

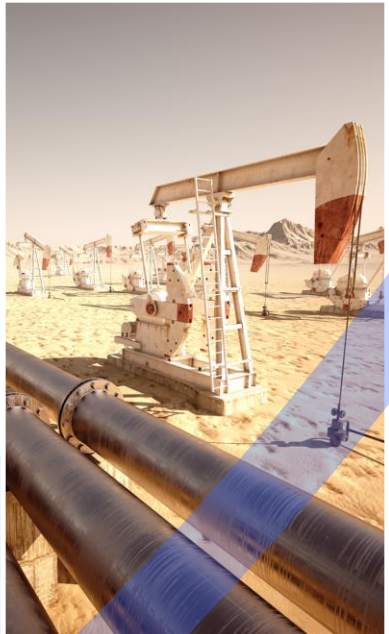


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Hydraulic Fracturing

The Fracking Experts

- Responsible Party Identification
- GIS and Geomatics
- Contaminant Hydrogeology
- Fate and Transport Modeling
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- Soil and Groundwater Remediation
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- Water Resources Assessment
- Source Water Assessment and Protection
- Drinking Water Treatment
- Environmental Risk Management
- Litigation Support/Expert Witness
- Forensic Engineering
- Stakeholder/Public Participation
- Regulatory Strategy



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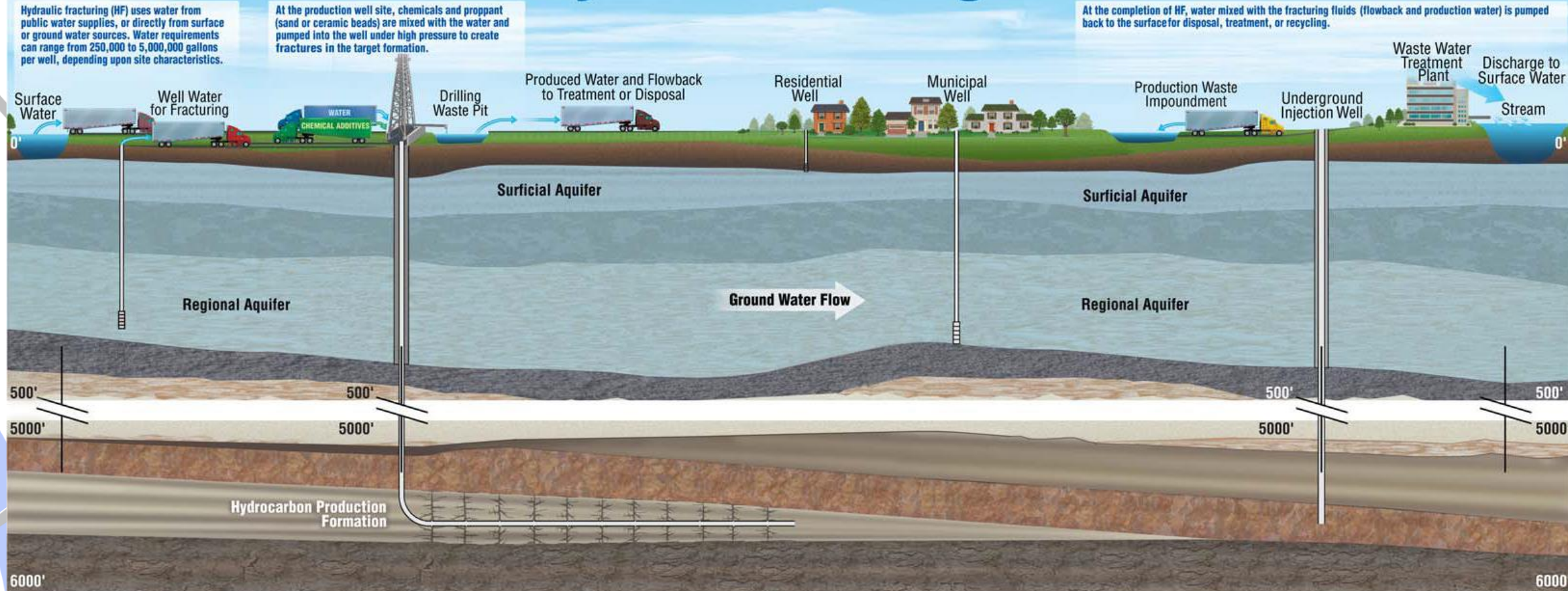


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Simplified Water Lifecycle in the Hydraulic Fracturing Process



Between 2005 and 2009, the 14 leading oil and gas hydraulic fracturing (HF) companies in the United States injected over 780 million gallons of hydraulic fracturing products (not including water). Of these 2,500 different hydraulic fracturing products, more than 650 of these products contained chemicals that are known or possible human carcinogens, regulated under the Safe Drinking Water Act (SDWA), or listed as hazardous air pollutants.

Chemical of Concern	Chemical Category	Chemical of Concern	Chemical Category
Methanol (Methyl alcohol)	Candidate for SDWA regulation	Nitrilotriacetic acid	Carcinogen
Diesel	Carcinogen, SDWA	Benzene	Carcinogen, SDWA
Naphthalene	Carcinogen	Di (2-ethylhexyl) phthalate	Carcinogen, SDWA
Xylene	SDWA	Acrylamide	Carcinogen, SDWA
Toluene	SDWA	Acetaldehyde	Carcinogen
Ethylbenzene	SDWA	Copper	SDWA
Formaldehyde	Carcinogen	Ethylene oxide	Carcinogen
Sulfuric acid	Carcinogen	Lead	Carcinogen, SDWA
Thiourea	Carcinogen	Propylene oxide	Carcinogen
Benzyl chloride	Carcinogen		

How these chemicals get into the environment:

- Transport of contaminants into underground drinking water zones through fractures produced during hydraulic fracturing process.
- Transportation of contaminants into drinking water through abandoned or other pre-existing wells.
- Leakage of contaminants from production wells (e.g., improperly constructed or damaged wells).
- Leaching of contaminants from improperly lined storage or drilling pits
- Spills of the HF fluids into surface water bodies used for drinking.
- Transport of contaminants through natural fractures in the rock into adjacent drinking water aquifers.

References: Chemicals Used in Hydraulic Fracturing, US House of Representatives, April 2011. www.epa.gov/hfstudy