Considering The Full Production History Of Five Key Resource Plays

August 21, 2013
Houston

Mike Morgan, P. Eng.
Major Concepts

• With over a decade of commercial deployment, multi-frac’d development is no longer new so why does most analysis still highlight initial rates?

• By analyzing the full production profile and decline behavior, simple diagnostics can help to identify the flow regime.

• These results can be used a starting point when trying to build analogs for emerging resource plays.

• Actual decline rates for old fields may be higher than you expected.
Peak Rate is, Mostly, a Good Proxy for EUR (Gas Wells in N. America)
…But This is a Broad Correlation
(Gas Wells in N. America with IP≈500Mcf/d)

There can be an order of magnitude uncertainty if EUR is est. by Peak Rate
High Rate Gas Wells in N. America Peak Rate $\approx 30,000$ Mcf/d

The uncertainty may be non-normal and even non-log-normal
Montney Gas in NE British Columbia (Rate–Time Plot)
Montney Gas in NE British Columbia (Pseudo-Blasingame Plot)

If analytical rate/transient techniques are used for our “type-curves”, damage/skin/clean-up effects start to become apparent.

Only Rates Greater than 100 Mcf/d are Plotted.
Montney Wells in NE British Columbia
(Decline at 1, 2, 3, 5, 10 years of production)

P50 decline at 10 years is ≈6%, but these are widely spaced verticals.
Decline Rates of N. American Gas Wells
(after 1, 2, 3, 5, 10, 20, 30 years of production)

P50 decline at 20-30 years is ≈8%
Multifract’d Cardium Oil in Alberta (Rate–Time Plot)

-1/2 Slope

Early well performance is pulling-up the averages
Multifrac’d Cardium Oil in Alberta (Pseudo–Blasingame Plot)

Maybe some wells are seeing boundary dominated flow, but most are not… suspect frac’s are interfering, by wells are probably only interfering weakly… more work needed.

Only Rates Greater than 0.1 bbl/d are Plotted
Multifrac’d Cardium Oil in Alberta
(Decline at 1, 2, 3 years of production)

P50 decline at 3 years is a steeper than both Montney and overall N. American gas declines

Slide 12
Alberta Horseshoe Canyon CBM
(Rate–Time Plot, by Well Cardinality)
Alberta Horseshoe Canyon CBM (Pseudo-Blasingame Plot)

Clear boundary dominated flow

Dewatering and near wellbore perm improvement?

Only Rates Greater than 1 Mcf/d are Plotted
Alberta Horseshoe Canyon CBM
(Decline at 1,2,3,5,10 years of production)

P50 decline at 10 years is ≈7%
Shallow Gas 1960s
Saskatchewan had a less favorable royalty regime at this time.
Saskatchewan had a more comparable royalty regime at this time.
Shallow Gas 1990s
Shallow Gas Early 2000s
Shallow Gas EUR
(from existing wells)

Suffield… we’ll see this later
Shallow Gas Remaining
(from existing wells)

Suffield... we'll see this next
Looking at one of Canada’s original resource plays, we can see that 25 years of technology have incrementally added EUR, but have not fundamentally changed the picture.
Is Your Database Accurate and Complete? (What’s the Matter with Kansas?)

Extent of Shallow Gas Play

Well Locations Were Stored in a Different DB Table
Major Conclusions

- Many current plays are still in infinite acting flow and so it is difficult to verify DPIIP assumptions from production data.

- Good areas are developed first. Technology may have a surprisingly marginal impact on ultimate recovery, though cost and profit may be another matter.

- Smart operators will delineate the expected economic outcome, which may take over a decade... and make sure they don’t miss anything!

- Typical long term decline rates may be steeper than you expect: median decline rates for gas wells after 30 years of production are approximately 5–10%. A minority of wells have much shallower declines.

- Many important parameters, such as EUR and decline rates, can be neither normally nor log-normally distributed.
For fun… how do the states compare?
For fun… how do the states compare?
Contact Us

Keith Braaten
1–403–266–9515
kbraaten@gljpc.com

Mike Morgan
1–403–266–9437
mmorgan@gljpc.com

Jodi Anhorn
1–403–266–9479
janhorn@gljpc.com

Bertrand Groulx
1–403–561–6876
bertrand@visageinfo.com
Contact Us

Keith Braaten  
1–403–266–9515  
kbraaten@gljpc.com

Myron Hladyshevsky  
1–403–266–95229  
mhladyhevsky@gljpc.com

Jodi Anhorn  
1–403–266–9479  
janhorn@gljpc.com

Mike Morgan  
1–403–266–9437  
mmorgan@gljpc.com