An operator in Eddy County, New Mexico, chose to optimize two wells from a five-well gas lift design based on the highest productivity index.

Each well was producing using an electrical submersible pumping (ESP) system and the operator wanted to switch to a gas lift system in order to lower maintenance costs and prevent sand damage to the ESP system.

Before switching, the operator wanted to find the optimal bottomhole pressure range to justify cost savings vs. lower production rate.

Baker Hughes, a GE company (BHGE) recommended the WellPulse™ production optimization software, which uses historical well test data to develop a more accurate well model in order to generate and optimize a well’s future production on a gas lift system.

Using the fluid and reservoir data acquired by the WellPulse software, BHGE built a model for each well. From there, an inflow and outflow curve match was established from the latest production figures. After interpolating back the production curves from an ESP-flowing well to a natural-flowing well, the curve created was then labeled as the base. Subsequently, a sensitivity analysis with changing gas injection rates was generated against the static inflow performance curve to find the highest possible production rate capable for each well.

Optimal production rate quantified for two wells

Using the sensitivity analysis charts that the software delivered, the operator could predict production rates when using gas lift at any given bottomhole pressure required. The charts also enabled the operator to find the optimal gas injection rate that would be economical for each well while sustaining reasonable flow rates.

For these wells, the WellPulse software provided the operator with a realistic prediction of the wells’ productivity using alternative artificial lift methods.

Results

- Obtained accurate, up-to-date data such as the trajectory, completion design, well tests, and fluids analysis
- Provided a realistic prediction of the wells’ productivity using alternative artificial lift methods
- Quantified the optimal production rate for two wells, adding approximately 140 BPD relative to natural flow
- Created gas-lift design expected to increase revenues by $5,000 USD/day within two days of installation

Challenges

- Identify a range of bottomhole pressures that signified a lower and upper gas lift limitation that was justifiable given a reasonable production rate
- Interpolate back vertical lift curve from an ESP-lifted well to a naturally flowing well
A lower bottomhole pressure limitation of approximately 500 psi with 100 STB/day was recommended, while a range between 1,000 and 1,500 psi was recommended as an upper limit.

Increasing gas injection rates does not always add to increased production, however. After a certain point, a high injection rate will increase the bottomhole pressure, resulting in lower production due to friction losses.

These results will allow the user to identify those limitations for each well. From there, a recommended gas lift design is developed, providing the most efficient space out and test rack valve pressures needed for the entirety of the gas lift assembly string.