GAS ASSISTED PLUNGER LIFT - WOLFCAMP

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ABSTRACT

In today's world almost all wells in shale plays are drilled horizontally on multi well pads. It is common to see a majority of these wells on gas lift during flowback, and for the early life of the well, to handle the high gas rates and solids during the flowback period. The horizontal completions have proven to lead to high production rates, however, production engineers are often left with highly deviated wellbores that are difficult to produce at lower rates and pressures. Specifically, it becomes very challenging to produce wells economically with rod pumps in deviated wellbores that have high water and gas rates. The operational challenges can be overcome with costly designs and well managed chemical programs, however, it can be more economical to extend the life of the well on gas lift by adding a plunger to the system.

This paper will review the reasons that EP Energy decided to change the Permian artificial lift program to include gas assisted plunger lift (GAPL) in the Wolfcamp Shale. Since converting wells to GAPL we have seen a reduction in compressor needs, capital investment to convert to rod pump, and flatter production curves which results in improved $/BOE metrics.

INTRODUCTION

The goal of this paper is to point out what has been learned from the GAPL program at EP Energy. The intent is not to persuade you to convert your wells to GAPL but simply to share some information to help you decide whether or not GAPL might be a good solution for some of the wells in your area.

Usually horizontal wells will start showing slug flow as pressure declines in the reservoir indicating that the gas lift is becoming inefficient for lifting. In the past, when wells showed the slugging signature, they became candidates to convert from gas lift to rod pump. The hope was to reduce the bottom-hole pressure enough to remedy some of the slugging issues from the wells while reducing the decline rate from inefficient gas lift. Unfortunately, some of the wells continued to slug causing severe gas interference and solids in the pumps. Those conditions are conducive to high failure rates and expensive well work.

Over the past 18 months we have focused on installing GAPL on lower producing gas lift wells that will be shared in this paper.

OPERATIONS

GAPL systems can be a challenging to operate but can also be a very cost effective way to maintain base production if you have the right training and processes in place. Overall the operations of a GAPL system is not very complex. A control valve with selected trigger points and consistent gas lift injection helps bring the plunger to surface. The plunger is capturing the fluids falling back that gas lift, by itself, can't bring to surface without slugging.

In theory the operations are very easy, however, plungers are not as simple to optimize as it seems. After several failed attempts to operate a GAPL well in the field, adjustments had to be made. Looking back it was clear that the operators weren't trained well enough and the field didn't have the required tools to optimize the wells efficiently. Without the tools or standard operating procedures in place it was foolish to believe the GAPL systems would be a success.

To improve the operations a manual was created to help teach how to optimize, troubleshoot, and automate each well. The automation group also made it possible to change set points on the wells from any location. It was important to have as many eyes on the plungers as possible to help with surveillance

and optimization. By training the operators increasing the automation capabilities the GAPL program had a much better chance for success compared to the original pilot that had failed.

ECONOMICS

If GAPL systems are being operated correctly there are several economic advantages when compared to rod pump. The capital spent to install GAPL is ~18% of a typical rod pump installation. By pushing the rod pump conversion down the road the rod pump installation costs can be reduced by ~10% due to lower production rates. Also, by adding a plunger to the system it reduces the gas lift volumes needed for efficient lift. To date the compression in the field has been reduced ~20% due due to GAPL conversions which is a significant savings on compression rentals.

In addition to capital and monthly LOE savings there is also benefits in rod pump failure rates. In general, the highest failure rates in the field are wells that have the highest production rates. By converting wells later in life the failure rate has dropped across the field. The new conversions are on very low producers that last much longer before failure.

GAPL is without question more economic in terms of capital invested and monthly lease operating expense. The challenging part is optimizing production in order to match what a rod pump can give on a consistent basis.

CONCLUSION

There is definitely an advantage running GAPL as an intermediate form of artificial lift between gas lift and rod pump. That being said, it is critical to make sure everyone in field is trained and has a working knowledge of how to troubleshoot the surface equipment as well as the downhole trends of plunger cycles. If the plungers aren't operated correctly the production lost will offset the capital savings earned by not installing rod pump. The presentation that goes with this paper will address the operational challenges, cost savings, and go forward ideas to improve GAPL systems.