Hydraulic Fracturing as a Soil Remediation Tool
- vs. -
"Fracking" to Produce Oil and Gas

FRx, Inc.
P.O. Box 498292
Cincinnati, OH
45249-8292

(513) 469 6040 fax (513) 469 6041
www.frx-inc.com

Recent technological advances have made it possible to recover natural gas from low permeability shales, opening large areas of the United States to the possibility of gas production. Significant economic rewards in the form of jobs and lucrative leases have been embraced as a godsend, but concerns about environmental risks have motivated strong opposition to exploration and production. Hydraulic fracturing, or fracking, is a key technology to economic gas production from shale, and it has become a lightning rod in the controversy over potential environmental risks.

The debate has overlooked the value hydraulic fractures can offer in efforts to repair, clean-up, and restore soil and groundwater that have been contaminated by toxic chemicals. Hydraulic fractures can optimally place treatment materials in situ or can promote the removal of these contaminants through extraction wells.

FRx has been making hydraulic fractures to improve soil and groundwater remediation since 1994, utilizing practices that were developed at the US EPA Center Hill Laboratory in Cincinnati. The Principals of FRx worked in those early development projects and have been implementing soil remediation technologies for over 20 years. Our experience has identified four key factors that distinguish hydraulic fractures used for soil and groundwater remediation from those created to improve production of oil and gas:

Volume: Hydraulic fractures created to stimulate oil and gas production use massive volumes of fluid compared to fractures used for remediation. For example, hydraulic fractures created by FRx typically use 100 to 300 gallons, while fractures used in oil and gas operations often are 1,000 to 10,000 times larger. This is important because it is the volume of injected fluid that controls the distance the fracture will spread. The relatively small injected volume means that fractures used for remediation are simply too small to affect unexpected areas. Furthermore, waste from remediation processes can be managed easily with long-standing practices, which contrasts sharply to the disposal challenges presented by flow-back water from natural gas fracking.

Depth: Hydraulic fractures in oil and gas reservoirs are created more than 1000 ft down, whereas fractures created for remediation are typically shallower than 100 ft. Concerns about hydraulic fracturing arise from those that tend to grow either laterally or upward. Upward growth introduces the possibility of unintentionally impacting shallower formations. In the case of deep oil and gas fracturing projects, these shallower formations may represent water supply aquifers or surficial deposits near residences. However, remedial fractures created at shallow depth for purposes of environmental remediation are intended to target the already contaminated uppermost formation materials.

Pressure: The creation of hydraulic fractures in bedrock reservoirs containing hydrocarbons requires pressures of thousands of pounds per square inch. In contrast, hydraulic fractures are created in soil with a small pump that generates about as much pressure as contained in a bicycle tire. This is important because high pressures can potentially stress well casings and annular seals, which can result in leaks. Leaky well casings represent direct pathways for introduction of contaminant materials (oil and gas) into potable water supplies. Also, the contents of new oil and gas reservoirs usually are under great pressure – enough pressure to push those fluids to the surface once a channel is opened. In contrast, soil and groundwater at contaminated sites usually are under no expansive pressure.

Chemicals additives: Hydraulic fractures, whether in the oil field or at a contaminated site, achieve their purpose because of the compounds they contain. FRx relies upon a set of compounds designed to effectively remediate contamination while being intrinsically safe. We have always fully disclosed the ingredients used in the fracturing process. Our hydraulic fractures contain:

- The remediation materials – often quartz sand or granular iron
- Water – usually from a potable source
- Suspending agent composed of:
  - *Guar* (a flour derived from a bean that grows in arid semi-tropical climates. Guar is used as a texturizer in foods and many consumer products such as cosmetics.)
  - *Borax* (20-Mule Team brand, straight from the grocery store.)
  - *Cellulase enzyme* – the same agent used by brewers to clarify beer.

In contrast, hydraulic fractures used in the petroleum industry are designed to effectively increase hydrocarbon production from reservoirs that typically are far below aquifers, so little regard is given to the hazards of their additives. In addition, the chemical conditions may be too severe for use of the innocuous materials utilized for remediation fractures. The significance of this is that the hydraulic fractures created in oil and gas reservoirs may contain exotic, hazardous additives, whereas the fractures created by FRx contain safe, commonly used compounds.

In summary, hydraulic fractures created by FRx are specifically designed to improve environmental problems at contaminated sites. Their only purpose is to reduce environmental risk and improve the quality of the site. Hydraulic fractures created by the petroleum industry are designed to improve recovery of oil and gas from deep reservoirs, where water quality has typically not a primary consideration. The end result is that hydraulic fractures created in the oil and gas industry may cause environmental problems, while those created by FRx will cure them.