“Unconventional” Discovery Thinking in Resource Plays: Haynesville Trend & John Amoruso Field, East Texas

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Learnings & Values

• Value Professional, Mentor & Peer Relationships

• Challenge Dogma & Paradigms (with data and scientific thinking)
  — “there are no more large fields to be found”
  — “deep is bad – high temperature, high pressure, high stress, poor porosity”

• IOIIIOI: Imagine, Observe, Interpret
  — Re-iterate
  — Avoid “paralysis by analysis”

• Employ Multiple working hypotheses

• Fully Utilize evolving technologies

• Don’t be shy about size / scale
Take-aways:

- **Resource Plays** require exceptional collaboration & leadership
- **Resource Plays** are more than unconventional
- **Resource plays** often have a long history – require persistence
- **Resource plays** aren’t all low rate / return
- **Mega gas shale plays** will be game changers
- **Supply and demand** will be a continuing challenge
Resource Plays
A Continuous Spectrum

EnCana Resource Plays

The Future is Resource
Gulf Coast Jurassic Trend
> 1 Million Acres on Trend

[Map showing locations such as Barnett Core, Haynesville Core, Deep Bossier Trend, and L Cretaceous Reef.]
Deep Bossier Amoruso
Exceptional Rates / Reserves

Highest Average 3 Month Gross Gas Production Rate (2003 – 2009)

MMcf/d

ECA Deep Bossier Wells

Source: HPDI
Deep Bossier Amoruso Subsurface

**Deep Bossier**
- Basinward to SE
- Submarine fans and turbidites
- Abnormally pressured – porosity preserved
- High porosity sands in Outer Shelf
- Thicker, tighter sands within Shelf Margin

**Amoruso**
- Stacked pay potential
- Continuous and compartmentalized
- Stratigraphic traps and fault separation
Haynesville / Bossier Play
Fairway Stack Pay

Haynesville Shale Average Values
- TOC (total organic content) – 3.2%
- $\phi$ (porosity) – 8.44%
- K (permeability) – 0.38 micro D
- Ro (vitrinite reflectance) – 2.19

Pissale, grayish black, slightly silty shale
Haynesville / Bossier Play
World Class Resource

Tcf EUR

South Pars, North Dome
Haynesville, Bossier
Urengoy
Yamburg
Hassi R’Mel
Shbemuk
Zapolyamoye
Hugoton
Groningen
Bonavenko
Medvezhye

USA  RUS  RUS  Algeria  RUS  RUS  USA  NETH  RUS  RUS
Haynesville / Bossier Play
World Class Resource

Play Mean Values
Bubble size – relative thickness

GIP (mcf/ac-ft)

Depth (ft)

Woodford OK
Barnett FWB
Marcellus, PA
Bossier Sh NL A
Haynesville NL A
Fayetteville AR

0 500 1000 1500
0 7000 14000

www.ancana.com
Presenter's Notes: EnCana has drilled 16 horizontal wells and over that period it has decreased well costs by 30% to about $9 million per well, increased IPs, decreased cycle time from 60 days to 50 with the most recent wells in the 40's.
Haynesville Play Status
Well Performance

Well rates limited by infrastructure flowing pressures: 7,000 to 9,000 psi

[Graph showing gas rate (MMcf/d) vs. producing time (Days) with different well performance data points and type curve.]
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