

Samuel A. Flewelling, Ph.D.  
Manu Sharma, M.S., P.E.  
David E. Merrill, M.S.  
Ari S. Lewis, M.S.  
Jeffrey T. Rominger, Ph.D.



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Poster Session - Exhibition Hall

## Evaluation of Human Health Risks *via* Drinking Water for Spills of Hydraulic Fracturing Fluids

Studies to understand potential effects of hydraulic fracturing on human health and the environment are currently being done at the state and federal levels; however, none have included a human health risk assessment. We have undertaken a human health risk evaluation for spills, specifically focusing on potential risks to drinking water in basins underlain by formations targeted for oil and gas development *via* hydraulic fracturing. We use a probabilistic (Monte Carlo) framework that incorporates the distribution of potential spill volumes and environmental characteristics that influence the concentrations of hydraulic fracturing and flowback constituents for cases where a spill might reach a surface water or groundwater drinking water resource. The modeling also incorporates the likelihood of spills occurring and, if a spill occurs, the likelihood that containment or mitigation measures might capture the spill and prevent potential impacts on drinking water resources altogether. The results from the modeling are distributions of potential constituent concentrations in hypothetical surface water and groundwater resources. For comparison, the toxicity of 177 chemicals potentially present in 12 different HF fluid systems (including slickwater, gels, foams, and hybrids) and flowback fluid were evaluated to establish risk-based human health benchmarks. By taking the ratio of modeled concentrations to the health-based benchmarks, we performed a screening analysis to identify the likelihood that a spill might warrant further investigation with respect to potential human health effects *via* drinking water. Overall, our analysis demonstrates that there is an extremely low probability that an oil or gas well might have a spill that would warrant additional investigation with respect to potential human health effects. These findings are consistent with data from several states where studies have investigated potential impacts of hydraulic fracturing on surface water and groundwater. The broad range of environmental settings, fluid types, and spill scenarios considered in our analysis makes the results broadly applicable and helps provide some much needed perspective on the overall likelihood of the migration scenarios and potential risks.