A Novel Foamer for Deliquification of Condensate-Loaded Gas Wells

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Baker Petrolite
Outline

• Challenges of conventional foamers
• Problem solving approach
• Screening tests
  – Product comparison
  – Well condensate comparison
  – Water cut effect
• Trial
  – Test well information
  – Gas production results
  – Condensate production results
  – Economic gains
• Summary
Challenges for Conventional Foamers

**Challenges**

- High condensate cut acts as foam suppressant
- Temperature limitations
- Higher concentration can have adverse impact on downstream processes
Problem Solving Approach

- Laboratory screening of products in synthetic fluids
- Candidate well selection
  - Production profile evaluation
  - Flow modeling
  - On-site screening with field fluids to evaluate wells
- Initiation of trial
- Monitoring of production data
- Performance evaluation
- Optimization
Foam Screening Apparatus

Diagram showing a setup with a water circulator, gas supply, flow meter, test column, and balance. The diagram indicates a process for foam screening apparatus.
Condensate Foamer Exhibited a Broader Effectiveness Range in Various Condensates

80% Condensate - 1% Various Foamers

- Condensate foamer
- Amphoteric foamer
- Anionic foamer

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<th>Well</th>
<th>% Unloaded</th>
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Increased Foaming Performance with Condensate Cut

Condensate Cut Effect - 1% Condensate Foamer

Wt % Unloaded

% Condensate

Well A
Well C
Well D
Well F
Condensate Foamer trial with Multiphase Separator
Well was Loaded with 66 Percent Condensate

- Trial performed at a well in Texas
- Well depth was 14,700 ft with 3-½ in tubing
- Slim-hole completion (no casing)
- Applied via cap string through production tubing
- Applied in conjunction with intermitter to assist in unloading fluids
- Monitored gas, water, and condensate production
$1,894 per Day Net Increase in Gas Revenue

Texas Trial - Gas Production Increase

- Loaded: 338 Mscf/d
- W/ Intermitter: 589 Mscf/d
- W/ Intermitter + Condensate Foamer: 939 Mscf/d
$782 Additional Revenue from Condensate

Texas Trial - Liquid Production

Fluid Production (bbls)

- 12-Day Production with Intermitter (Baseline)
  - Condensate: 222.0
  - Water: 78.0

- 12-Day Production with Condensate Foamer
  - Condensate: 296.3
  - Water: 28.2

Legend:
- Condensate
- Water
Economic Impact

- Gas price: $5.41/mBTU (at time of trial)
- Crude price: $68/bbl (at time of trial)
Trial Summary

- Effectively foamed well with >65 percent condensate cut
- Extended intermittent production from a 1 day “on” to 11 day “on” cycle
- No foaming or emulsion problems observed on surface equipment
- Improved gas production by 59 percent
- Improved condensate production by 16 percent
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Comments & Questions?
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