Heterogeneity in Unconventional Plays and Quantifying Sweet-Spots in the NEBC Montney

Ian Cockerill
April 2018
RISC’s Global reach and experience

2000+ completed assignments in more than 90 countries for over 500 clients worldwide
## RISC’s Capabilities

**Technical, commercial and strategic advice across the value chain**

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RISC’s Global LNG experience

Significant global experience with LNG Projects. We understand that each project is unique, and faces both individual and common challenges. We understand the key differences between projects in different countries and regions.

RISC provides advice to clients across the LNG supply chain from assessment of pre-production and producing fields through upstream gathering, processing and transportation, liquefaction, export and market assessments.

With our proven track record we are ideally placed to provide an independent view on any proposed LNG asset in the world.
Oil price versus North American Unconventional Development
Global unconventional ‘interest’

Technically Recoverable Shale Gas Resource (Tcf)

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OIL PRICE

RELATIVE COMMERCIAL INTEREST
## Global unconventional ‘interest’

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- U.S. Energy Information Administration
- U.S. Department of Energy

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*EIA/ARI World Shale Gas and Shale Oil Resource Assessment*

Technically Recoverable Shale Gas and Shale Oil Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States
Heterogeneity in North American unconventional plays

Source: Consensus view from public domain information
Break-even oil prices for new wells in North American plays

KEY PLAYS

- MONTNEY (CANADA)
- WOLFCAMP MIDLAND
- WOLFCAMP DELAWARE
- EAGLE FORD
- CRETACEOUS (CANADA)
- BAKKEN
- BONE SPRING
- NIOBRARA
- SCOOP/STACK
- DUVERNAY (CANADA)
- THREE FORKS

RANGE OF BREAK-EVEN IN THE NORTH AMERICAN UNCONVENTIONAL PLAYS ($/BBL)

Source: Consensus view from public domain information
Breaking point in the Eagle Ford

58% of Eagle Ford break-even at <$70 Oil (4,634,000 acres)

Source: Consensus view from public domain information
Growth of the Eagle Ford

Eagle Ford 2007

Eagle Ford 2017

- Oil Well
- Gas Well

50km
1) Can we recognise key rock property characteristics in the producing pervasive unconventional systems?

2) Can we isolate and map out those characteristics to high grade areas for exploration and development (sweet-spot mapping)?

3) Can we calibrate the mapping back to the producing wells to QUANTIFY the potential of the play?
Identification of key play components

THOUSANDS OF PRODUCING WELLS NOW IN NORTH AMERICAN UNCONVENTIONAL PLAYS

MASSES OF PRODUCTION DATA

RECOGNITION OF THE GEOLOGICAL CHARACTERISTICS ASSOCIATED WITH THE HIGH QUALITY PRODUCING ZONES ALLOWS US TO IDENTIFY THE KEY PLAY COMPONENTS

Source: Crew Energy
Common Risk Segment Mapping

Recovery Potential is the combined effect of multiple attributes.

**Common Risk Segment Map** (Sweet Spot Map)

- Attribute exists and the quality is comparable or better to that seen at known production.
- Attribute exists with poorer quality to that seen at known production.
- Attribute doesn’t exist or exists with significantly less quality to that seen at known production.
Common Risk Segment Mapping

COMMON RISK SEGMENT MAP (Sweet Spot Map)

- Liquids-Gas Ratio
- Net Pay Thickness (Porosity/Resistivity)
- Depositional Environment
- Pressure

PRODUCTION CALIBRATION

- WELL A
- WELL B
- WELL C
Common Recovery Segment Mapping

WELL A
WELL B
WELL C

COMMON RECOVERY SEGMENT MAP

RECOVERY POTENTIAL IS THE COMBINED EFFECT OF MULTIPLE ATTRIBUTES

LIQUIDS-GAS RATIO
ROCK QUALITY
ROCK TYPE
PRESSURE

ESTIMATED ULTIMATE RECOVERY
LIQUIDS EUR / SECTION (MBLS)
GAS EUR / SECTION (BCF)
POTENTIAL WELL LAYERS PER ZONE
LIQUIDS EUR PER WELL (MBLS)
GAS EUR PER WELL (BCF)
LIQUIDS/GAS RATIO OF WELL EUR
COMMON RECOVERY SEGMENT MAPPING
The Montney Play Atlas

Phase 1 – North-East British Columbia

- A full suite of interpreted maps at section level detail characterising individual Montney zones.
- Phase 1 is complete and comprises petrophysical interpretation of 400 wells.
- Calibrated attribute, in-place, and recovery mapping across the play.
- The atlas can be delivered as hard copy maps and digitally as .shp files ready for import directly into your interpretation package of choice.

PETROPHYSICS
INTERPRETATION ON
400 KEY WELLS

KEY RESERVOIR
ATTRIBUTES MAPPED OUT
AT SECTION LEVEL DETAIL
The Montney Play Atlas has been used in the identification of new prospective areas and marketing of three recent land transactions in NEBC.
Some closing thoughts

• Heterogeneity in unconventional opportunities can be seen at a global scale through to a play scale. Heterogeneity sets up the opportunity. There are winners and losers.

• Not all Montney is Created Equal. Understanding the heterogeneity is key.

• Detailed petrophysical interpretation, spatial analysis, and an approach to calibrate production to Common Risk Segment Mapping has been used to identify sweet-spots and quantify recovery potential across the NEBC Montney at a section level detail.

• Access to the interpretation product and results is available through purchase or subscription to the Montney Play Atlas.

Opportunities are created by those who see things differently.
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