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Natural gas and gas condensates development

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The high price of natural gas on world markets in recent years has stimulated and increased interest in developing gas reservoirs. This is why; companies seek new ways to optimize their natural gas and gas condensate resources through several ways i.e. Hydraulic fracturing and matrix acidizing.

Development

Determining whether to drill a well depends on a variety of factors, including the economic potential of the hoped-for natural gas reservoir. It costs a great deal of money for exploration and production companies to search and drill for natural gas, and there is always the inherent risk that no natural gas will be found. If the new well, once drilled, does in fact come in contact with natural gas deposits, it is developed to allow for the extraction of this natural gas, and is termed a 'development' or 'productive' well. At this point, with the well drilled and hydrocarbons present, the well may be completed to facilitate its production of natural gas.

Around the world today, with the use of modern horizontal drilling techniques and hydraulic fracturing, the trapped oil and natural gas in these shale reservoirs is being safely and efficiently produced; gathered and distributed to customers.

Hydraulic fracturing

Hydraulic fracturing produces fractures in the rock formation that stimulate the flow of natural gas or oil, increasing the volumes that can be recovered. Wells may be drilled vertically hundreds to thousands of feet below the land surface and may include horizontal or directional sections extending thousands of feet.

Fractures are created by pumping large quantities of fluids at high pressure down a wellbore and into the target rock formation. Hydraulic fracturing fluid commonly consists of water, proppant and chemical additives that open and enlarge fractures within the rock formation. These fractures can extend several hundred feet away from the wellbore. The proppants - sand, ceramic pellets or other small incompressible particles - hold open the newly created fractures.

Once the injection process is completed, the internal pressure of the rock formation causes fluid to return to the surface through the wellbore. This fluid is known as both "flowback" and "produced water" and may contain the injected chemicals plus naturally occurring materials such as brines, metals, radionuclides, and hydrocarbons. The flowback and produced water is typically stored on site in tanks or pits before treatment, disposal or recycling. In many cases, it is injected underground for disposal. In areas where that is not an option, it may be treated and reused or processed by a wastewater treatment facility and then discharged to surface water.

Matrix Acidizing

Matrix acidizing (or treating) is treating of the formation beyond the wellbore to remove permeability blocking damage to inward or outward flow. Most formation damage is very shallow, often within an inch or less of the formation face. Most common damage causes are particulates in injected fluids. Other causes are water blocks (relative permeability damage), fine particle migration (silts and clays), crush zones in perforations, bacterial colonies and any other blocking mechanism that is acid soluble or solvent and dispersant removable. Damage causes that cannot be removed by matrix treating include poor perforating practices (too few perfs, uncleaned perfs, perfs off-depth), water influx (edge water or coning), packer slip or extremely low formation permeability. Before pumping an acid job under questionable conditions, re-perforating of the zone should be considered. Re-perforating is more controllable in terms of exact location affected and generally penetrates deeper than matrix acidizing.

Problems with HF and MA

Problems with MA: Many problems (most preventable) may cause the failure of an acid job to increase or recover lost production rates. Acid penetration is limited so penetration of any improved zone into the reservoir will also be limited. Acid will dissolve many materials but has no effect, or even has a detrimental effect on several more. Many operators use acid as a diagnostic tool, just to see if what they consider a damage problem is acid soluble. Acidizing is relatively cheap, and using acid as a diagnostic tool is acceptable in most cases, if the results are analyzed for what they reveal.

Problems with HF: Each gas well requires an average of 400 tanker trucks to carry water and supplies to and from the site. It takes 1-8 million gallons of wáter to complete each fracturing job. The water brought in is mixed with sand and chemicals to create fracking fluid. Approximately 40,000 gallons of chemicals are used per fracturing. Up to 600 chemicals are used in fracking fluid, including known carcinogens and toxins such as HCL, Radium, Uranium. That means it requires 72 trillion gallons of water and 360 billion gallons of chemicals needed to run gas wells. During this process, methane gas and toxic chemicals leach out from the system and contaminate nearby groundwater. Methane concentrations are 17x higher in drinking-water wells near fracturing sites than in normal wells.

Conclusion

In my opinion Hydraulic fracturing is very effective yet very harmful to the environment thus, I would differ from using it. But we can stop using it till humanity finds a better way to use it or use different fluids that can lower the it's negative effect or even completely remove it.

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