Case History: Unloading Tight Gas Wells in South Texas with Wellhead Compression

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Outline of Presentation

• Overview
• Candidate Selection
• Individual Well Results
• Equipment and Operational Considerations
• Challenges
• Overall Results/Path Forward
ConocoPhillips Lobo Asset

- Produces 420 MMCFPD (Gross)
- 1600 Producing Wells
- Tight LoboWilcox Sands .01-1 md
- 99% of wells are fraced

- 8-12,000' Depth
- Depletion Drive
- SCADA rate/press. For 99% of wells
Artificial Lift Methods Used In Lobo

- “Smart Intermitter”
- Plunger Lift
- Soap Capillary, backside, batch
- Siphon String
- Wellhead Compression
Opportunity/Question

- Hundreds of loaded up wells
- Where do we begin using wellhead compression as an artificial lift method?
Tool - Decision Model

• Provides method for decision making (ranking candidates) in uncertainty
• Includes multiple factors that you believe effect outcome
• Weights these factors according to best guess ranking
Decision Model for Wellhead Compression - Required Hurdles

- Production Rate below liquid unloading rate (Turner)
- Well’s cumulative production more than 3 BCF
- Downstream compression has sufficient capacity for expected increase
- Expected Liquid Production < 30 BPD
Decision Model - Factors

- History of unloading in past
- Sensitive to wellhead pressure
- Cum. over 6 BCF
- Six additional minor factors
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Vaquillas A-24
6 BCF Produced
750 psig SIWHP
Coil Tubing
Stuck/Parted
Wellhead Compressor installed, required batch soap/SI to unload

125 MMCF Uplift

System Bottleneck

Projected Decline

Flowline Pressure

Projected Decline

Metered Volume

Uplift

Static Press

Tbg Press
Vaquillas A-40
2.875" Tubing
SIWHP=300 psig
4 BCF Produced
D/S Compression Problems

EFM installed

ConocoPhillips
South Texas Production

Well Work Monitoring
82002036 Vaquillas A-40 C#8786
Tracking Type: 03 GasJack Compr

Volumes (mcfd)

Projected Decline

Metered Volume

Uplift

Static Press

Tbg Press

March 1-3, 2004 2004 Gas Well De-Liquification Workshop Denver, Colorado
MV Herbst 8
2.875” Tubing
SIWHP= 700 psig
11 BCF Produced
Thought well
Loaded up with
Pressure increase

Wellhead Compressor + Batch
Soap/SI did not unload well
Productivity Problem

Projected Decline  Metered Volume  Uplift  Static Press  Tbg Press
Replaced 2.875” with 2.375” Tubing Could not Unload well

Wellhead Compressor Installed
La Perla 50
Res. Press = 500 psi
27 BCF Produced

2.875” Tubing Parted @ 56’
Wellhead
Compressor
Batch Soap SI 24 hrs
Rate now 900 MCFD
Equipment and Operational Considerations

Skid Mounted Gas Jack/ Compressco Field Services
Compressco Field Services, Inc. – GasJack Compressor

- Patented
- Manufactured by Compressco Field Services, Inc.
- Skid mounted and trailer transportable
- Wide range of Operating conditions
- Inexpensive to Operate
- Safe and Environmentally Friendly
UNIT DESCRIPTION

- Ford 460 cu. in. V-8 natural gas fueled engine
- Four (4) cylinders deliver 50 Hp for power
- Four (4) cylinders with compression valves
- Suction pressures from 20 in. Hg to 75 psig
- Discharge pressures up to 350 psig
- ASME coded Blowcase handles 40-70 BPD liquids
- ASME coded GEA gas aftercooler
Production Flow Path

• 2” Suction Control Valve controls full well stream inlet
• Blowcase separates gas/liquid. Equipped w/ relief valve
• Manual bypass for start up and blowdown
• ASME coded gas aftercooler
• Configured compression valves for application
• Mechanical gas production bypass activates as required after unloading.
Environmental and Safety

- Noise level ranges 56.5 to 72 dB(A) +/- 2000 rpm
- 50 Hp emits < 10 tons per year CO – NOX
- Footprint 4’ x 12’ – 4650 lbs. w/ drip rail
- All pressured vessels w/ Mercer relief valves
• Battery start with solid state electronic ignition

• Weatherproof Murphy panel with 11 signals

• Coordinated installation and start up

• Job Safety Assessment (JSA) performed

• Routine monthly preventive maintenance (PM)
Challenges

• Candidate Selection
• Uplift Prediction
• Initial Unloading of Wells
• Downstream compression limitations
Challenges

• Pushing compressor operating envelope to higher rate range
• Battery System
• Control Valves – Suction and Recycle
• Liquid Slugs
Summary 20 Wells
600 MMCF Incr. Gas
Quick Look Economics

- Incremental Revenue – $2.5 MM
- Total CAPEX+ OPEX - $.6 MM
- Ongoing Incremental Cost - $.30/MCF Uplift
Path Forward

• Install additional 20 units in 2004
• Revise Decision model selection criteria with results of 2003 installations
• Take Flowing/Static BHP on “risky” wells before installation
• Increased use of Integrated Production Modeling to determine best option predict flowstream and reserves addition