Abstract: ALRDC Houston Feb 28 – Mar 2 2022

Title: New Life for Old Wells: Finding Production and Economic Wins in Gas Wells with Tubing Perforation and Plunger Lift

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1. Objectives/Scope

As many as 10% of Laramie Energy, LLC's wells were non-producing or under-producing due to deep-set tubing or mechanical restrictions in tubing or casing. A program of evaluating existing completions followed by tubing perforation and reestablishment of plunger lift was undertaken to restore economically viability to these wells.

2. Methods, Procedures, Processes

The process identified candidates based on production and operating parameters, established well conditions with Echometer data, slickline, and field information, and modeled well flows with nodal analysis to determine if plunger lift could be run more effectively from a different depth. Perforation depth was based on nodal analysis, geological interpretation of water bearing zones, and known or suspected mechanical constraints.

3. Results, Observations, Conclusions

The program has been applied to 32 wells so far. Thirteen wells were removed from the potential P&A list, 15 others showed significant gains, 3 were unsuccessful and 1 is still pending results. On average, there was a per-well production increase of 135 MCFD, reserve addition of 241 MMCF, and valuation increase of $328,900 for an overall cumulative gain of 4.58 BCF and $9.2 Million. Overall cost of the program over the reporting period was $209,200 for an average of $6,540 per well. In addition, common operating issues such as venting loaded wells was all but eliminated, reducing man hours, operating expense, regulatory load, and environmental impacts. There are approximately 100 additional candidate wells in this asset with potential for an additional 14 BCF in reserves.

Tubing placement in existing gas wells is rarely re-assessed as the well ages. A thorough assessment of this aspect can yield an effective, low-cost, high-impact positive result, that has a

short payback period with added environmental and regulatory-related benefits. Incremental gas sold at high market prices further improves returns.