

# PETE 310

## Lecture # 16

### Chapter 9 – Properties of Black Oils from Field Data

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## Analyzing Production Trends

- Gas production trends
  - Dissolved gas only
  - Dissolved and free gas
- Pressure trends
  - Bubble point pressure determination
  - Adjustment of surface gas data

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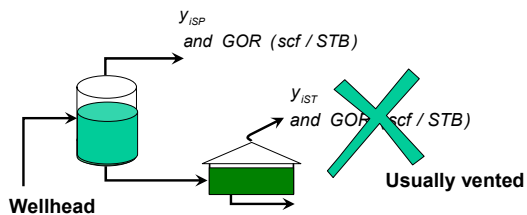
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## Separators



Note for a black oil have more liquid produced than for a wet gas – Less oil shrinkage and lower GOR

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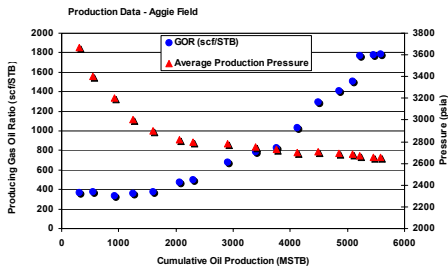
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## Production Trends




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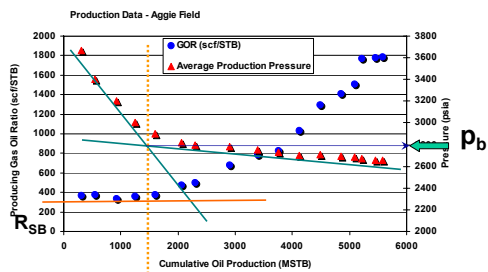
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## Production Trends




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## Adjustment of Surface Gas Data

- Gas from the stock tank usually is vented
- Ignoring this gas could lead to estimates for  $R_{sb}$  10% to 20% lower
- Solution:
  - Add stock-tank gas-oil ratio obtained from a correlation to the  $R_{sb}$  obtained from field data

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## Graphical Procedure

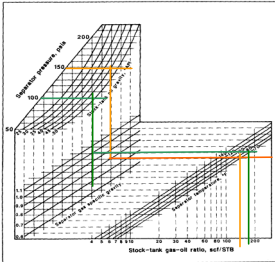


Fig. 9-3. Stock-tank gas-oil ratio correlation.

- Interpolations needed
- Easy to mix up lines
- Note the trends in  $R_{ST}$

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## Adjustment of Surface Gas Data

- Reading from graph can lead to substantial round off error
- Equation B-36 in Appendix B page 518 has been used to create Figure 9.3
- Be careful with the units required in the equation

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## Adjustment of Surface Gas Data

- Equation

$$\ln R_{ST} = A_1 + A_2 \log \gamma_{STO} + A_3 \log \gamma_{GST} + A_4 \log p_{SP} + A_5 \log T_{SP}$$

- Here the temperature is in °F
- Read constants A1 through A5 from text book
- Note the differences in oil and gas specific gravities (density oil/density water, vs Gas molecular weight/ air molecular weight)
- Note subscripts **STO** at stock tank p and T, **SP** at separator p and T

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## A Conceptual quiz

- An oil with API gravity of 50 will have a lower  $R_{ST}$  than an oil with API gravity of 20
  - TRUE ?
  - FALSE?
  - DEPENDS?

- **Discuss**

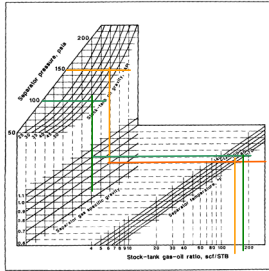


Fig. 9-3. Stock-tank gas-oil ratio correlation.

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