

JetPak™



Case Study: New cleanout method results in significant increase in gas production utilizing a highly efficient jet pump with a newly developed coil tubing system.

Introduction

Eight coal bed methane wells in Southeastern Oklahoma producing from the Hartshorne Coal were chosen to test a new cleanout process utilizing a jet pump and newly developed coil tubing system. All wells were similar, with an average vertical depth of 2200ft, and an average total depth of 4300ft.

The jet pump, trademarked JetPakr (fig. 1), and the parallel coil tubing system, trademarked FLATpakr (fig. 2), were developed to provide customers with a quick, easy, and efficient way to clean out their wells and increase production.

The JetPakr assembly is run on the FLATpakr™ string, using one side for power fluid injection and the other side for fluid returns. The jet pump is equipped with a nozzle/throat configuration which will be optimized for the candidate wells.

The intake of the pump has a screen to allow appropriately sized solids to be produced, but will prevent oversized particles from clogging the pump. Also incorporated is a combination back-pressure valve / nozzle which acts as a forward jet if sand or coal bridges are encountered which prevent normal forward advancement of the JetPakr assembly. When pressurized by pumping down both FLATpakr strings, the valve will open and the tool will jet forward into the bridge. Once the bridge is broken, jet pumping can resume, and the fluid and solids can be produced to surface.

Challenge

Economically clean out medium depth, horizontal coal bed methane wells with a goal to achieve increases in gas production.



fig. 1

Highlights:

- o Averaged 31% increase in gas production per well
- o Two wells more than doubled in gas production
- o Jetted through multiple coal bridges per well
- o Lower costs than previous cleanout methods



Complete cleanout setup including CT unit, pump truck, and flowback tank.



fig. 2

Solution

Utilize the JetPakr pumping/jetting system along with a FLATpakr parallel coil tubing string to jet through any coal bridges and retrieve solids to surface.

Results

The following results in Table 1 are based on average production of wells for 30 days prior to cleanout, and 30 days post cleanout.

Conclusion

The results show that some wells had a better reaction than others when examining raw increases in gas production. Some of the wells that showed marginal or no increase in gas production showed large increases in water production. This stems from the water buildup of the deeper zones of the wellbore that were blocked off by coal bridges. It can be assumed that in time, this early increase in water production will fall off, and gas production will increase.

Using a combination of vacuuming and jetting, all coal bridges were blown through and cleaned to surface successfully. By creating a low pressure (vacuum) in the wellbore, there was no damage to the reservoir, and well productivity increased immediately after the service was completed. Previous methods of cleanout included under-balanced foaming which is more costly, less efficient, and can cause formation damage.

Overall, there was an average 31% increase in gas production per well, while Well #1 and well #8 both more than doubled in gas production.

Based on the results of this multi-well cleanout, the JetPakr shows to be a viable solution for cleaning solids and increasing gas production.



Function testing jetting tool on surface prior to running in hole.



Coal fines in returns.

Well	Pre Cleanout Gas Production (mcf/d)	Post cleanout Gas Production (mcf/d)	Increase in Gas Production (%)	Pre Cleanout Water Production (bpd)	Post Cleanout Water Production (bpd)	Increase in Water Production (%)
1	41.4	86.0	108%	7.2	20.2	181%
2	104.8	136.3	30%	0.3	0.8	167%
3	143.5	158.0	10%	0.5	0.6	20%
4	266.9	277.3	4%	1.7	2.4	41%
5	74.3	79.4	7%	1.2	1.9	58%
6	28.2	32.2	14%	5.7	20.1	253%
7	46	34.7	-25%	0.7	20.1	2771%
8	119.5	240.2	101%	1.4	4.0	186%
Cumulative			31%			460%

Table 1 - Production Results



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