Bakken/Torquay Development: A Manitoba Update

Dan Barchyn
Outline

- History of Bakken/Torquay Development in Manitoba

- Examples of different play types:
  - Daly Pools: Finding sweet spots in an area of ubiquitous oil saturation.
  - Birdtail: Structural and stratigraphic closures in a regionally wet sand.
  - Sinclair: Reservoirs below the unconformity.

- Bakken Oil System:
  - What we still don’t know (but would like to!).
History

- **California Standard 1954:**
  - First completion attempt at Daly 13-14-9-28.

- **Newscope 1985:**
  - Kola Pool Discovery: Daly area development

- **Northrock 1996:**
  - Birdtail Pool Discovery: Extends fairway updip

- **Tundra 2003:**
  - Sinclair Pool Discovery: Torquay (Three Forks) production

- **Current Production (Nov./04):**
  - 1014 bopd from 193 wells
HISTORICAL

BAKKEN/TORQUAY PRODUCTION

MANITOBA

Data As Of: 2004-11 (MB)
Well Count: 254/255

From: 1972-09
To: 2004-11

Cum GAS 0.0 Mcf
Cum OIL 3,940,192.4 Bbl
Cum WTR 6,323,542.8 Bbl

Well Count  count

Calndr-Day Avg OIL Bbl
Bakken Subcrop

Birdtail

Rocanville

Daly

Sinclair

Sask Man

Bakken Producing Areas

R29

R17
Daly Area

- Major Lodgepole pool discovered in 1950.
- Bakken oil charge throughout area (40 degree API).
- Production performance determined by reservoir quality in Middle Bakken sandstone.
- “Sweet Spots” trend north-south parallel to depositional strike.
- Kola (Bakken A) Pool ultimate recovery = 2 mmbbls
- Major pools are under waterflood.
- Production is commonly commingled with overlying Lodgepole.
- Underlying Torquay beds are productive in S. Ebor area.
Kola Area Log

Phi.(avg) = 17%
K(avg) = 12 md
Net Pay = 5 m
Kola Area: Stratigraphic Section
Kola Horizontal Production Profile

Data As Of: 2004-11 (MB)
From: 1998-02
To: 2004-11

INDIVIDUAL PRODUCTION
Kola Unit No. 2 HZNTL
100/06-33-010-29W1/00

Status: Capable Of Oil Prod
Field: DALY (01)
Pool: BAKKEN A (60A)

Capable Of Oil Prod
DALY (01)
BAKKEN A (60A)

Prdcg-Day Avg OIL Bbl
Cum GAS 0.0 Mcf
Cum OIL 78,902.5 Bbl
Cum WTR 4,063.4 Bbl

Percent: WTR Cut %
Monthly Hours hrs
Daly Area: Commingled Completion
Birdtail Area

- Small Pools (500 mbbls.) within area of good quality Middle Bakken sand.
- Identifiable down-dip water legs.
- Shallow depth (520m), 36 degree API oil.
- Under waterflood.
- Trapping appears to be a combination of structural and stratigraphic factors.
Birdtail Area

Birdtail Unit 1

Birdtail Unit 2
Birdtail Area Log

Phi (avg) = 18%    Net Pay = 3.5m
Birdtail Production Profile

Data As Of: 2004-11 (MB)
From: 1997-07
To: 2004-11

INDIVIDUAL PRODUCTION
Birdtail Unit No. 2 Prov.
100/01-19-016-27W1/00

Status: Capable Of Oil Prod
Field: BIRDTAIL (15)
Pool: BAKKEN C (60C)

Capable Of Oil Prod
BIRDTAIL (15)
BAKKEN C (60C)

Cum GAS 0.0 Mcf
Cum OIL 32,818.5 Bbl
Cum WTR 18,744.4 Bbl
Percent: WTR Cut %
Monthly Hours hrs

Prdcg-Day Avg OIL Bbl
Recent (2003) discovery with currently active development.

Flow unit straddles the unconformity with the bulk of pay found in the underlying Torquay.

Reservoir beds correlate to Christopher’s Torquay “Unit 4”.

Reservoir is a sandy carbonate (Dolomite).

Log expression is subtle and doesn’t explain variations in productivity.
Sinclair Area Log

Phi (avg) = 16%   K (avg) = 3.5 md   Net Pay = 6.0m
Sinclair Production Profile

Data As Of: 2004-11 (MB)
From: 2003-02
To: 2004-11

INDIVIDUAL PRODUCTION
Tundra South Ebor
102/03-07-008-29W1/00

Status: Capable Of Oil Prod
Field: OTHER AREAS (99)
Pool: BAKKEN - THREE FORKS B (62B)

Prdcg-Day Avg OIL Bbl
Monthly GAS [No Data]
Percent: WTR Cut %
Cum GAS 0.0 Mcf
Cum OIL 11,286.8 Bbl
Cum WTR 5,556.6 Bbl

Monthly Hours hrs
Structure on Upper Bakken

- Birdban-Waskada Axis
- Rocanville-Birdtall
- Daly-Sinclair
- Virden-Subcrop
Three different play types are known:

- Daly: facies variations in the Middle Member define sweet spots in area of oil saturation.
- Birdbtaill: structural/stratigraphic trapping within area of regionally wet sand.
- Sinclair: erosionally truncated carbonate reservoirs charged from overlying younger strata.

The Bakken oil system

- Limited distribution of pools and shows.
- Do we really understand it?
Questions for the Researchers

- What is the nature of and hydrodynamic history of the Bakken flow unit?
- Why is there a cluster of light (40 degree API) oil pools at very shallow depths on the northeastern basin flank?
- What is the geochemistry and thermal history of the “hot” Upper Bakken shales in the Daly area?
- Does the conventional view of long distance secondary oil migration from a basin-centered oil window still make sense?