Producing natural gas from shale

Process of hydraulic fracturing

1. **Drilling**:
   - Drilling a vertical hole, usually from 5,000 to 10,000 feet into the shale formation.

2. **Laying**:
   - Laying a series of horizontal holes to increase the area of the shale formation that can be fractured.

3. **Fracturing**:
   - The process of creating fractures in the shale by pumping a fluid (fracturing fluid) along with sand or other particulate matter under high pressure.

   **Fracturing Fluid**
   - Types: Water-based, Foam, Cross-linked, Alcohol-based.
   - Uses: To prop open the fractures, transport the sand particles, and displace formation fluids.

   **Sand**
   - Used to create a physical barrier that allows the flow of natural gas from the fractures to the wellbore.

4. **Completion**:
   - Once the fractures have been created, the wellbore is cleaned and the fractures are propped open with sand or other material.

   **Completion Fluids**
   - Types: Cement, Gel, Polymer.
   - Uses: To stabilize the wellbore, prevent the formation of sand plugs, and allow the flow of natural gas.

Groundwater

- **Dissolution of Salt Deposits**: When water moves through the rock, it can dissolve salt deposits, creating fractures and channels.

- **Natural Fractures**: Fractures that already exist in the rock can also be used for gas migration.

**Did you know?**

- **Water Usage**: The process of hydraulic fracturing requires large volumes of water, typically ranging from 1 to 5 million gallons per fracture.

- **Environmental Impact**: Hydraulic fracturing can lead to concerns about water quality and the release of hydraulic fracturing fluids into the environment.

- **Regulations**: Regulations for hydraulic fracturing vary by state, with some requiring permits and bonding for the drilling process.

- **Technological Advances**: Advances in drilling and horizontal drilling technology have increased the effectiveness of hydraulic fracturing.

- **Economic Impact**: The natural gas industry has become a major economic driver in many regions, providing jobs and tax revenue.