Tuscaloosa Marine Shale

An Emerging Play

Hart Energy

3rd Annual Developing Unconventional Oil Conference & Exhibit

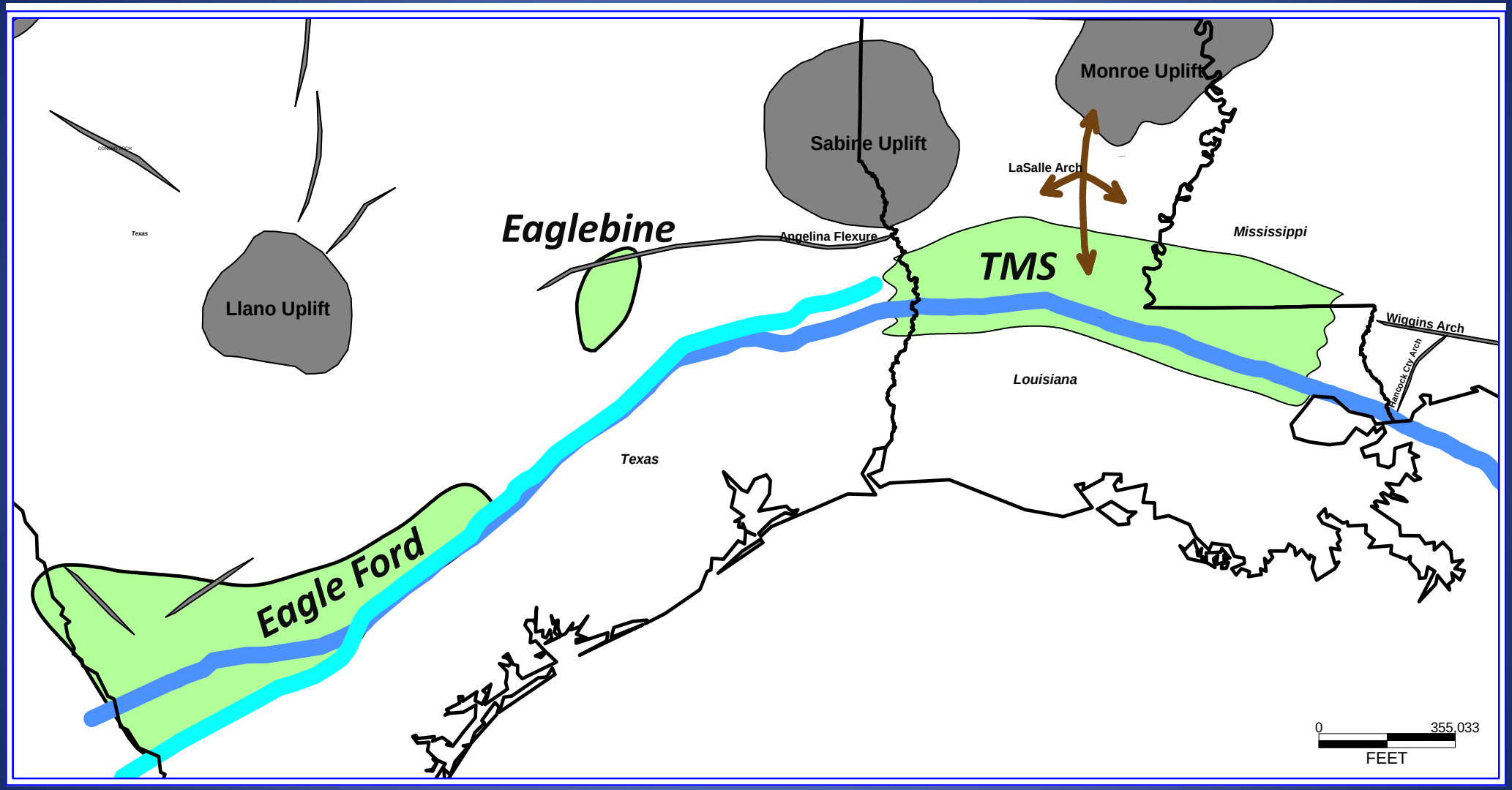
Denver, CO

May 16, 2012

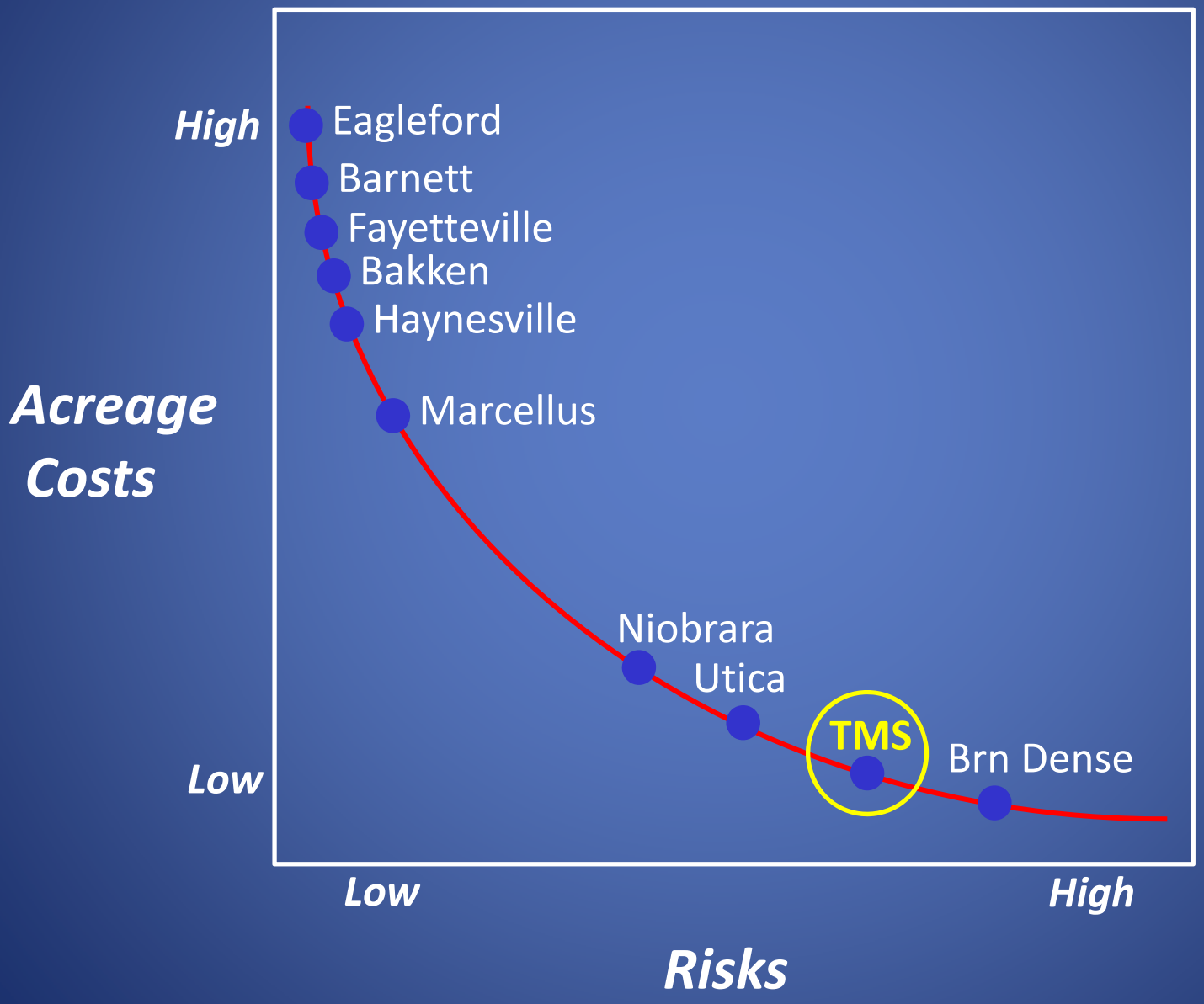
Play Overview

- 2.9-7.4 million acres prospective
- Proven source rock
- Proven producer
- Eagle Ford age equivalent
- Oil-prone unconventional reserves

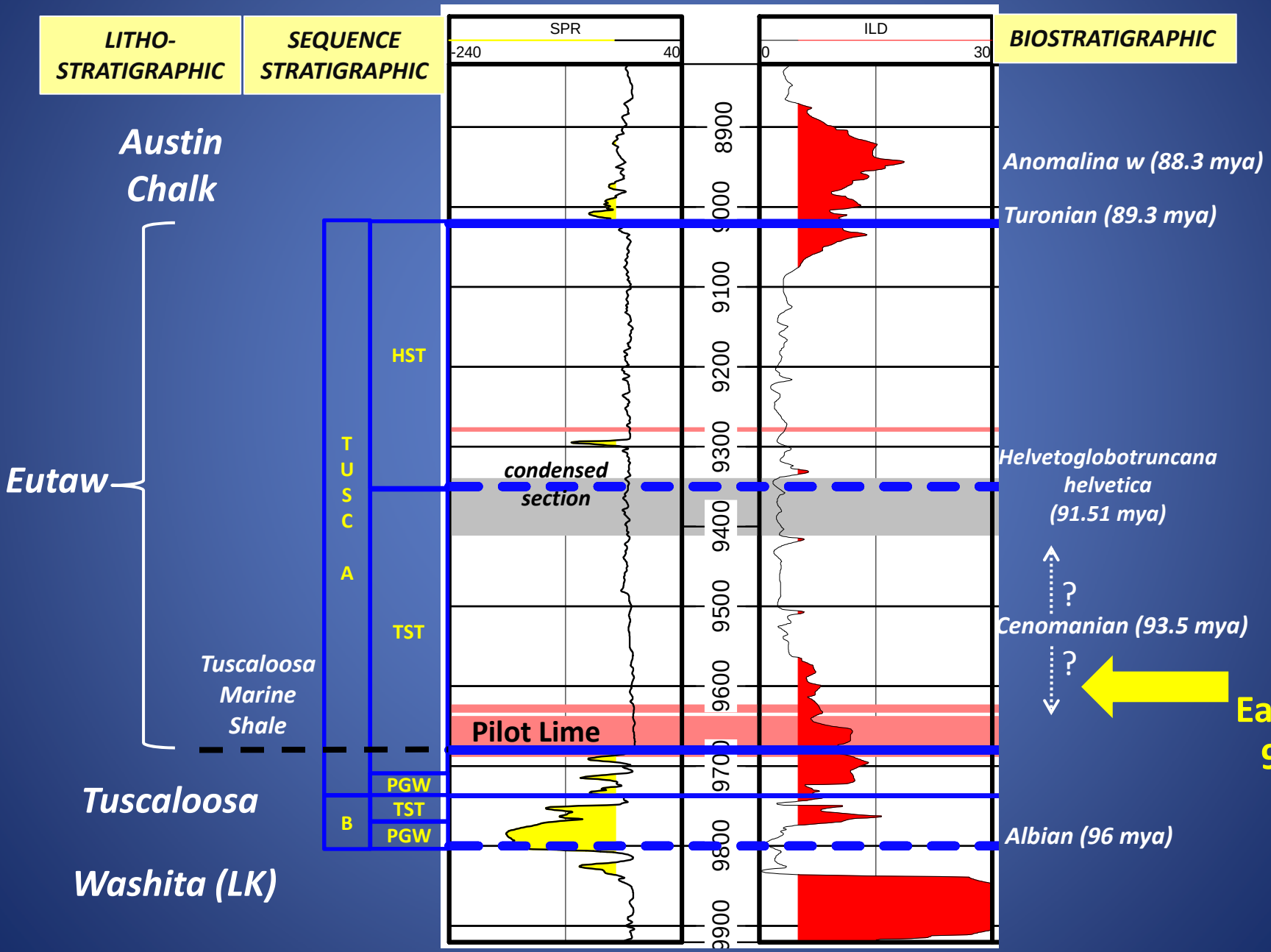
Geologic Age-Equivalent Plays



Risks vs Costs



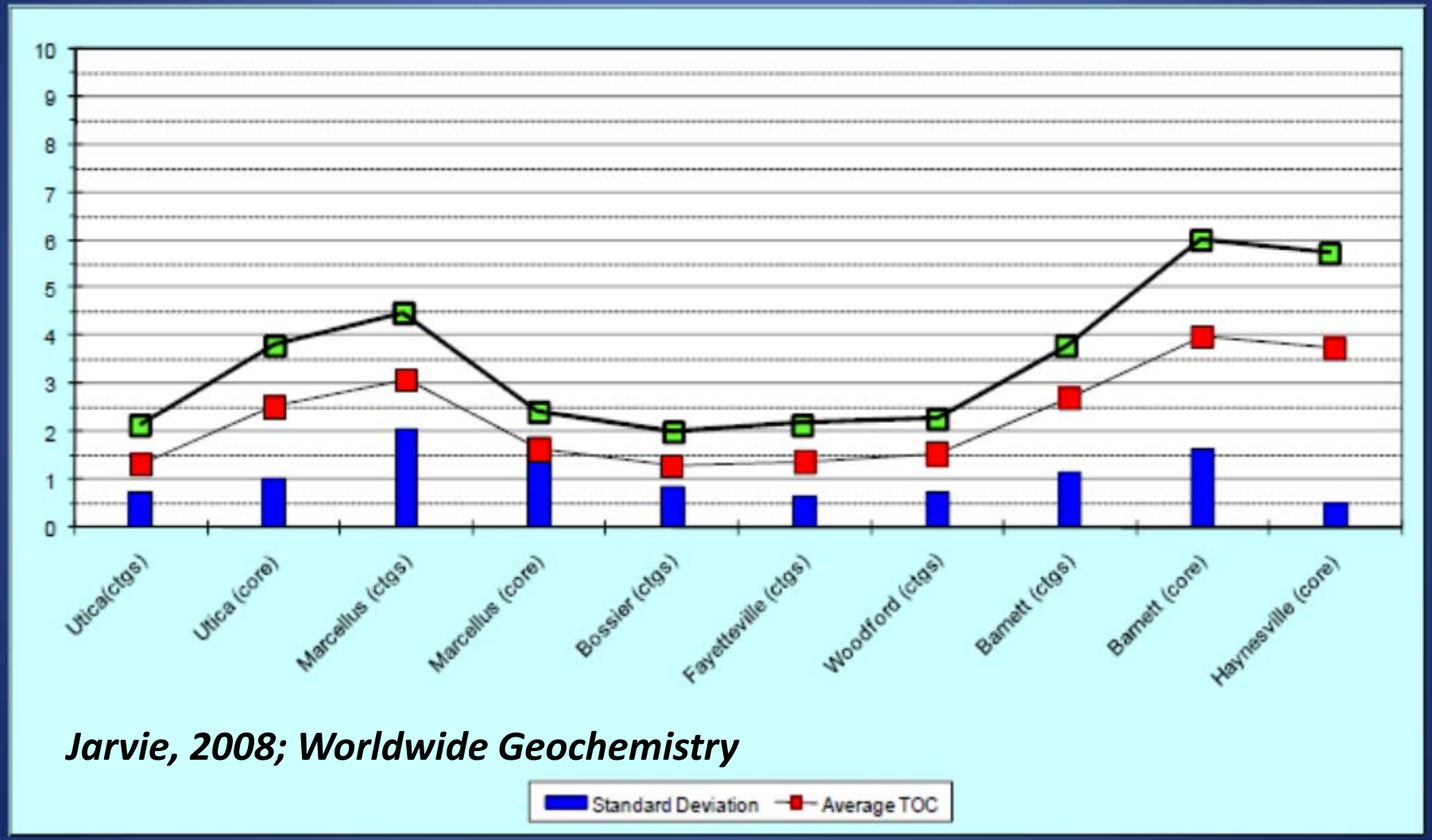
Type Log


LITHO-STRATIGRAPHIC
SEQUENCE STRATIGRAPHIC
BIOSTRATIGRAPHIC
SPR
-240
40
ILD
0
30
8900
9000
9100
9200
9300
9400
9500
9600
9700
9800
9900
Austin Chalk
Eutaw
Tuscaloosa
Washita (LK)
T U S C A
B
HST
TST
PGW
TST
PGW
condensed section
Tuscaloosa Marine Shale
Pilot Lime
Anomalina w (88.3 mya)
Turonian (89.3 mya)
Helvetoglobotruncana helvetica (91.51 mya)
?
Cenomanian (93.5 mya)
?
Albian (96 mya)
S. TX Eagle Ford 94 mya

Shale Play TOC Comparison

Average TOC and Standard Deviation

for various economically successful shale-gas systems

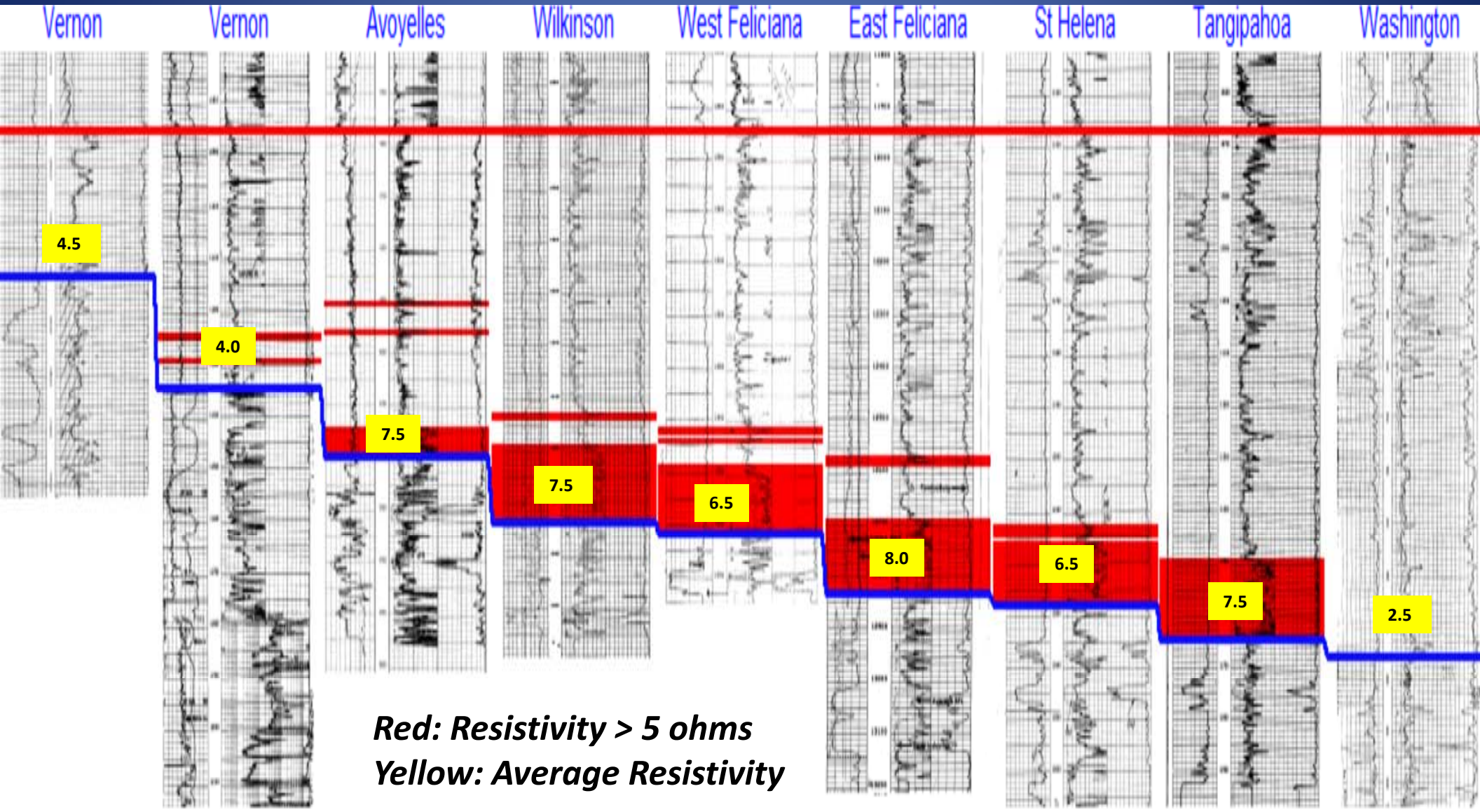


TMS

Jarvie, 2008; Worldwide Geochemistry

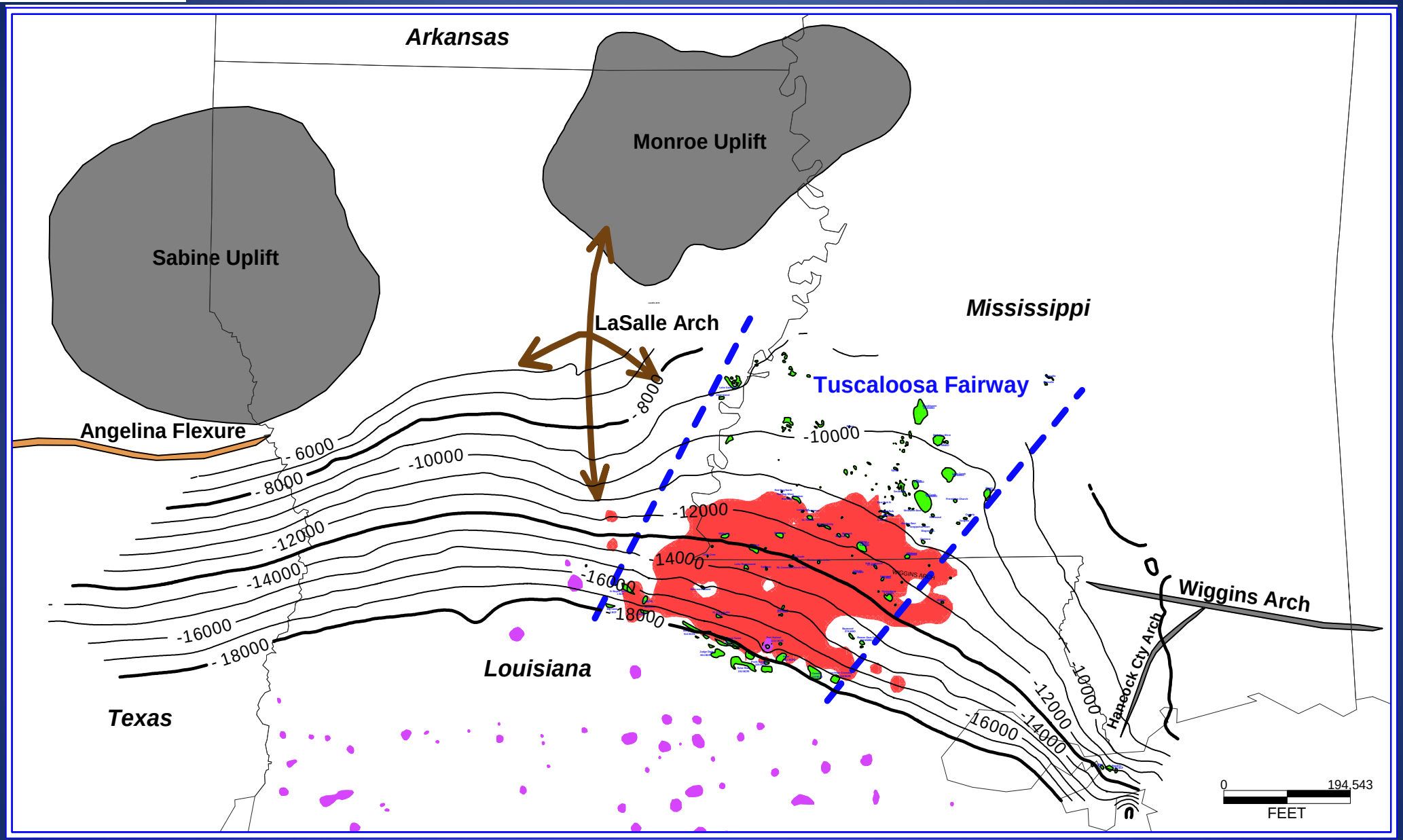
Regional Strike Stratigraphic Cross Section

Average Resistivities



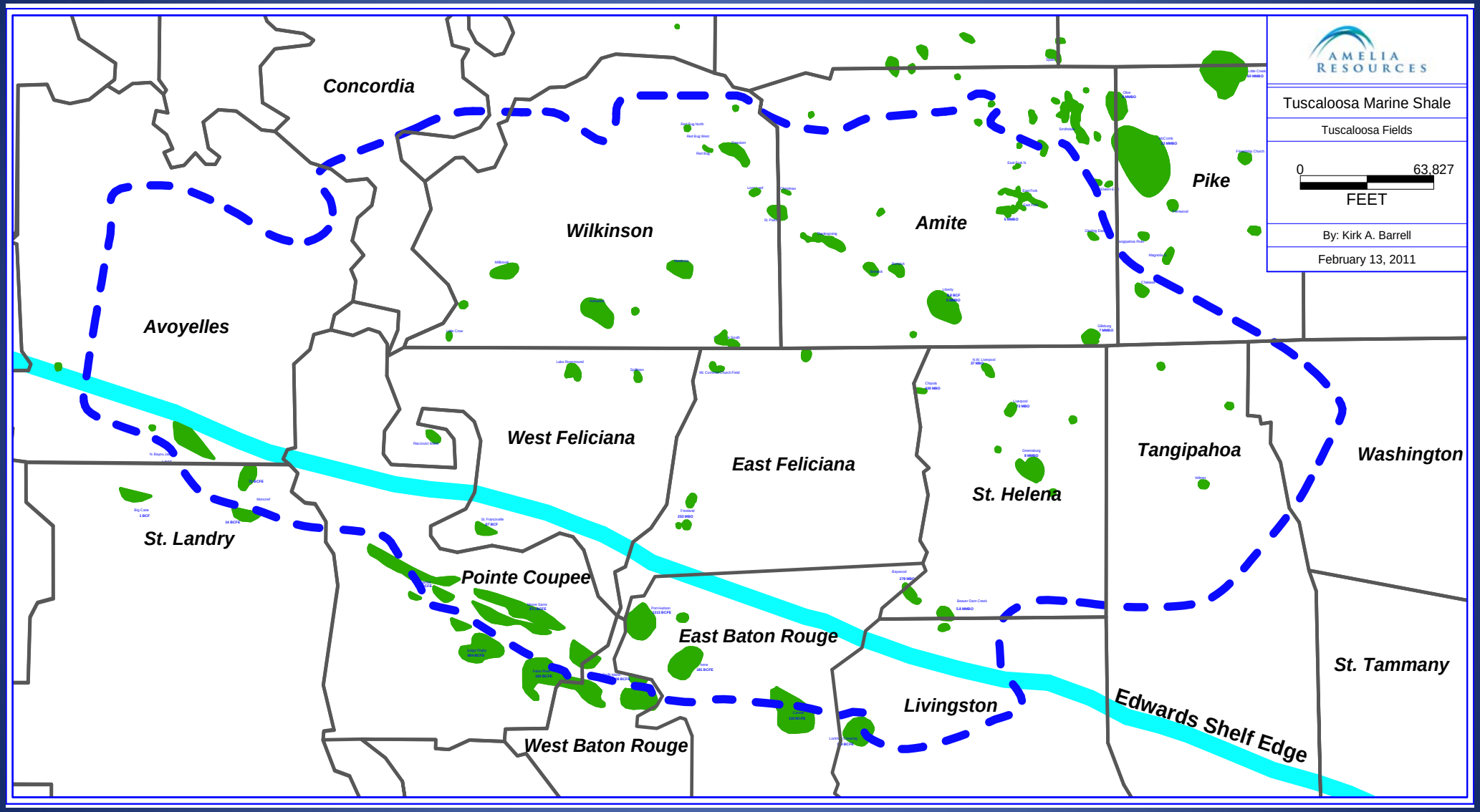
775 wells analyzed

Regional Geology



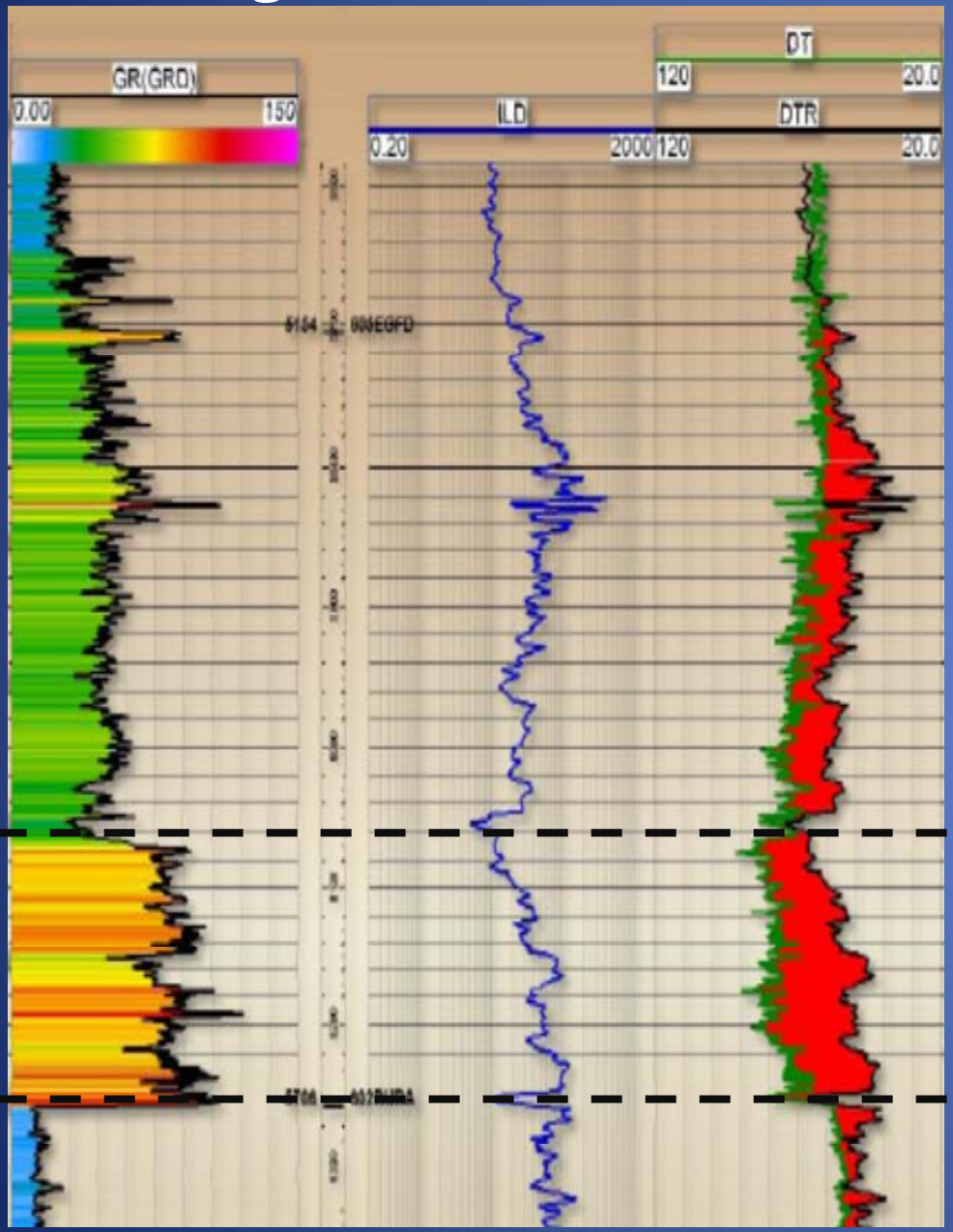
Tectonic features (gray) Base TMS Structure (black lines) TMS High Resistivity (red)
Tuscaloosa Sand Fields (green) Salt Domes (magenta) Tuscaloosa Fairway (blue dashed lines)

Tuscaloosa Sand Producing Fields



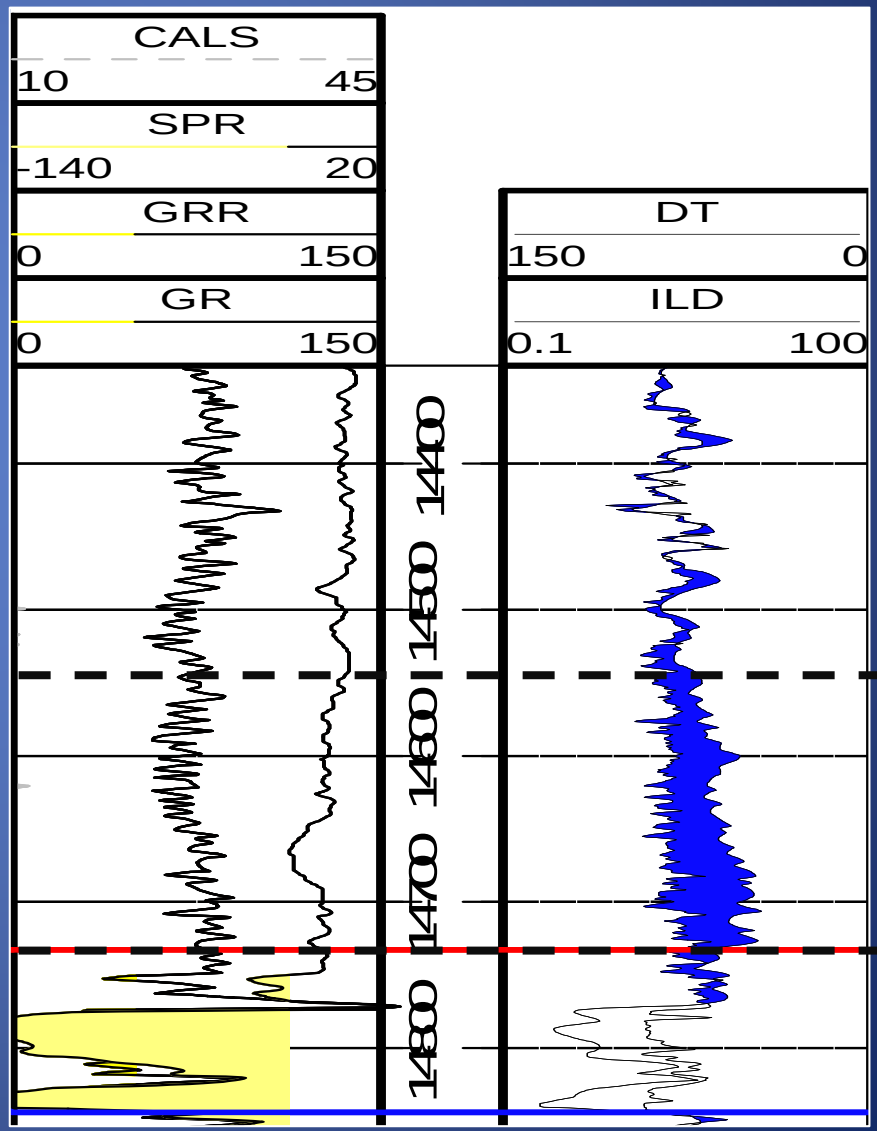
Passey Log Analysis Method

Eagle Ford Shale



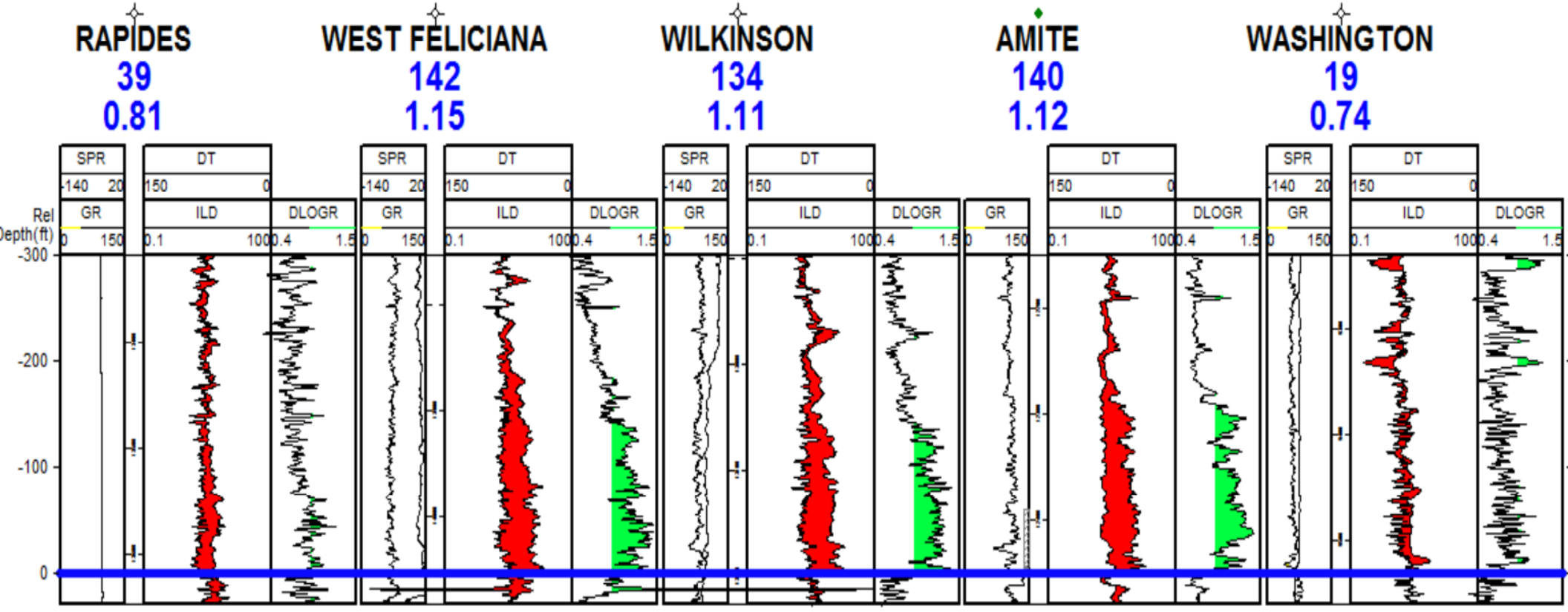
Thomas Bowman, AAPG Search & Discovery Article #110128, 6/14/10

Tuscaloosa Marine Shale



Strike Cross Section

West *East*

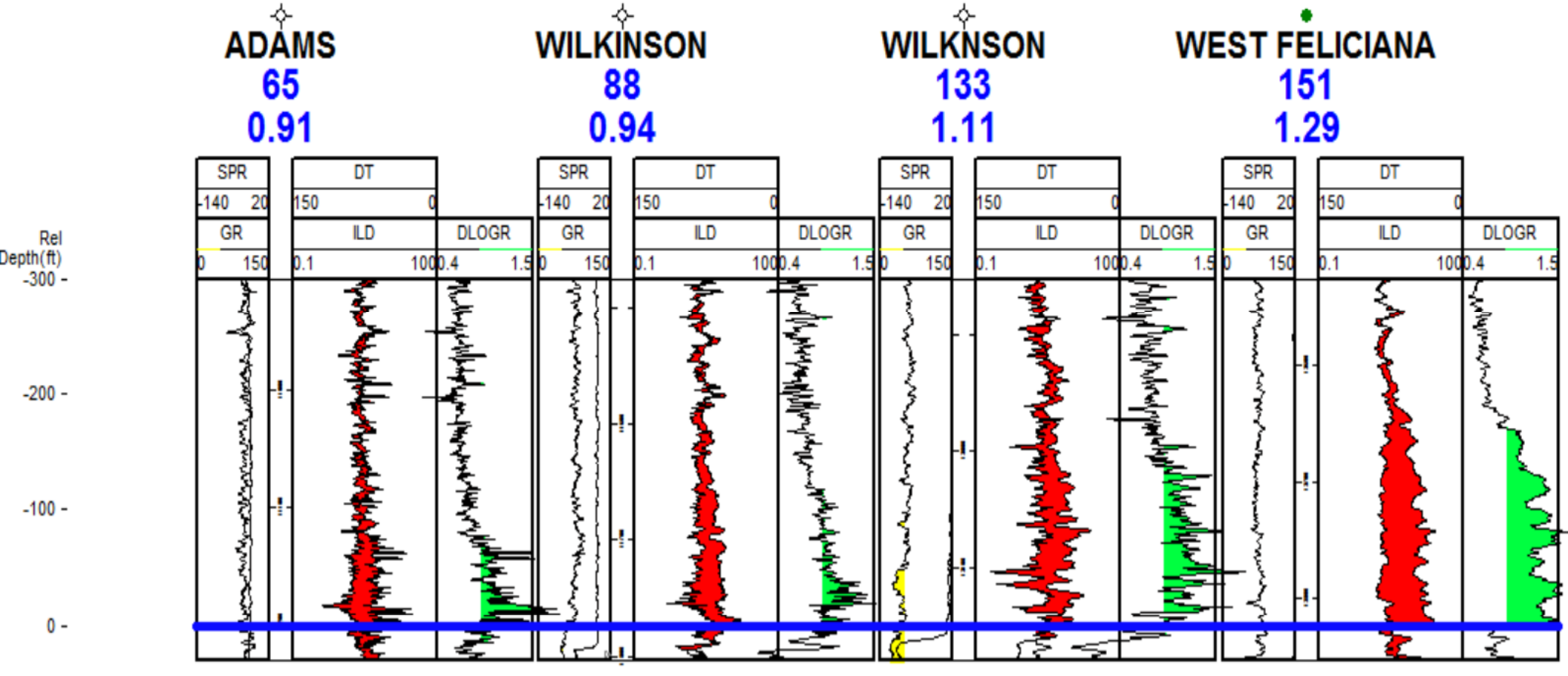


- Feet of Delta-Log-R > 0.9
- Mean Delta-Log-R

DLOGR=LOG(ILD/1.7)+.02*(SONIC-63)

Dip Cross Section

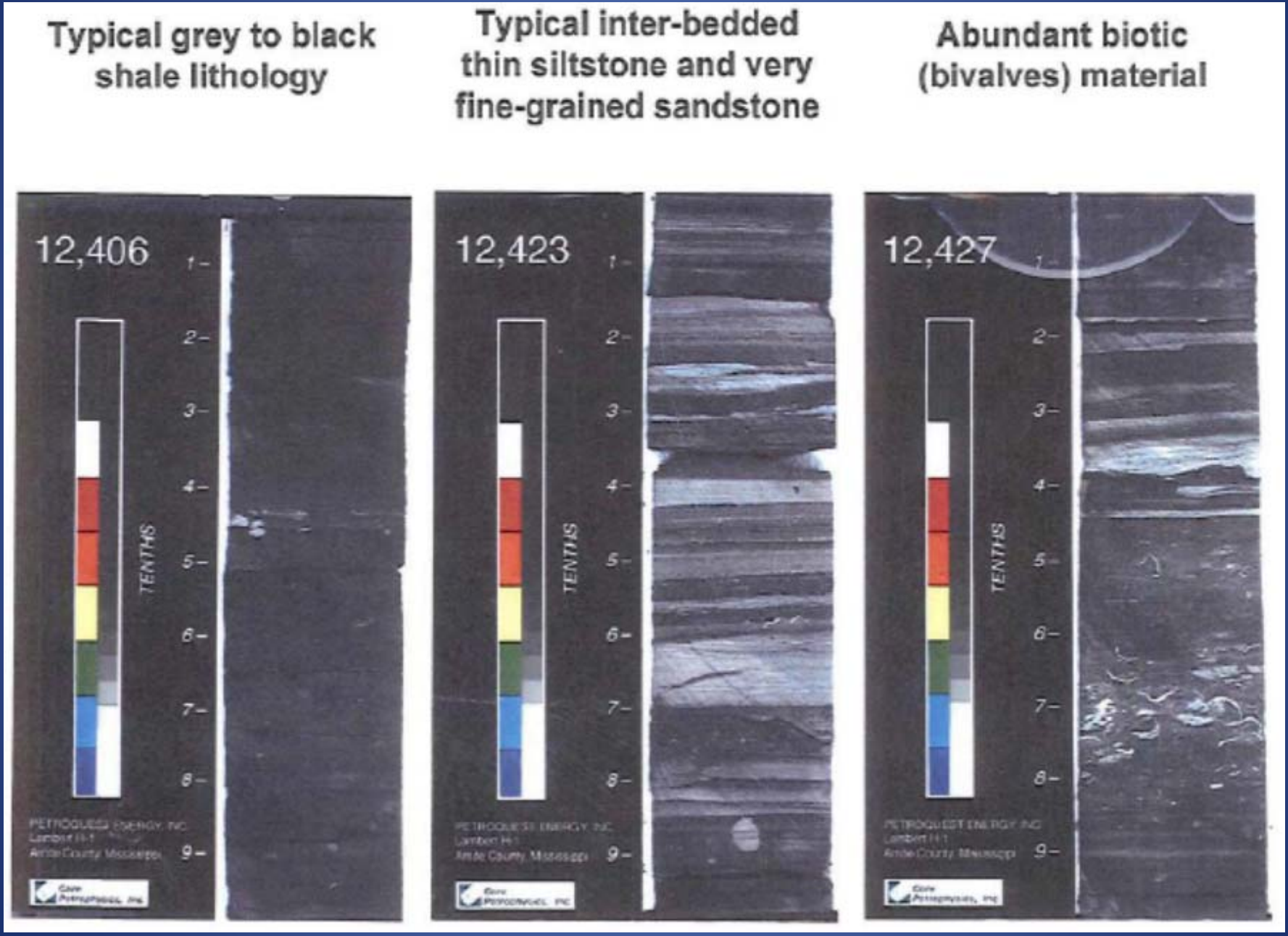
North *South*



- Feet of Delta-Log-R > 0.9
- Mean Delta-Log-R

DLOGR=LOG(ILD/1.7)+.02*(SONIC-63)

Conventional Core

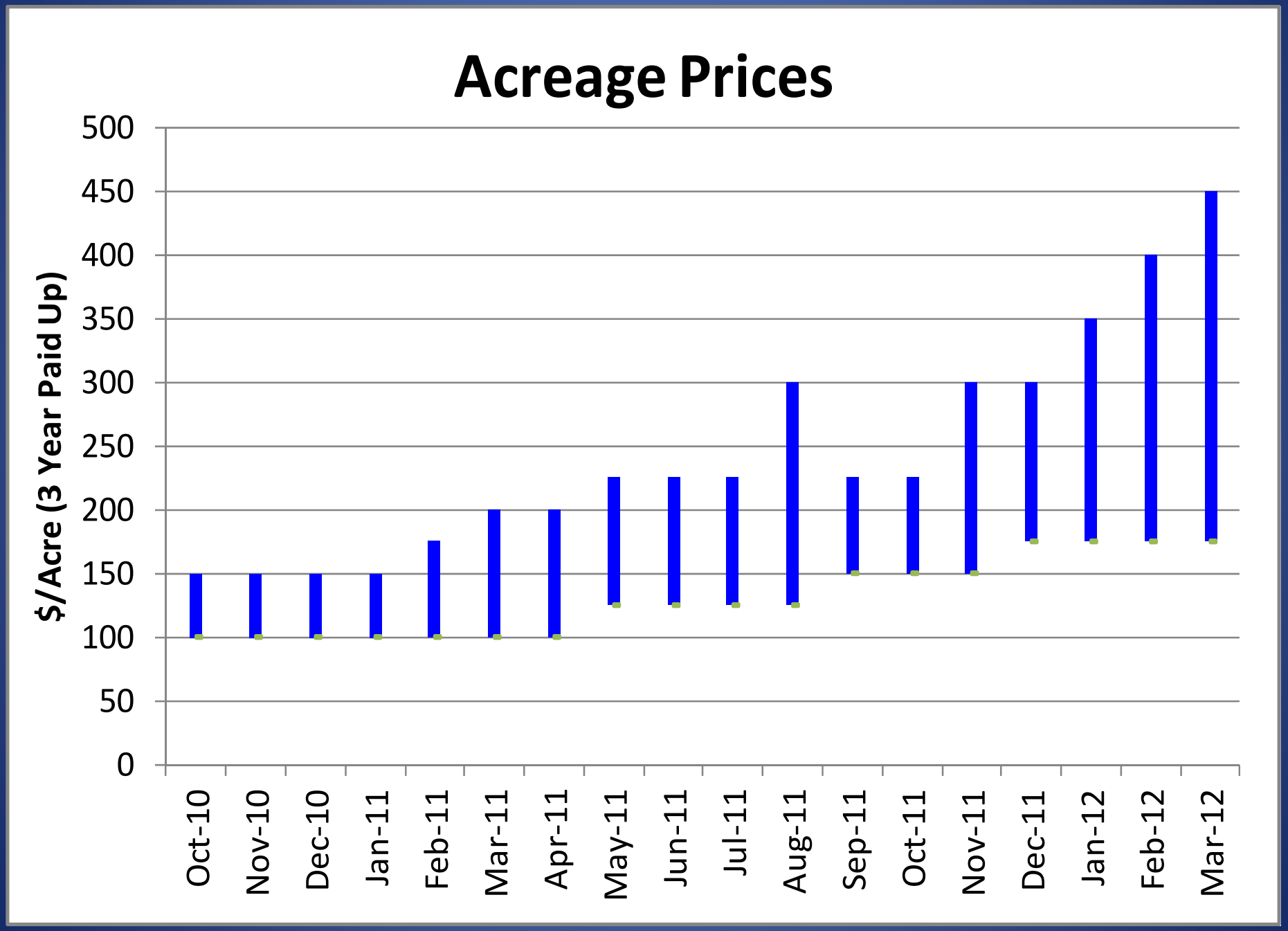


Source: Goodrich Petroleum, DUG – April 25, 2012

Major Leaseholders

- Encana – 300,000+ acres
- Devon – 290,000+ acres
- Indigo Minerals – 255,000 acres
- EOG – ~120,000+ acres
- Goodrich Petroleum – 102,600+ acres

Leasing


Acreage Prices
$/Acre (3 Year Paid Up)
500
450
400
350
300
250
200
150
100
50
0
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12

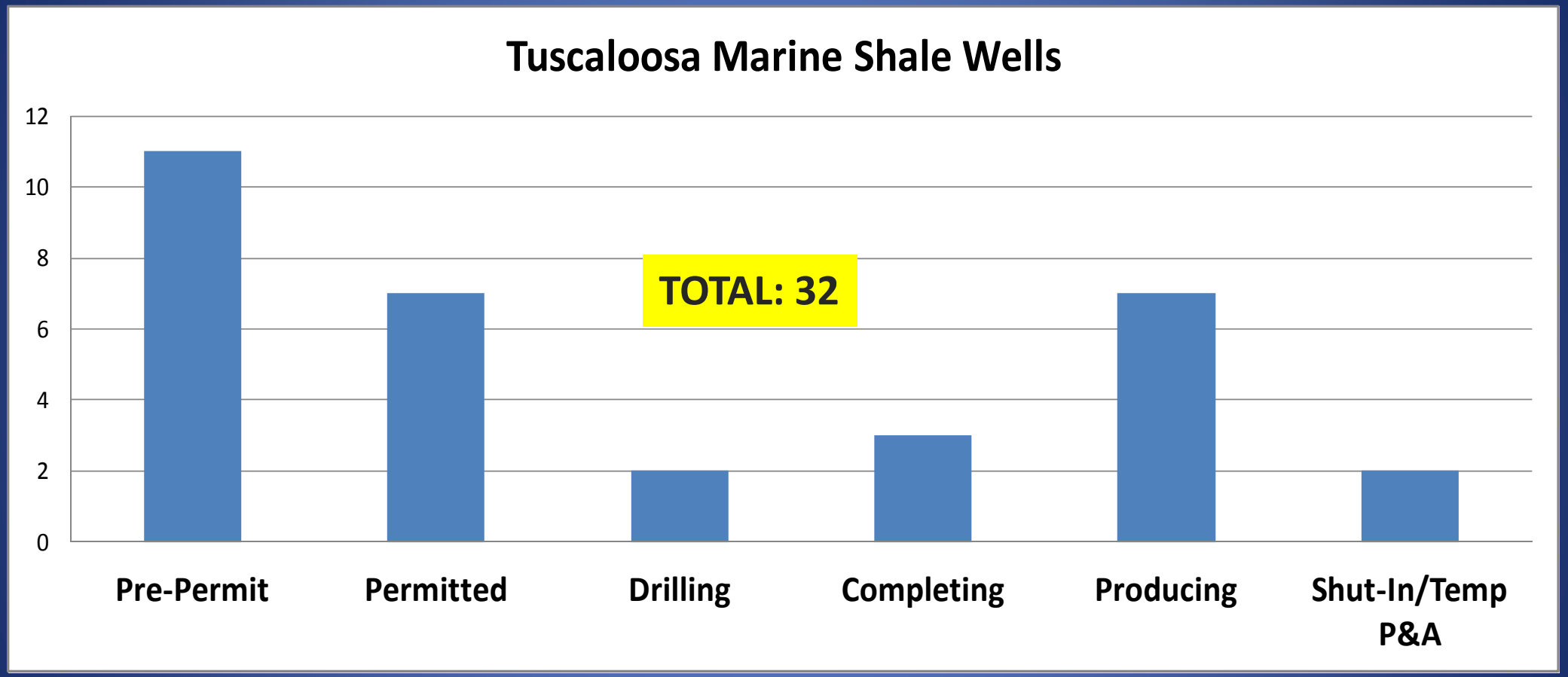
Joint Ventures

- Encana/Denbury/Shell?
- Devon/Sinopec
- EOG/MCX

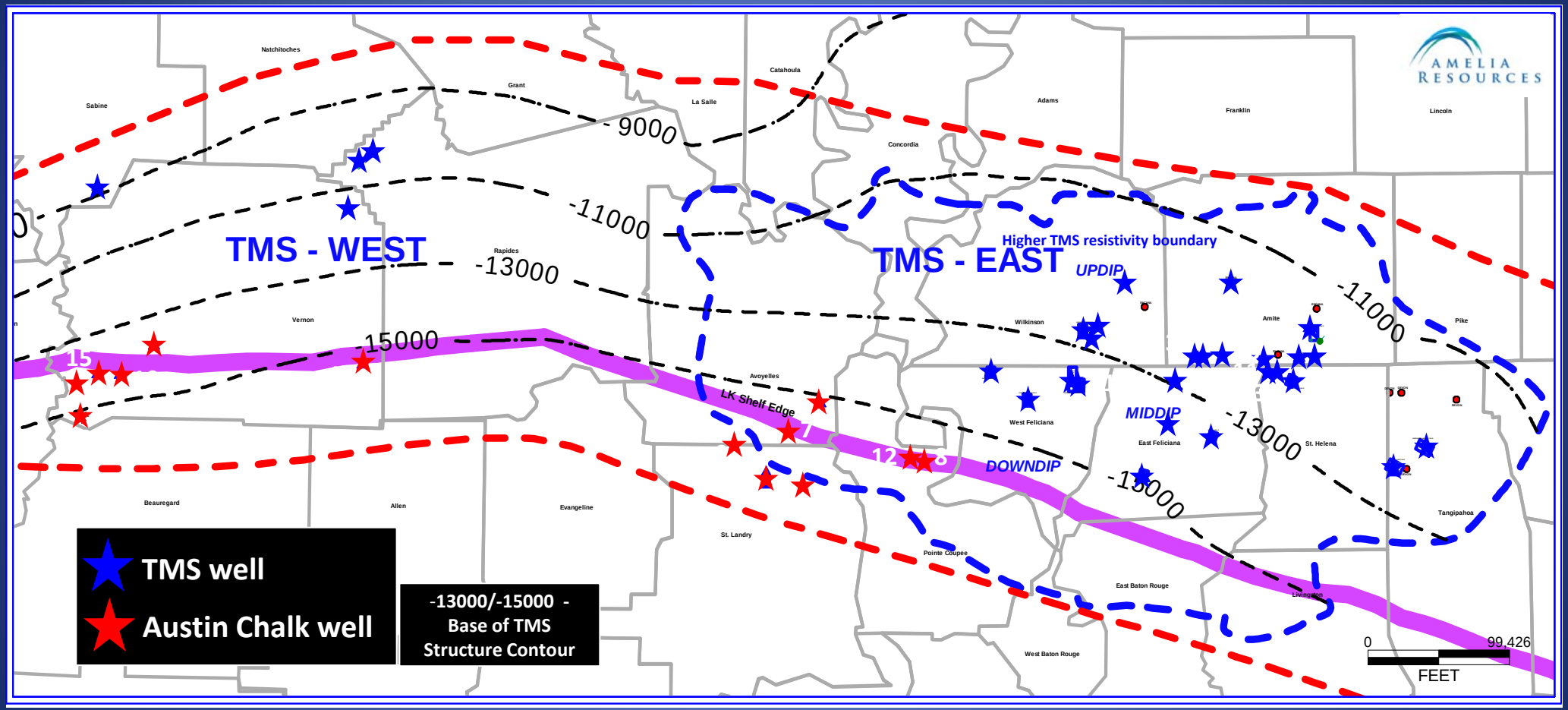
Play Benchmarks

- Long Laterals – Encana, 8932’
- Drilling Time – Encana, 19547’ in 39 days
- Initial Potential – Encana, 784 bopd 309 mcfgd (837 boepd)
- Frac stages – 30 (Encana Anderson 17H and 18H)
- 1st Year Production Decline: unknown

Drilling Activity

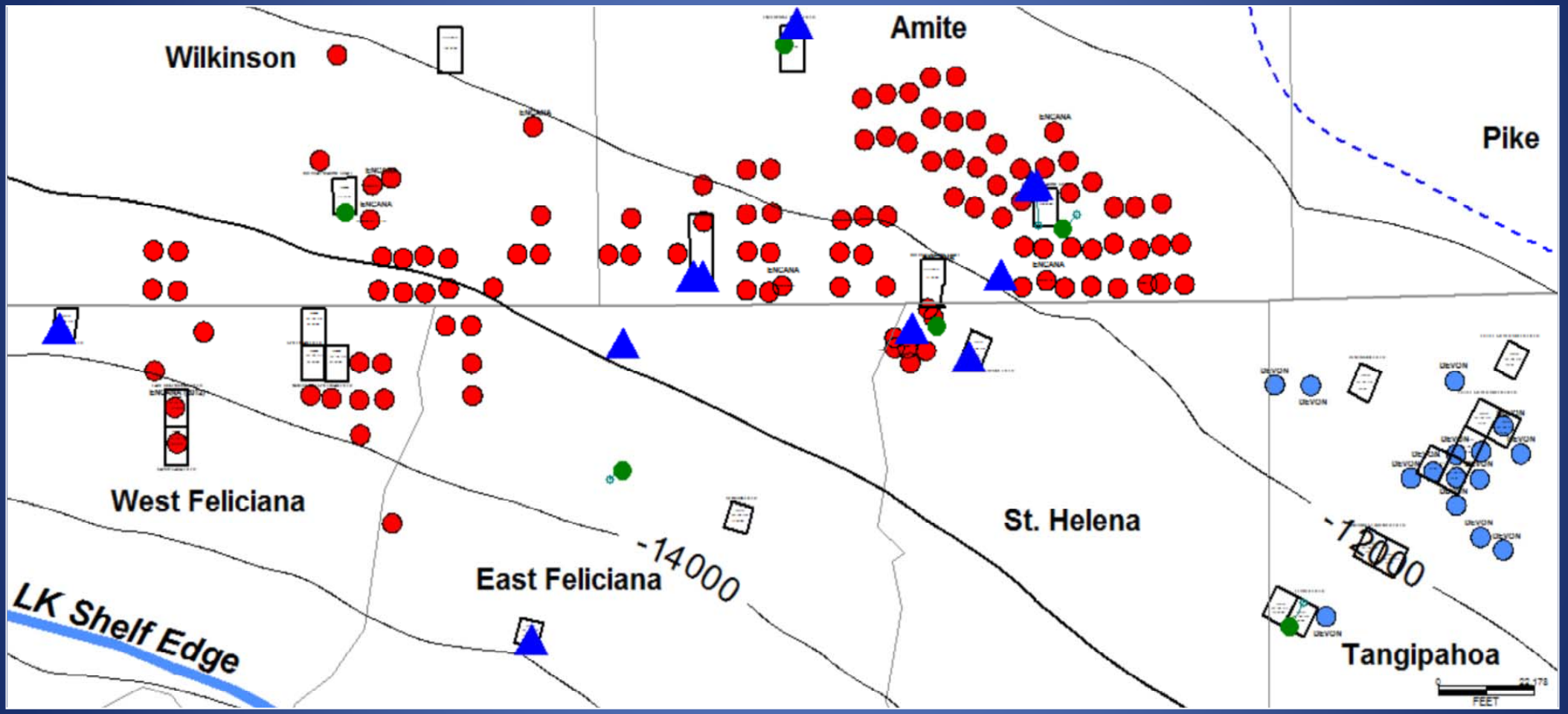


Current Activity



Future Activity

Base TMS Structure Map



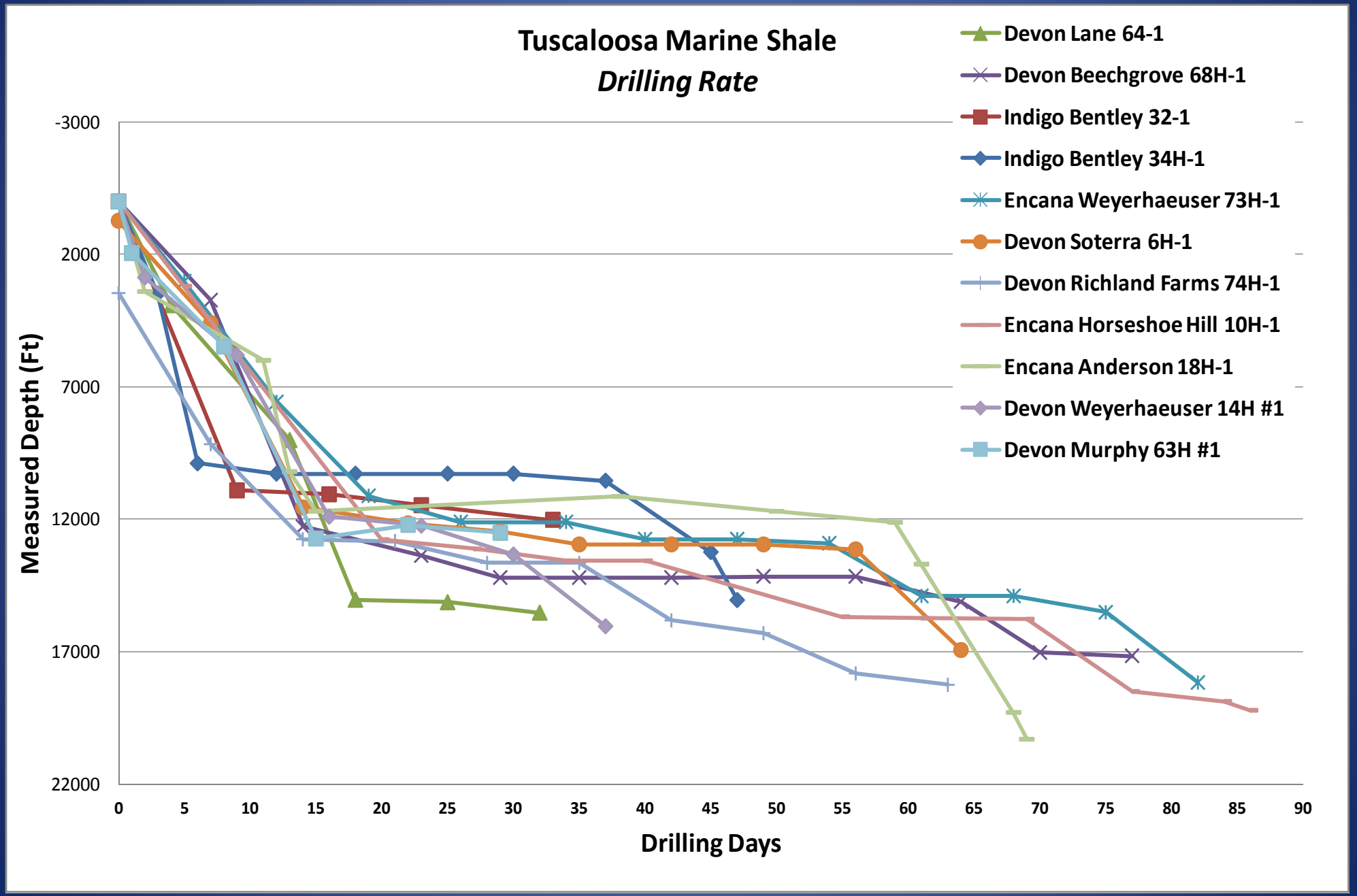
Recent Discoveries

- Encana Weyerhaeuser 73H-1: 784 bopd, 309 mcfgd **(837 boepd)**
- Indigo Bentley Lumber 34H-1: 324 bopd, 154 mcfd **(351 boepd)**
- Devon Energy Beech Grove 68H-1: 101 bopd, 100 mcfd **(118 boepd)**
- Devon Energy Soterra 6H-1: 176 bopd **(176 boepd)**
- Encana Horseshoe Hill 10H-1: 732 bopd, 483 mcfd **(815 boepd)**
- Devon Energy Richland Farms 74H-1: 259 bopd, 151 mcfd **(285 boepd)**

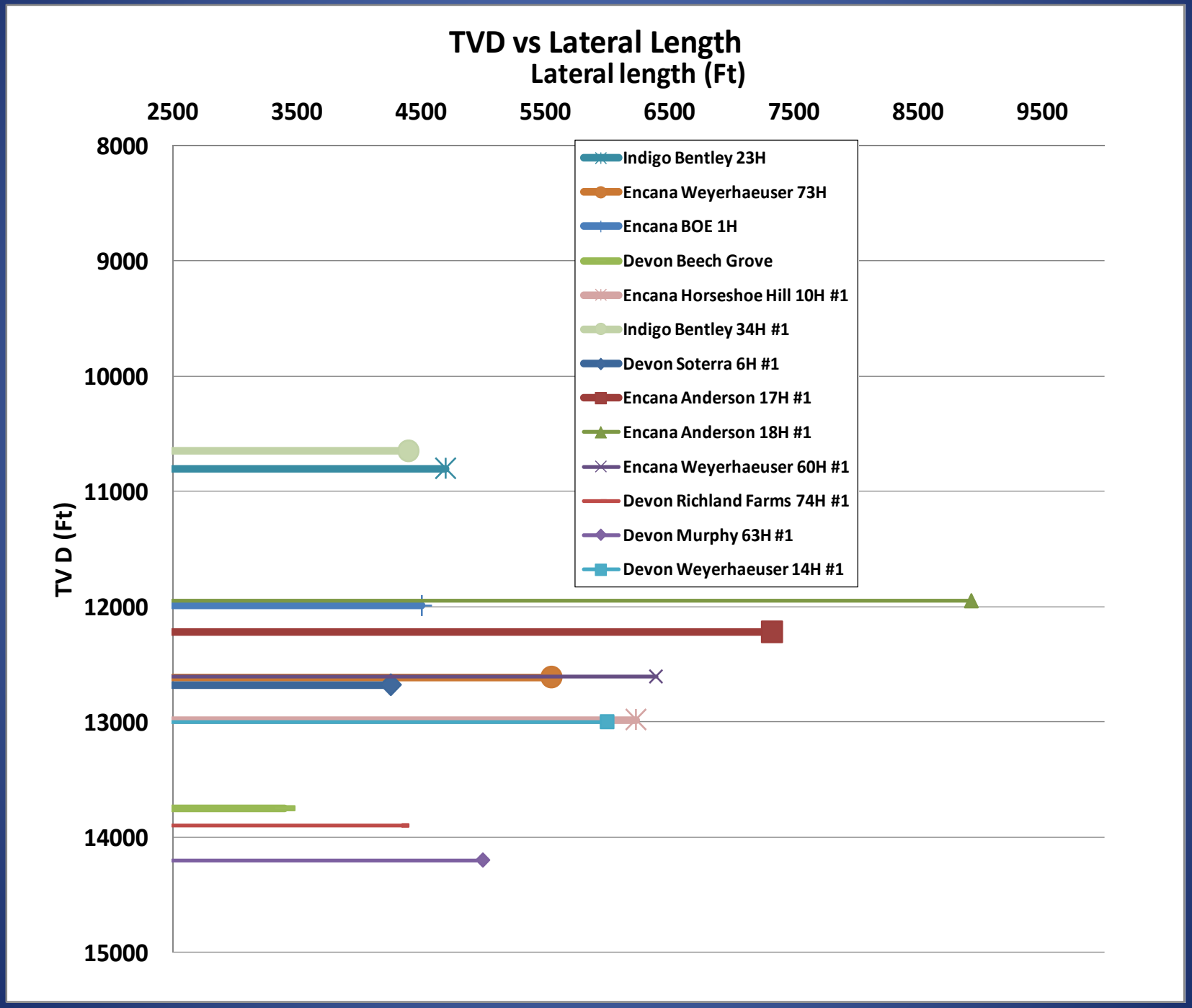
Encana Horseshoe Hill 10H-1

Devon Energy Soterra 6H-1

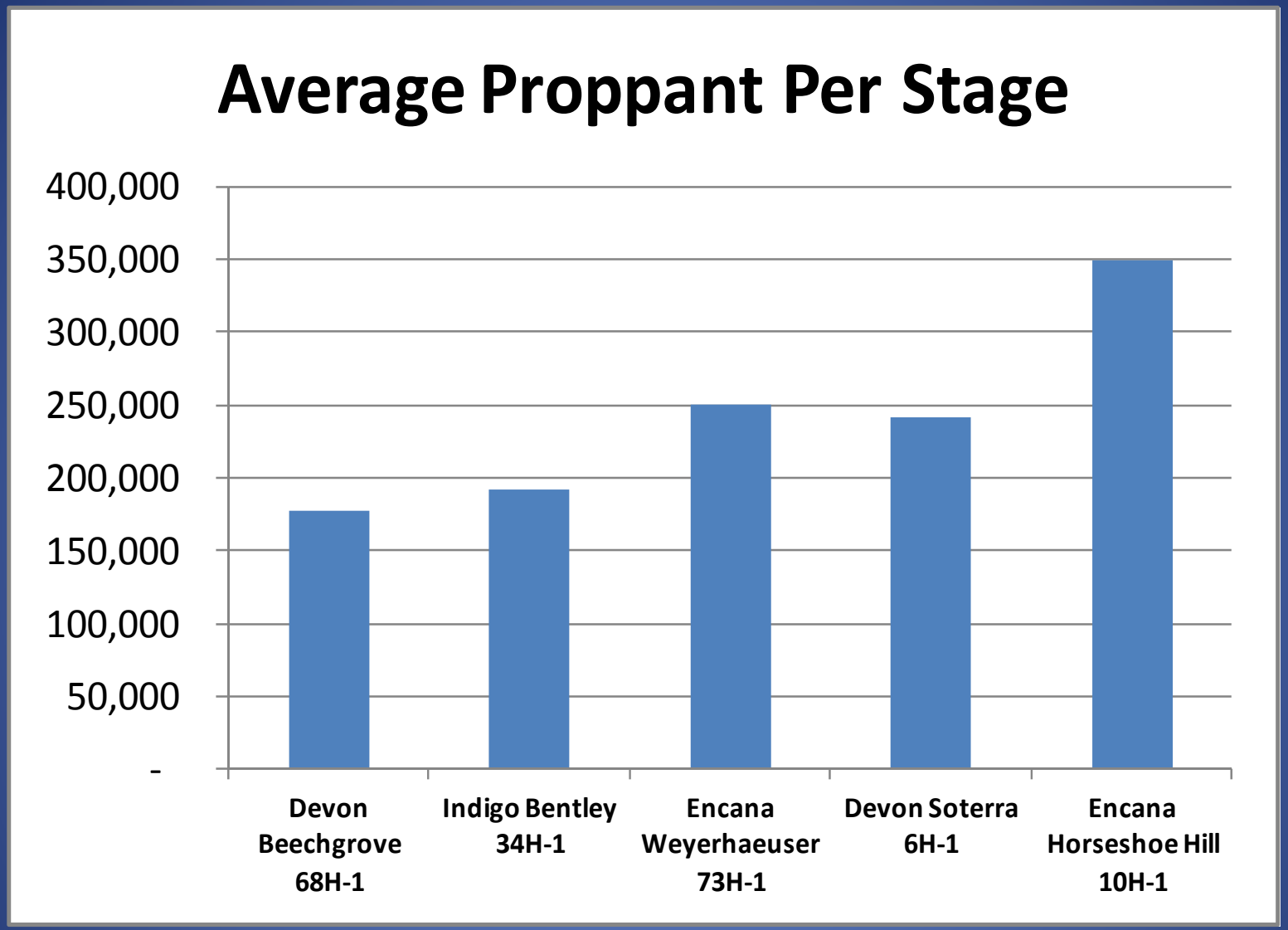
Drilling Time



TVD vs Lateral Length



Frac Jobs



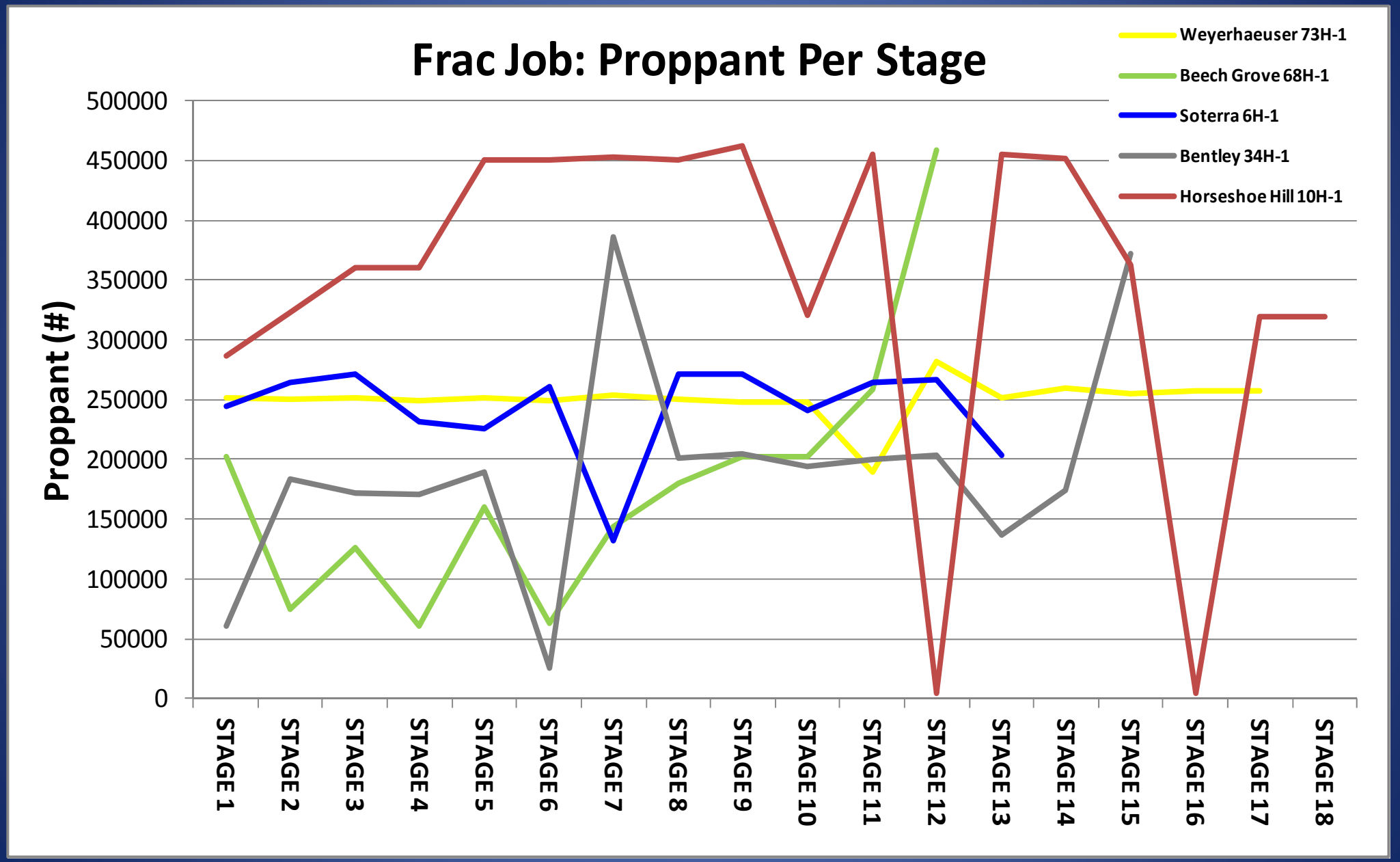
EnCana (HH,17H,18H):

-10%: 100 Mesh
-80%: 40/70 Premium White (Crushable)
-10%: 30/50 Resin Coated/Interm. Str.
-450,000# total

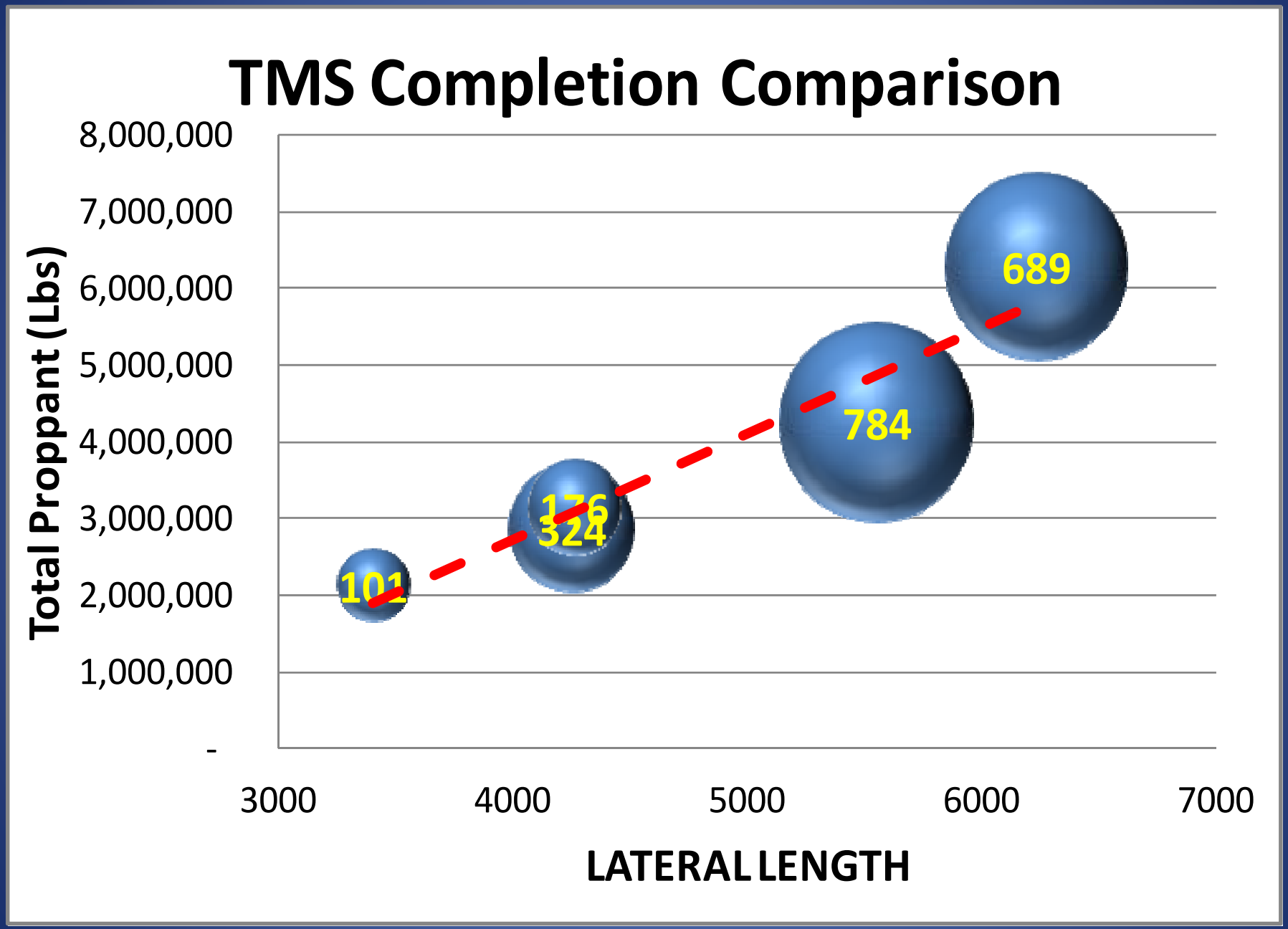
Devon (Richland):

-10%: 40/70 Carbo (ISP)
-90%: 30/50 Bauxlite (ISP)
-100,000# total

Frac Jobs

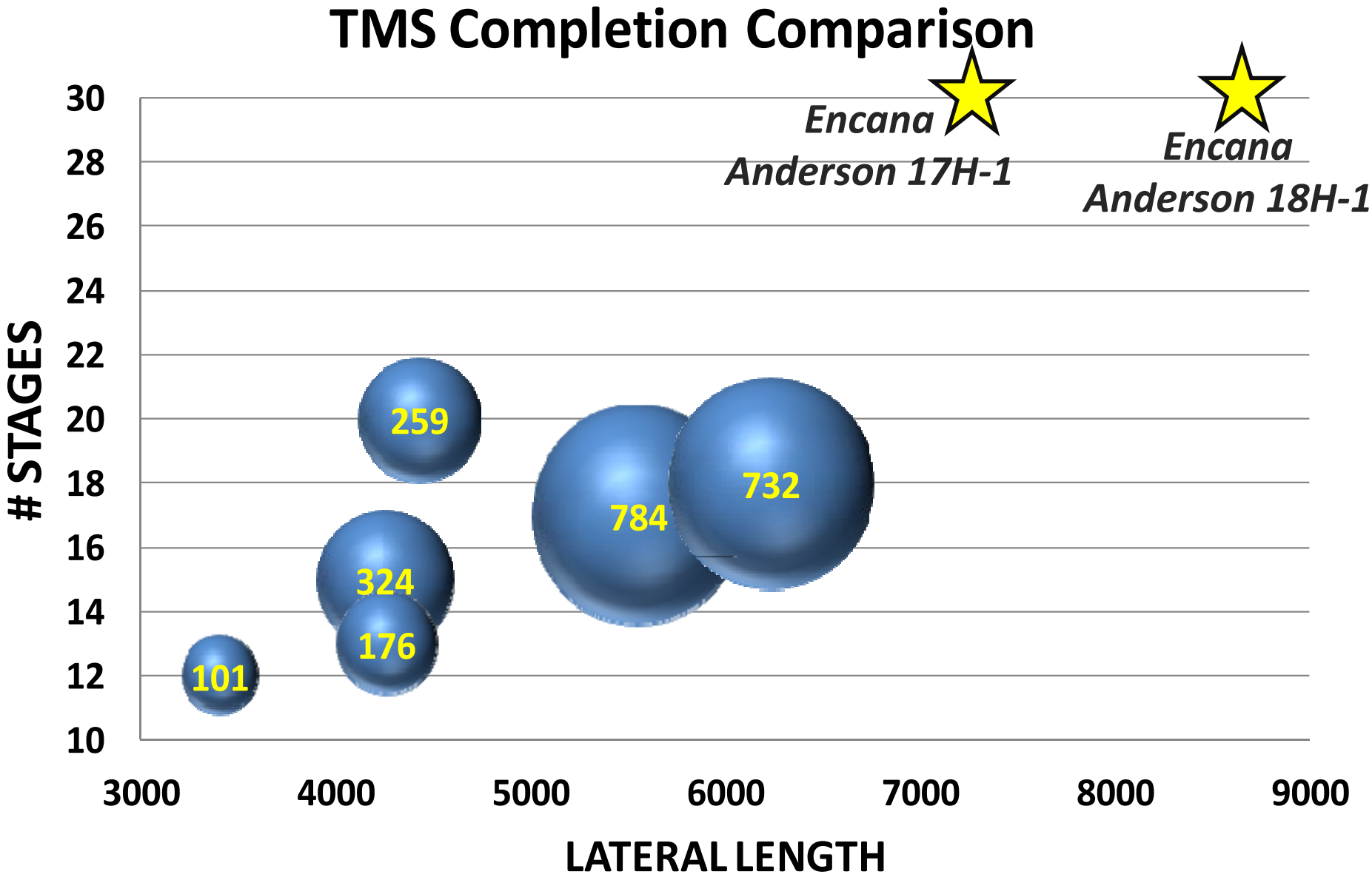

Frac Job: Proppant Per Stage
Proppant (#)
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5
STAGE 6
STAGE 7
STAGE 8
STAGE 9
STAGE 10
STAGE 11
STAGE 12
STAGE 13
STAGE 14
STAGE 15
STAGE 16
STAGE 17
STAGE 18
Weyerhaeuser 73H-1
Beech Grove 68H-1
Soterra 6H-1
Bentley 34H-1
Horseshoe Hill 10H-1

Frac Jobs



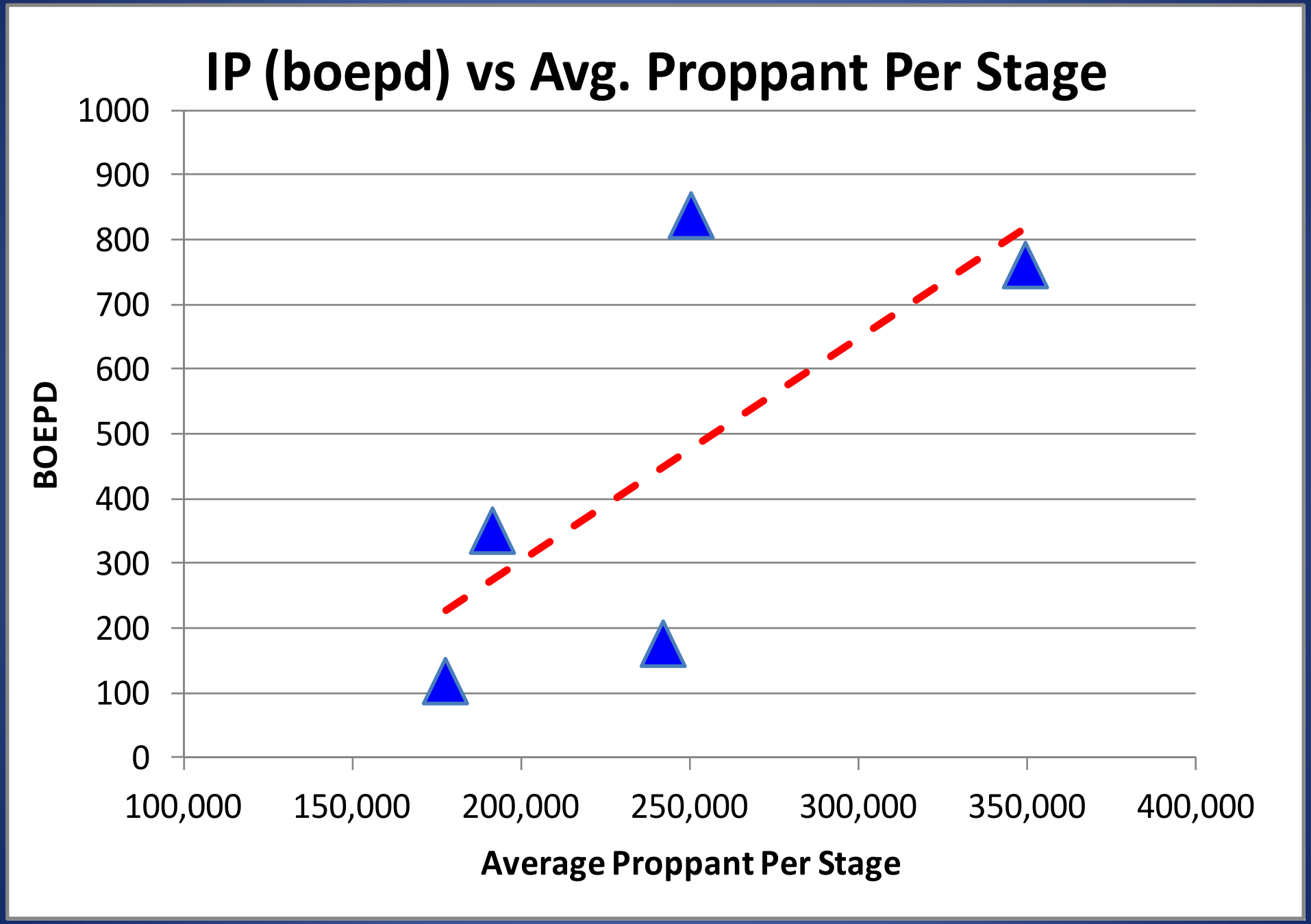
Circle Size: IP Oil (bopd)

Frac Jobs

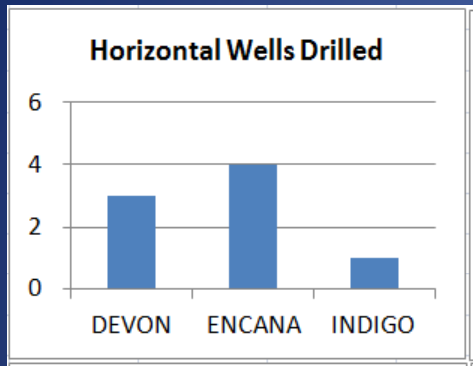


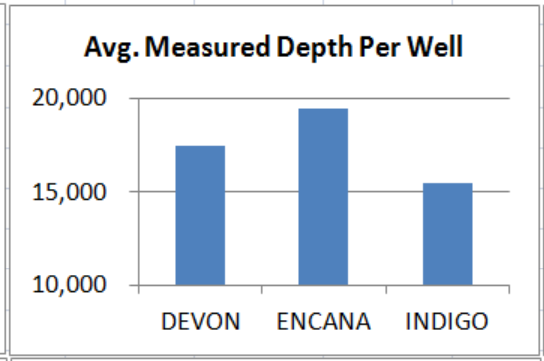
Circle Size: IP Oil (bopd)

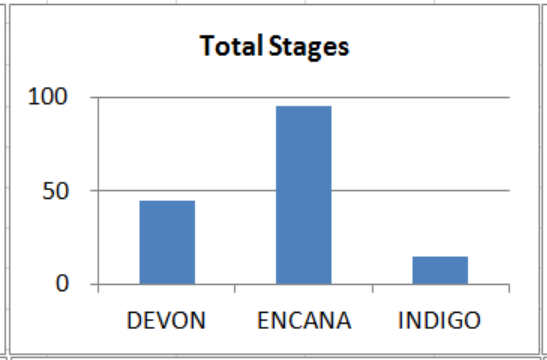
Frac Jobs

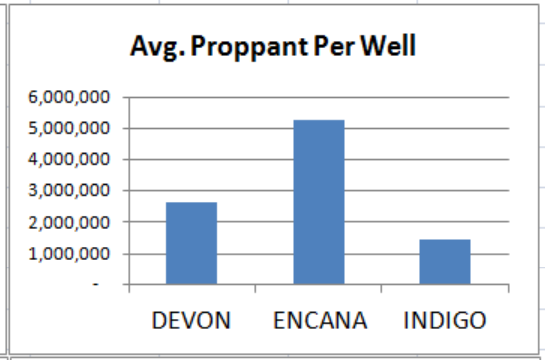

IP (boepd) vs Avg. Proppant Per Stage
BOEPD
1000
900
800
700
600
500
400
300
200
100
0
100,000
150,000
200,000
250,000
300,000
350,000
400,000
Average Proppant Per Stage

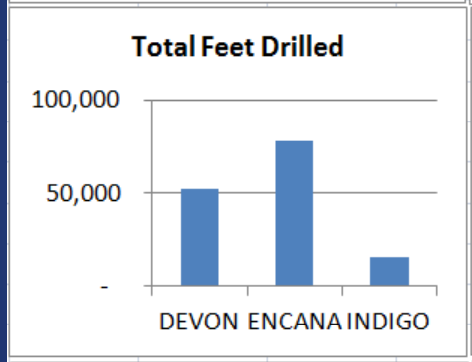
Scorecard

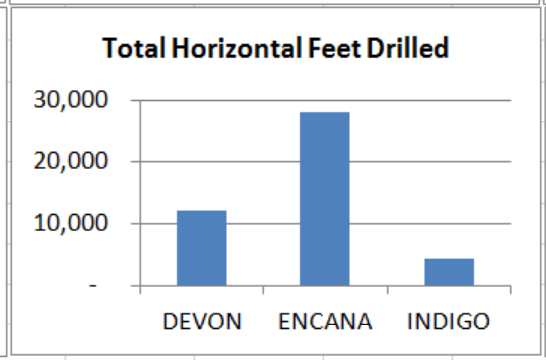

Horizontal Wells Drilled
6
4
2
0
DEVON
ENCANA
INDIGO

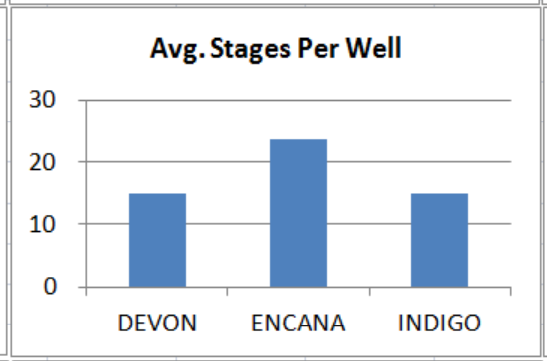

Avg. Measured Depth Per Well
20,000
15,000
10,000
DEVON
ENCANA
INDIGO

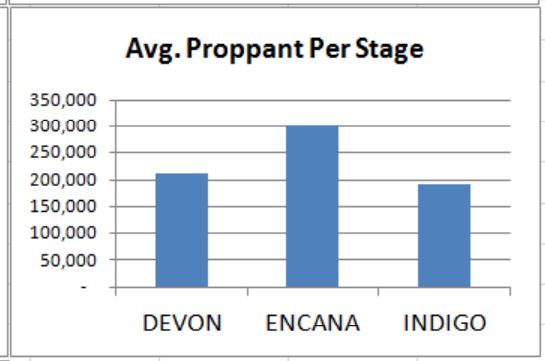

Total Stages
100
50
0
DEVON
ENCANA
INDIGO

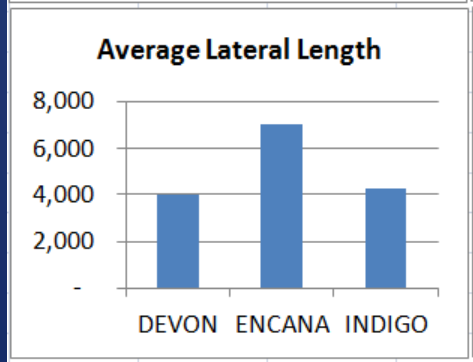

Avg. Proppant Per Well
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
-
DEVON
ENCANA
INDIGO

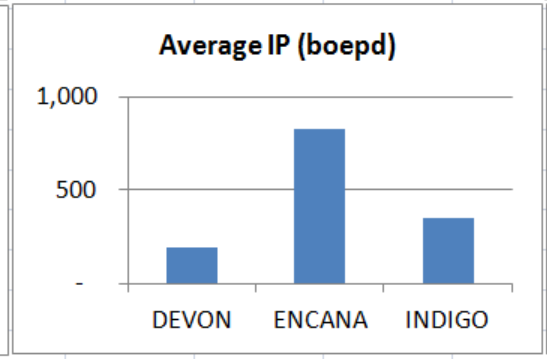

Total Feet Drilled
100,000
50,000
-
DEVON
ENCANA
INDIGO

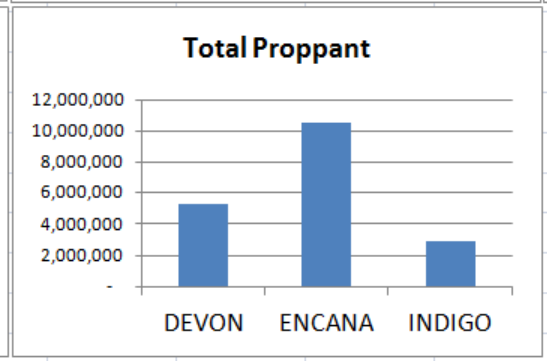

Total Horizontal Feet Drilled
30,000
20,000
10,000
-
DEVON
ENCANA
INDIGO


Avg. Stages Per Well
30
20
10
0
DEVON
ENCANA
INDIGO


Avg. Proppant Per Stage
350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
DEVON
ENCANA
INDIGO


Average Lateral Length
8,000
6,000
4,000
2,000
-
DEVON
ENCANA
INDIGO


Average IP (boepd)
1,000
500
-
DEVON
ENCANA
INDIGO

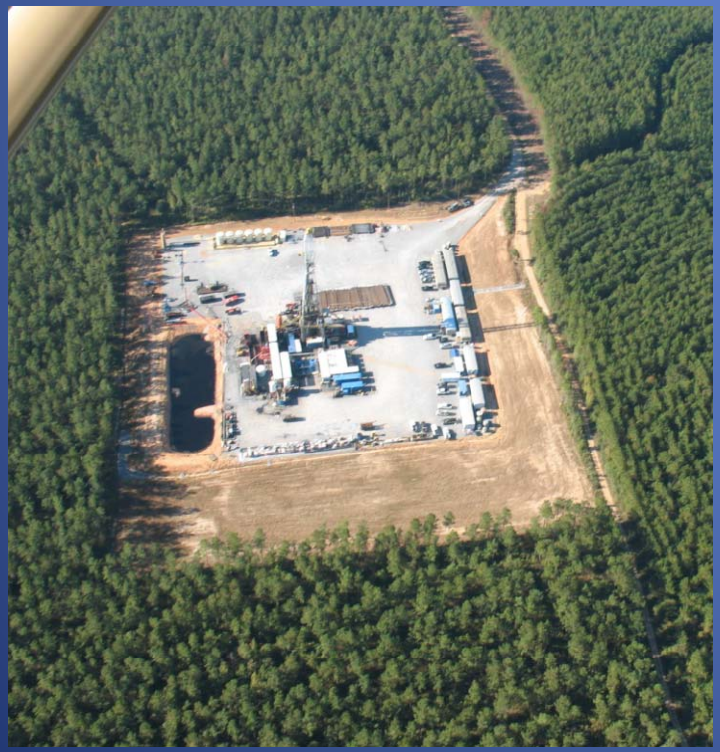

Total Proppant
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
-
DEVON
ENCANA
INDIGO

Targeted Costs

TVD (ft)	LATERAL (ft)	MD (ft)	FRAC Stages	Drilling	Frac, Water	Coil, WL, Testing	COMPLETION	TOTAL
12000	8000	20000	27	$ 5,950,000	$ 3,066,667	$ 1,733,333	$ 4,800,000	**$ 10,750,000**
13500	6500	20000	22	$ 6,375,000	$ 2,491,667	$ 1,408,333	$ 3,900,000	**$ 10,275,000**
15000	5000	20000	17	$ 6,800,000	$ 1,916,667	$ 1,083,333	$ 3,000,000	**$ 9,800,000**

Feet per stage: 300

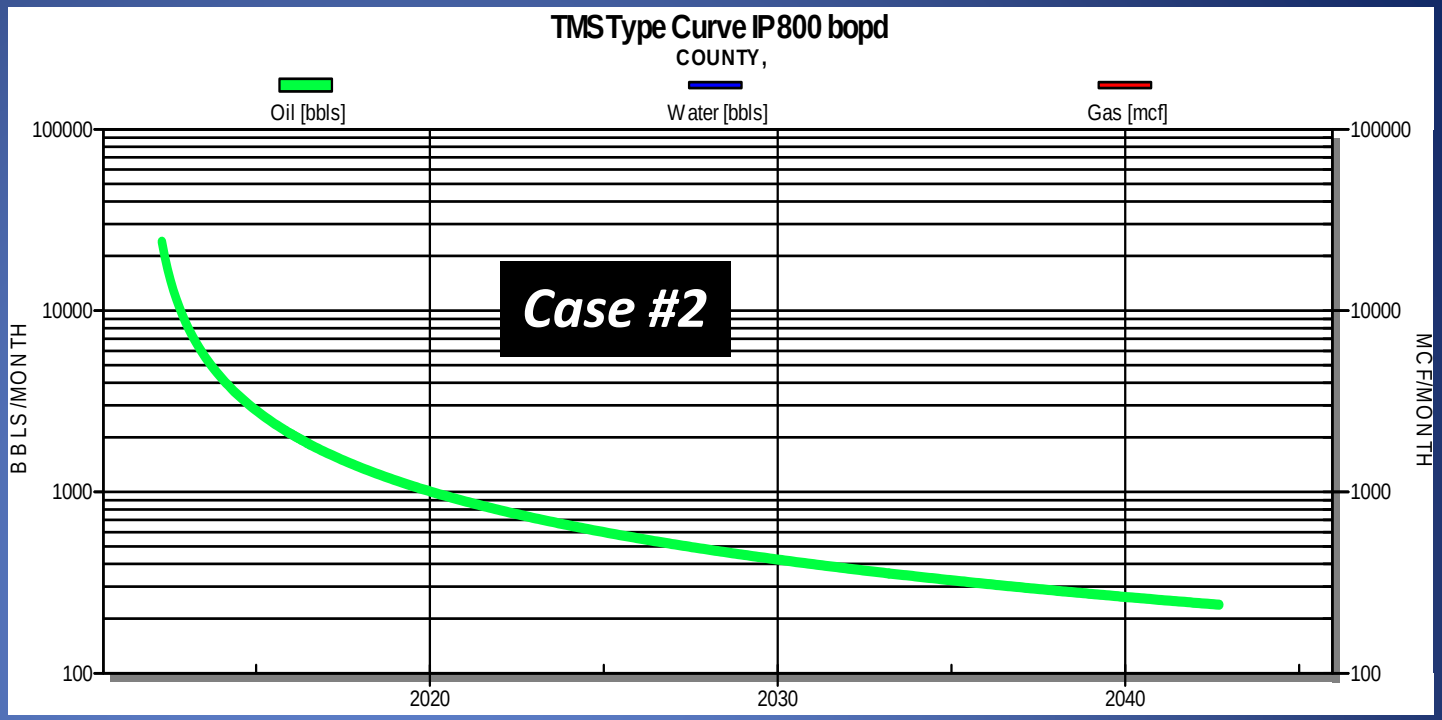
Encana Weyerhaeuser 73H-1
St. Helena Parish, LA



Encana Horseshoe Hill 10H-1
Wilkinson County, MS

Targeted Economics

Location	Louisiana
1st Year Decline	73%
Working Interest	100%
Net Revenue Interest	78%
Lease Cost	$ 250,000
Dryhole Cost	$ 6,500,000
Completion Cost	$ 3,500,000
Total Cost	$ 10,250,000
Start Date	Apr-12
End Date	Sep-42
Years Produced	30
B exponent	0.925
Di	2.493
Oil Price	$ 100



Case #	1	2	3	4
30 Day IP (bopd)	600	800	1000	1200
Estimated Ultimate Recovery (bbls)	346,885	462,513	578,141	693,770
PV10 ($)	$ 4,578,797	$ 9,814,332	$ 15,053,862	$ 20,297,460
PV20 ($)	$ 2,231,074	$ 6,561,145	$ 10,896,689	$ 15,235,191
PV30 ($)	$ 862,726	$ 4,691,796	$ 8,524,885	$ 12,359,792
Investment	$ 10,250,000	$ 10,250,000	$ 10,250,000	$ 10,250,000
Payout (Years)	2.00	1.08	0.75	0.58
ROI	1.99	2.74	3.49	4.24
IRR (%)	39%	75%	120%	160%

Play Summary

- Play still economically unproven
- Several well capitalized companies have large lease blocks
- Several wells drilling and permitted
- First initial potentials are encouraging