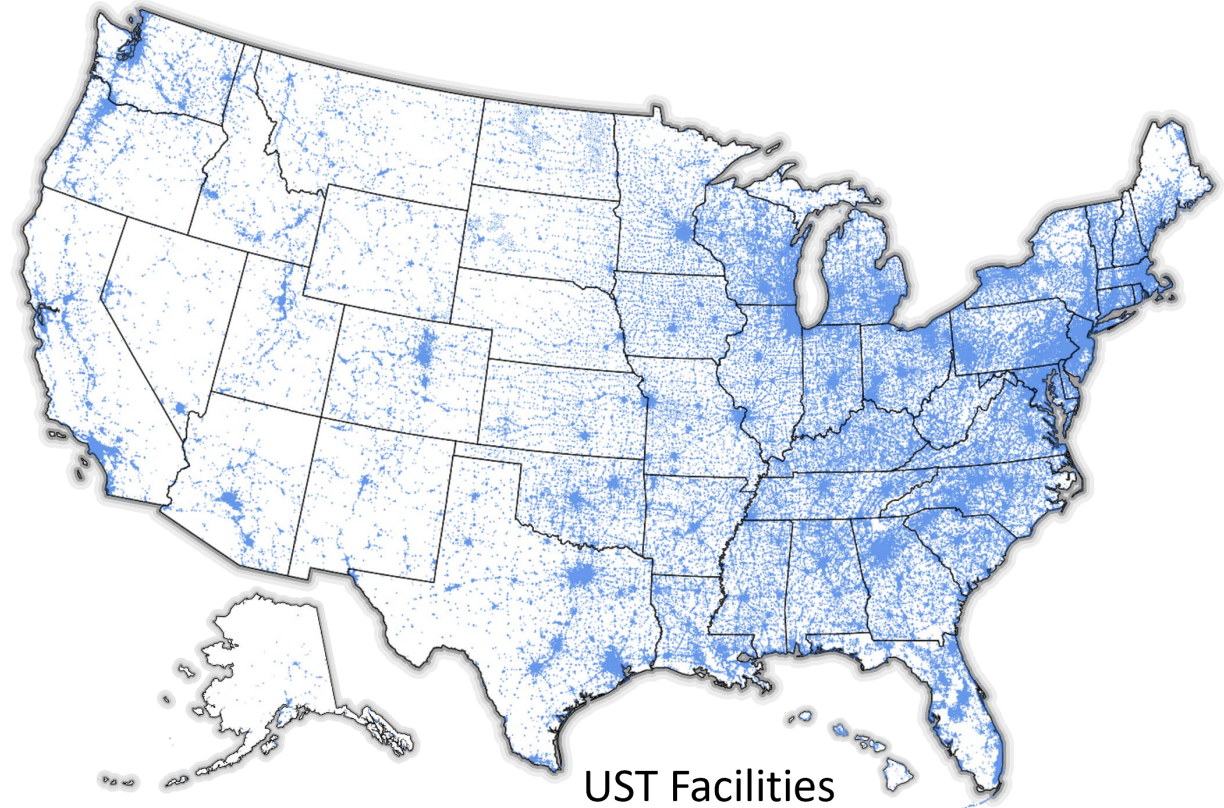
Small Drinking Water Systems Webinar
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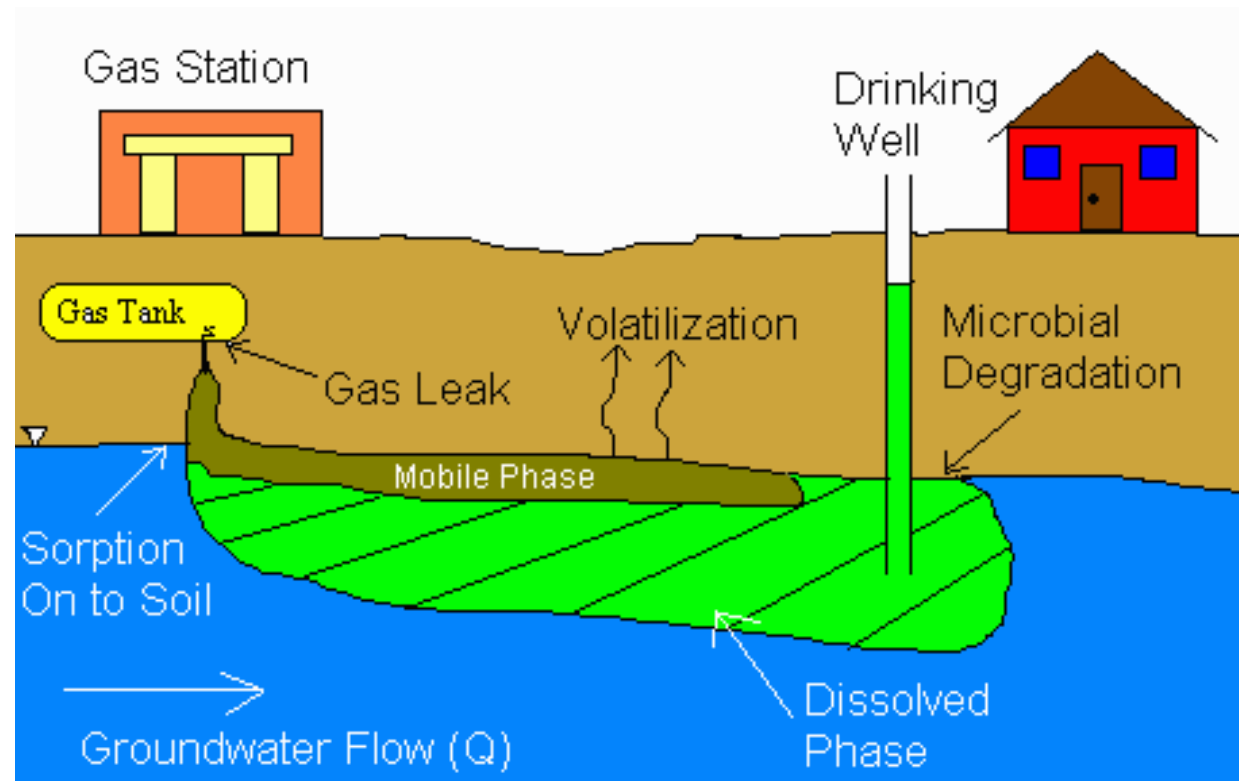
Underground Storage Tanks Universe

- Historically
 - 2.2 million underground storage tanks
 - 800,000 facilities
 - 550,000 leaking underground storage tanks
- Presently
 - 540,000 active USTs
 - 193,000 facilities
 - Up to 6 billion gallons of fuel stored in USTs daily
 - Backlog 62,000 UST releases remaining to be cleaned up
- Potential impacts
 - Ground water contamination principal concern, also petroleum vapor intrusion
 - Extreme weather conditions can increase the extent of contamination, spatially and temporally



Underground Storage Tank Sites

- A leaking underground storage tank fuel release from an UST that can contaminate surrounding soil, groundwater, or surface waters, and/or affect indoor air spaces.
- Contaminated UST sites vary considerably
 - Some are very contaminated sites where drinking water resources have been adversely impacted and may involve years of cleanup activities that can cost millions of dollars.
 - Other sites may involve relatively minor or no groundwater contamination that may allow sites to be cleaned up more quickly and at less cost.
- Tank leak detection
 - Detection rate generally 0.1 – 0.2 gallons/hr



Fuel Composition and Drinking Water Standards

Component	MCL (mg/L)	Gasoline Fuel Composition (mg/L)	Ratio of fuel composition/MCL
benzene	0.005	6140	1,228,000
toluene	1	15,400	15,400
ethylbenzene	0.7	3080	4,400
xylene	10	13,730	1373

Benzene odor threshold – 60 ppm

Benzene taste threshold – 0.6 to 4.5 ppm

https://www.atsdr.cdc.gov/sites/toxzine/benzene_toxzine.html

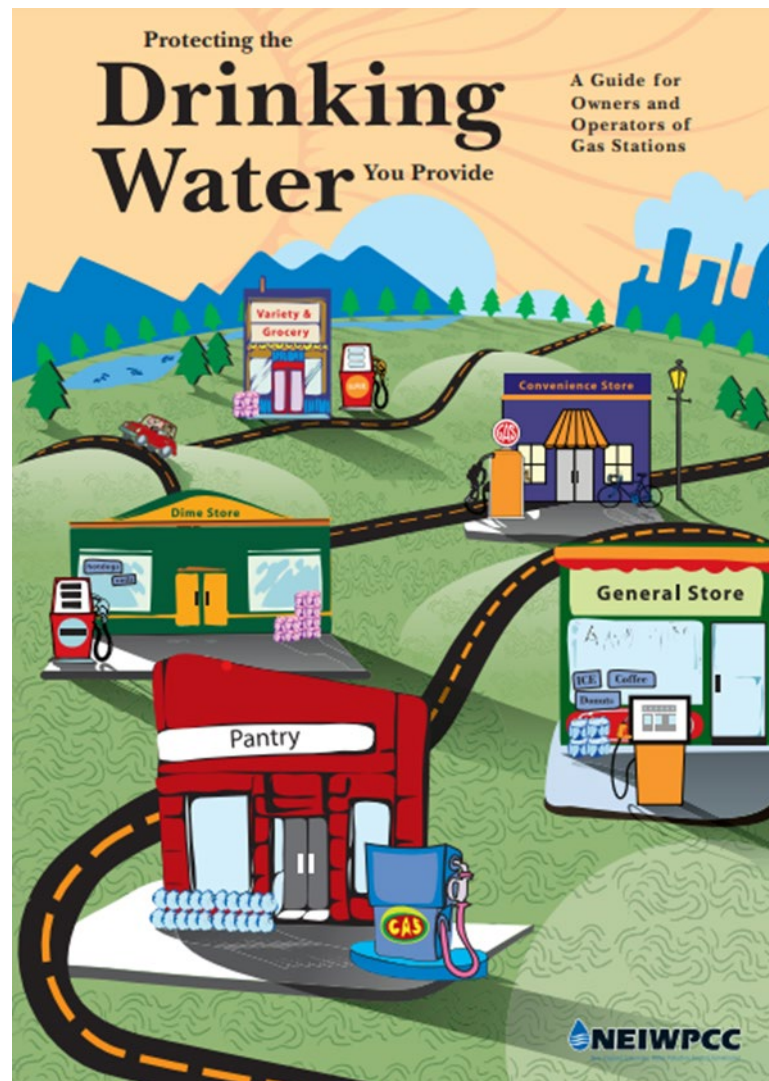
Transient Non-Community (TNC) Water Systems

- Public water system
 - Provides water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year.
 - EPA has defined three types of public water systems:
 - **Community Water System (CWS):** A public water system that supplies water to the same population year-round.
 - **Non-Transient Non-Community Water System (NTNCWS):** A public water system that regularly supplies water to at least 25 of the same people at least six months per year. Some examples are schools, factories, office buildings, and hospitals which have their own water systems.
 - **Transient Non-Community Water System (TNCWS):** A public water system that provides water in a place such as a gas station or campground where people do not remain for long periods of time.
 - Water can be supplied for coffee, fountain drinks, ice, drinking water fountain
 - <https://www.epa.gov/dwreginfo/information-about-public-water-systems>
- Responsibility of TNC water system owner/operator
 - Register systems with state drinking water program
 - Test – nitrate, nitrites, E coli, petroleum hydrocarbons
 - Report – lab results to state drinking water program
 - Inspect - state
 - Records – varies, depends upon record type

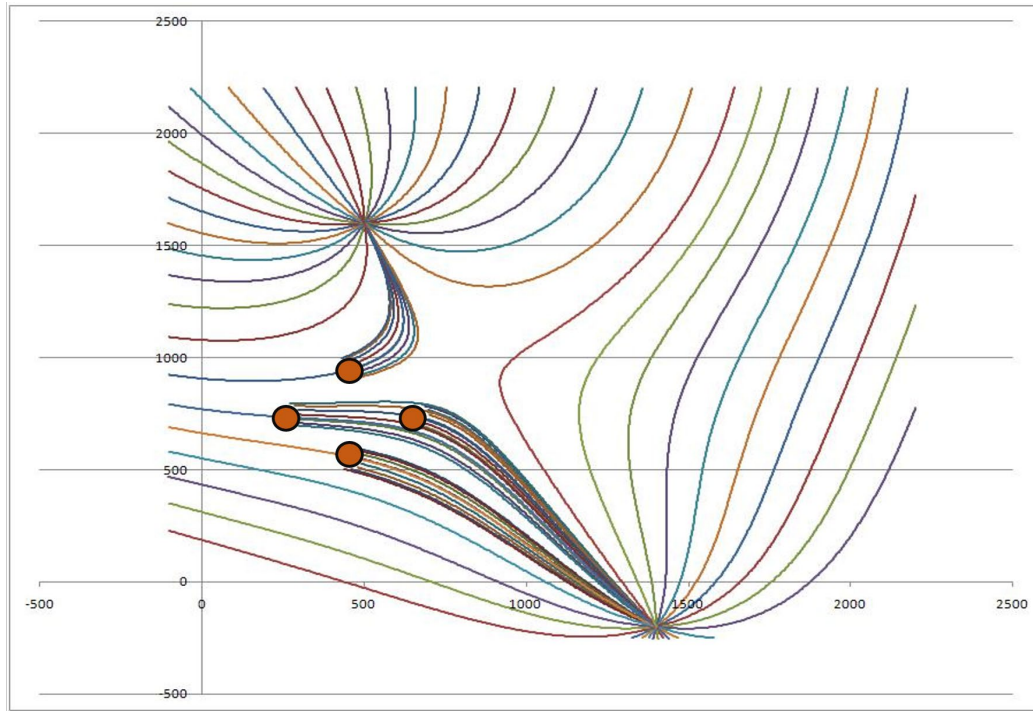
<http://neiwpcc.org/wp-content/uploads/2020/08/GasStationTNCGuide.pdf>

- National Primary Drinking Water Regulations - 141.24 Relevant to BTEX and Ethylene dibromide

<https://www.epa.gov/sites/default/files/2019-03/documents/cfr-2011-title40-vol23-part141.pdf>

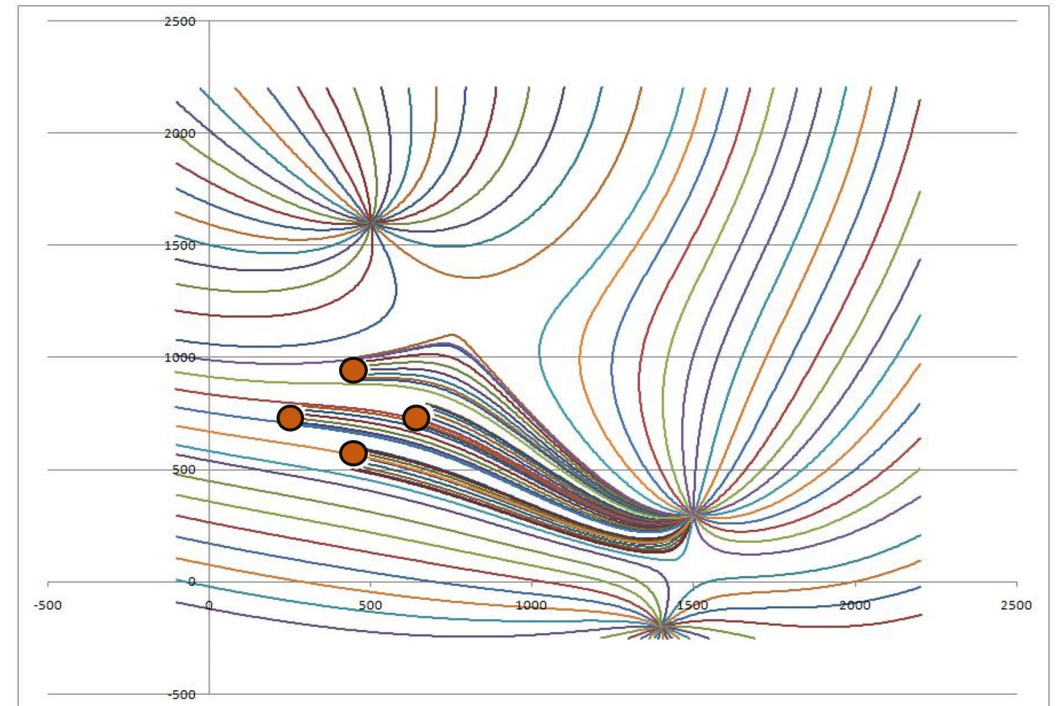


Implications of Water Supply Wells on Contaminant Transport and Water Quality



• Contaminant source

Base Scenario with 2 pumping wells and 4 sources



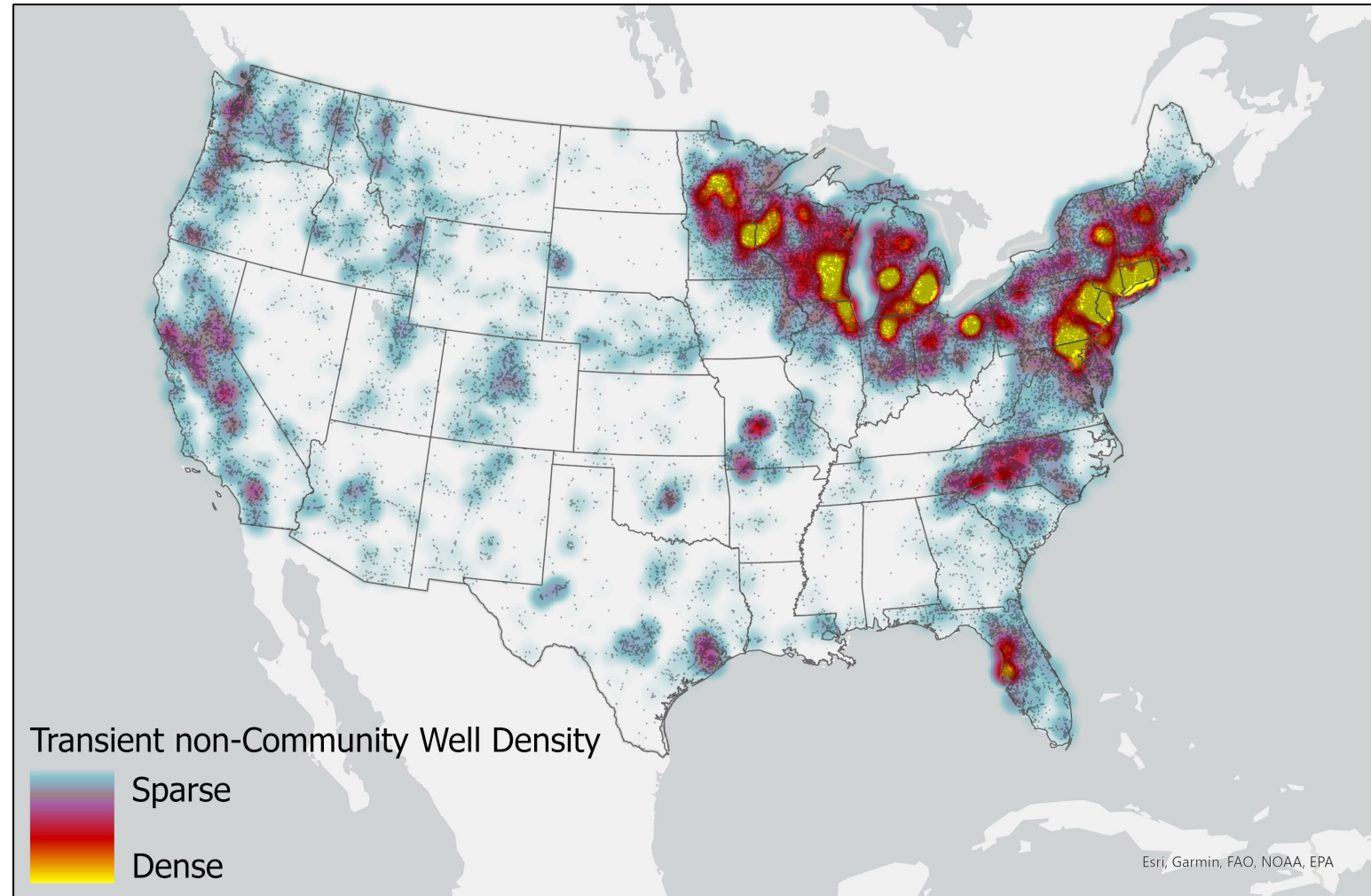
3rd well added can be vulnerable to all sources depending upon the pumping regime

Transient non-Community Wells in the US

- 80,000 TNC in the US
- 1 in 20 of these are within 300 meters of an active UST

Top 10 States with Most TNCs near a UST Facility

State	Number of TNCs	Daily Population Served
Wisconsin	422	39401
New York	395	32296
Pennsylvania	363	NA
Florida	348	24285
Michigan	272	47793
Texas	213	36842
Indiana	174	40638
California	154	18219
North Carolina	136	9461
New Hampshire	130	22064



Wisconsin TNCW Benzene Concentrations

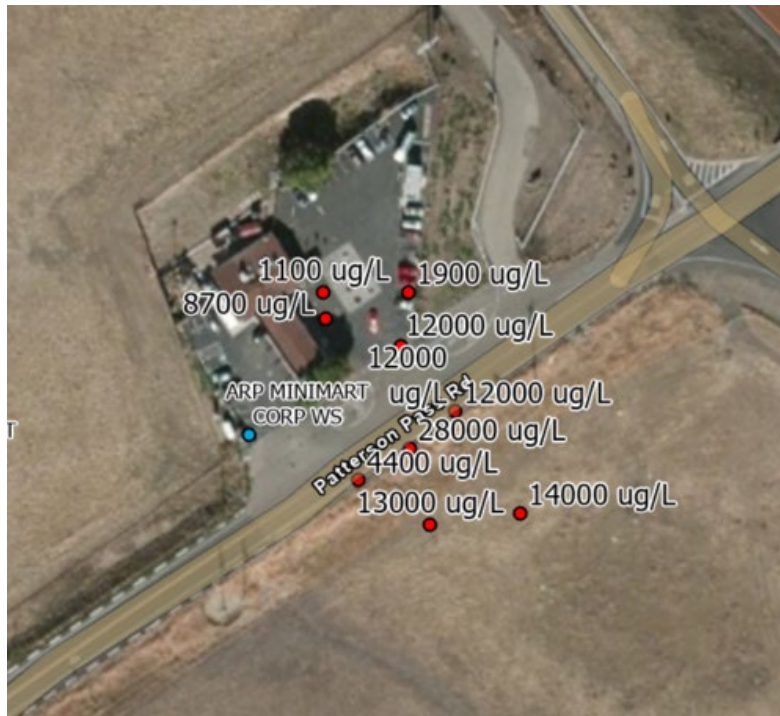
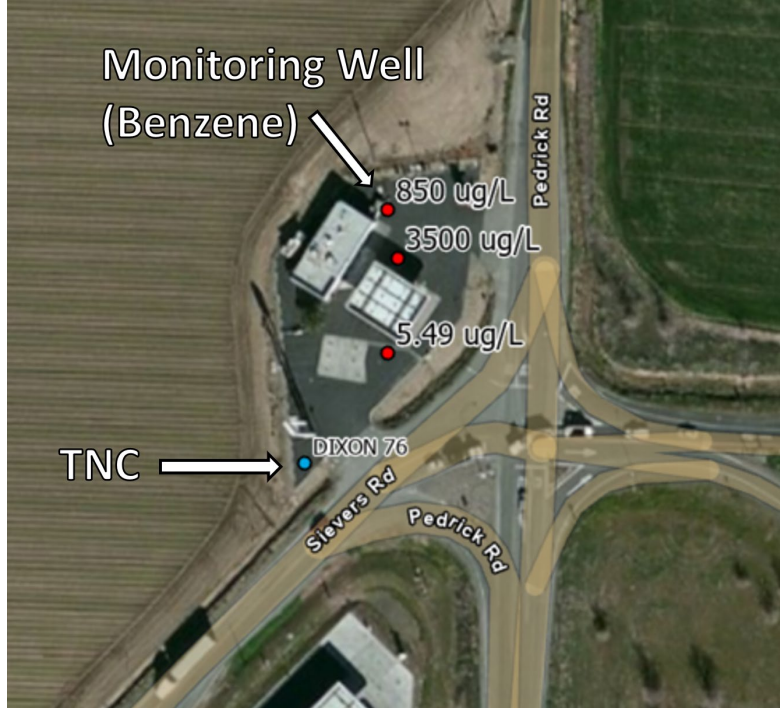
- 54 out of 425 Transient Non-Community Wells tested over the MCL for benzene in the last 40 years (13%)
- 49 out of the 54 of these had an UST or UST release within 1,800 ft
- 16,000 TNCWs in WI

TNC/Benzene Concentration Data:
<https://dnr.wi.gov/dwsviewer/ContamResult/Search>

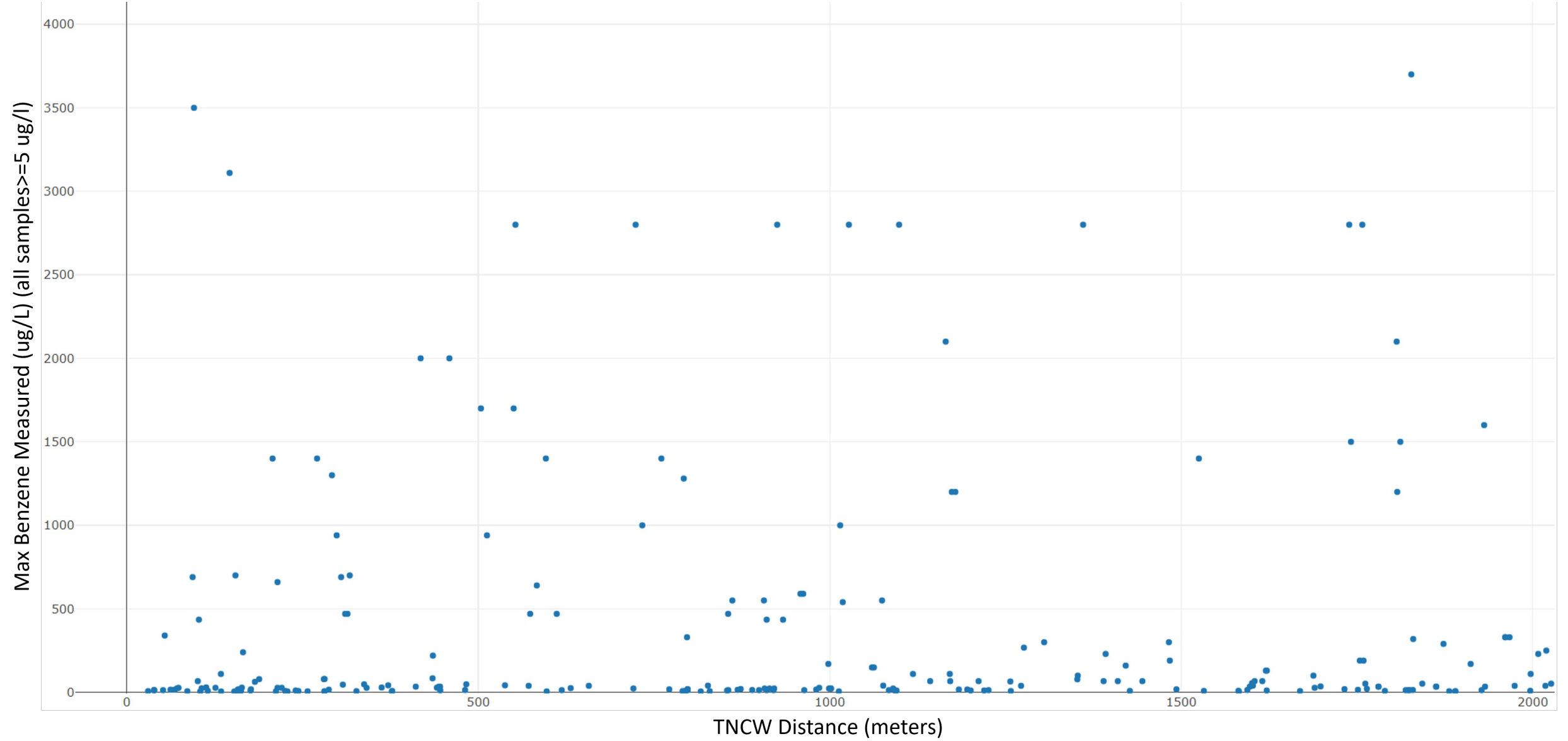


CA TNCWs Near Leaking UST Monitoring Sites

- 324 of 4,135 TNCWs had a benzene measurement at a LUST site greater than MCL (5 ug/L) within a half mile (7.8%)
- For those 324 TNCWs, the median maximum measured benzene concentration at the closest well was 52 ug/L



Transient Non-Community Wells Near Monitoring Wells with Benzene

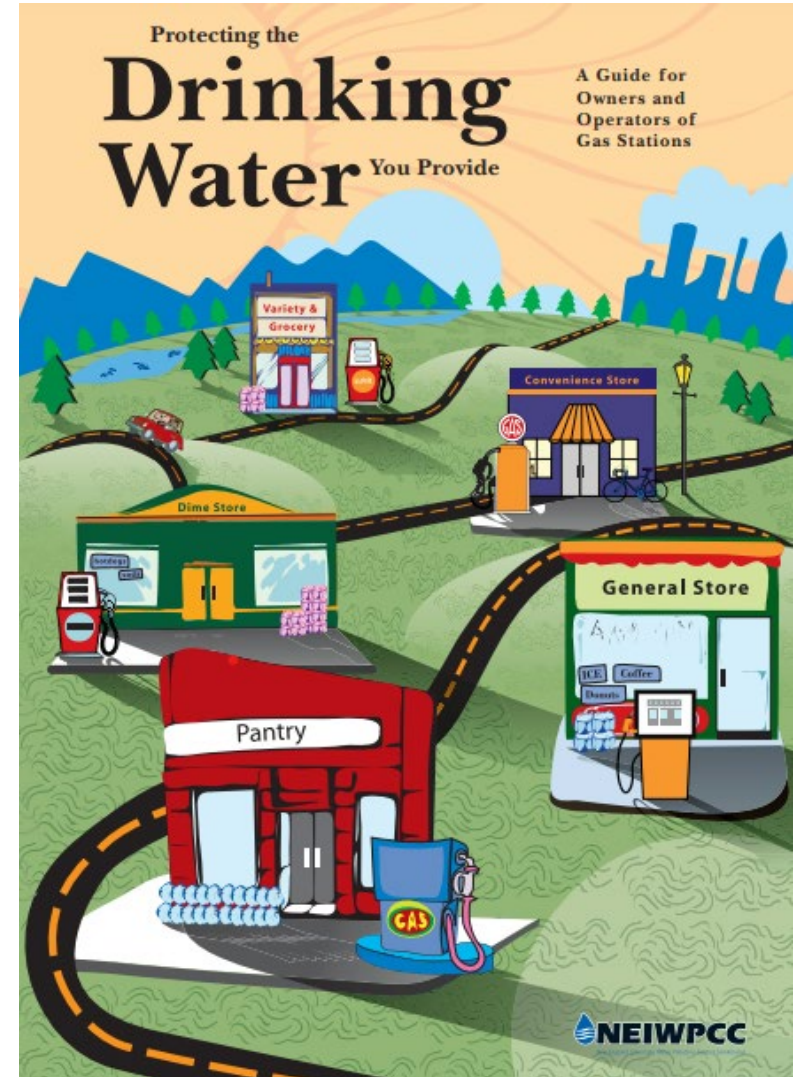


How Can We Improve TNC Water Supply Safety

- “While seldom required, testing for VOCs is a common and strongly recommended way to determine if a well is contaminated with petroleum compounds. It is important to test for VOCs, including contaminants such as benzene”

[“Protecting the Drinking Water You Provide: A Guide for Owners and Operators of Gas Stations”](#)

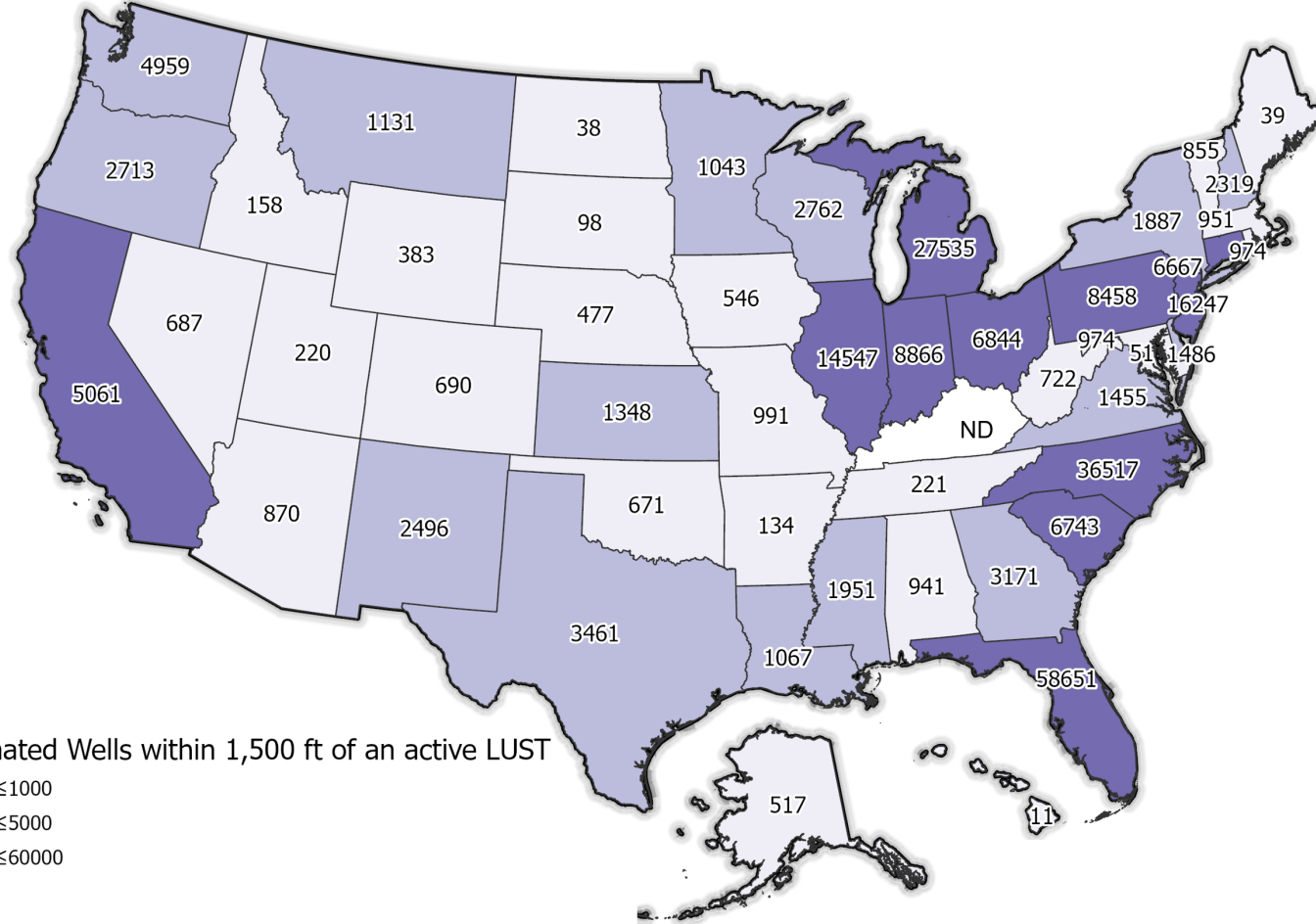
- Minimally consider routine testing for petroleum compounds in water supplies in proximity to leaking USTs
- Bridging the horizontal and vertical communication between the Site Remediation and Water Supply Programs at the state and local levels
 - Consider means for automated communication if release is suspected/known



[Image source](#)

Proximity to Private Domestic Wells

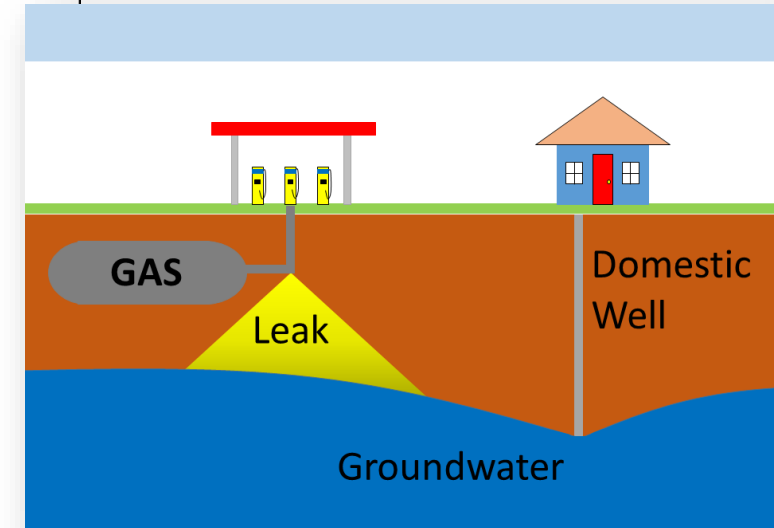
COUNT OF PRIVATE DOMESTIC WELLS WITHIN 1500 FT OF ACTIVE LUSTS—BY STATE



Estimated Wells within 1,500 ft of an active LUST



- Estimated 250,000 private domestic wells within 1,500 feet of all active UST releases



Contacts and Information

- Alex Hall – hall.alexander@epa.gov
- Fran Kremer – kremer.fran@epa.gov
- Further Information
 - Tanks
 - [UST Finder](#)
 - Private Domestic Wells
 - [Private Domestic Well Map](#)
 - [Technical Paper: Methods for Estimating Locations of Housing Units Served by Private Domestic Wells in the United States Applied to 2010](#)
 - TNCs
 - [Protecting the Drinking Water You Provide: A Guide for Owners and Operators of Gas Stations](#)
 - [Pocket Sampling Guide for Operators of Small Water Systems](#)