Hydraulic Fracturing

QUESTERRE ENERGY CORPORATION • SEPTEMBER 2010

OVERVIEW

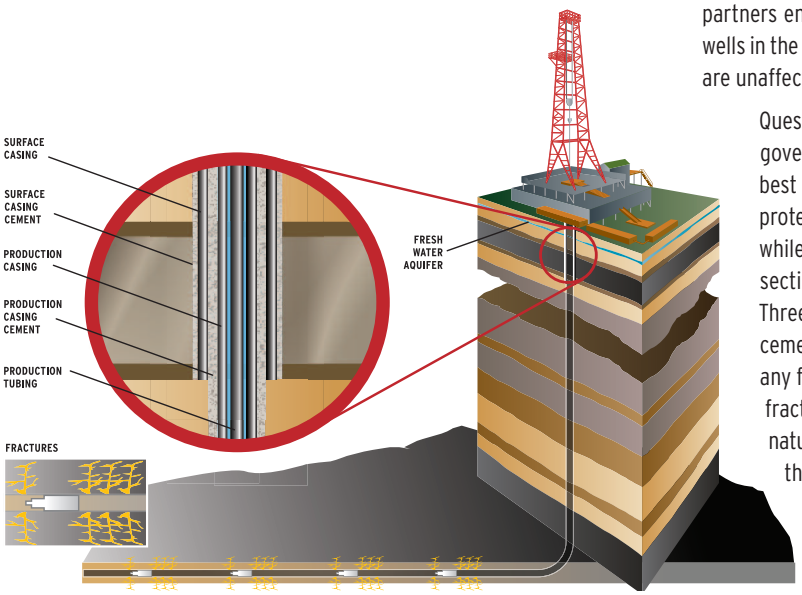
Horizontal drilling and hydraulic fracturing are proven and well established techniques used to safely and efficiently recover natural gas from underground geological formations like the Utica shale in Quebec.

The Utica shale in the St. Lawrence Lowlands is a world class natural gas resource. Successful development of this resource will strengthen Quebec's energy security and reduce its dependence on external sources. Currently in early commercialization, it has the potential to satisfy the province's natural gas needs for at least the next 50 years.

Hydraulic fracturing is used in almost all of the natural gas wells drilled in Canada today. It is also used for water wells and for geothermal energy development. It is a technically complex and highly controlled industrial process that is governed by strict regulations. Questerre and its partners have conducted these operations in Quebec for the last two years in a safe and environmentally conscious manner.

HYDRAULIC FRACTURING PROCESS

Hydraulic fracturing or frac'ing creates small fractures or cracks in the deep shale formation that form pathways for natural gas to flow to the well. Shale is less permeable than concrete and the gas in the shale does not flow economically unless it contains these fractures, either created by nature or artificially through frac'ing. The procedure involves pumping water, sand and additives at high pressure into the shale. This mixture known as the frac fluid consists of over 99% of water and sand and low concentrations of additives. Additives are to principally reduce the surface tension of the water and to carry the sand. Once the fractures have been created, the sand helps keep them propped or open so the natural gas can flow to the well.



- **Hydraulic fracturing is a safe, proven technology that is used on several thousand wells in Canada every year**
- **Fracture fluids consists of 99.5% water and sand, while the remaining additives are often found in common consumer products**
- **Fracturing process is isolated from fresh water sources by approximately 1000m of impermeable rock and several layers of steel casing**

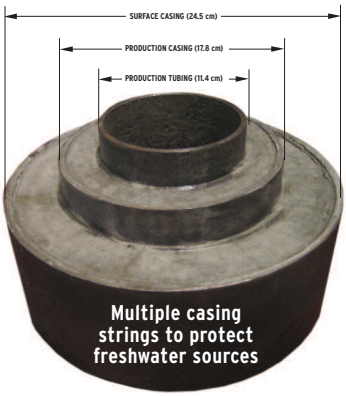
Prior to frac'ing a well, extensive technical work is conducted by engineers, geologists and geophysicists to design the frac. They study the shale as well as the surrounding formations to create a complex network of intersecting fractures within the shale and ensure it is contained within this formation. Microseismic technology is employed to create maps of the under ground frac.

FRESH WATER PROTECTION

Questerre has not conducted any hydraulic fracturing operations in fresh water aquifers or within a 1,000m depth of these aquifers. Independent analysis of the fracture stimulation operations completed to date confirms that the stimulations were contained within the Utica.

The hydraulic fracturing for the Utica shale by Questerre and its partners is conducted at depths ranging from 1,000m to 3,000m. The deepest fresh water aquifers in Quebec are located at a depth of approximately 100m. Separating the Utica shale and these fresh water aquifers are several hundred meters of impermeable rock. Furthermore, Questerre and its partners engage an independent engineering company to test the water wells in the surrounding area and gather baseline data to confirm that they are unaffected by the natural gas operations.

Questerre follows strict government regulations and best industry practices to protect fresh water aquifers while drilling the vertical section of the horizontal well. Three sets of steel casing are cemented into place to prevent any fluid used in the drilling and fracturing process or produced natural gas from contacting these aquifers.



Multiple casing strings to protect freshwater sources

There is no documented case of fresh water aquifers being contaminated by the hydraulic fracturing of a deep shale gas well. The risk of hydraulic fracturing to impact fresh water aquifers is estimated at one in two hundred million (Groundwater Protection Council Report, April 2009).

*Please see backgrounder on water usage

FRAC FLUID COMPOSITION

Additives in frac fluid used by Questerre are chemicals found in common consumer products like disinfectants, cosmetics, food and pharmaceuticals. These additives in total account for less than one half of a percent (0.5%) of the total frac fluid. A table listing these highly diluted additives used, their classification, concentration and use is below.

Other 0.5%

- Acid
- Friction Reducer
- Surfactant
- Gelling Agent
- Scale Inhibitor
- pH Adjusting Agent
- Breaker
- Crosslinker
- Iron Control
- Corrosion Inhibitor
- Antibacterial Agent
- Clay Stabilizer

Hydraulic Fracture Fluid Additives Commonly Used by Questerre

Typical Concentration	Additive Type	Main Compound	Purpose	Common Use of Compound
96.26%	Water	Water	Used to expand fracture and deliver proppant (sand)	Irrigation, manufacturing, human consumption (drinking, bathing, cooking)
3.62%	Proppant	Silica Flex Sand	Hold fractures open to allow gas to escape to the well bore	Use as In-Fill on synthetic turf, bedding on indoor athletic fields and as anti-skid material for concrete floors, water filtration, and glass manufacturing
0.048%	Friction Reducer	Polyacrylamide	Added to frac fluids to minimize friction	Used in toys, diapers, contact lenses, and aesthetic facial surgery
0.038%	Gellant-Surfactant	Isopropanol Trimethyloctadecylammonium Sodium Xylene Suphonate	Used to reduce the surface tension of the fracturing fluids to improve liquid recovery from the well after the frac	Used in all-purpose cleaners, disinfectants, room sprays, cosmetics, toiletries, and polish remover, fabric softener and conditioner
0.016%	Breaker	Sodium Hypochlorite	Breaks down the gelling agent to allow the water and sand to flow more easily out of the fractures	Used in laundry bleach, disinfectants, and daily sanitizing spray
0.012%	Water Gellant	Guar Gum Low Toxicity Base Oils	Makes water more viscous and capable of keeping sand in suspension	Used in pharmaceuticals, cosmetics, toothpaste, shaving cream, paint, as well as to extend shelf life of food (including ice cream, soft drinks, jams, bread cheese, ham, pet food etc.)
0.005%	Clay Control	Quaternary Amine	Prevents clay swelling and clay migration	Disinfectants, fabric softeners, and as antistatic agents (e.g. in shampoos)
0.002%	Iron Control	Trisodium Nitrilotriacetate Monohydrate	Prevents precipitation of metal oxides	Household and industrial detergent, hard surface cleaning product
0.001%	Demulsifier	Isopropanol	Used to break emulsions (water in oil or visa versa)	Used in all-purpose cleaners, disinfectants, room sprays, cosmetics toiletries, and polish remover
0.0004%	Corrosion Inhibitor	Methanol	Prevents carbonate and sulfate scale precipitation in fracturing systems. Prevents corrosion of drilling materials	Used in windshield washer fluid, antifreeze, plastics, paint, and as a source of fuel
0.00002%	Foam Preventer	Tributyl Phosphate	Reduces viscosity and mud weight	Used in herbicide and is used as a solvent in inks, gums, adhesives

Hydraulic Fracture Fluid Additives Reported by Other Companies

Typical Concentration	Additive Type	Main Compound	Purpose	Common Use of Compound
0.05%	Antibacterial Agent	Hydrochloric Acid	Inhibits the growth of bacteria in water that produce corrosive by-products	Disinfectant, sterilizer for medical and dental equipment