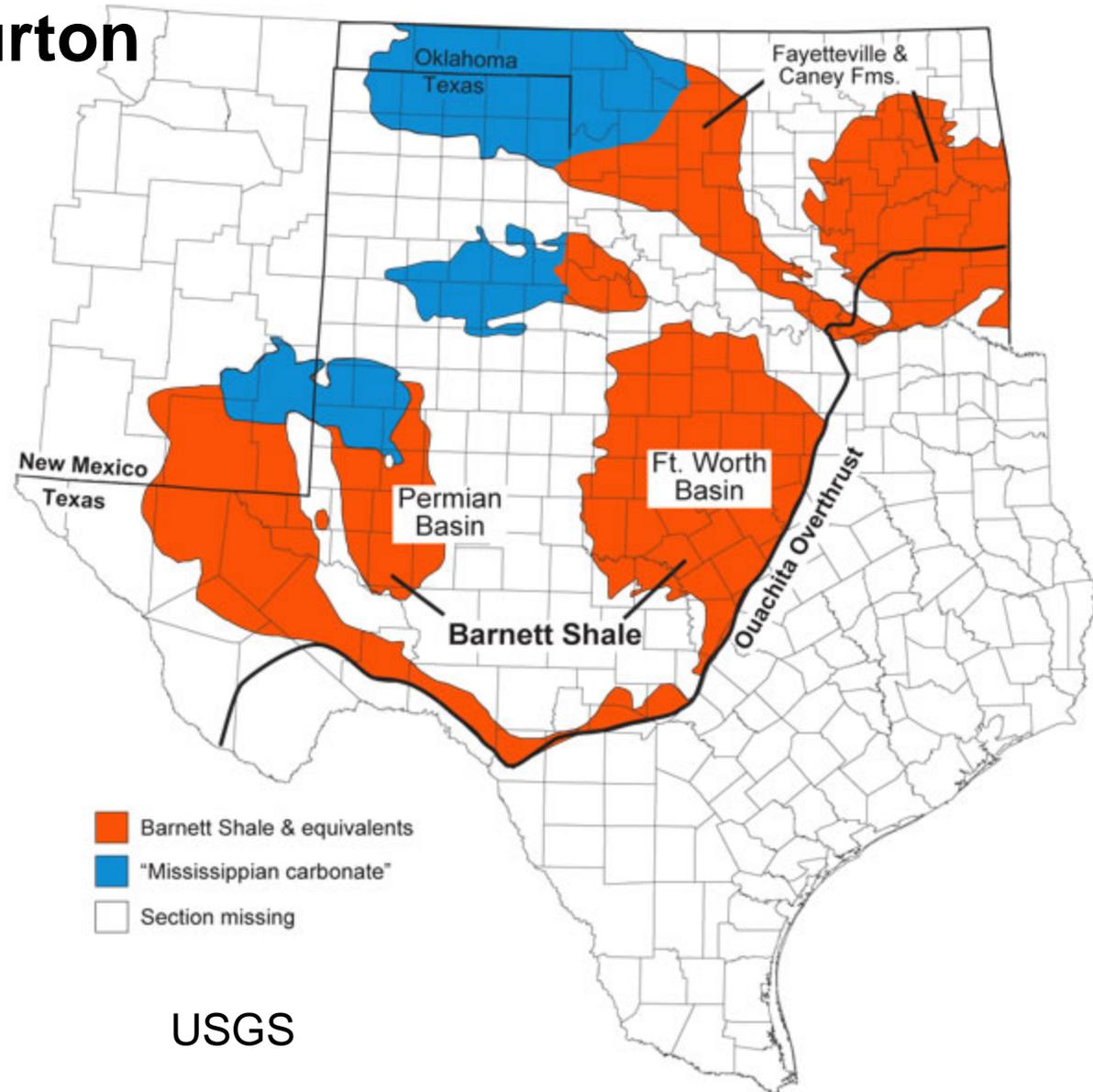


Caney Shale

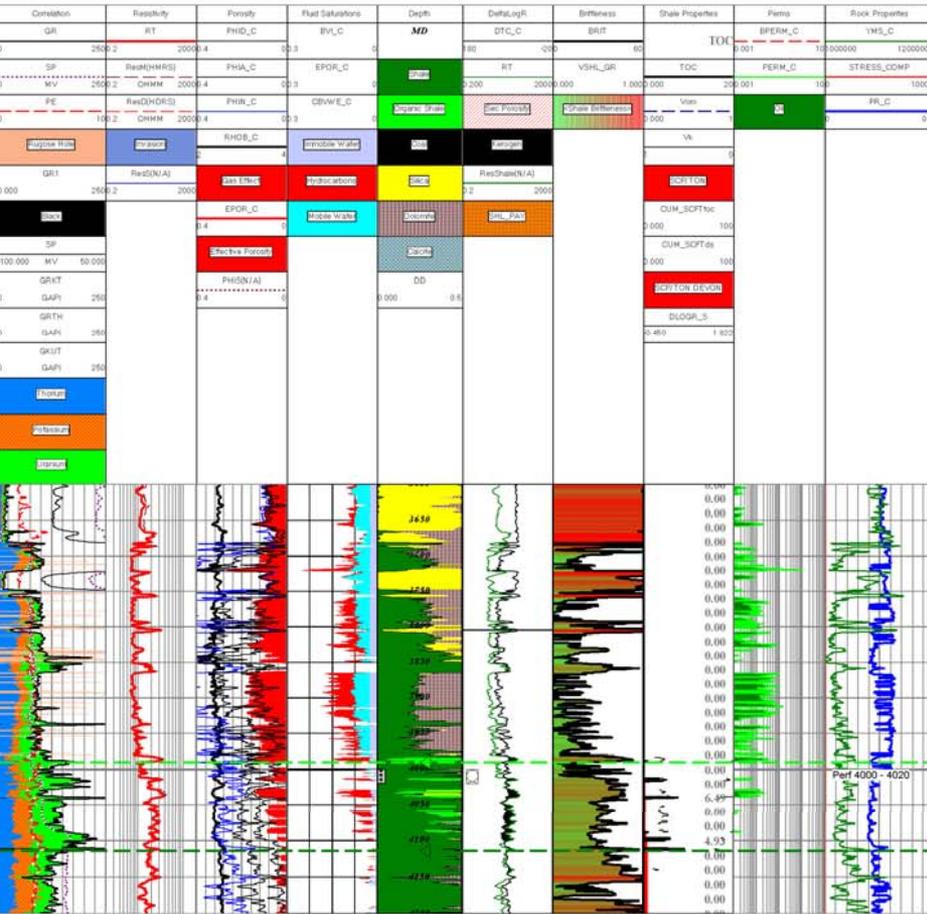
Oklahoma's Shale Challenge

Bill Grieser Halliburton

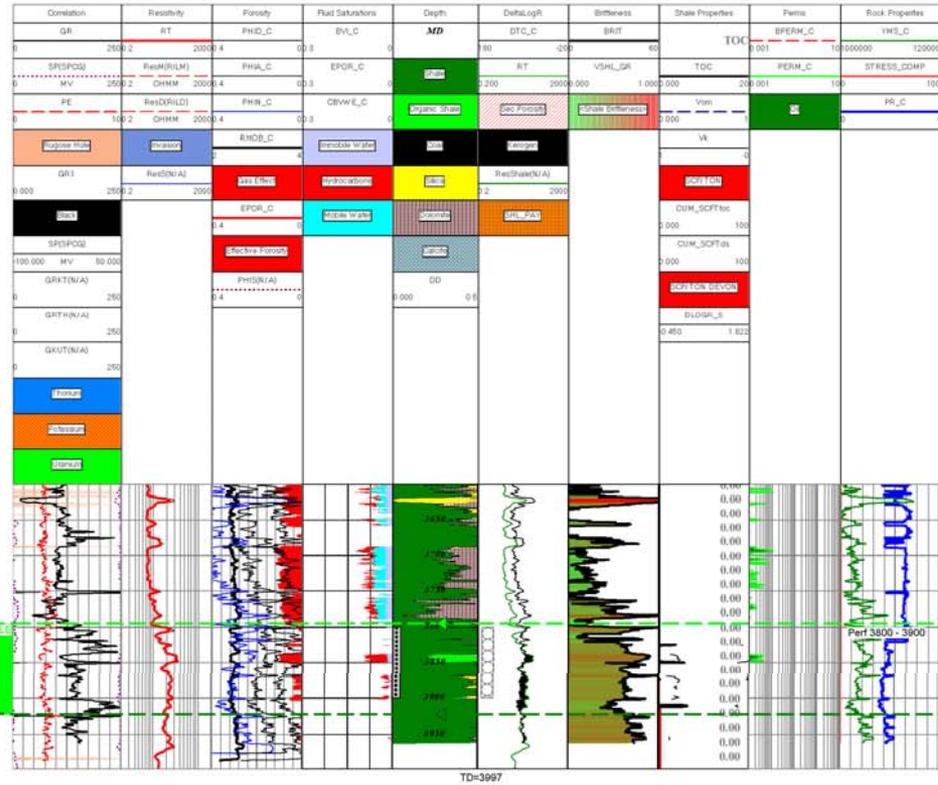


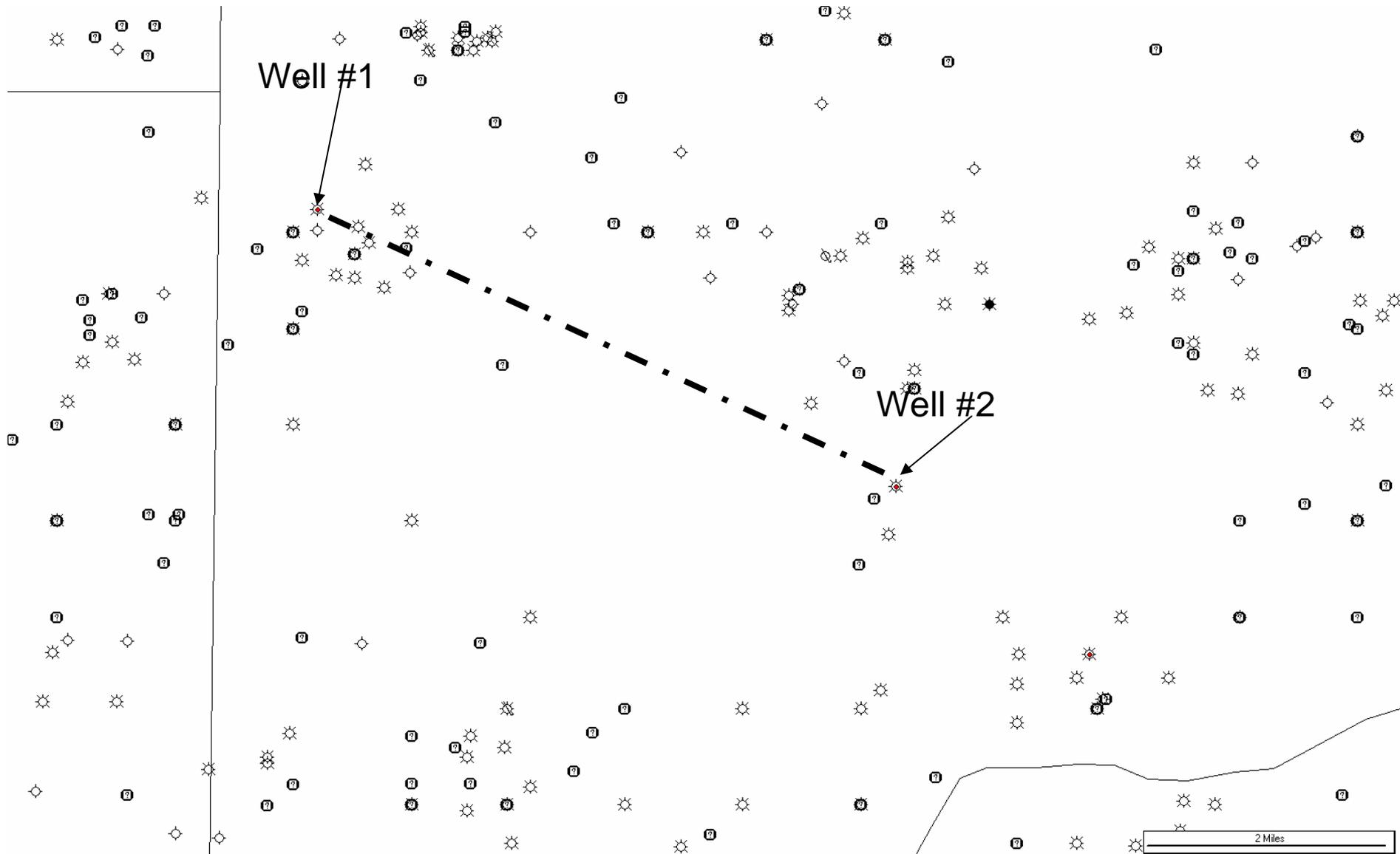
Play	TOC (%)	Ro	H	P* PSI/ft	Scf/ton
Barnett	3-5	0.9-1.4	100-400	0.52	50-300
L-Bossier	4-8	0.9-1.6	200-300	0.7-0.9	
Marcellus	3-10	0.8-1.4	100-300		
Caney	1.2-9	0.8-2.0	20-180	0.46	40-140
Fayetteville	4-9	1-4	50-325		60-220
Haynesville	0.5-4	0.94-2.6	100-250	0.7-0.9	
Woodford	3-10	0.7-1.5	50-200	0.48	50-160

Well 1



Well 2



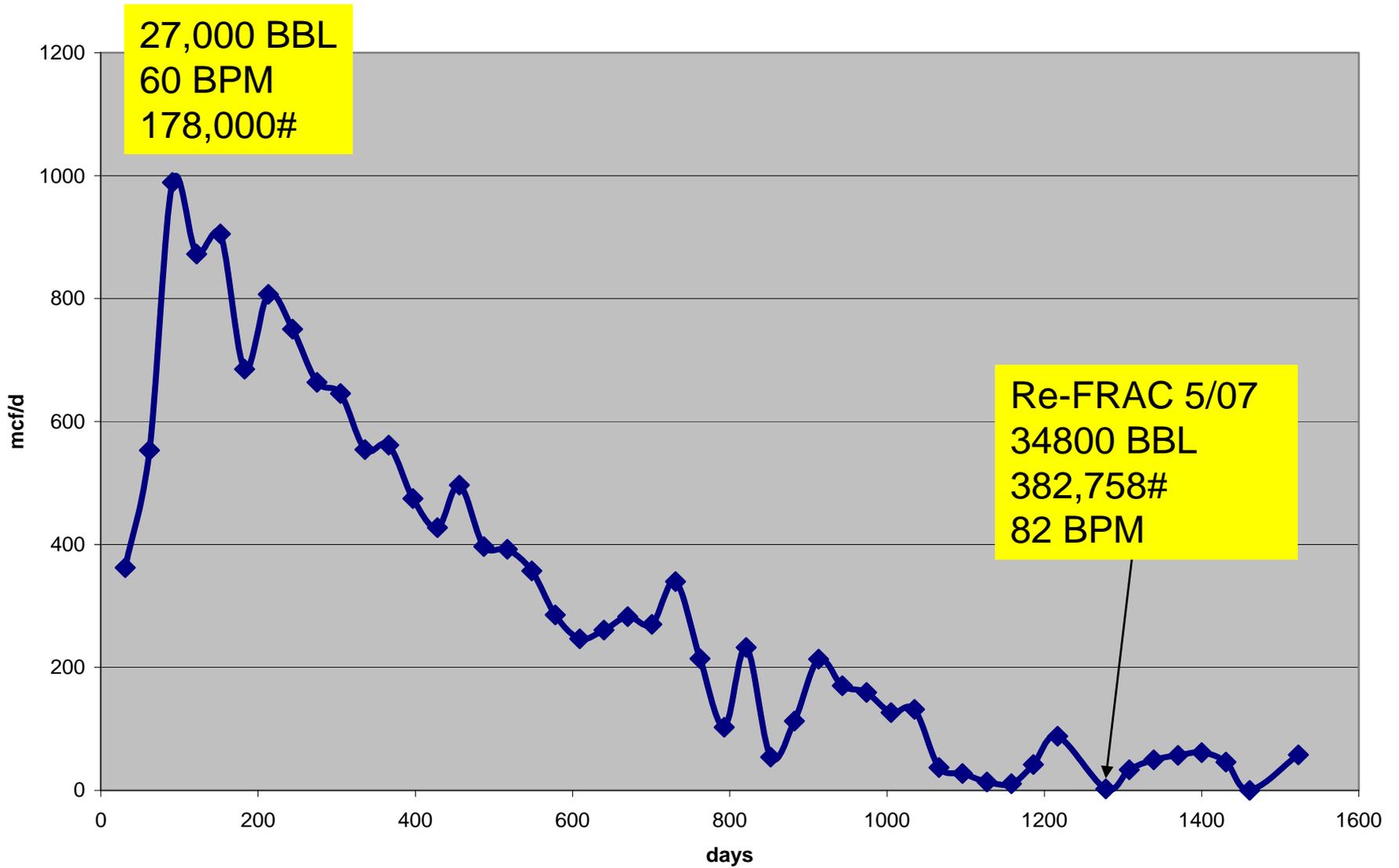


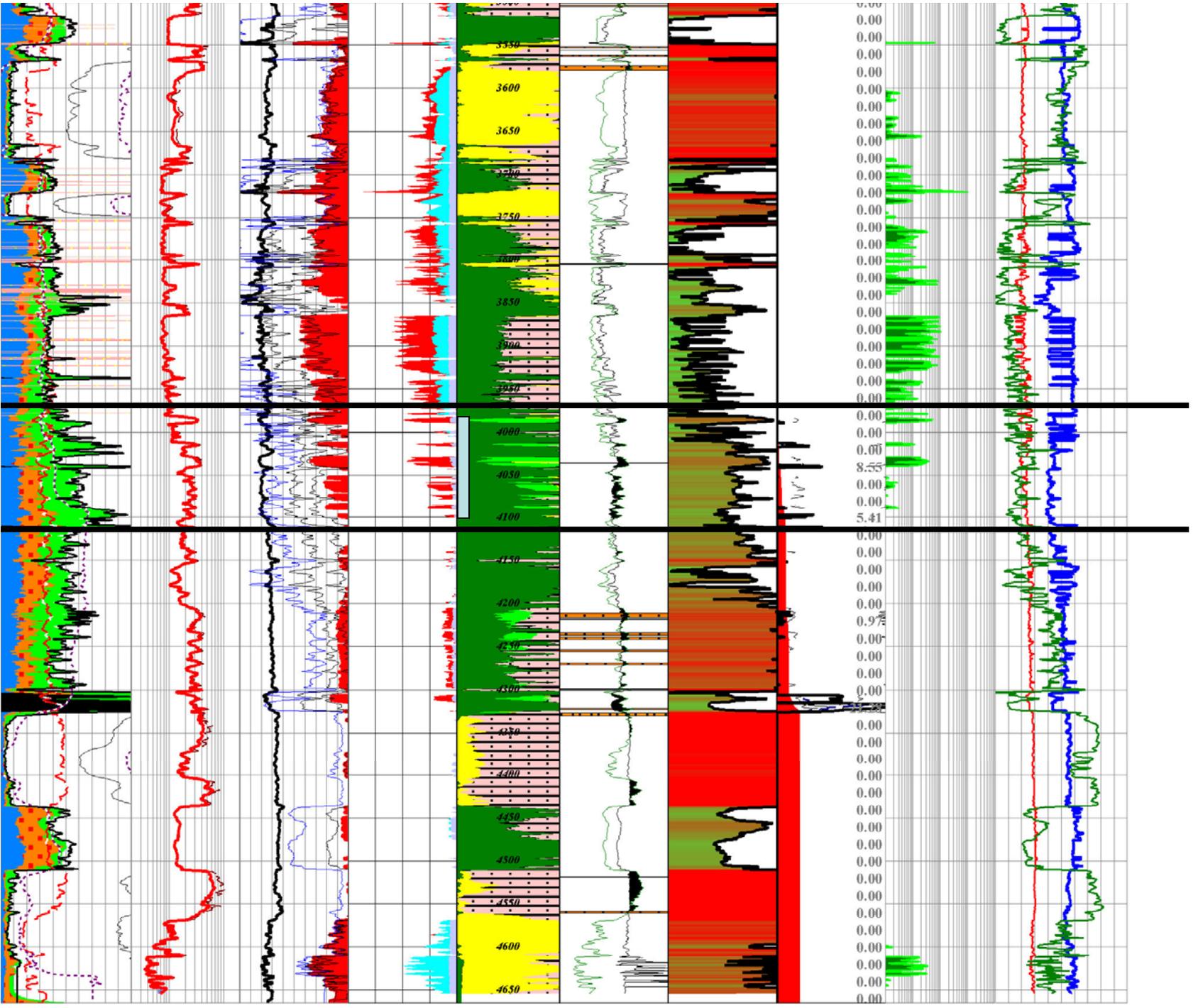
Well #1

Well #2

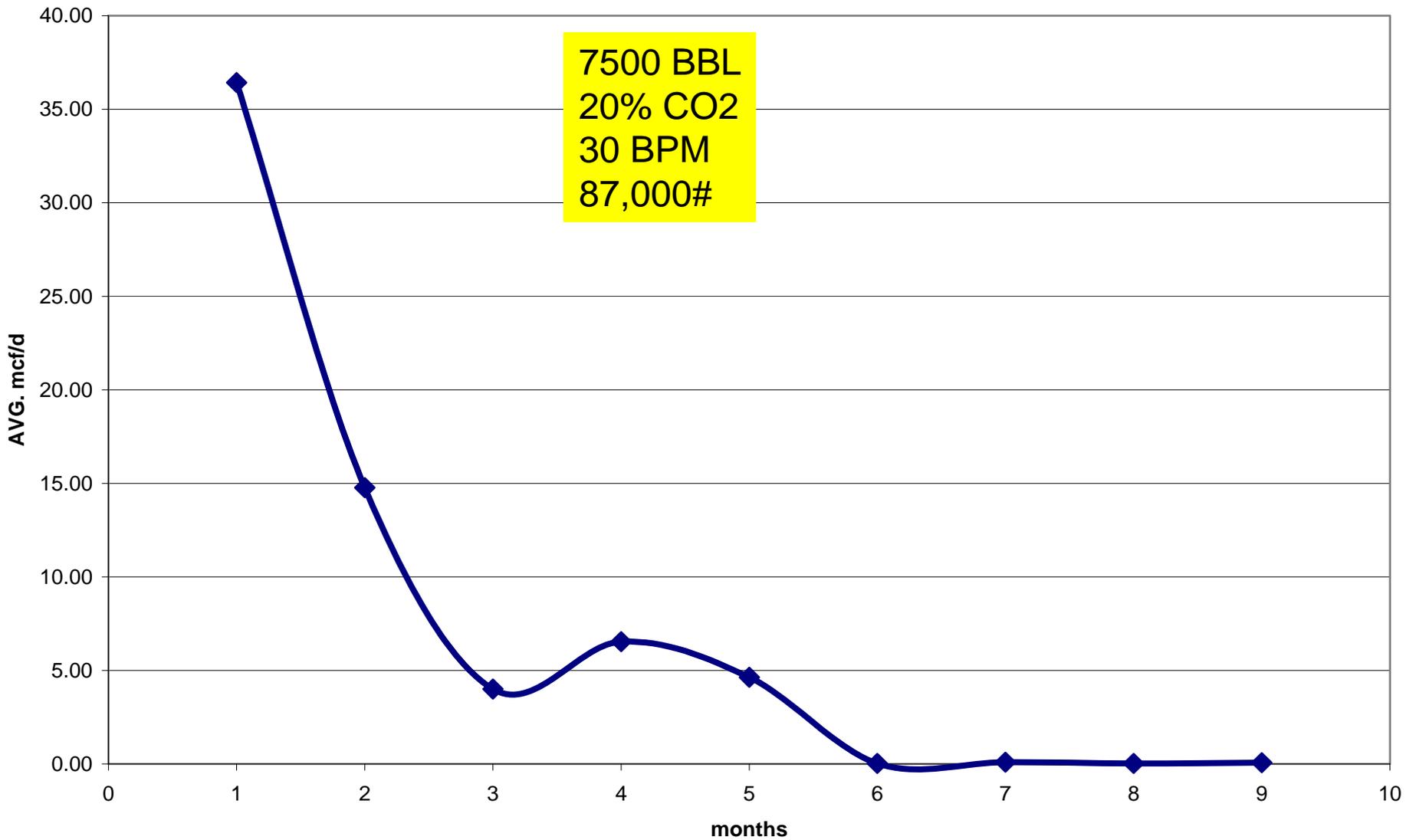
2 Miles

Well #1





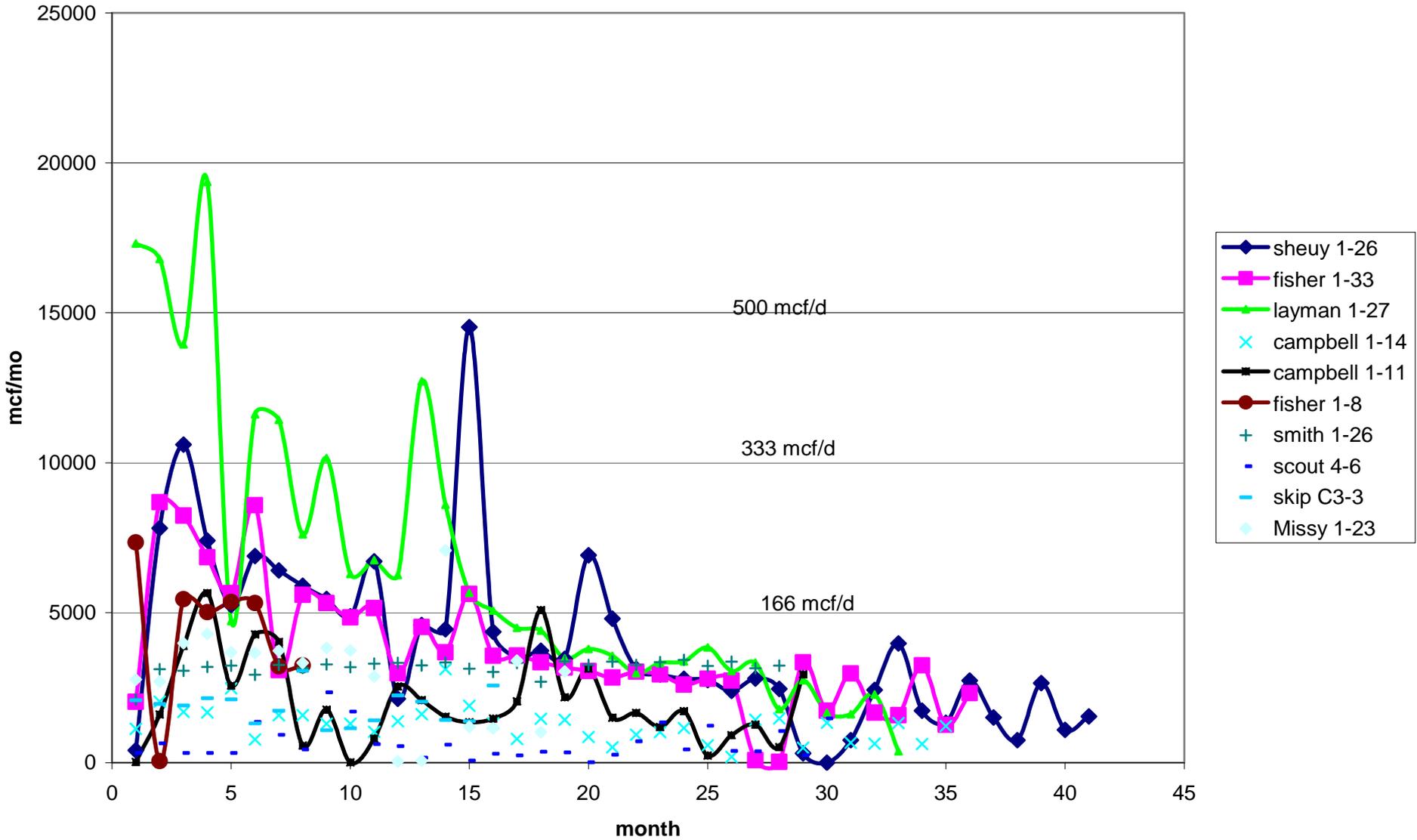
Well #2



McIntosh CO OK Horizontal Caney

API_NO	Lease	well #	operator	TD	GAS_CUM
35-091-21632	BLACKBIRD B	16-13H	NOBLE ENERGY, INC.	5581	0
35-091-21451	CAMPBELL	1-11H	WILLIAMS PROD MIDCONTINENT CO	7350	58596
35-091-21459	CAMPBELL	1-14H	WILLIAMS PROD MIDCONTINENT CO	7275	44037
35-091-21453	FISHER	1-33H	WILLIAMS PROD MIDCONTINENT CO	6665	132724
35-091-21460	FISHER	1-8H	CITRUS ENERGY CORPORATION	7350	34997
35-091-21482	HARVEY	1-24	WILLIAMS PROD MIDCONTINENT CO	7773	0
35-091-21458	LAYMAN	1-27	WILLIAMS PROD MIDCONTINENT CO	7098	215904
35-091-21444	MARTIN	1-13H	WILLIAMS PROD MIDCONTINENT CO	6219	0
35-091-21485	MISSY	1-23	WILLIAMS PROD MIDCONTINENT CO	7350	0
35-091-21430	REED	21-1	BRAMMER OPERATING COMPANY LLC	6335	64812
35-091-21470	SCOUT	4-6	WILLIAMS PROD MIDCONTINENT CO	8791	19421
35-091-21433	SHEUY	1-26H	WILLIAMS PROD MIDCONTINENT CO	6603	160293
35-091-21495	SKIP	C 3-3	WILLIAMS PROD MIDCONTINENT CO	8606	29547
35-091-21431	SMITH	26-1	BRAMMER OPERATING COMPANY LLC	7195	88954
35-091-21464	SMITH	1-35H	CITRUS ENERGY CORPORATION	7350	0
35-091-21466	SPORT	4-5	WILLIAMS PROD MIDCONTINENT CO	8524	0
35-091-21568	WASWO	2-21 H	DYNE EXPLORATION COMPANY	6304	0

Caney Horizontal McIntosh CO OK



Porosity 7-12%

Sw: 30-70%

Sg: 65-30%

So: 0.3%0.1%

SpGr: 2.5-2.72 gm/cc

K: 0.00001 – 0.0000000003 md

Ro=1.5-2.0

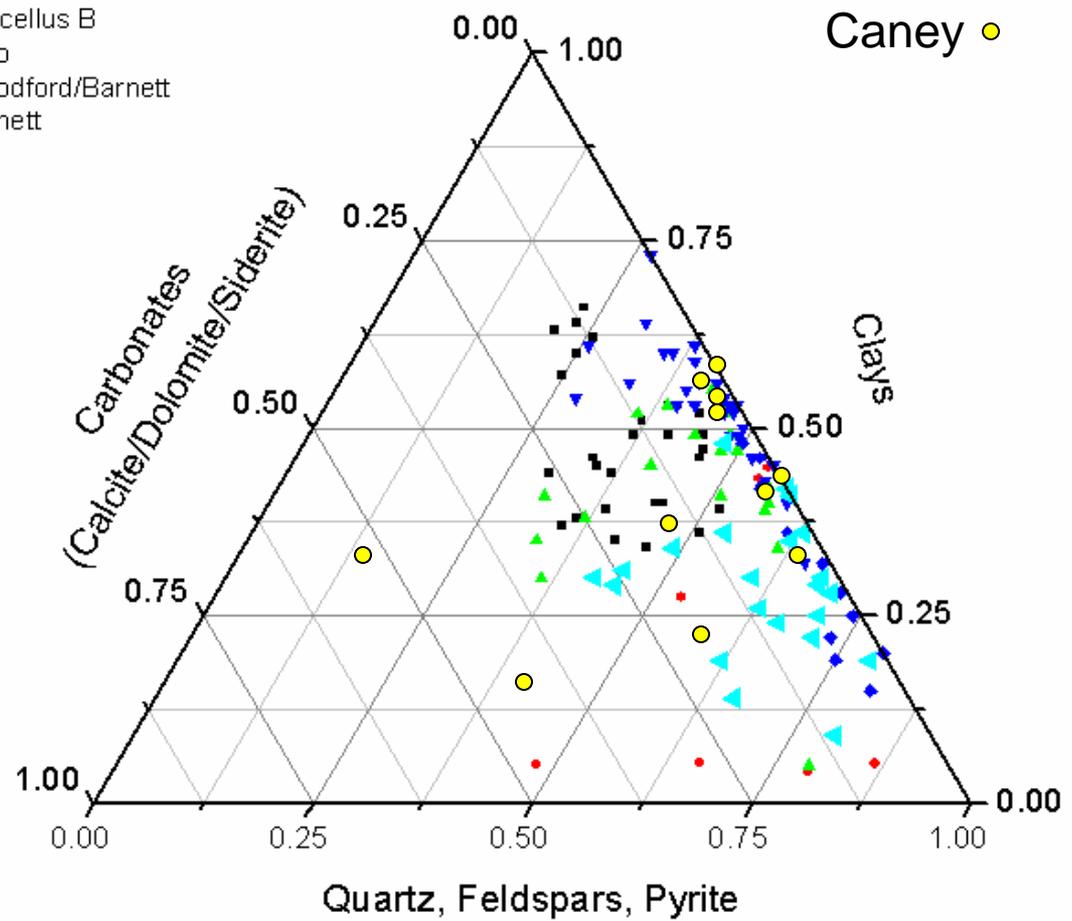
TOC = 1.9-8.0

TOC= 41.11 – 14.464(g/cc)

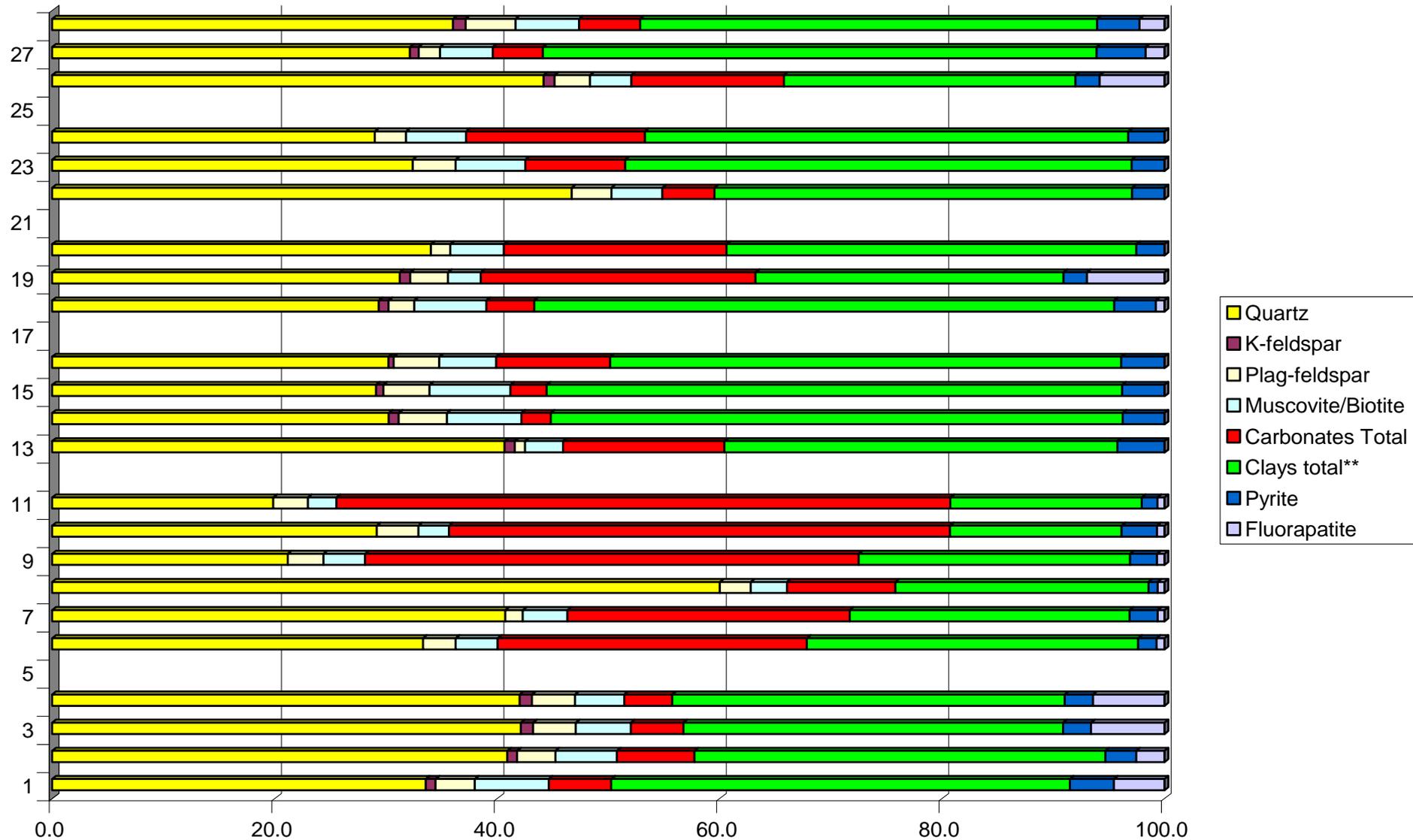
Scf/ton = 19.866(TOC) + 10.518 Schad 2006

Shale Mineralogy Comparison

- Bossier
- Marcellus A
- ▲ Marcellus B
- ▼ Ohio
- ◆ Woodford/Barnett
- ▲ Barnett

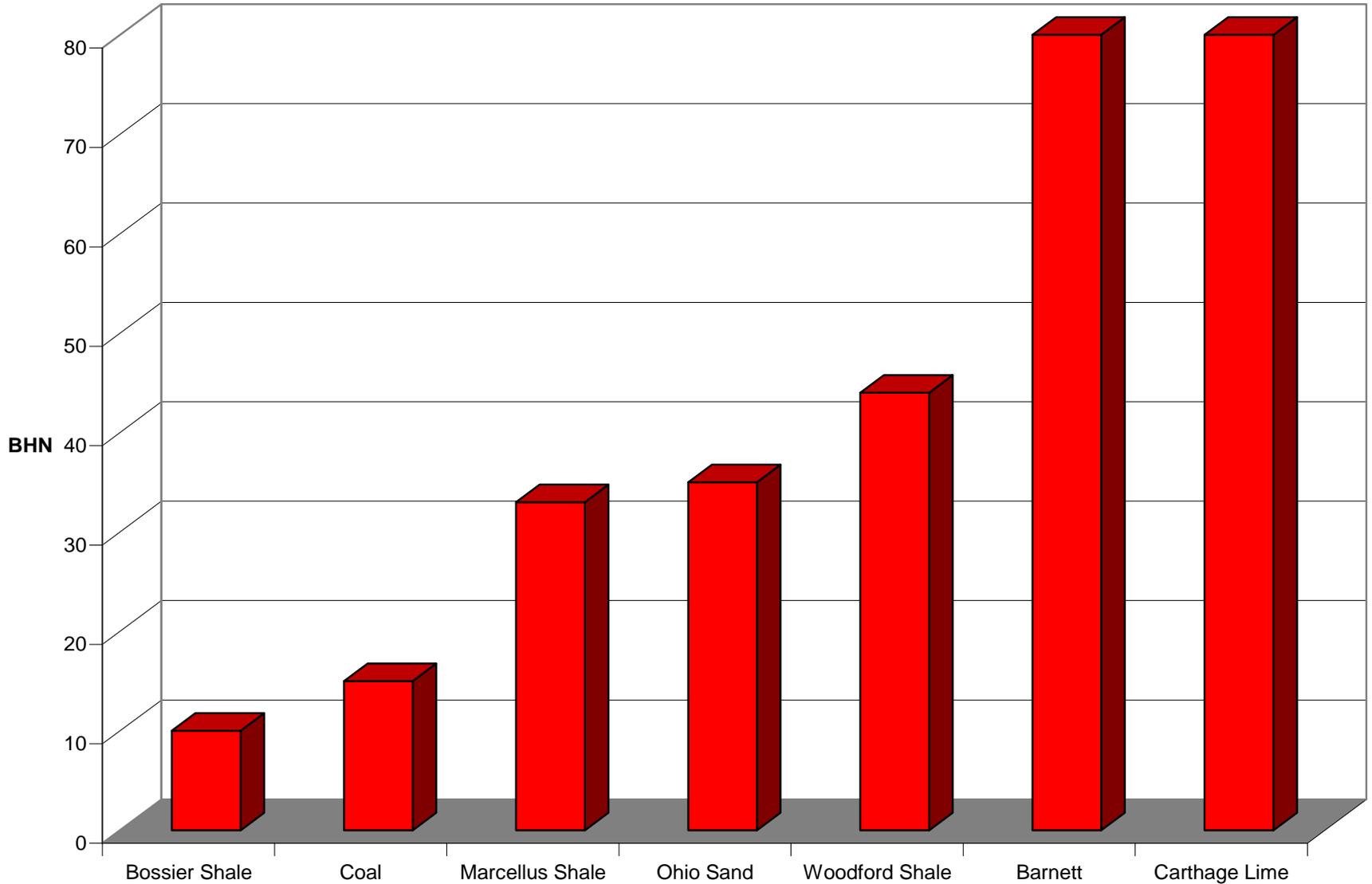


Caney Minerals





Brinell Hardness Comparison



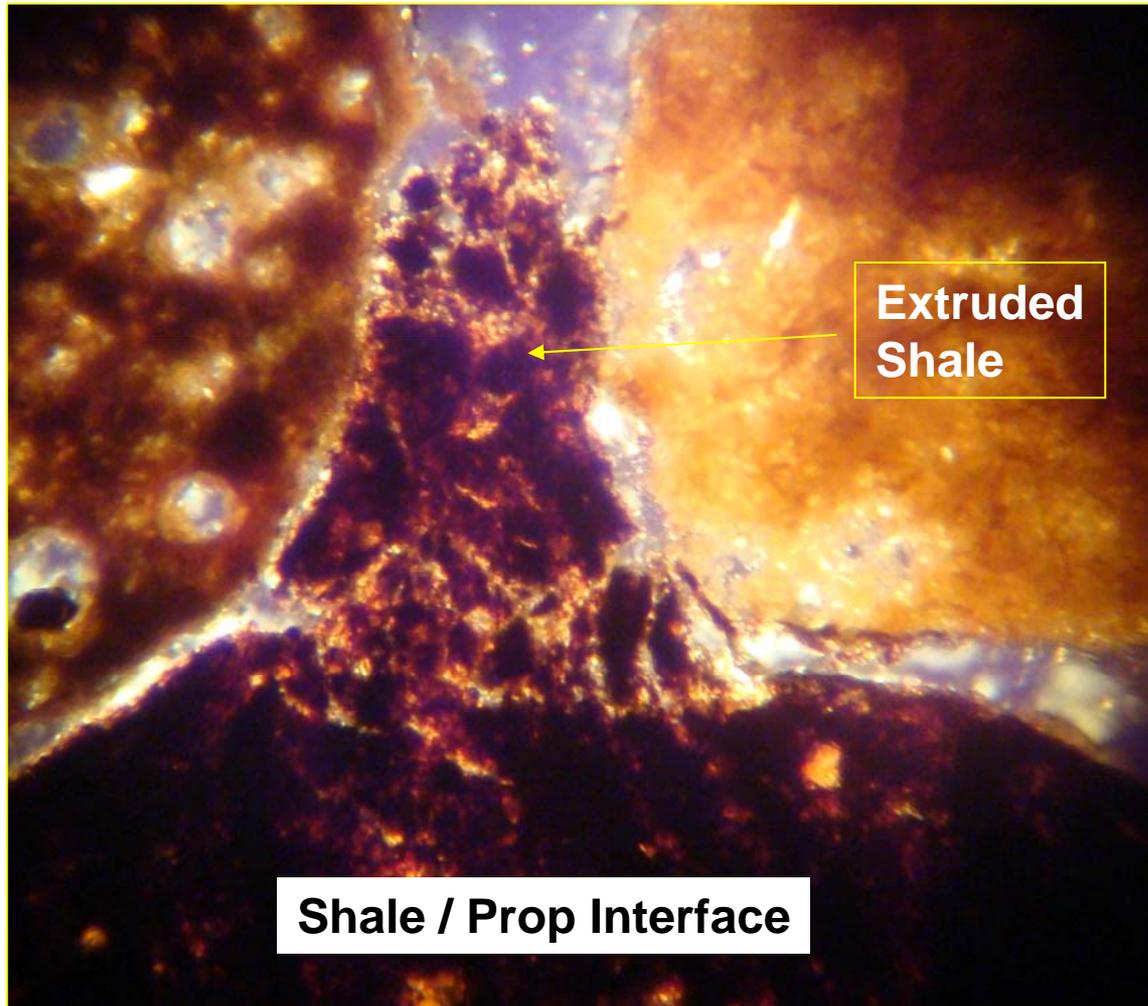


Embedment in Soft Shales

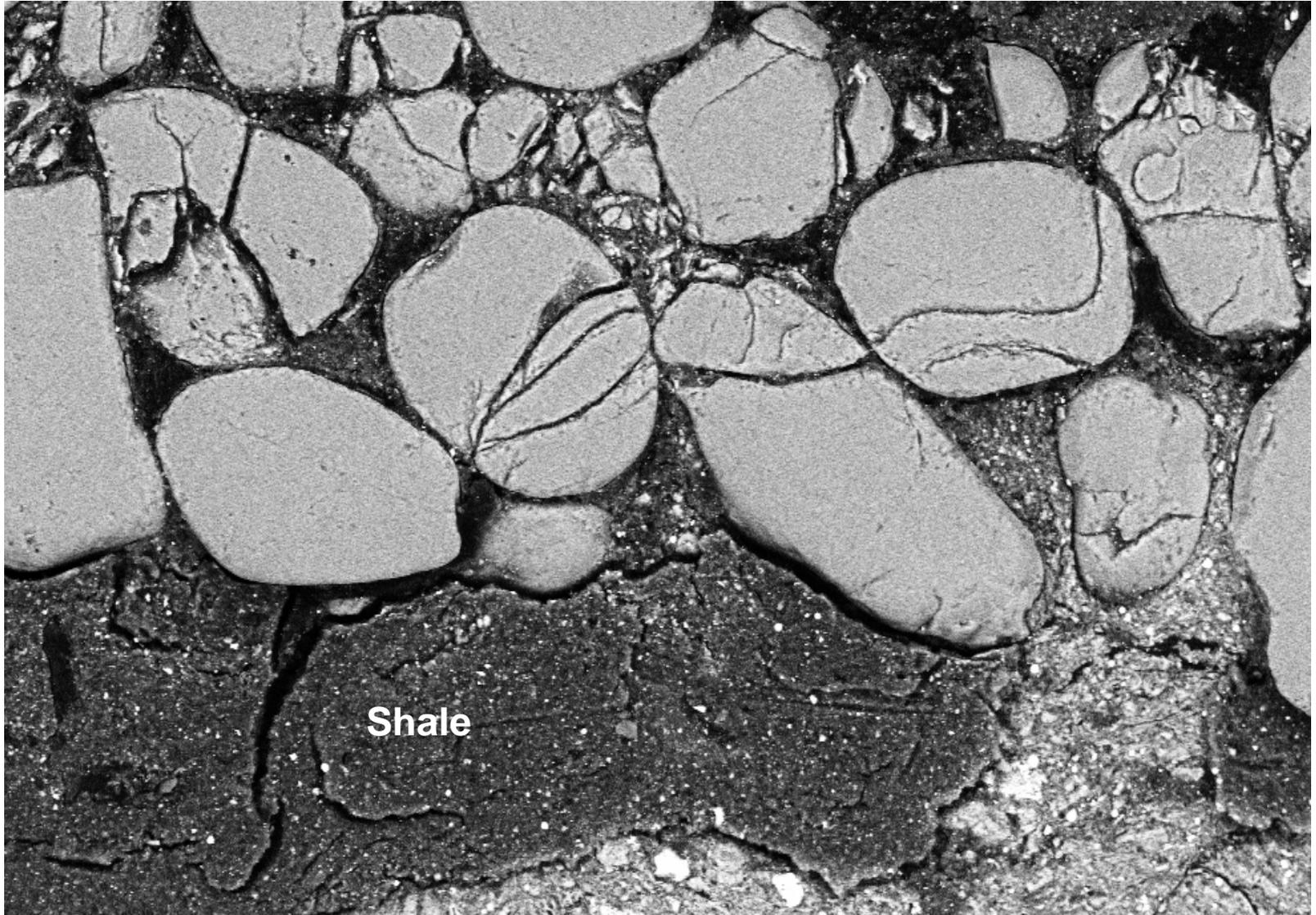




Thin Section



BSE 100 mesh



Caney Rock Properties:

Young's Modulus:

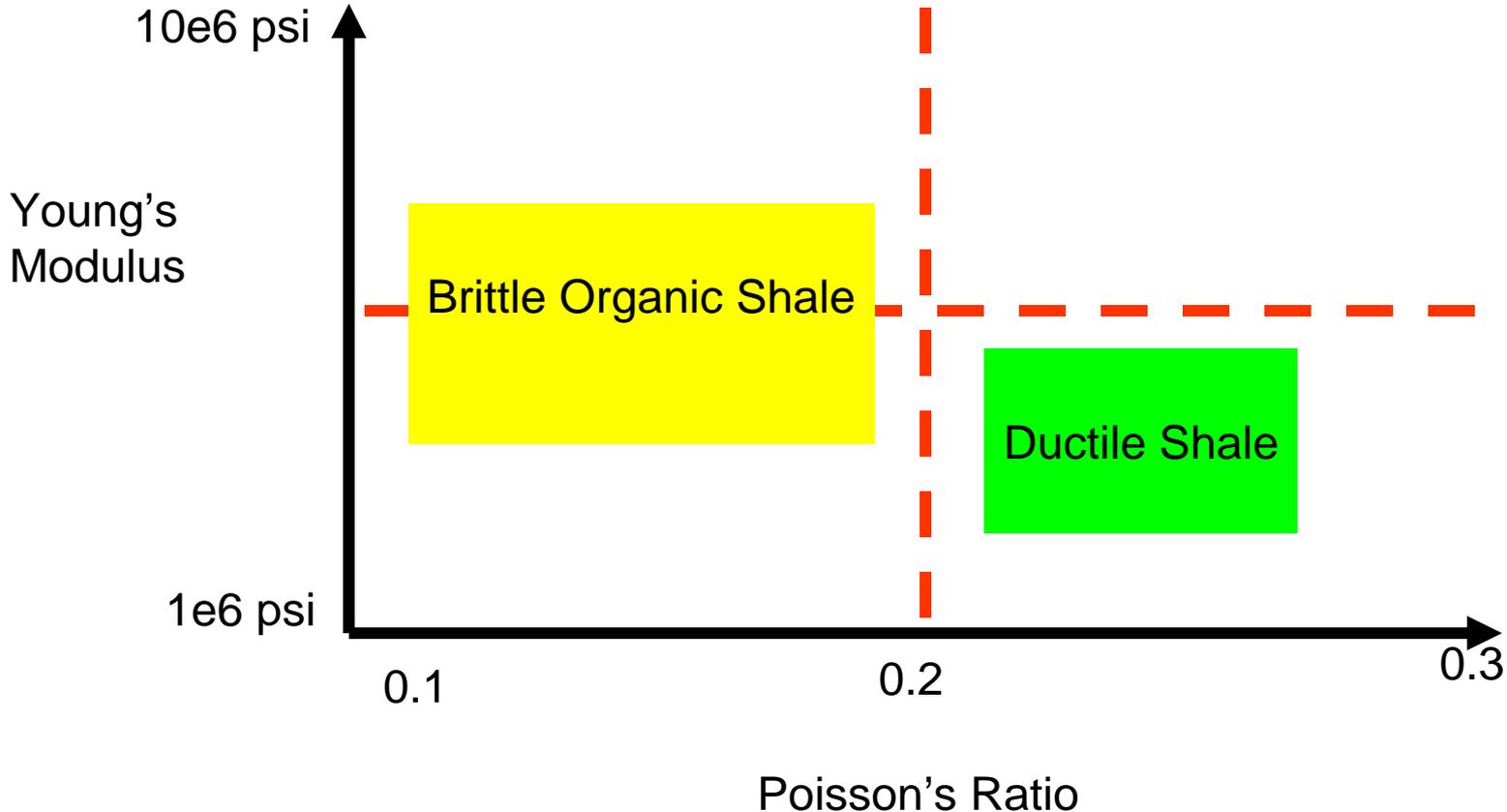
4-8 E6 PSI

Poisson's Ratio:

0.12-0.25

Compressive Strength:

12,000 – 24000 PSI



Jarvie and others (2007) defined brittleness as

$$***B = (Q)/(Q+C+CL)***$$

where

B: brittleness,

Q: quartz,

C: carbonate, and

Cl: clay.

Caney .31 < B < .46

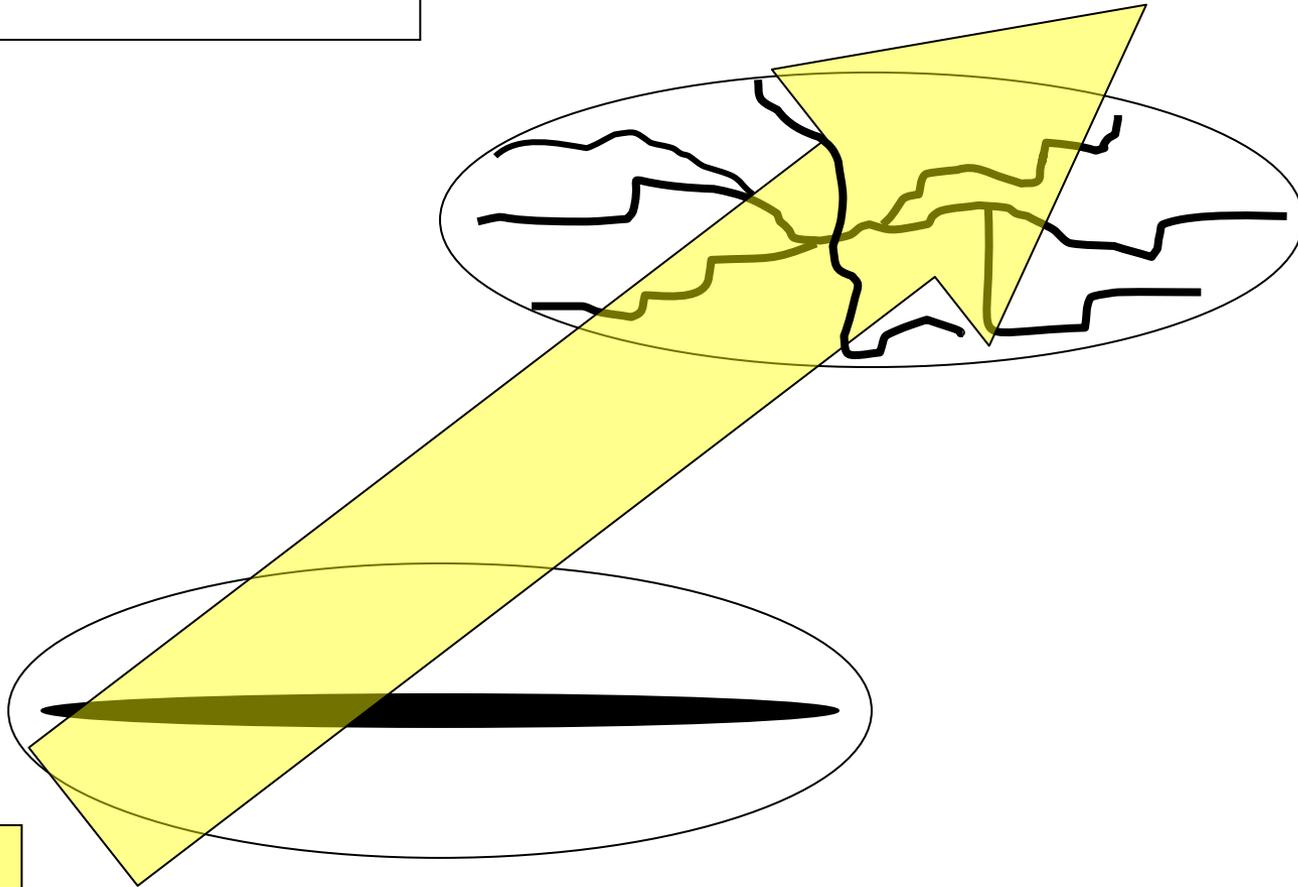
Barnett .40 < B < .65

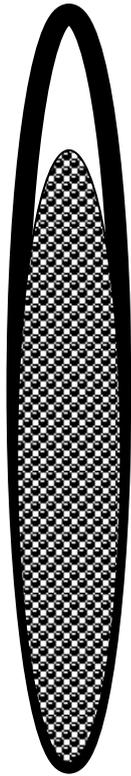
Woodford .40 < B < .75

Fracture Geometry Change

Brittle

Ductile



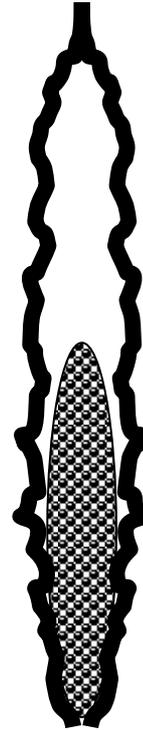


Injection



Closure

DUCTILE

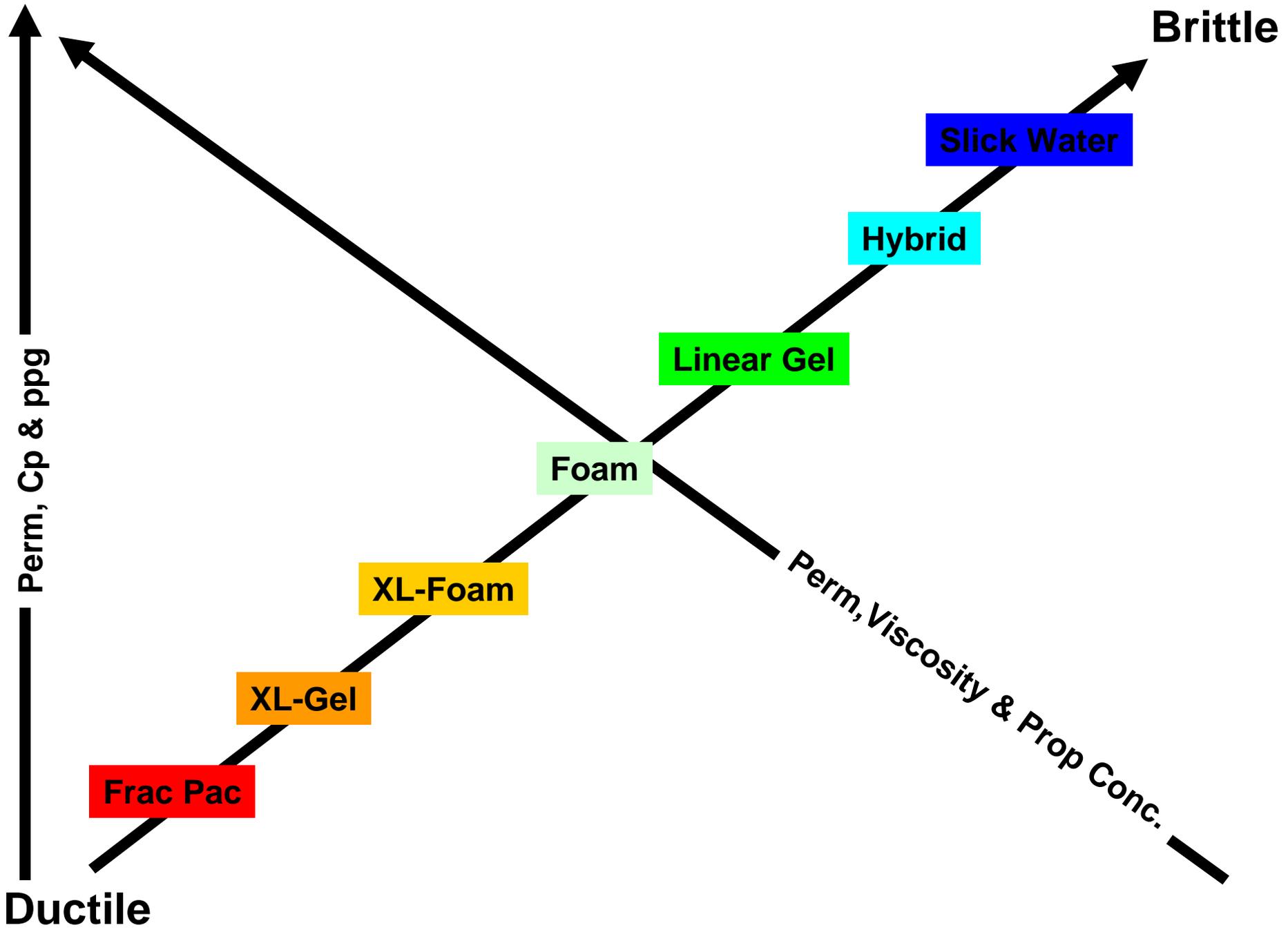


Injection



Closure

BRITTLE



Experience: Is what you get,, when you did not get what you wanted. Randy Pausch

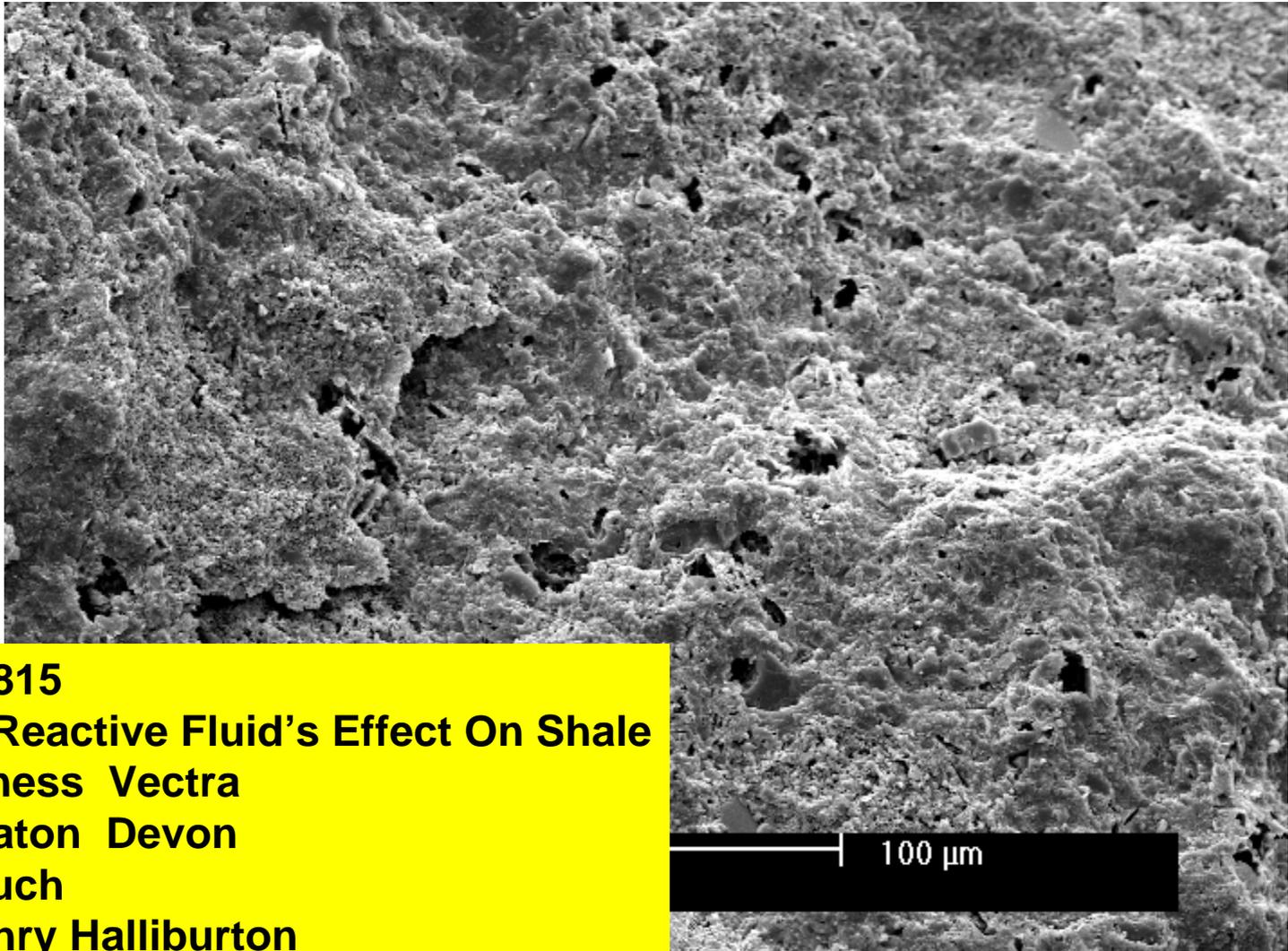


Frac Types Used

- Slick Water Fracs 11,000-35,000 BBL
75-200k#
- X-Link N2 Foam, N2Acid 3-4MMscf N2
150K#
- Acid/Water Fracs 10,000/15000BBL
75K#
- 50-100 BPM



Caney reacted surface after immersion



SPE 106815

Surface Reactive Fluid's Effect On Shale

Bill Magness Vectra

Bill Wheaton Devon

Matt Blauch

Ray Loghry Halliburton

Some Basic Caney Questions:

Is the Caney on the low end of thickness and gas content?

Is it water sensitive because of clay, carbonate or other minerals.

Is it too ductile or does it fracture as a simple bi-wing?

If you answer YES to one or more; Then completion methods to consider are...

Vertical inexpensive completions.

Brine or Foam as a base frac fluid.

Hybrid systems with low to high viscosity and high ppg.

**Hybrid pump schedules with multiple injection/shutdown and diversion stages.
“complex-frac generators”**

QUESTIONS

