CONTINUED PETROLEUM EXPLORATION OF THE BIRDBEAR AND DUPEROW FORMATIONS (DEVONIAN) OF THE WILLISTON BASIN:

WHO/WHAT HOLDS THE KEY?

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Stratigraphy
Depositional Setting

- Shallow epeiric seaway
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Lithology

- Two Upwards-Shallowing Sequences
- Duperow-Carbonate/Evaporite Cycles (10+)
  - Basal = brachiopod-crinoid wackestone or stromatoporoid boundstone
  - Middle = laminated lime mudstone w/ostracods and calcispheres
  - Top = bedded anhydrite capped w/dolostone
- Birdbear-Carbonate/Evaporite Cycles (4)
  - Lower Member = Limestone and dolostone capped by thick anhydrites
  - Upper Member = Two-three, thin, shallowing-upwards carbonate (dolostone)/evaporite packages
- Ideal Stratigraphy
  - Seal = Anhydrite
  - Reservoir = Bank Facies
  - Source?
Birdbear Formation

Massive anhydrite

Wackestone-Grainstone (stromatoporoids, corals, ostracods, brachiopods)

Dolomitic limestone (corals, stromatoporoids, brachiopods, crinoids)

Wackestone-Boundstone (stromatoporoids)

Thin dolostone interbeds

Collapse facies

Burrow-mottled to nodular fossiliferous mudstone (gastropods, brachiopods, corals)
Birdbear Production

- 187 producing wells
- 21 MMBO to date
- 23 BCF
- **Structural**, stratigraphic, combination traps

Cumulative Production: BOE - Birdbear Pool

- >500,000
- 200,000-500,000
- 100,000-200,000
- 50,000-100,000
- 10,000-50,000
- <10,000

Devonian Pool well, Duperow and/or Birdbear production.
Duperow Production

- 484 producing wells
- 153 MMBO to date
- 110 BCF
- **Structural**, stratigraphic, combination traps
Is Structure the Key?
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YES, Structure is the Key
Summary

- Attractive Targets
- Under Explored
  - **Birdbear** (LeFever, 2009)
    - In-place reserves = 2,313 MMBO
    - Estimated Ultimate Recovery = 644 MMBO
    - Produced = 21 MMBO
  - **Duperow**
    - In-place reserves = ?
    - Estimated Ultimate Recovery = ?
    - Produced = 153 MMBO
Map carbonate-bank facies (reservoirs)
Assess potential source intervals
Basin architecture (all units)
  - Structural/Tectonic evolution
  - Control on depositional systems
    - Source and reservoir rocks
  - Thermal evolution of the basin
    - Origin of thermal anomalies
    - Thermal maturity of source rocks
  - Trap and seal formation
  - Diagenesis-early/late
  - TIMING = Generation-Migration-Accumulation!