

**Bakken/Torquay  
Development:  
A Manitoba Update**

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# 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!).

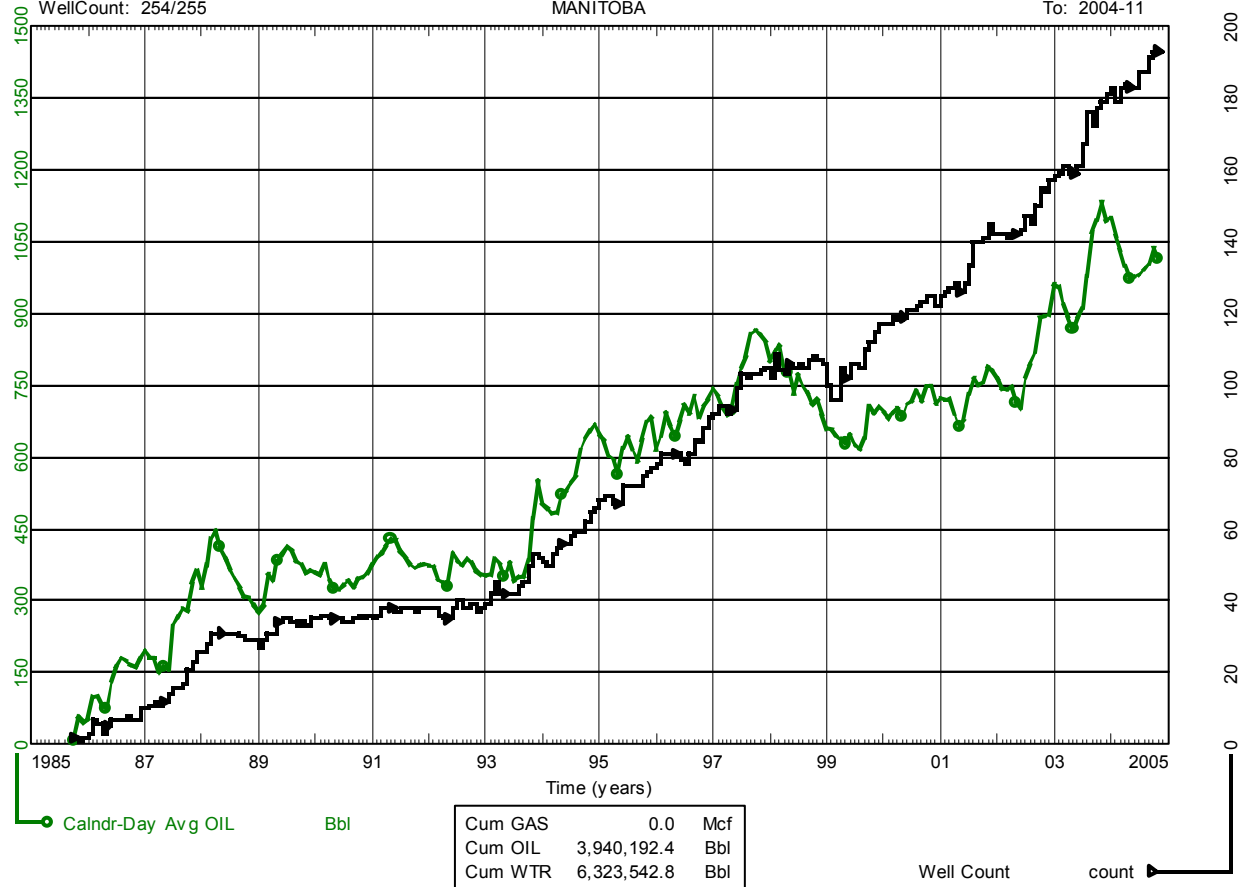
# History

- 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

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

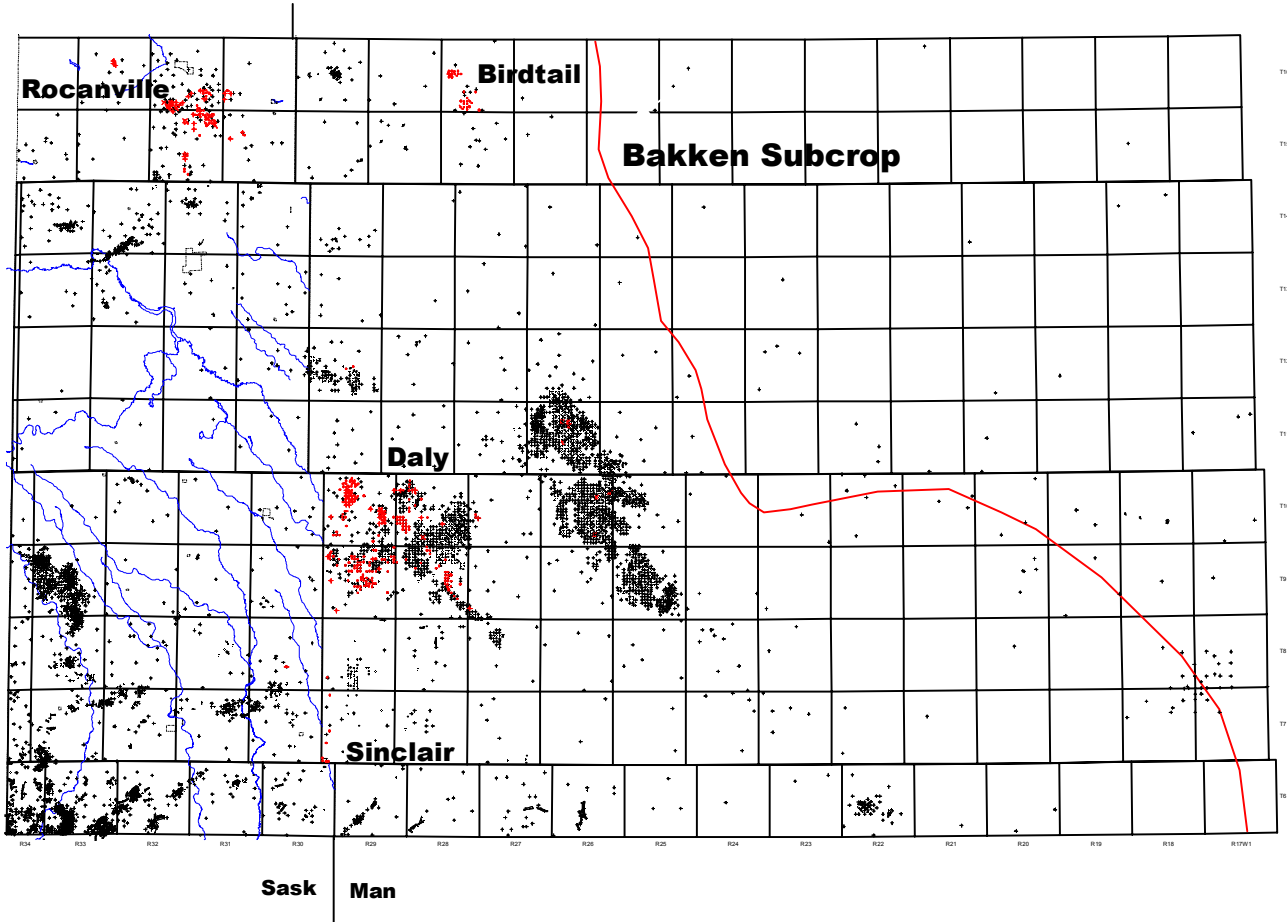
### HISTORICAL BAKKEN/TORQUAY PRODUCTION MANITOBA

From: 1972-09  
To: 2004-11



R29

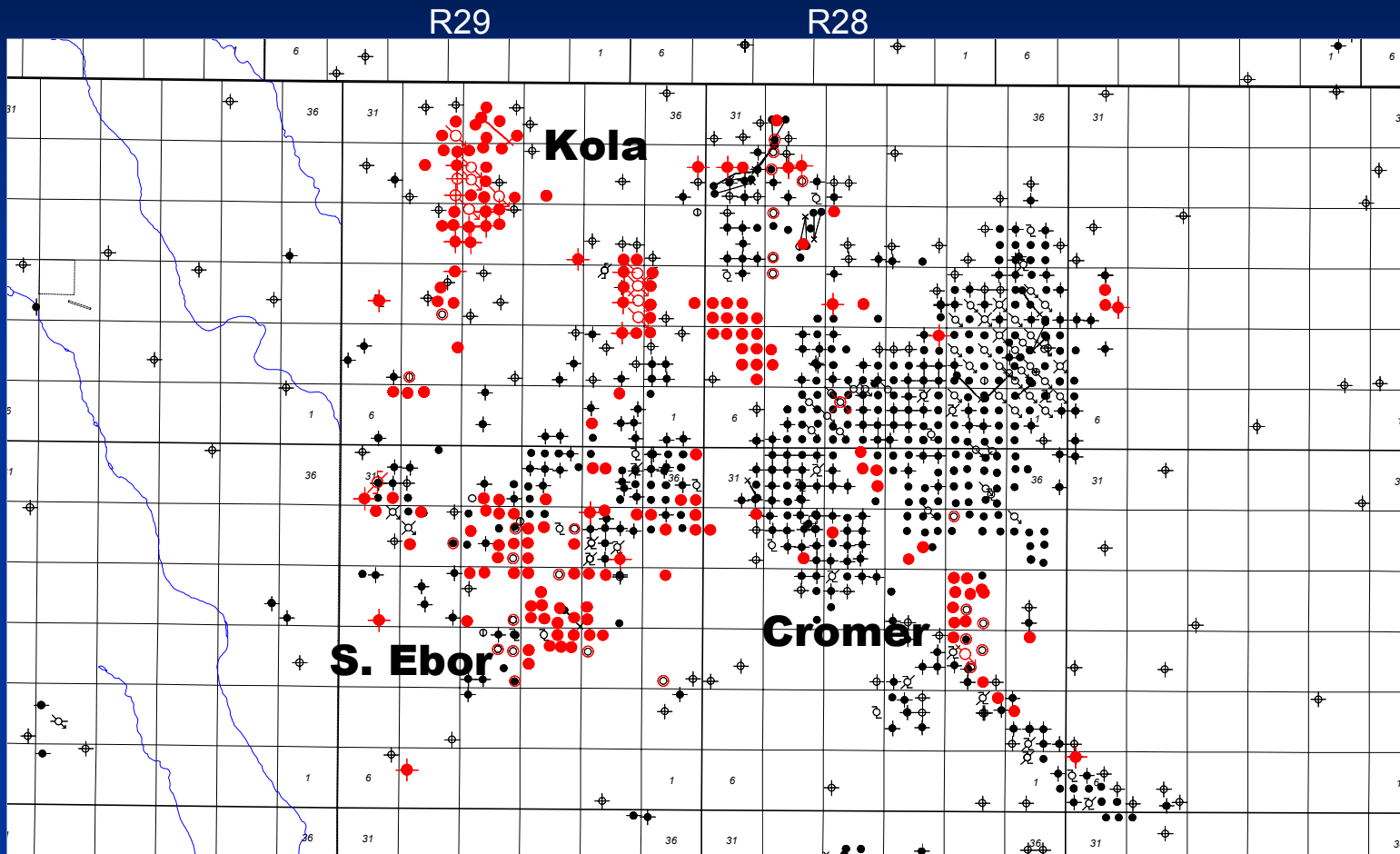
R17



# Daly Area

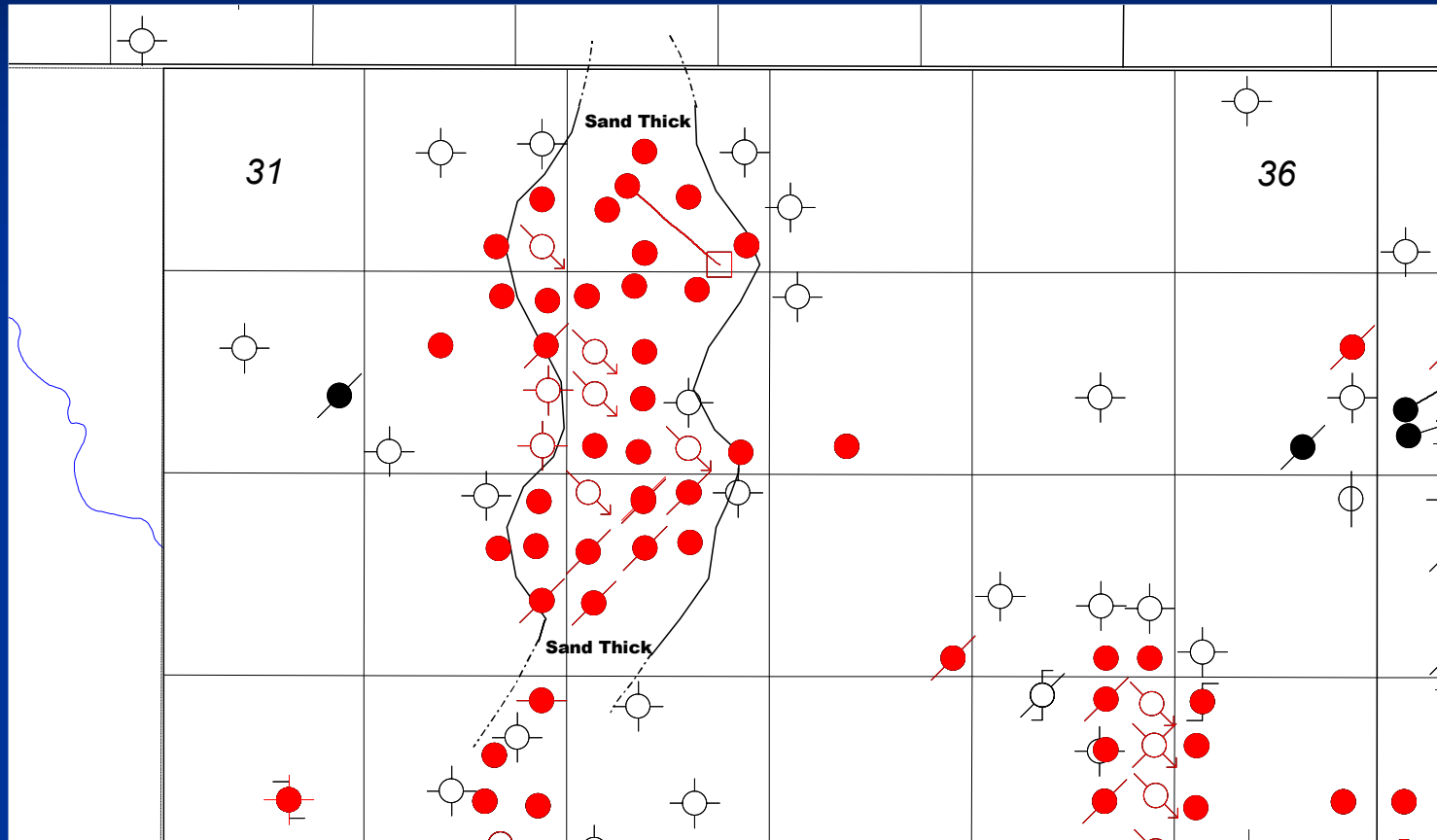
- Major Lodgepole pool discovered in 1950.
- Bakken oil charge throughout area (40 degree API).
- Production performance determined by reservoir quality in Middle Bakken sandstone.
- “Sweet Spots” trend north-south parallel to depositional strike.
- Kola (Bakken A) Pool ultimate recovery = 2 mmbbls
-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

# Daly Area



**Bakken Producers Highlighted**

# Kola Pool Detail



T10

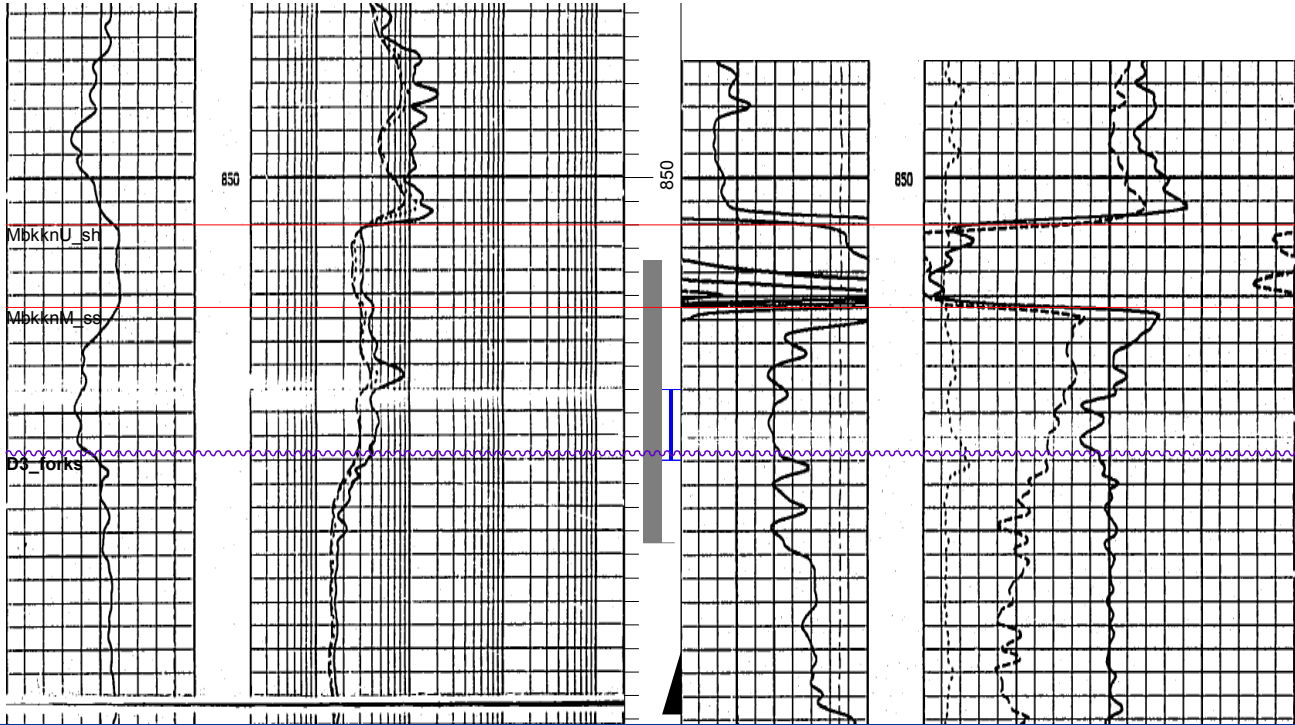
R29



# Kola Area Log

100/03-33-010-29W 1/00

●  
4489

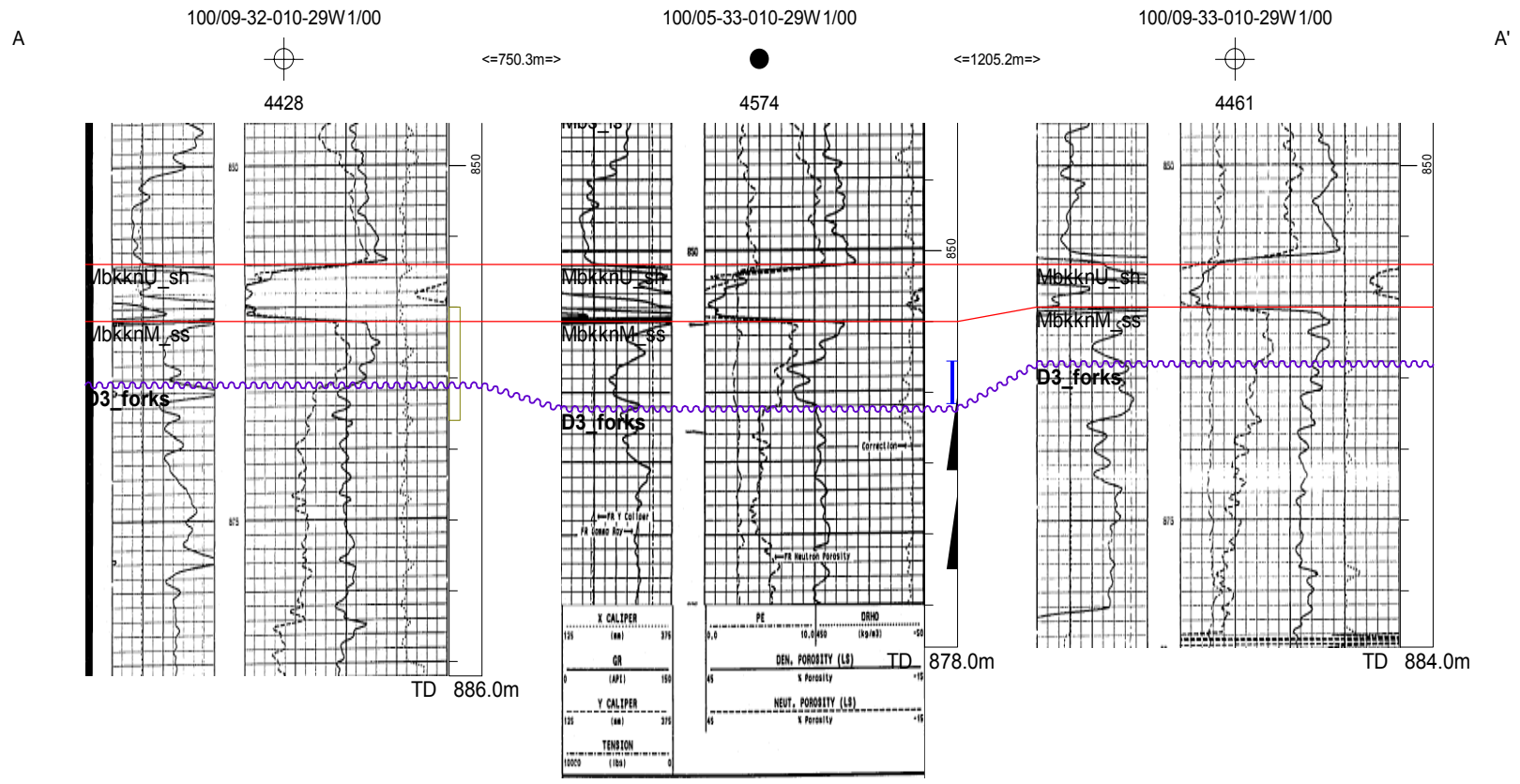


**Phi.(avg) = 17%**

**K(avg) = 12 md**

**Net Pay = 5 m**

# Kola Area: Stratigraphic Section

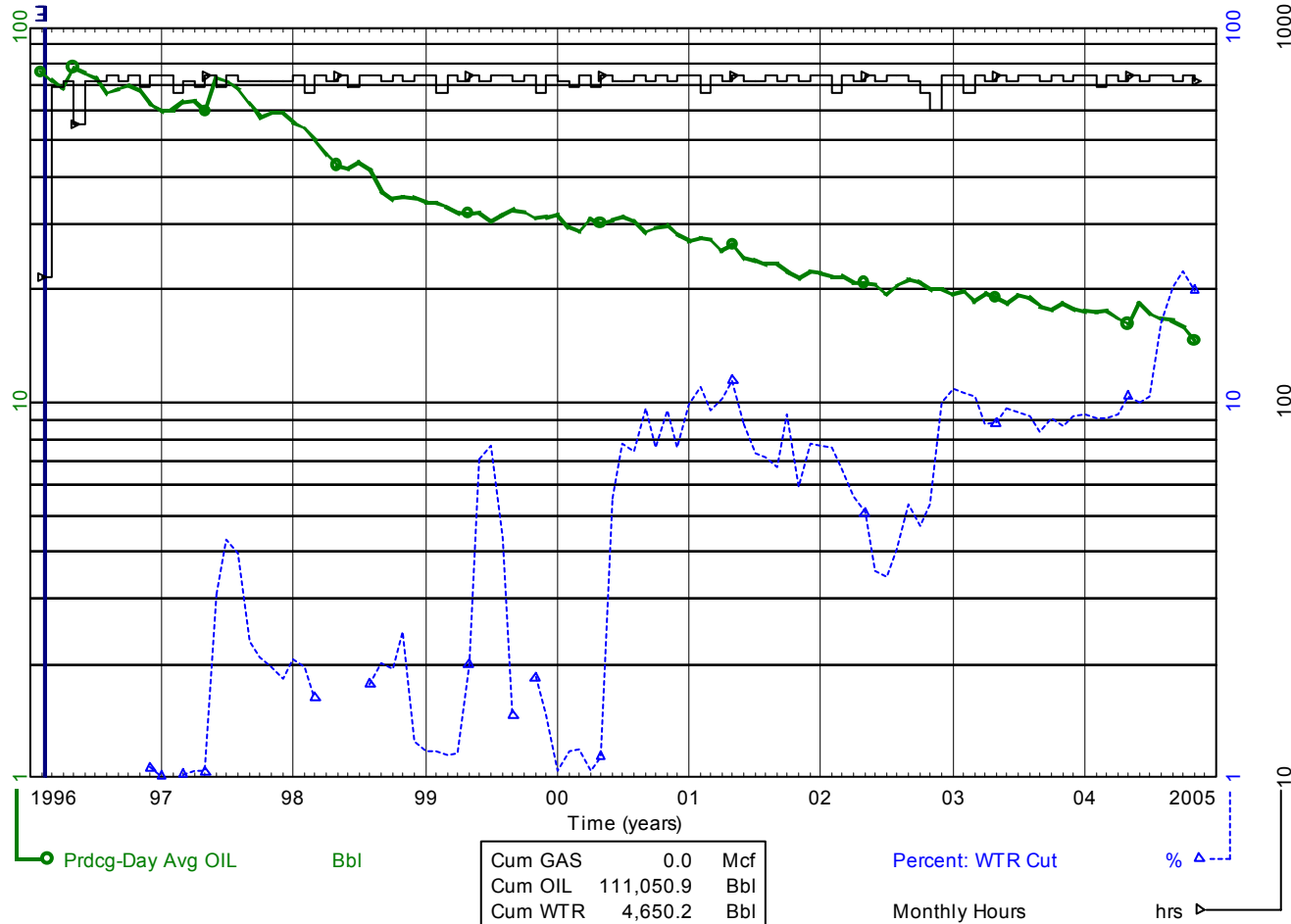


# Kola Production Profile

Data As Of: 2004-11 (MB)  
 From: 1996-02  
 To: 2004-11

INDIVIDUAL PRODUCTION  
 Tundra Kola Unit No. 2  
 100/05-33-010-29W1/00

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

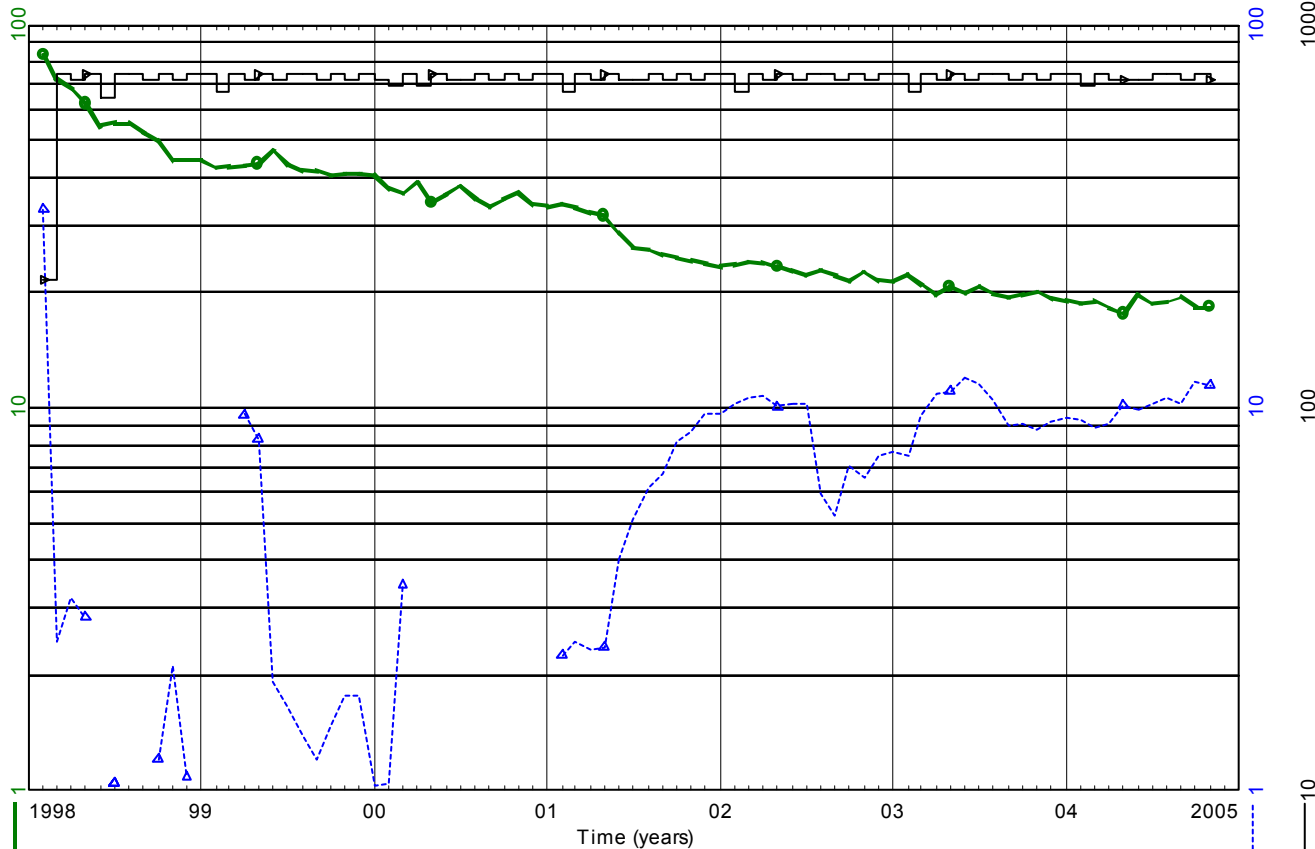


# Kola Horizontal Production Profile

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)



● 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

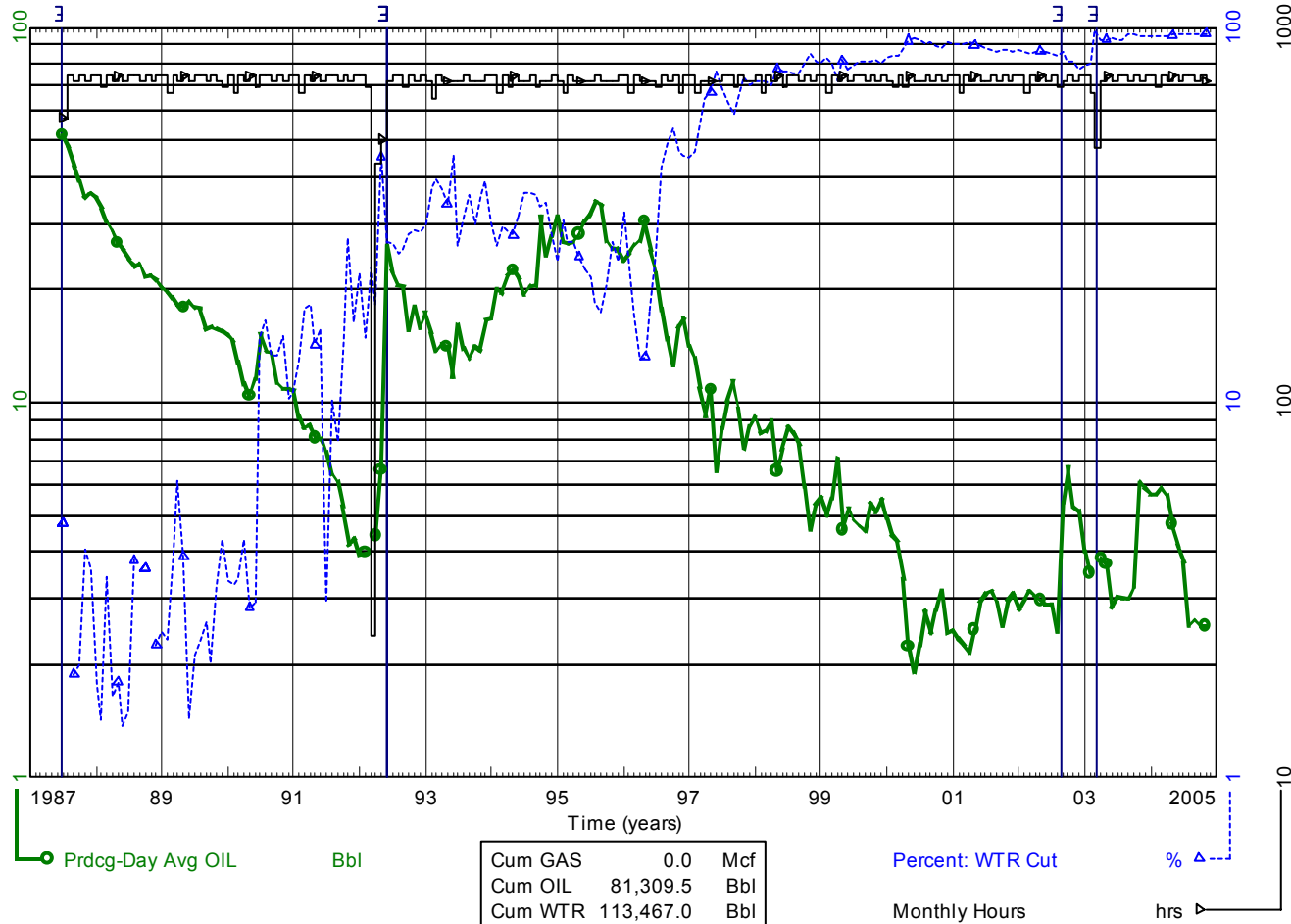
hrs

# Kola Waterflood Response

Data As Of: 2004-11 (MB)  
 From: 1987-07  
 To: 2004-11

INDIVIDUAL PRODUCTION  
 Tundra Kola Unit No. 1 Prov.  
 100/16-20-010-29W1/00

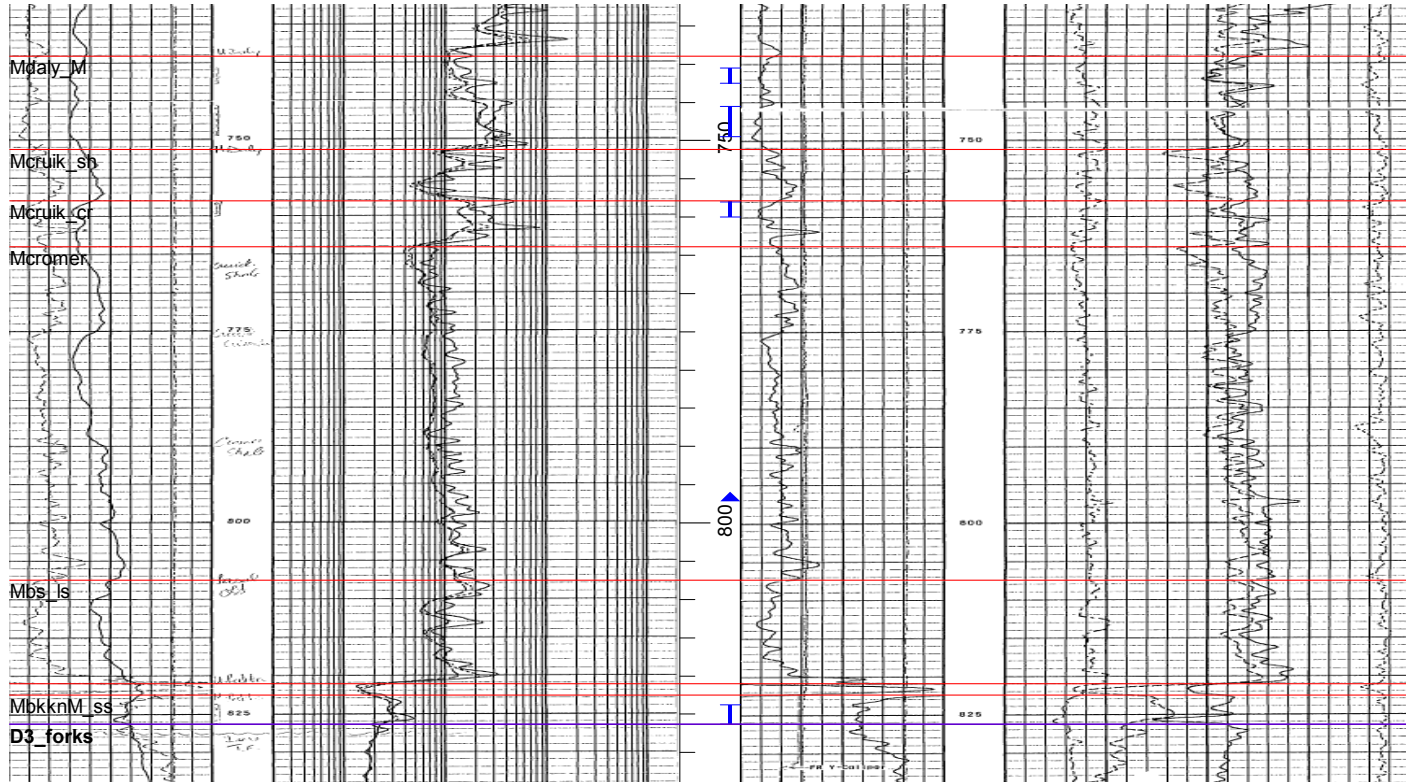
Status: Capable Of Oil Prod  
 Field: DALY (01)  
 Pool: BAKKEN A (60A)



# Daly Area: Commingled Completion

100/11-23-009-28W1/00

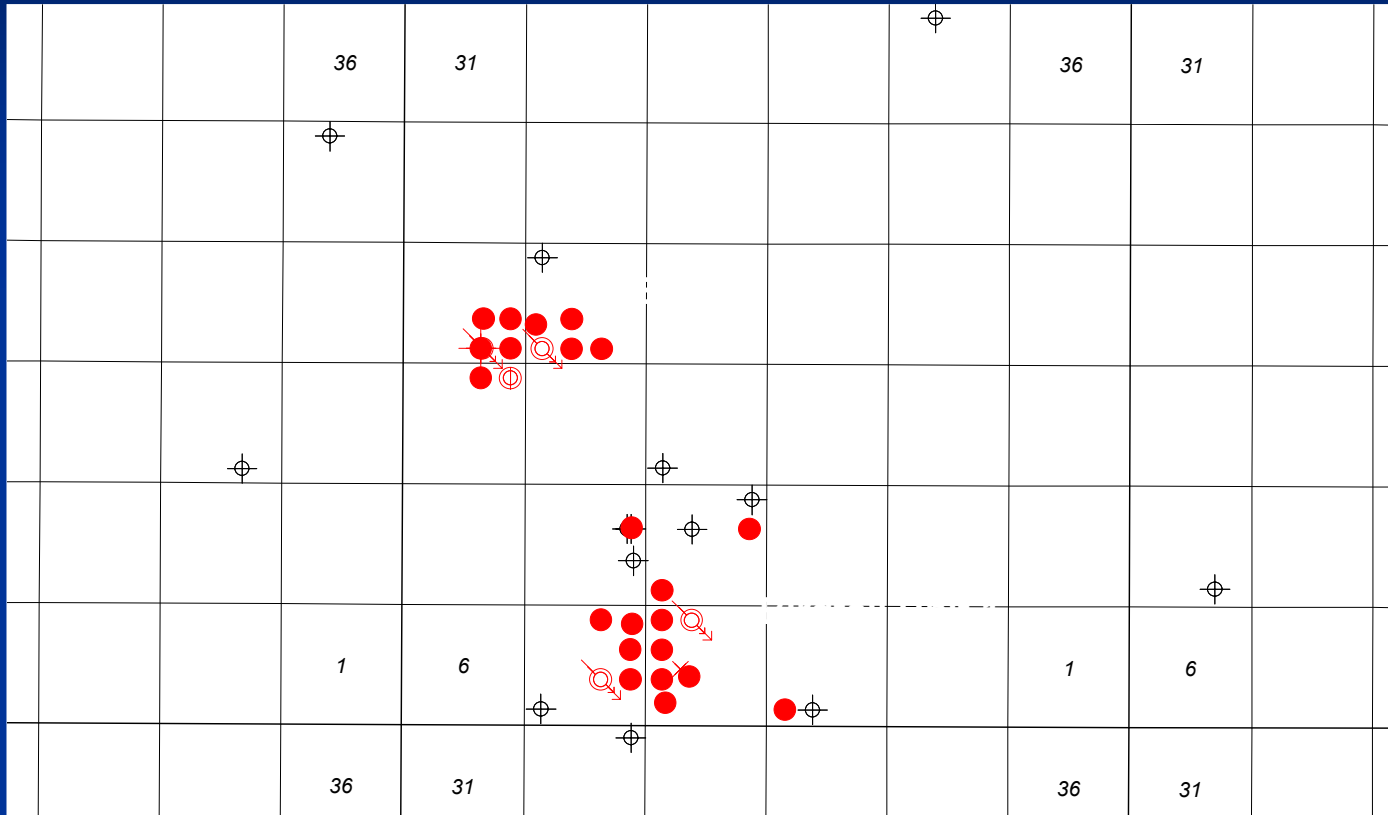
●  
4989



# 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



R27

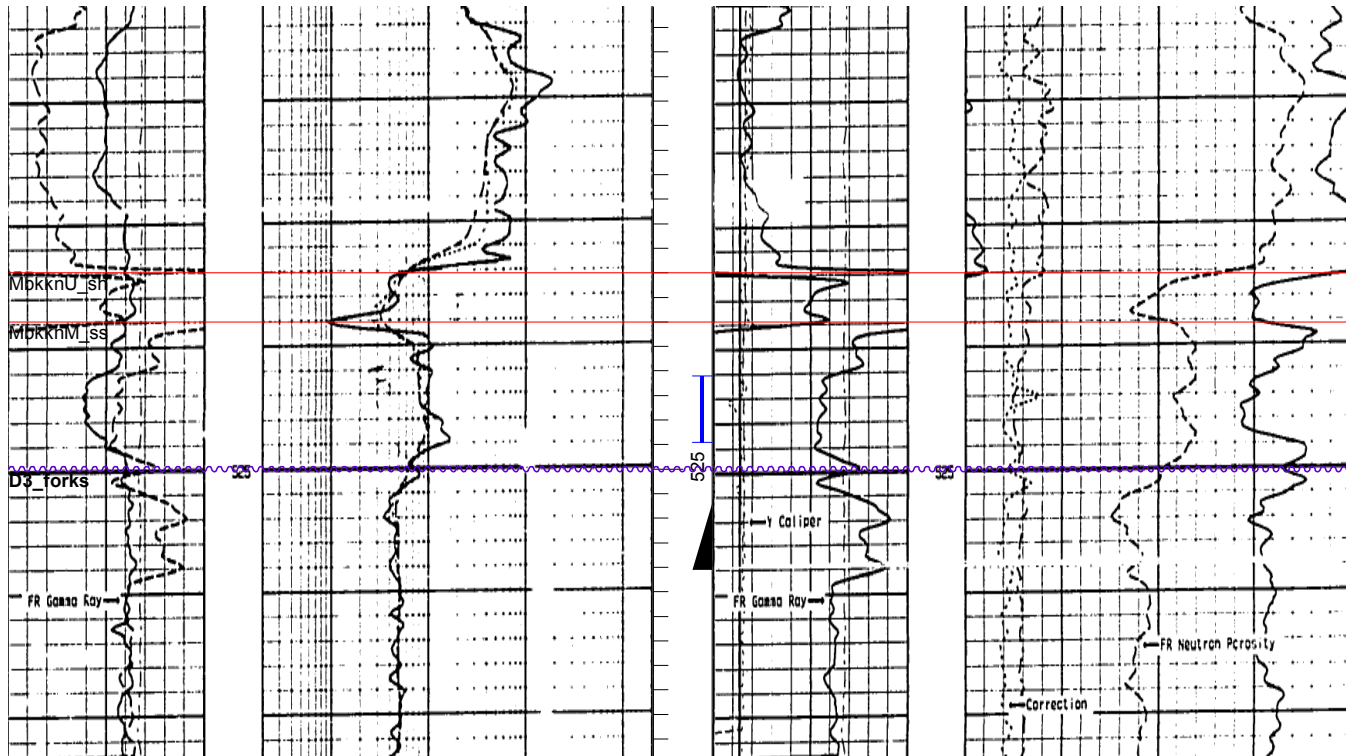
T16



# Birdtail Area Log

100/01-19-016-27W 1/00

4714



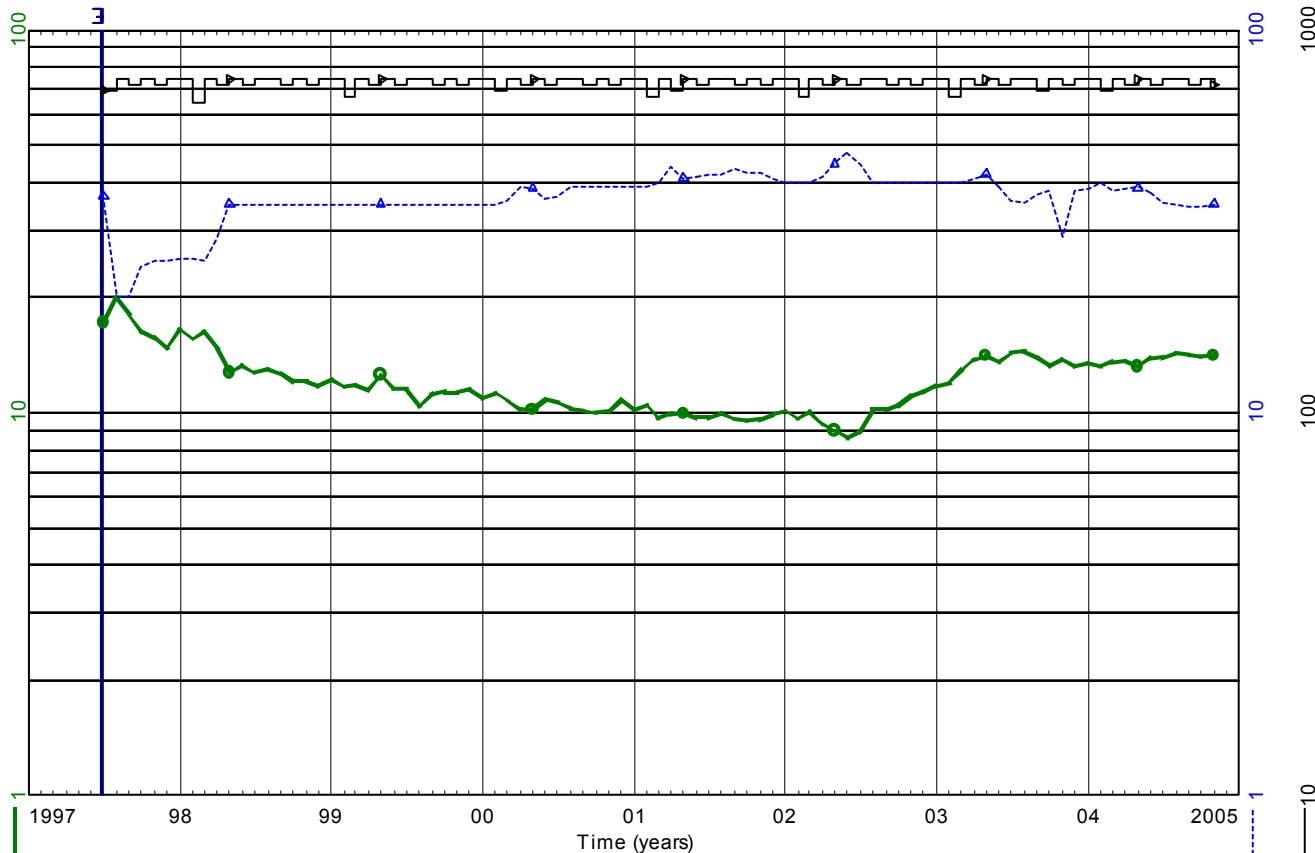
**Phi (avg) = 18%      Net Pay = 3.5m**

# 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)



● Prdcg-Day Avg OIL

Bbl

Cum GAS	0.0	Mcf
Cum OIL	32,818.5	Bbl
Cum WTR	18,744.4	Bbl

Percent: WTR Cut

% ▲

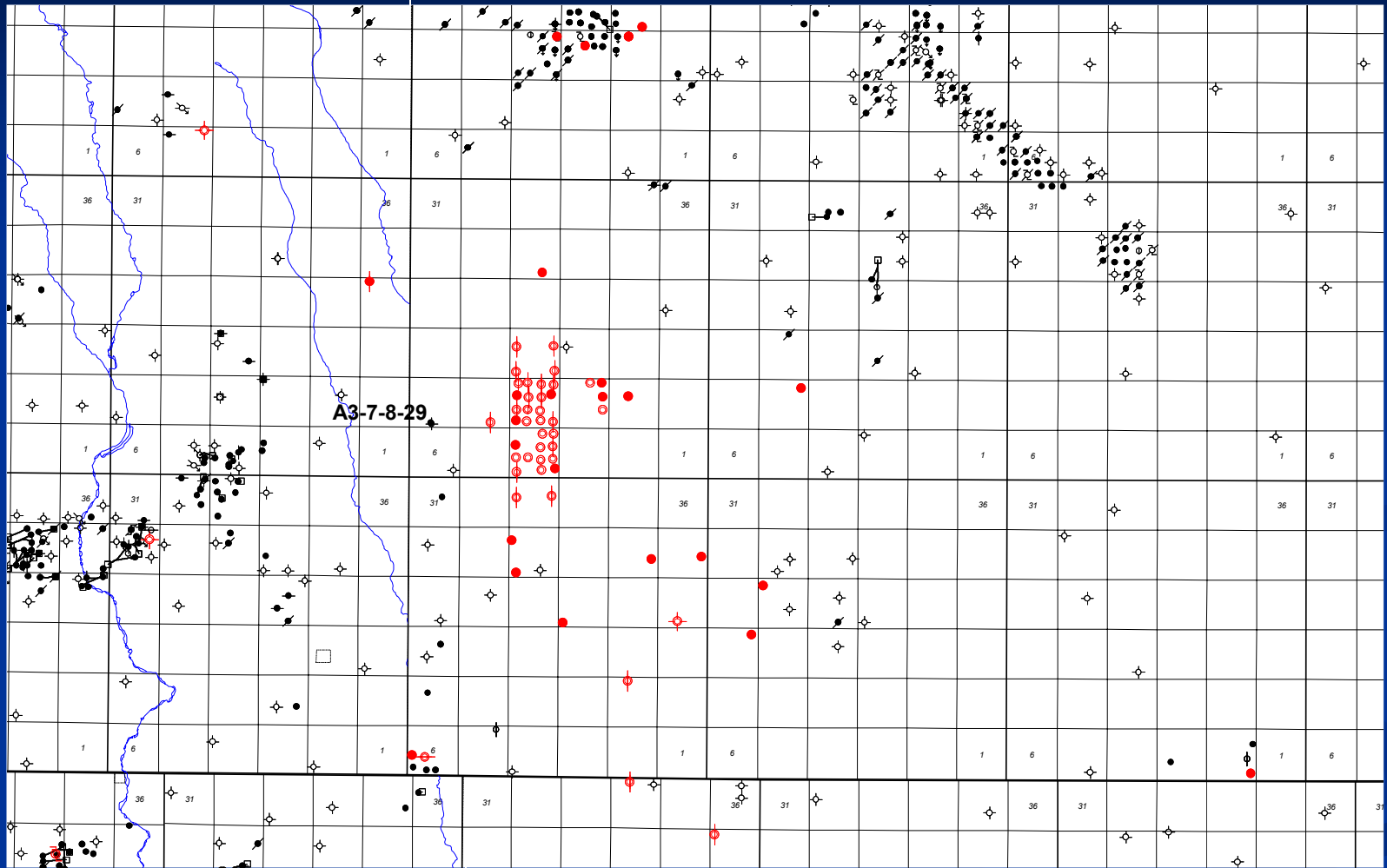
Monthly Hours

hrs ▶

# Sinclair Area

- 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



Sask.

Manitoba

Highlighted wells drilled since Jan. 2004

T8

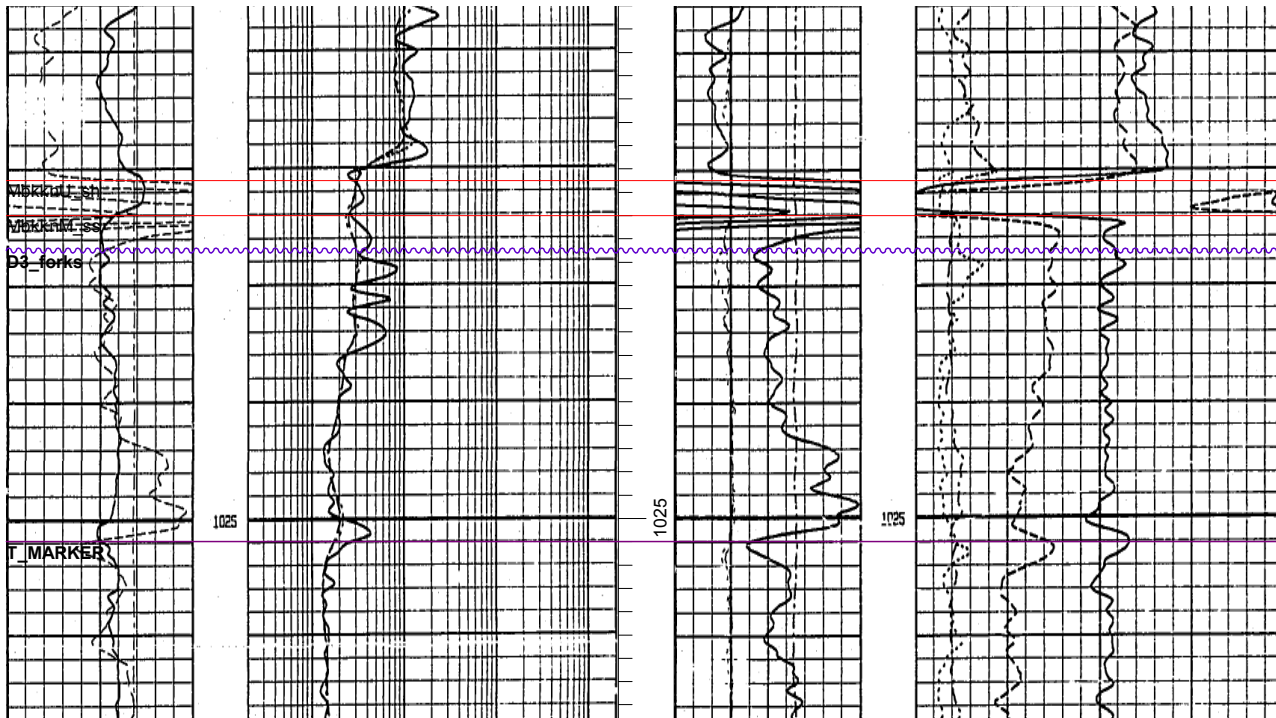
T7

# Sinclair Area Log

100/03-07-008-29W 1/00



4666



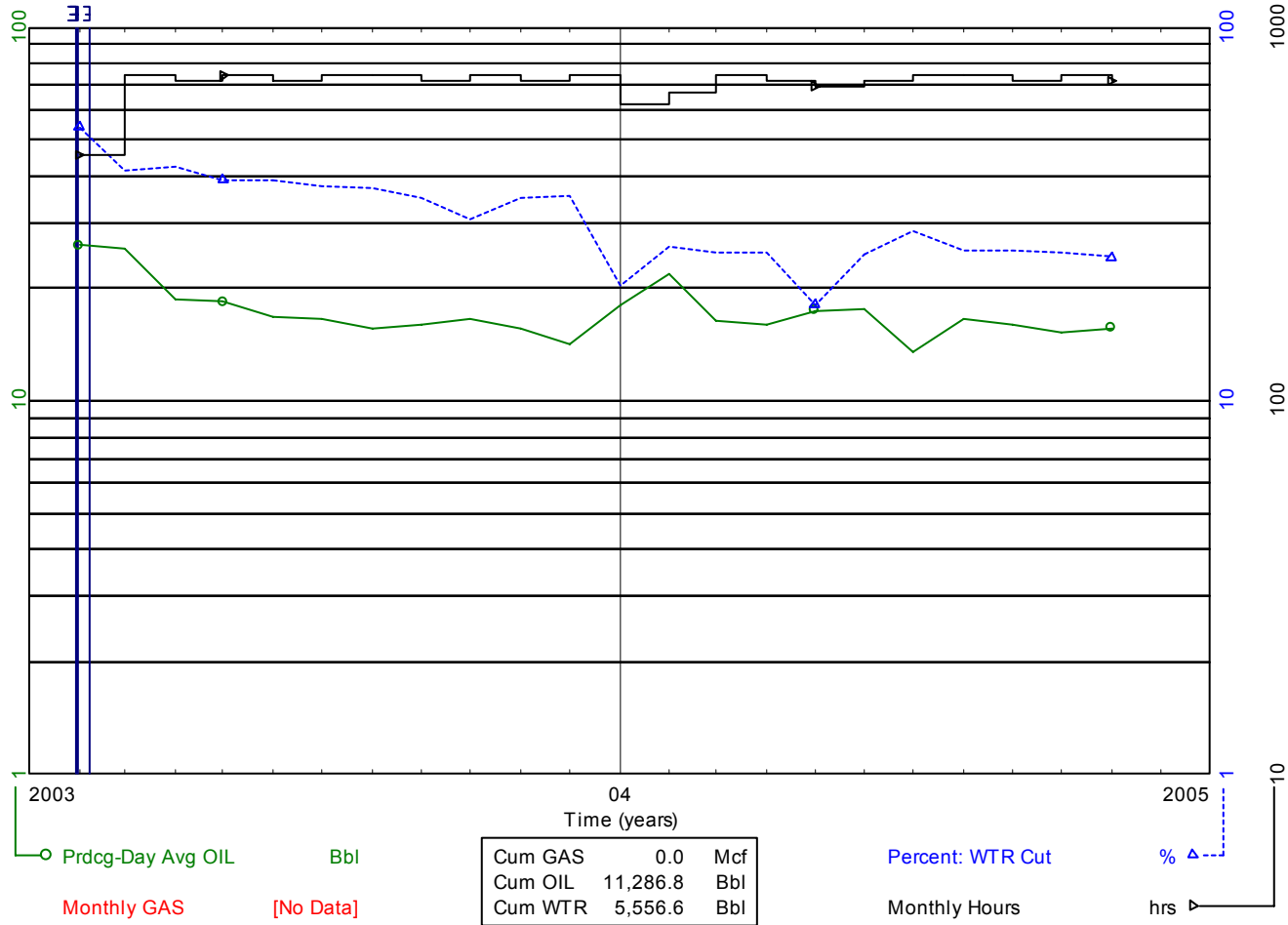
**Phi (avg) = 16%    K (avg) = 3.5 md    Net Pay = 6.0m**

# Sinclair Production Profile

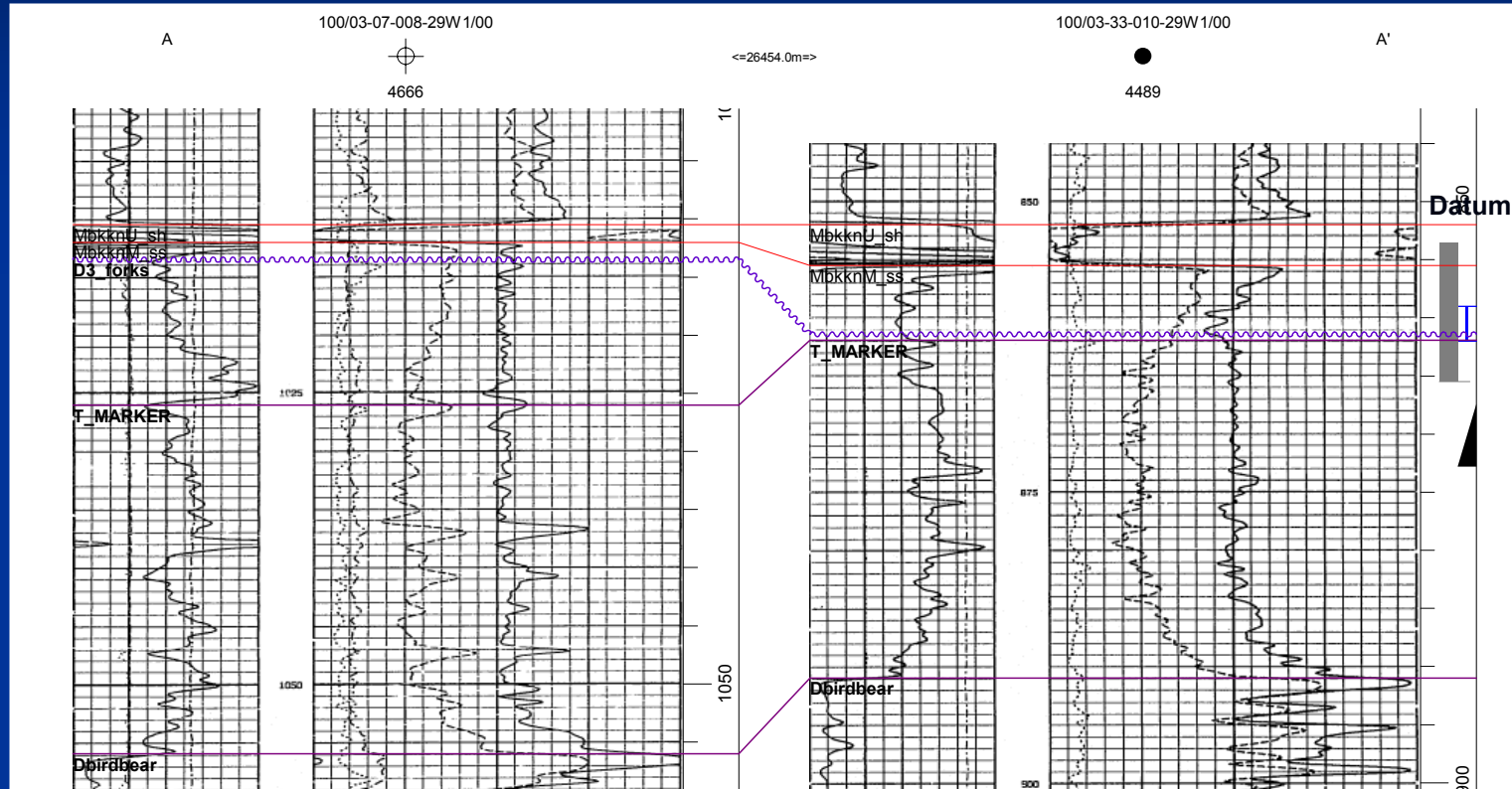
Data As Of: 2004-11 (MB)  
 From: 2003-02  
 To: 2004-11

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

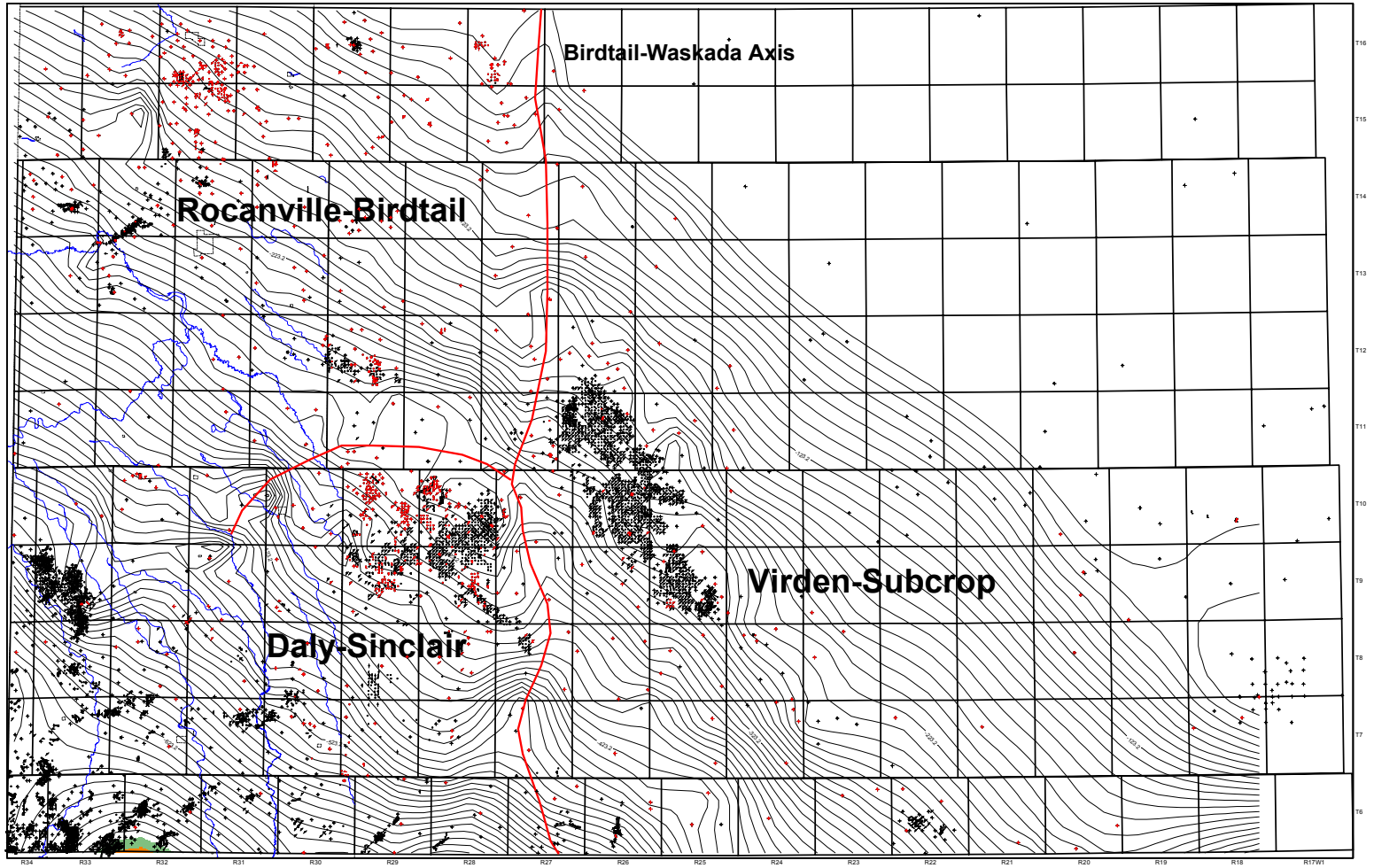
Status: Capable Of Oil Prod  
 Field: OTHER AREAS (99)  
 Pool: BAKKEN - THREE FORKS B (62B)



# Sinclair – Daly Stratigraphic Section



# Structure on Upper Bakken



R29

R17



# Exploration Issues

- Three different play types are known:
  - Daly: facies variations in the Middle Member define sweet spots in area of oil saturation.
  - Birdtail: 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?