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1
Two scenarios modeled
Flow through casing
Flow through annulus
Models are draft versions
Coarse grid
Lacking operational details
Pore pressure = 12.6 ppg
Gains = 85 bbl
Flow through annulus vs shoe

Slide 1 Comments

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Flow through annulus vs shoe

- Two scenarios modeled
  - Flow through casing
  - Flow through annulus
- Models are draft versions
  - Coarse grid
  - Lacking operational details
- Pore pressure = 12.6 ppg
- Gains = 85 bbl

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Flow through annulus vs shoe

- Total volume increase by 1100 bbls
- 1970 bbl total volume -> 126 % increase

- Volume from shoe incl.dp: 870 bbl

- Volume in riser (ex dp): 1650 bbl

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Flow through annulus vs shoe

- Bleed down volumes caused by compressibility of fluids
- From 2400 psi to 1200 psi
  - 5 bbl without annulus
  - 12 bbl including annulus
- No underbalance with 12.6 ppg reservoir during this initial bleed down, neither through the annulus nor through the casing

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Flow through annulus vs shoe

- Second bleed down from 1200 to 273 psi
- Total bleed down volumes due to comp.
  - 10 bbl without annulus
  - 22 bbl including annulus
- Underbalance for casing scenario
- Higher pressure in annulus. Form-A-Set volume below annular preventer may create an underbalance

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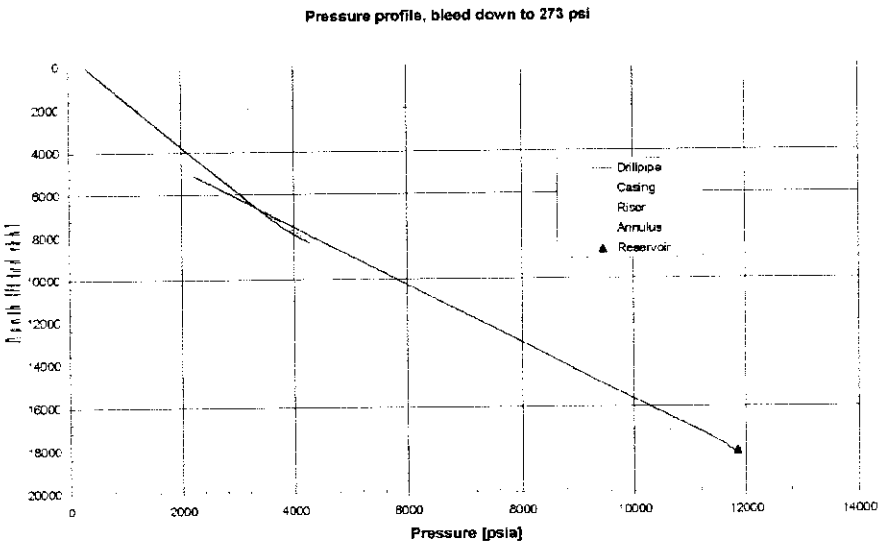
Flow through annulus vs shoe



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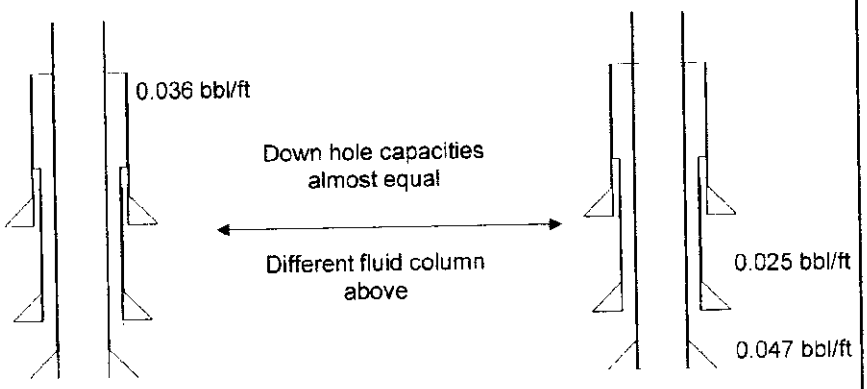
Flow through annulus vs shoe

- Kick sizes required to create the observed shut-in pressures



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Flow through annulus vs shoe

- Shut-in pressure of 1200 psi
  - Kick size ~ 190 bbl in casing
  - Kick size ~ 25 bbl in annulus
- Shut-in pressure of 1400 psi
  - Kick size ~ 250 bbl in casing
  - Kick size ~ 45 bbl in annulus

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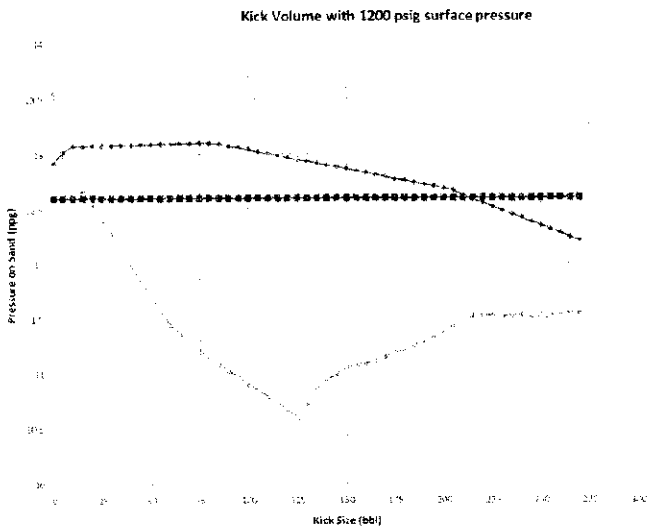
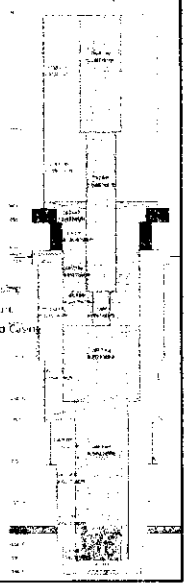
Flow through annulus vs shoe





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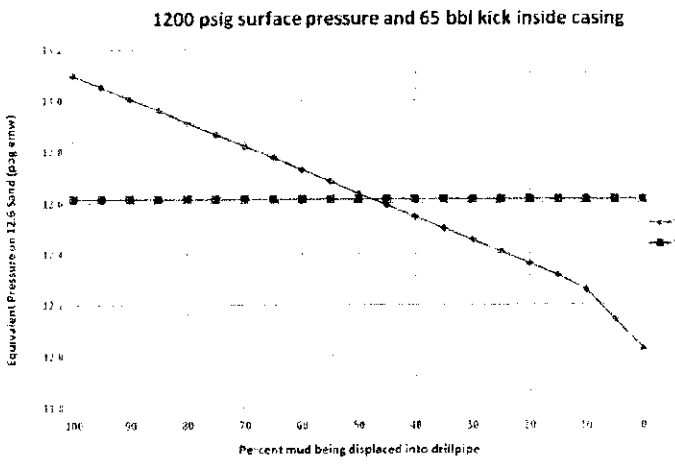
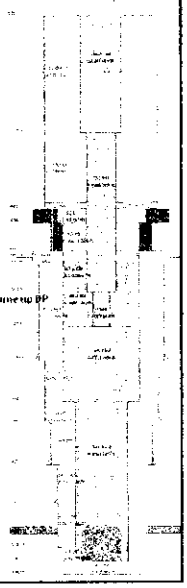
Flow through annulus vs shoe





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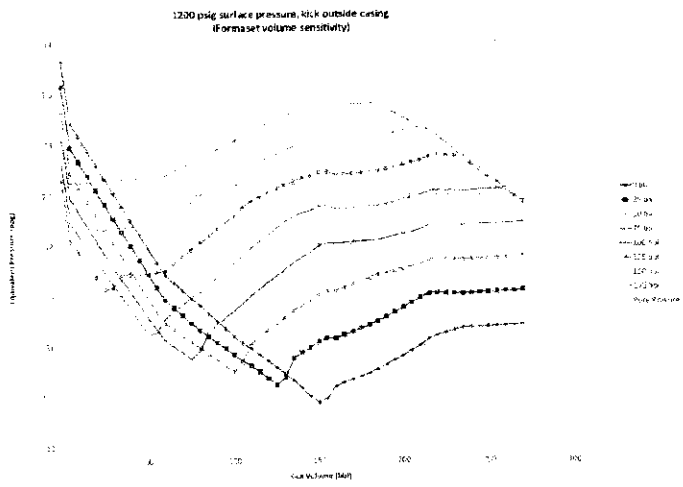
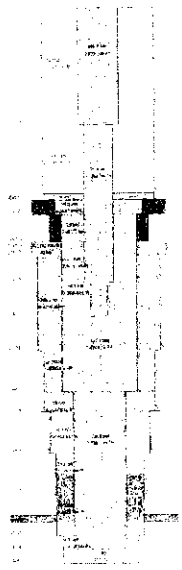
Flow through annulus vs shoe





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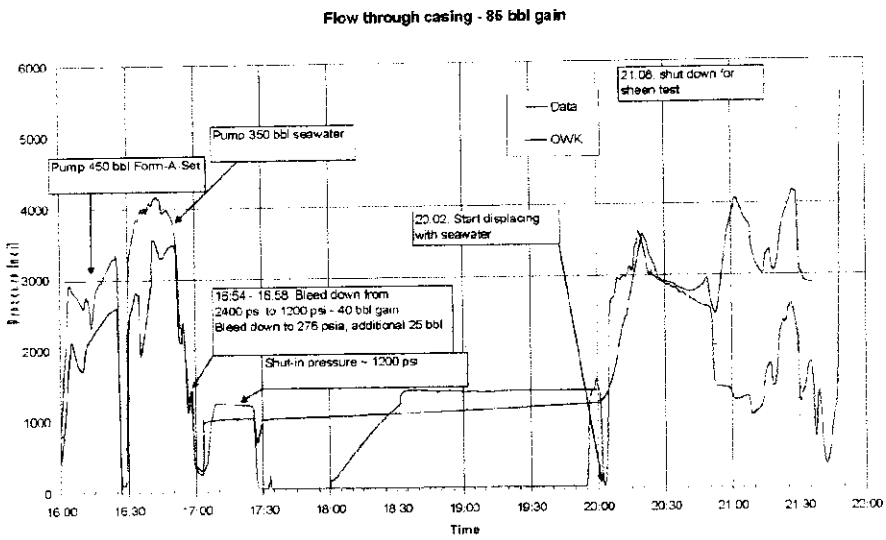
Flow through annulus vs shoe



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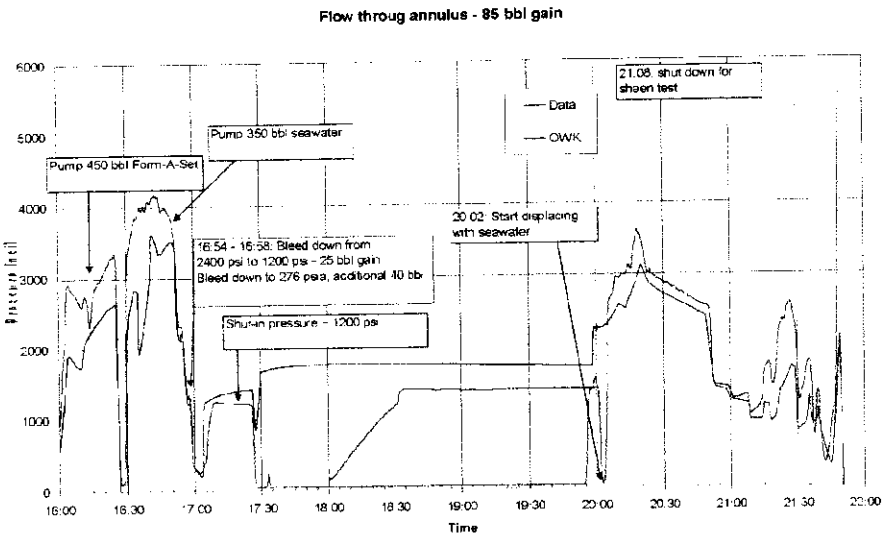
Flow through annulus vs shoe



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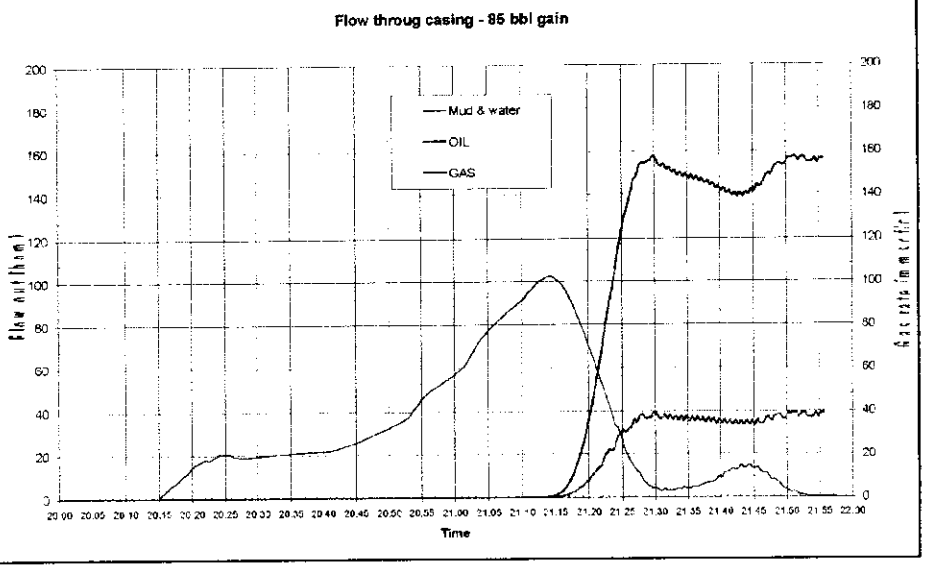
Flow through annulus vs shoe



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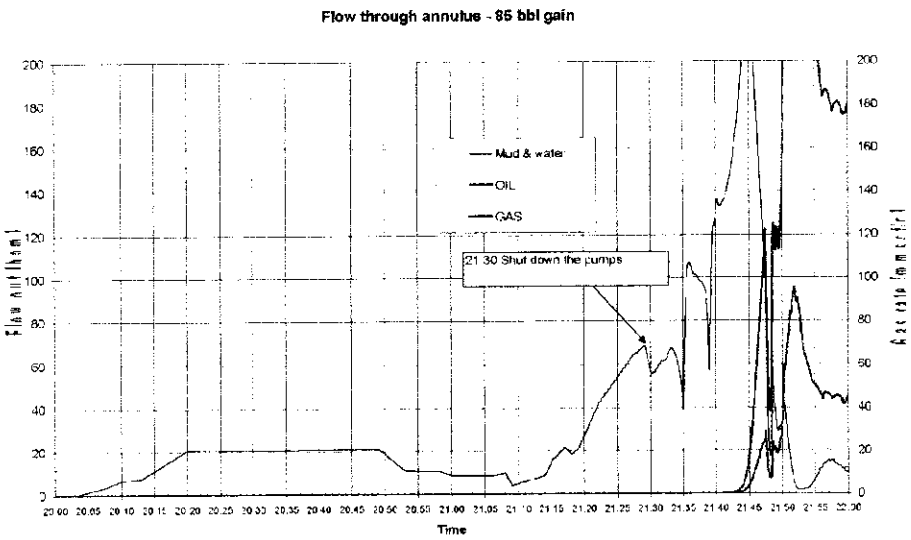
Flow through annulus vs shoe



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Flow through annulus vs shoe

- Shut-in pressures do not match with reported gains
- The calculated shut-in pressures are lower for casing scenario and higher for annulus scenario compared to measurements

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Flow through annulus vs shoe

- Shut-in pressure too low for casing scenario based on reported pressures
- Simulation based on 13.0 ppg sand and 4 ft net pay

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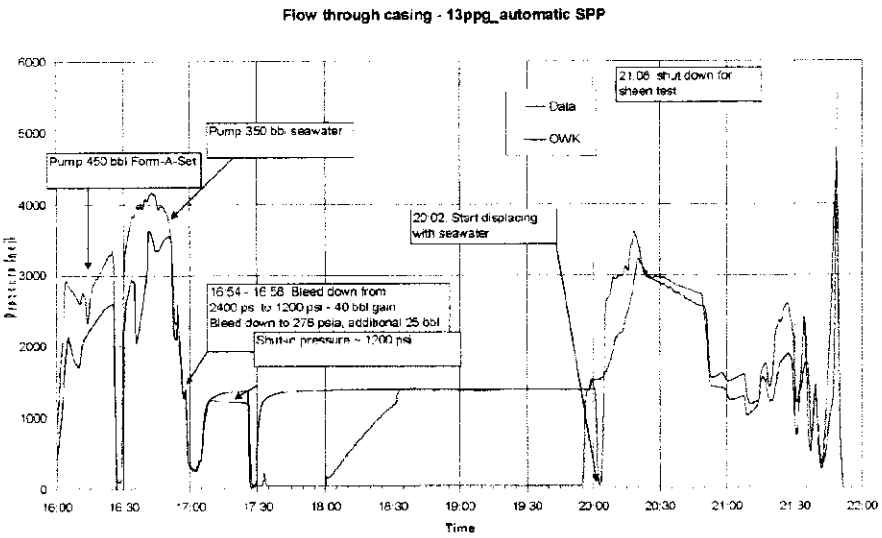
Flow through annulus vs shoe



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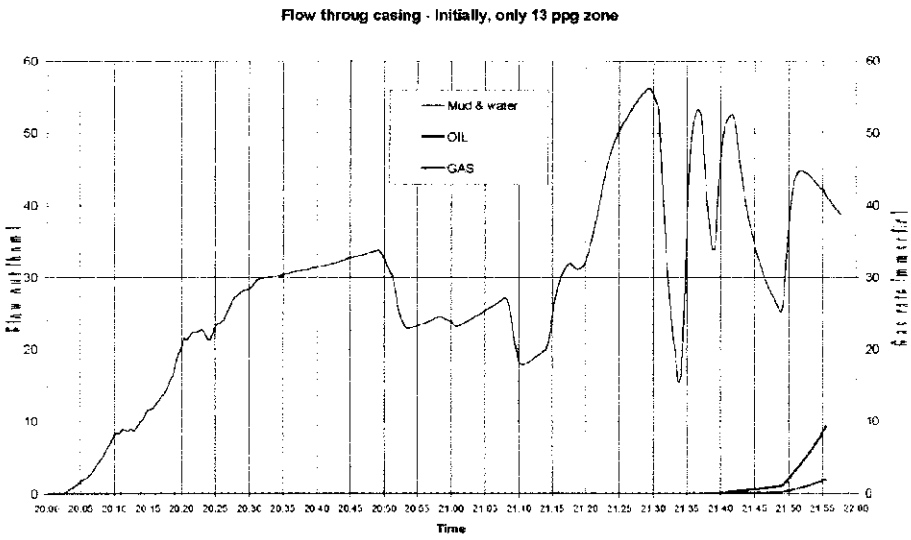
Flow through annulus vs shoe



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Flow through annulus vs shoe

- Recommendations for further modeling
  - Validate input data and implement
  - Finer grid (increase computational time)
  - Sensitivites wrt. reservoir exposure
  - Sensitivities wrt. restrictions down hole

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