

## Sources of Groundwater Contamination

DEP previously identified and prioritized a list of major groundwater contamination sources and the information was briefly reviewed and updated for this report. The priorities include industrial facilities, surface impoundments including centralized impoundments at unconventional gas well sites, underground storage tanks, hazardous waste sites, landfills, waste piles, aboveground storage tanks, manure/fertilizer applications, chemical facilities, septic systems, acid mine drainage, and abandoned oil and gas wells. The contaminants associated with these sources are also shown. Additionally, bulk salt storage and active natural gas wells were noted as significant sources of ground water contamination by one region.

Multiple regional studies have indicated 30% to 90% of private water wells have total coliform contamination. In addition, one study showed up to 30% had *E. coli* contamination. A USGS study (Zimmerman, T.M., Zimmerman, M.L. and Lindsey, B.D., 2001, Relation between selected well construction characteristics and occurrence of bacteria in private household supply wells, south-central and southeastern Pennsylvania: USGS WRIR 01-4206, 22 p.) stated that either or both well construction and aquifer contamination could be responsible for the results but problems were more likely to occur where the well was poorly constructed. Pennsylvania currently has no statewide private water well construction requirements.

## Major Sources of Groundwater Contamination

Contaminant Source	High Priority Sources (√)	Factors Considered in Selecting Contaminant Sources (1)	Contaminants (2)
<b>Agricultural Activities</b>			
Animal feedlots			
Chemical facilities	√	ACDEFG	ABCDE
Drainage wells			
Manure/fertilizer applications	√	ABCDEFGH	DEIK
On site pesticide mixing & loading			
Pesticide applications			
<b>Storage/Treatment Activities</b>			
Land application of biosolids			
Lawn maintenance/pest treatment			
Material stockpiles			
Storage tanks (above ground)	√	ABCDEFGH	ABC
Storage tanks (underground)	√	ABCDEFGH	ABC
Surface impoundments (all types)	√	ABCDEFGH	ABFGHJK
Waste piles or tailings	√	ABCDEFGHI (slag/CKD)	AGJKL
<b>Disposal Activities</b>			
Abandoned landfills	√	ABCDE	ADGJ
Landfills (current)	√	ADEFGHI	ABCDEFGH
Septic systems	√	ABCDEFGH	EIK
Underground injections			
<b>Resource Extraction</b>			
Abandoned oil/gas wells	√	DHI	BFGJ (CH <sub>4</sub> )
Existing/active oil/gas wells		ACDEFG	ABFGJKL (CH <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> )
Abandoned/poorly built water wells			
Coal mining/acid mine drainage	√	BCDEFH	JKL (pH)
Quarries (noncoal)/borrow pits			
<b>Other</b>			
Atmospheric deposition			
Industrial facilities	√	ABCDEFGF	ABCGL (PFCs)
Airports/Former Military Air Bases	√	ABCDEFGF	ABCL (PFCs)
Firefighting/Training Facilities	√	ABCDEFGF	ABCL (PFCs)
Hazardous waste generators			
Hazardous waste sites	√	ABCDEFGF	ABCDEGHIJKL (PFCs)
<b>Natural groundwater conditions (3)</b>			
Petroleum/fuel pipelines			
Sewer lines			

Contaminant Source	High Priority Sources (√)	Factors Considered in Selecting Contaminant Sources (1)	Contaminants (2)
Salt storage & Road deicing		ABCDEF	FGK
Urban runoff			

**Major Sources of GW Contamination Table (Continued)**

**(1) Factors in Selecting a Contaminant Source**

- A. Human health and/or environmental risk (toxicity)
- B. Size of the population at risk
- C. Location of the source relative to drinking water sources
- D. Number and/or size of contaminant sources
- E. Hydrogeologic sensitivity
- F. State findings, other findings
- G. Documented from mandatory reporting
- H. Geographic distribution/occurrence
- I. Other criteria (please describe)

**(2) Contaminants**

- A. Volatile organic chemicals
- B. Petroleum compounds
- C. MTBE/TBA
- D. Pesticides
- E. Nitrates
- F. Salinity/brine
- G. Metals
- H. Radionuclides
- I. Microbiological
- J. Sulfates, manganese and/or iron
- K. Total dissolved solids
- L. Other contaminant:
  - CKD – Cement Kiln Dust
  - CH<sub>4</sub> – Methane
  - C<sub>2</sub>H<sub>6</sub> – Ethane
  - PFCs – Perfluorinated Compounds

**(3) This could include natural occurring contaminants such as radium, radon, sulfate, arsenic, iron, manganese, salt, etc.**