Risks to Private Wells & Septic Systems

Risks to Private Wells

Private wells are especially vulnerable because they draw directly from groundwater and often lack the oversight, treatment, and regular testing required of municipal water supplies. Nearby gas station operations can threaten wells in several ways:

- Leaks from underground fuel storage tanks (USTs), spills at fuel pumps, or runoff carrying petroleum byproducts can enter the soil and migrate into aquifers. Gasoline components like benzene, toluene, ethylbenzene, and xylene (BTEX) are highly mobile in soil and water; even small leaks may contaminate large volumes of groundwater.
- Benzene in particular is of concern: it is known to be carcinogenic, and low-level contamination in drinking water has serious long-term health implications.
- Because private wells are not regulated in the same way as public systems, many homeowners do not routinely test their well water. Contamination may go undetected until levels are high. Once aquifers are polluted, remediation is expensive, technically challenging, and sometimes only partially effective.

Risks to Septic Systems

Septic systems depend on a delicate balance: clean soil, proper drainage, and functioning groundwater flow are essential. Gas station development can disrupt these, compounding risks:

- Impervious surfaces (like pavement) from a new development increase runoff and reduce natural recharge of groundwater. This changes how water percolates through soil, potentially overloading septic drain fields, interfering with soil filtration, and worsening how wastewater is naturally treated.
- If groundwater in the area becomes contaminated with petroleum product chemicals, those contaminants can interact with septic effluent. Soil microbes (which help “treat” wastewater by breaking down pathogens and organic matter) may be harmed, reducing the system’s ability to mitigate pollution. Contaminants might also move more easily from the septic system into the surrounding groundwater if the soil’s capacity to adsorb or filter them is compromised.
- Because septic effluent and private well water often share the same shallow groundwater system in many residential areas, contamination from gasoline leaks or spills plus septic discharge creates a combined risk: drinking water may carry both petroleum contaminants *and* pathogens or excess nutrients. This overlap increases the chance of health effects for entire neighborhoods rather than just individual wells.

References

1. Fei-Baffoe, B., et al. (2024). *Contamination of groundwater by petroleum hydrocarbons*. Demonstrates how UST leaks and fuel storage affect groundwater quality. (ScienceDirect)
2. "Groundwater Fact Sheet: Benzene" (California Water Boards). Describes benzene's mobility in groundwater, health standards, and how benzene enters drinking water supplies from gas station storage leaks. (Calif. Water Board)
3. "The Hidden Cost of Gasoline" – Grist. Estimates like *ten gallons of gasoline can contaminate 12 million gallons of groundwater* and discusses long-term cleanup challenges. (Grist)
4. Illinois Department of Public Health: *Gasoline – Hazardous Substances*. Explains how gasoline (including BTEX) can contaminate soil, air, surface water, and groundwater, including private wells. (Illinois Department of Public Health)
5. Maine Department of Environmental Protection: *Septic Systems and Groundwater*. Outlines how septic systems can contribute nitrates, pathogens, metals/solvents, etc. to groundwater when failing or improperly maintained. (Maine)
6. Recent study ("Septic Systems as a Pathway for Emerging Contaminants …", Wilschnack et al., 2024). Examines how contaminants (including from household sources) can move through septic systems into surface or groundwater. (ScienceDirect)