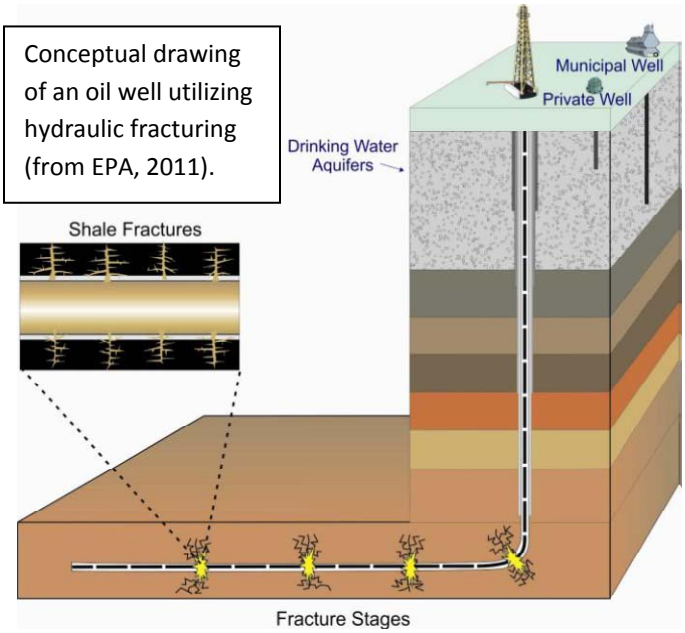
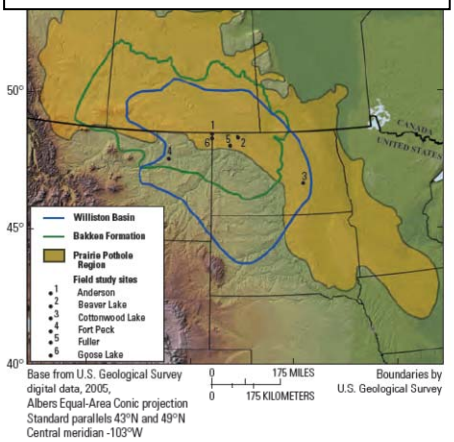
Aquifer Impacts from Hydraulic Fracturing

Water needed for energy developments throughout the arid Mountain West of North America may limit the Nation's ability to address energy security issues. Oil and natural gas from tight sand and shale plays an expanding role in the nation's energy future and hydraulic fracturing is a primary way of accessing these vital resources. One of the most important, rapidly expanding, developments of fossil fuel resources in the U.S. is the Bakken Formation of eastern Montana and western North Dakota. "Fracking" requires two to five million gallons of water to fracture one horizontal well. As development of oil and gas in the Bakken formation moves westward, concerns are increasing that artesian aquifers in Eastern Montana, which have historically supported grazing and agriculture, may be impacted. The Idaho National Laboratory is partnering with the Montana Bureau of Mines and Geology to perform a water-energy assessment to establish an approach that may be applicable to other developments in the Mountain West with similar water limiting issues.

Conceptual drawing of an oil well utilizing hydraulic fracturing (from EPA, 2011).



Location of the Williston Basin and Bakken Formation (from USGS, 2011)



This project will evaluate the water needed for Bakken development in Eastern Montana, characterize the groundwater resources, identify key areas where development may be water limited and develop an approach for optimizing water usage. This research will be at the forefront of Montana development activities and will create a framework for water use that will maximize the energy return on water investment and minimize negative effects. By incorporating the impacts from water consumption (both spatially and temporally) into the design of drilling plans through an optimization approach, the negative water impacts associated with energy development can be reduced to manageable levels.

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