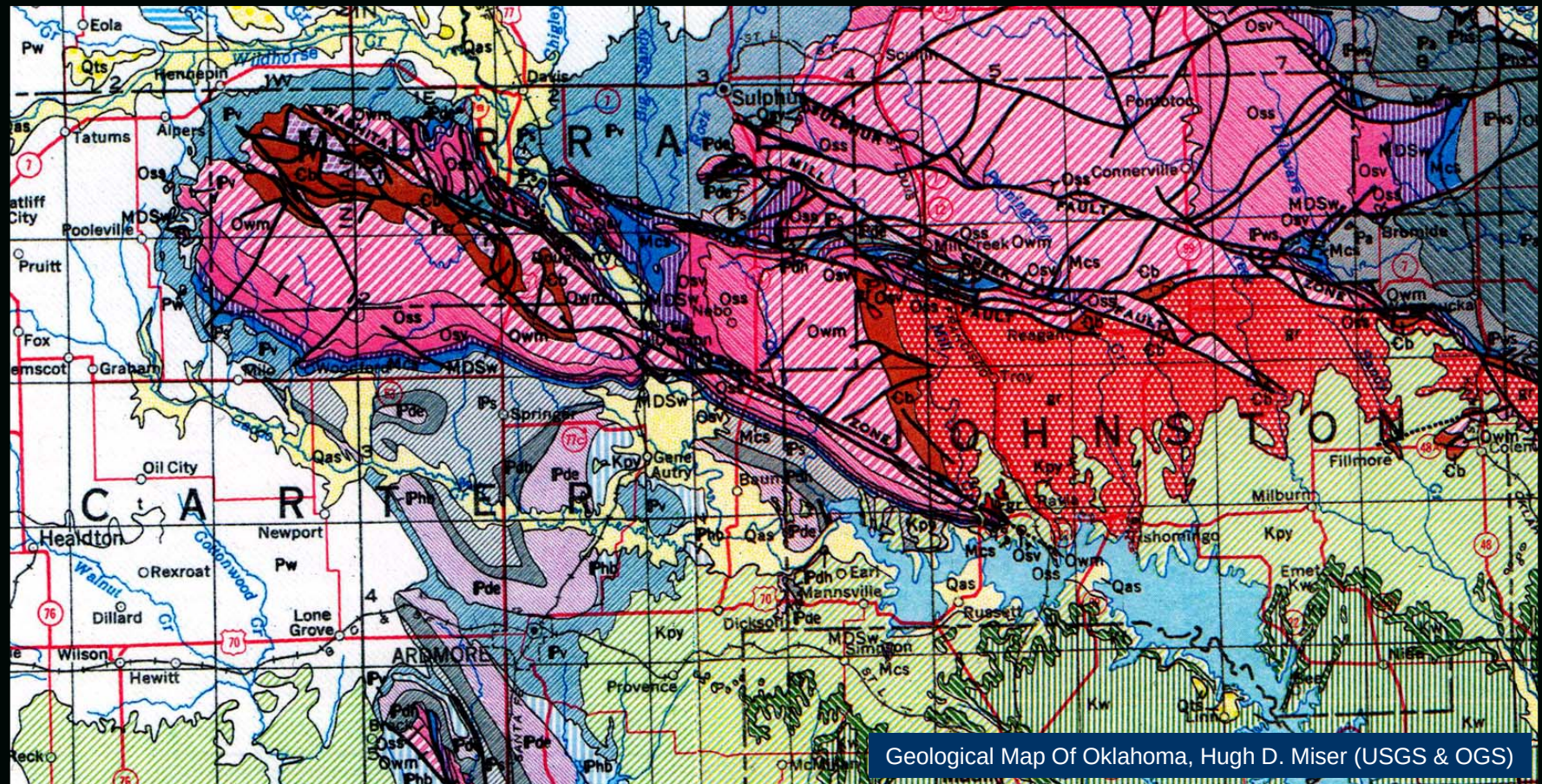
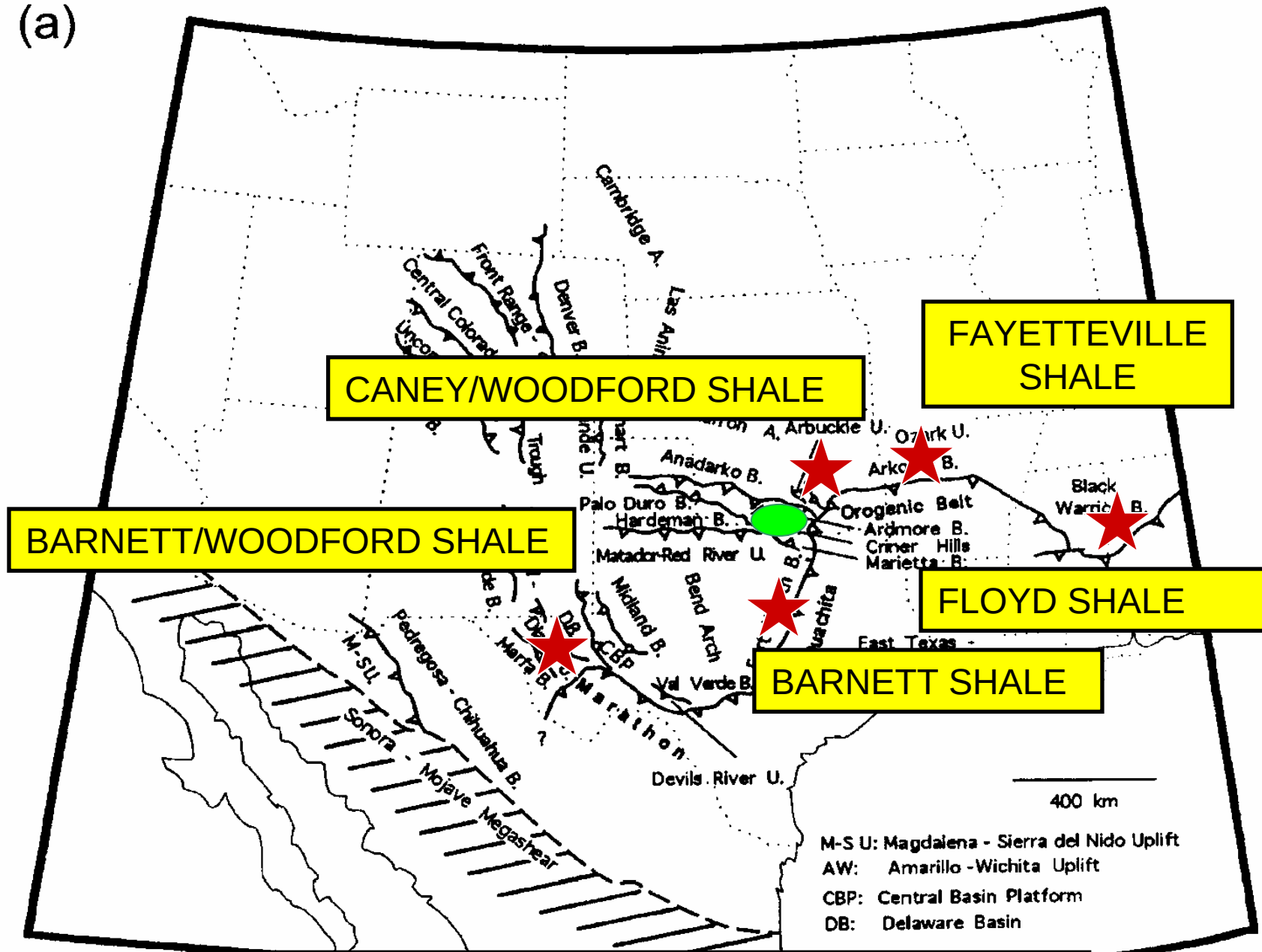


Woodford Shale, Ardmore Basin, Oklahoma: A Developing Shale Play

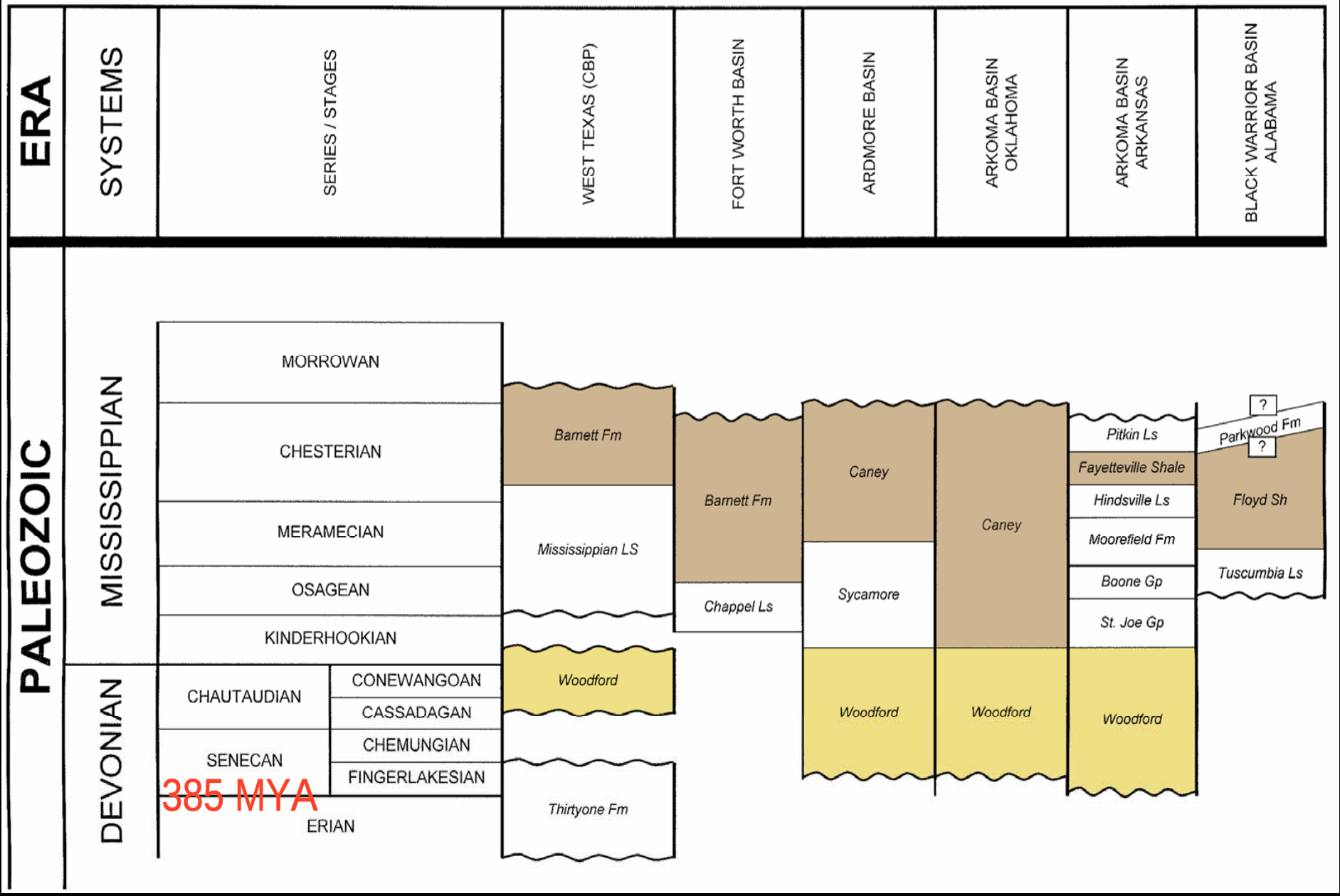


***J. Michael Party and Robert A. Wipf (Wagner & Brown, Ltd.),
Jason M. Byl, Jeff Lawton, and James M. Hill (BNK Petroleum, Inc.)***

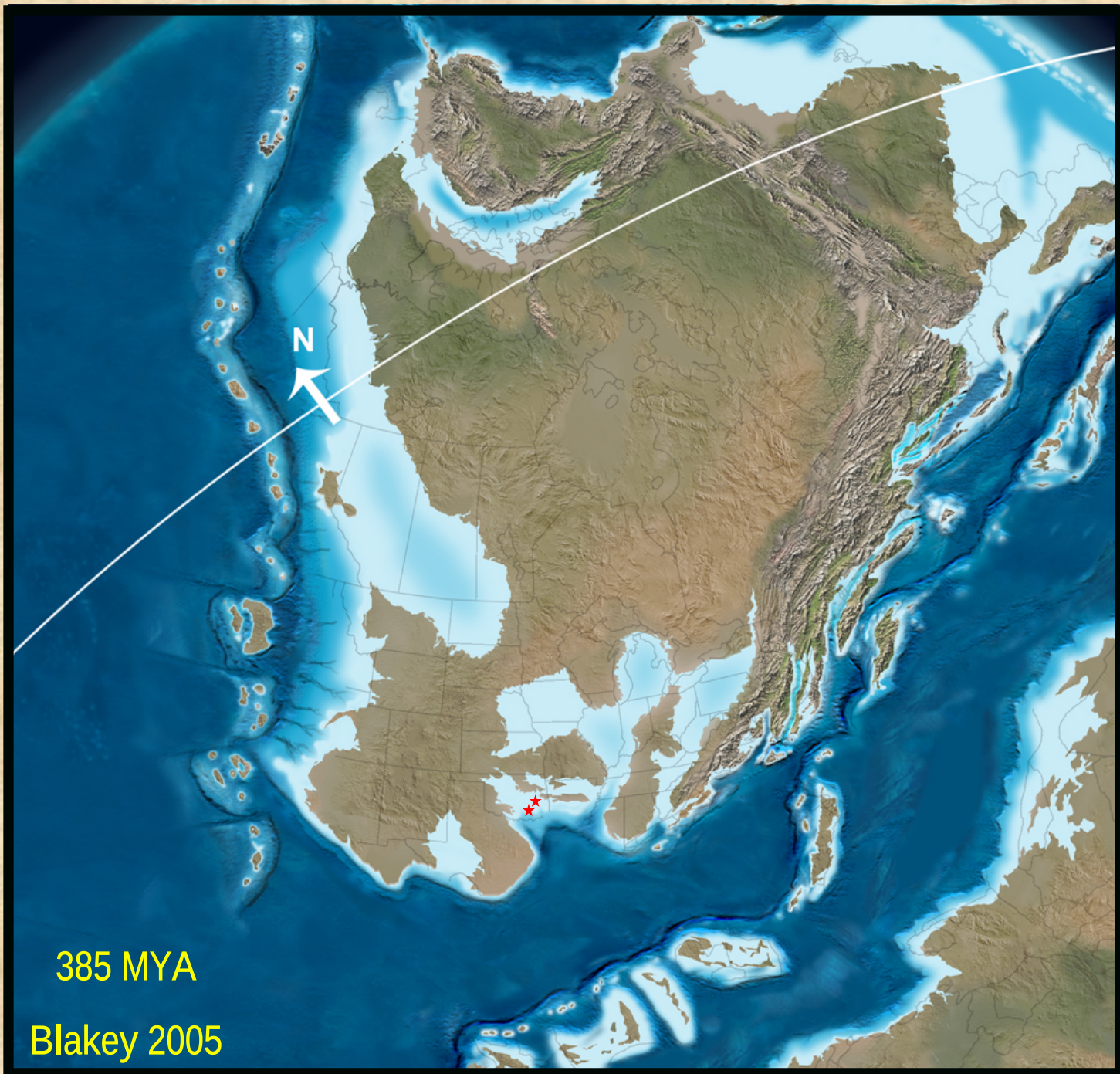
(a)



Geological Survey of Alabama Circular 192 Pashin & Hinkle, 2001



After AAPG COSUNA Project

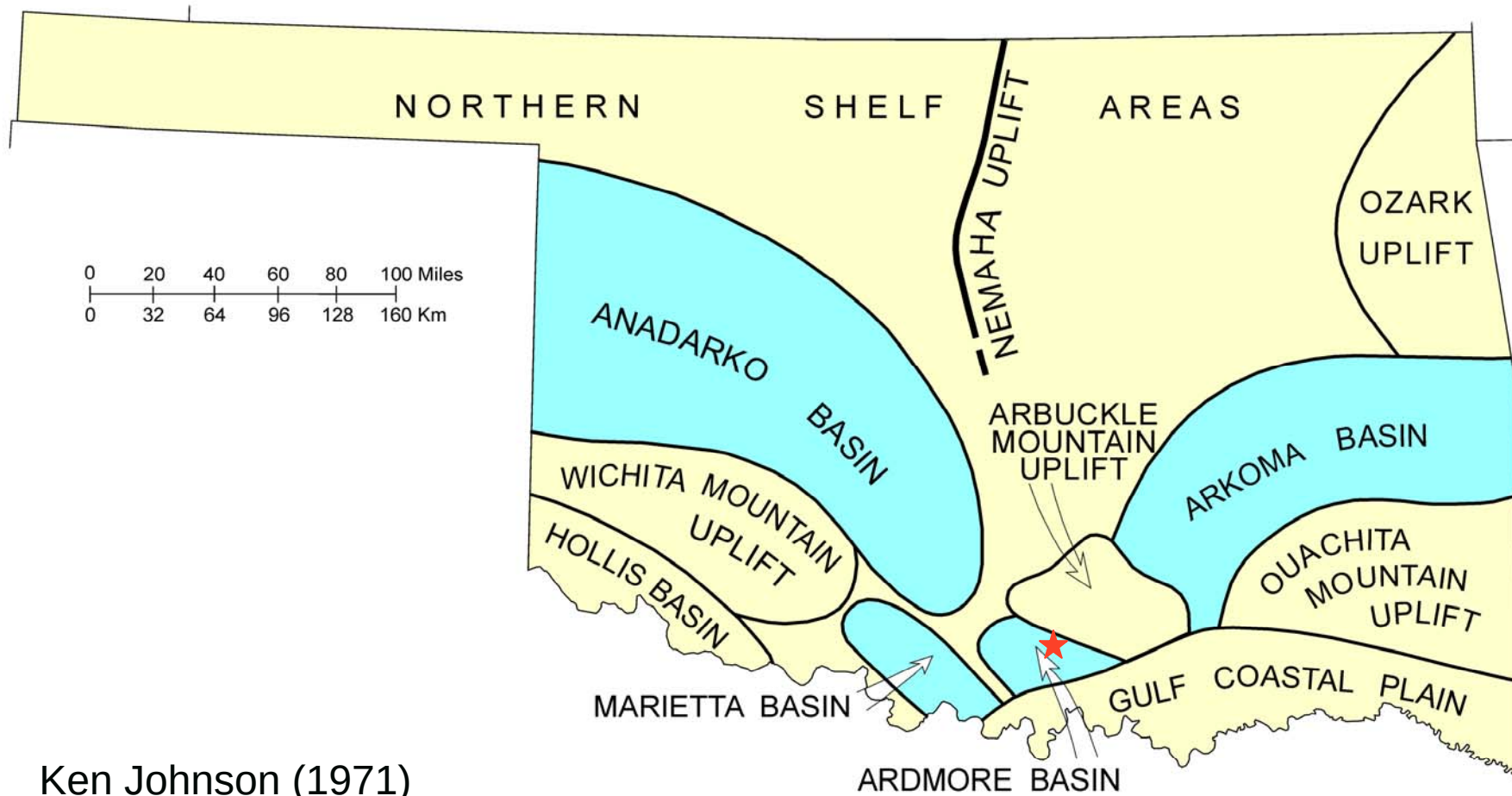


385 MYA

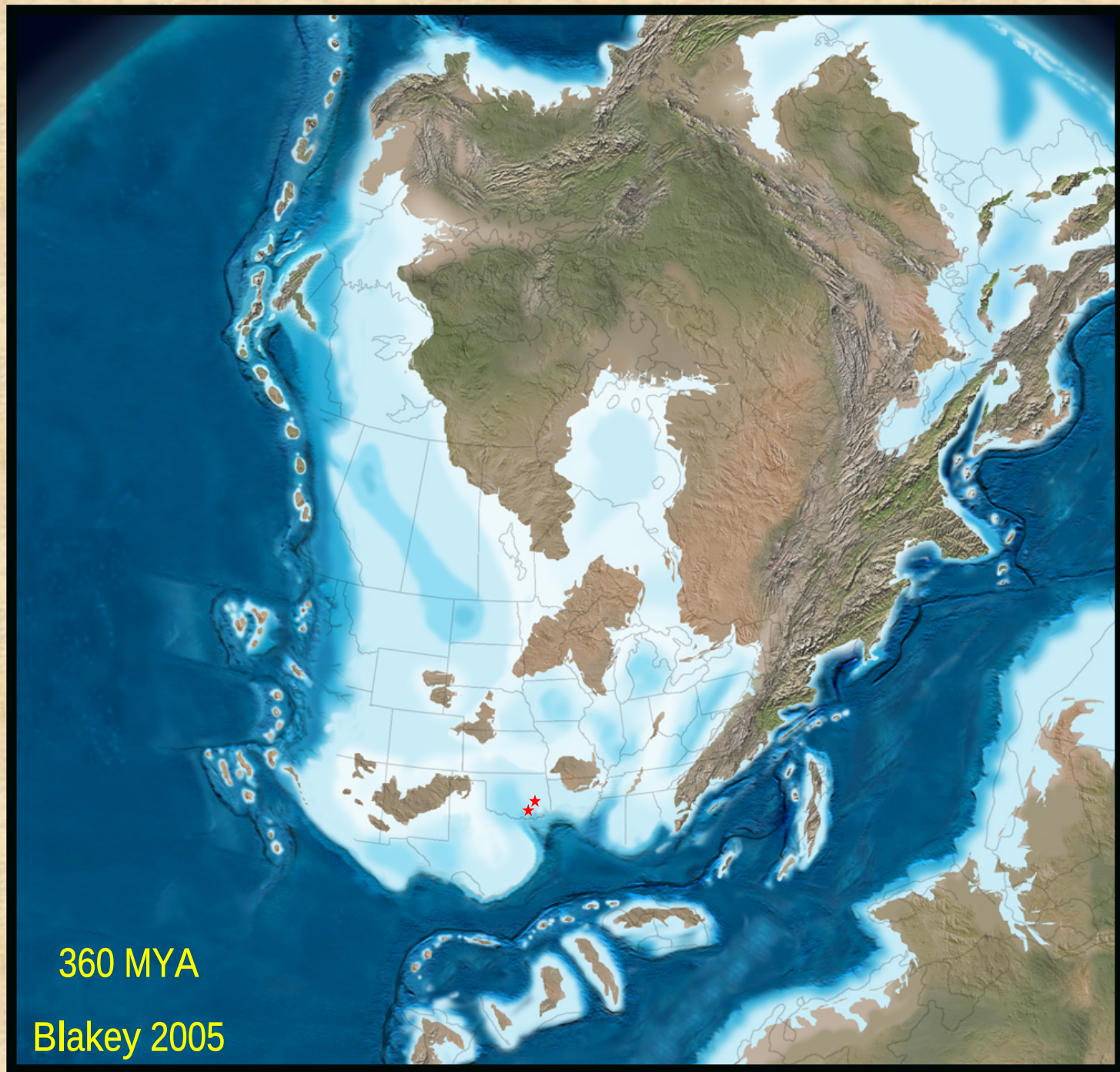
Blakey 2005

PALEOZOIC		ERA															
DEVONIAN	MISSISSIPPIAN	CHAUTAUDIAN		SERIES / STAGES		WEST TEXAS (CBP)		FORT WORTH BASIN		ARDMORE BASIN		ARKOMA BASIN OKLAHOMA		ARKOMA BASIN ARKANSAS		BLACK WARRIOR BASIN ALABAMA	
		SENECAN															
	ERIAN																

After AAPG COSUNA Project

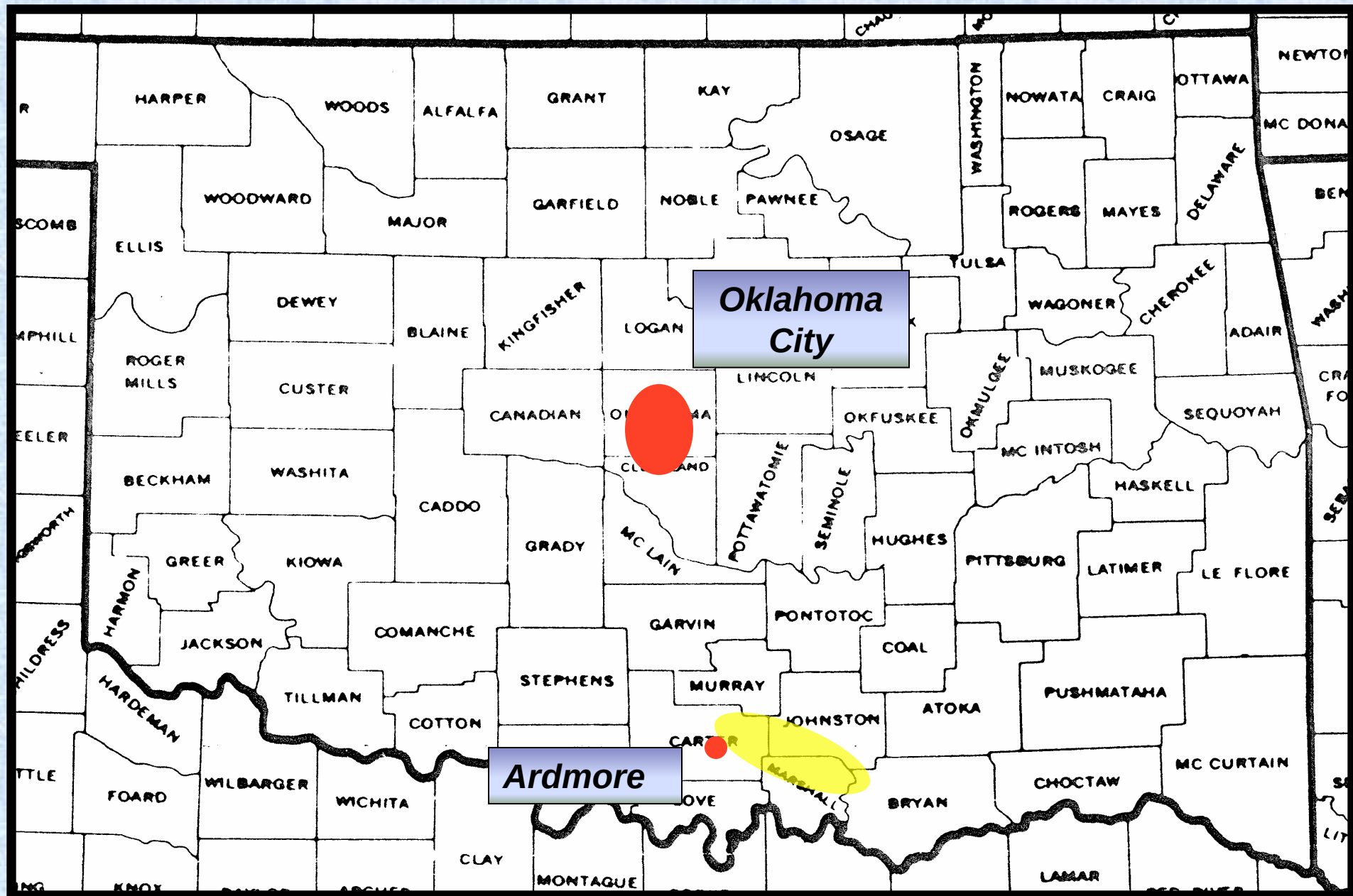


Ken Johnson (1971)



360 MYA

Blakey 2005



CADDO & SPRINGER FIELDS

Murray

Johnston

Carter

MADILL FIELD

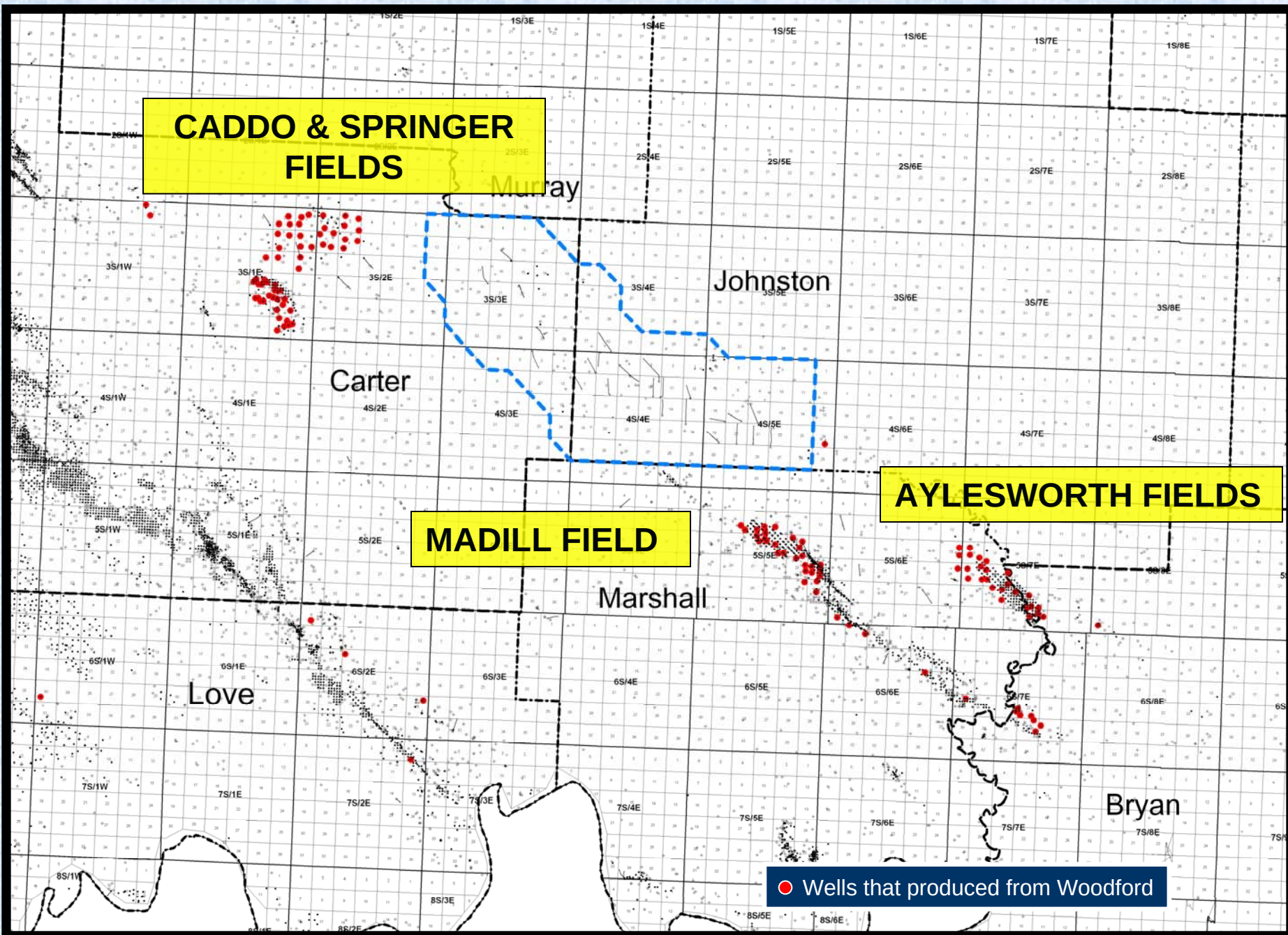
AYLESWORTH FIELDS

Marshall

Love

Bryan

● Wells that produced from Woodford



NW

AYLESWORTH, AYLESWORTH SE, & AYLESWORTH DIST SE (WOODFORD)
MARSHALL & BRYAN COUNTIES, OKLAHOMA
Stratigraphic Cross Section
Datum = Woodford

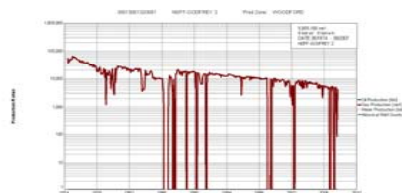
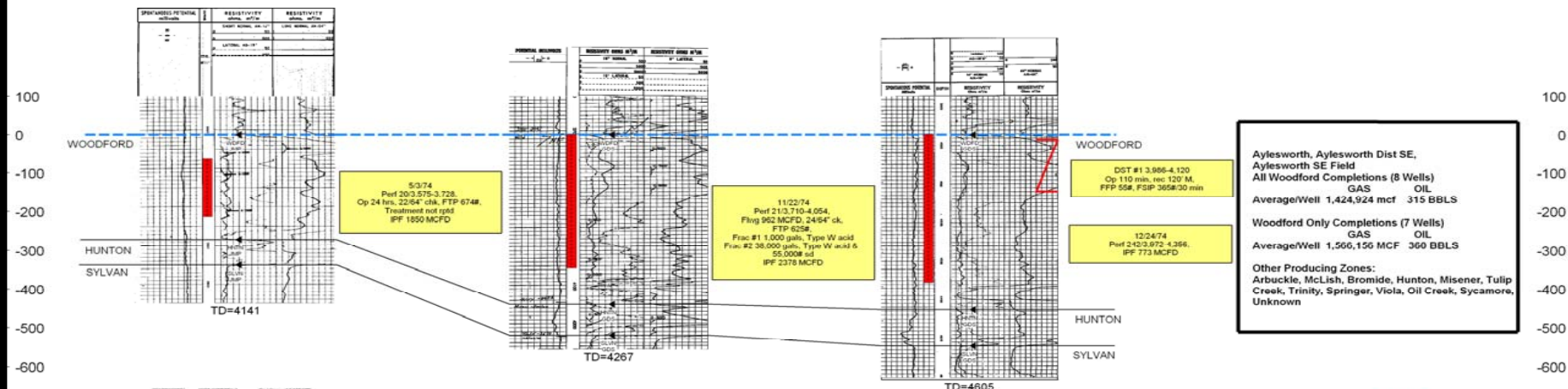
SE

35013001320000 4029 ft 35013002810000 1158 ft 35013001340000

HAMON JL
NEFF-GODFREY 2
NE NE SE
TWP: 6 S - Range: 7 E - Sec. 21

ANDERSON-PRITCHARD
HAYNIE 1
648 FSL 1942 FEL
TWP: 6 S - Range: 7 E - Sec. 22

ROY GODFREY
STATE 2
N2 N2 NE
TWP: 6 S - Range: 7 E - Sec. 27



5,859,168 mcf

05/74-

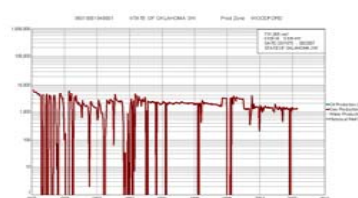
4,500 mcf/month



2,328,287 mcf

178 bbls oil

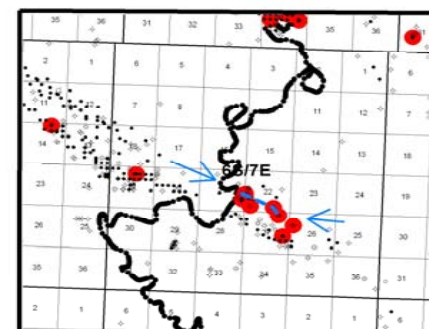
11/74-07/07



731,005 mcf

03/75-

1,300 mcf/month



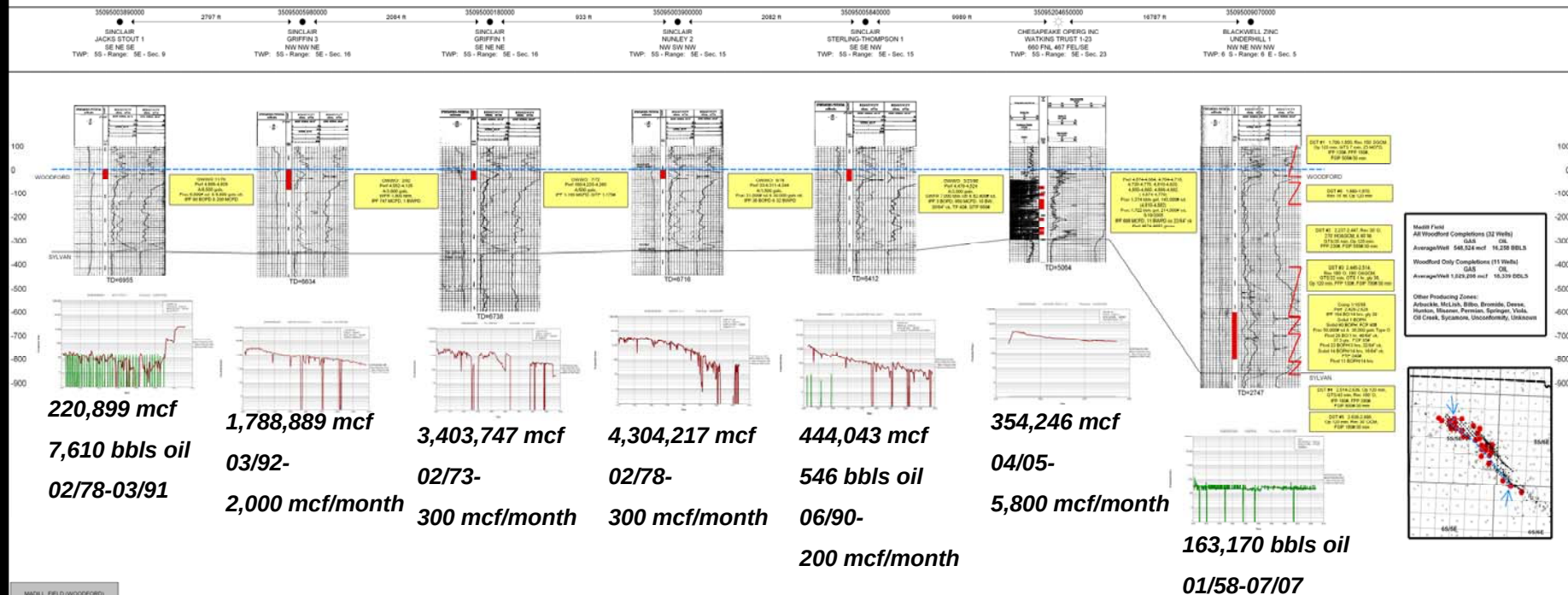
AYLESWORTH, AYLESWORTH SE,
& AYLESWORTH DIST SE (WOODFORD)
MARSHALL & BRYAN COUNTIES, OKLAHOMA
Stratigraphic Cross Section
Datum = Woodford

SP WOODFORD_AYLESWORTH.xsd

NW

SE

MADILL FIELD (WOODFORD)
MARSHALL COUNTY, OKLAHOMA
 Stratigraphic Cross Section
 Datum = Woodford



MADILL FIELD (WOODFORD)
 MARSHALL COUNTY, OKLAHOMA
 Stratigraphic Cross Section
 Datum = Woodford

SP WOODFORD_MADILL.nsd

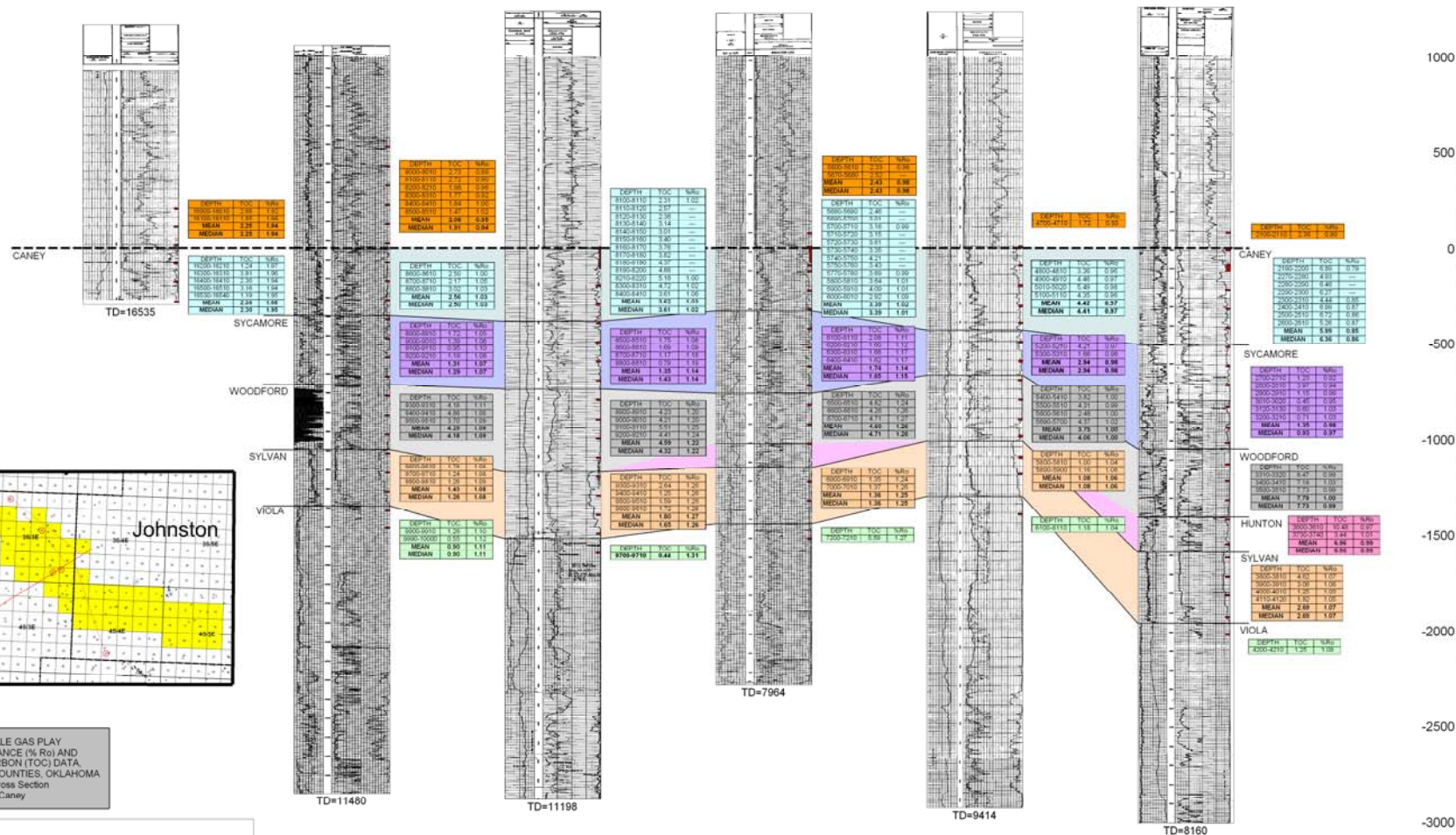


1,262,515 mcf	2,040,543 mcf	1,414,947 mcf	2,692,895 mcf	1,256,797 mcf
6,127 bbls oil	398,303 bbls oil	724,208 mcf	06/61-	07/61-05/02
03/95-	04/54-	06/61-12/90	4,000 mcf/month	603,609 mcf
5,000 mcf/month	2,000 mcf/month	844,893 mcf	1,842,552 mcf	07/61-09/83
1,696,249 mcf	1,066,495 mcf	06/61-02/95	11/61-04/94	
06/61-	03/62-			
3,000 mcf/month	1,200 mcf/month			

OKLAHOMA SHALE GAS PLAY
VITRINITE REFLECTANCE (% Ro) AND TOTAL ORGANIC CARBON (TOC) DATA, CARTER & JOHNSTON COUNTIES, OKLAHOMA
Stratigraphic Cross Section
Datum = Caney

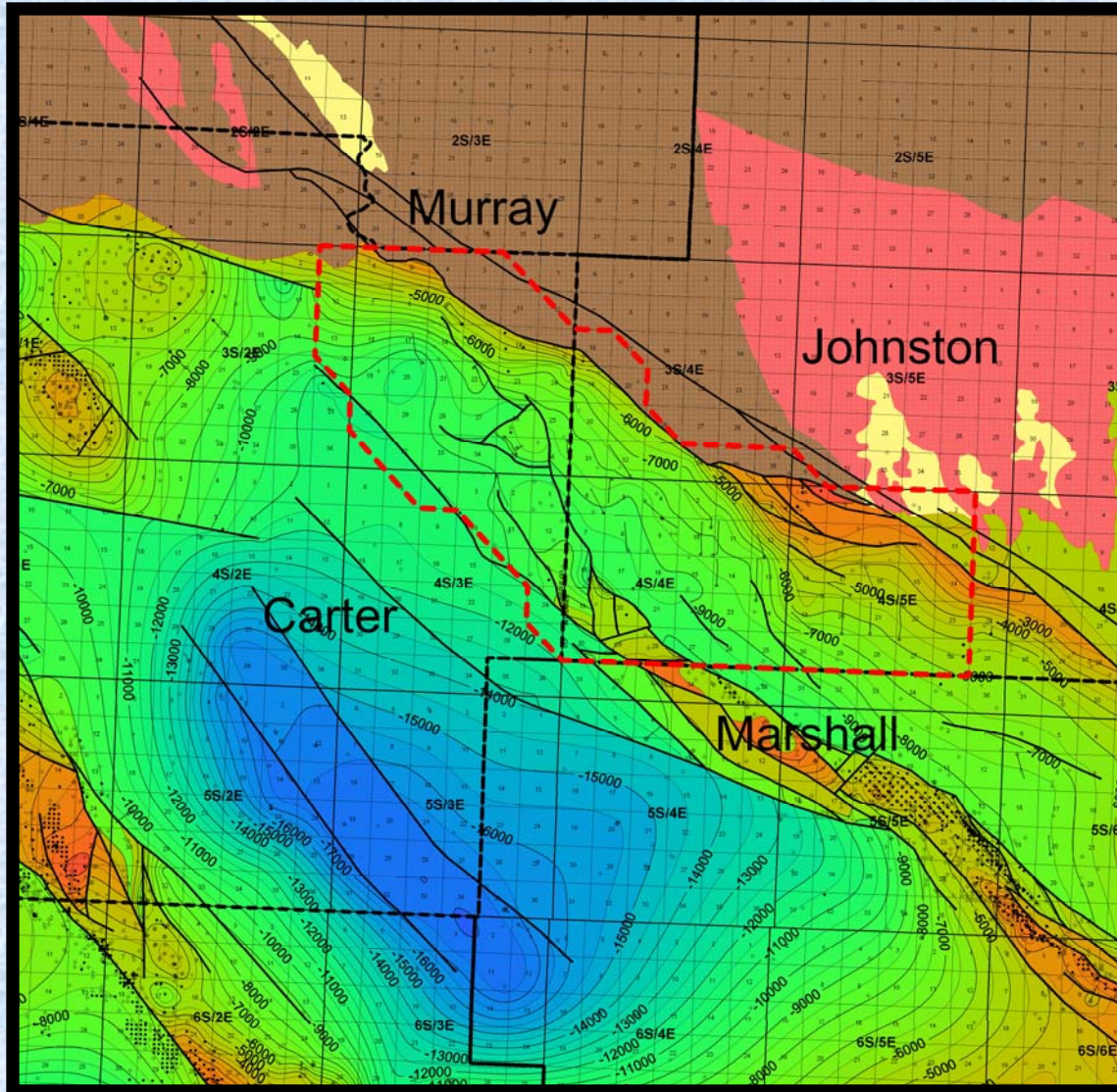
35019214490000 55839 ft 35019234270000 3121 ft 35019207550000 15536 ft 35019230160000 48903 ft 35069000180000 64059 ft 35019217720000

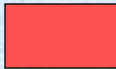
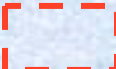
BURMAH OIL & GAS SUN E&P SUN OIL MARSHALL OIL SUNRAY EXXON
 CITY OF ARDMORE 32-1 DROWN 1 PAGE 1 BUDDY YOUNG 1-15 RAWSON 1 SPEAKMAN 1
 2310 FNL 412 FEL 1620 FNL 2310 FEL NW NW 2440 FSL 1420 FEL NW NE SW 2640 FSL 2310 FEL
 TWP: 4 S - Range: 2 E - Sec. 32 TWP: 3 S - Range: 3 E - Sec. 35 TWP: 3 S - Range: 3 E - Sec. 36 TWP: 3 S - Range: 3 E - Sec. 15 TWP: 4 S - Range: 4 E - Sec. 28 TWP: 3 S - Range: 3 E - Sec. 5



STRUCTURE TOP WOODFORD

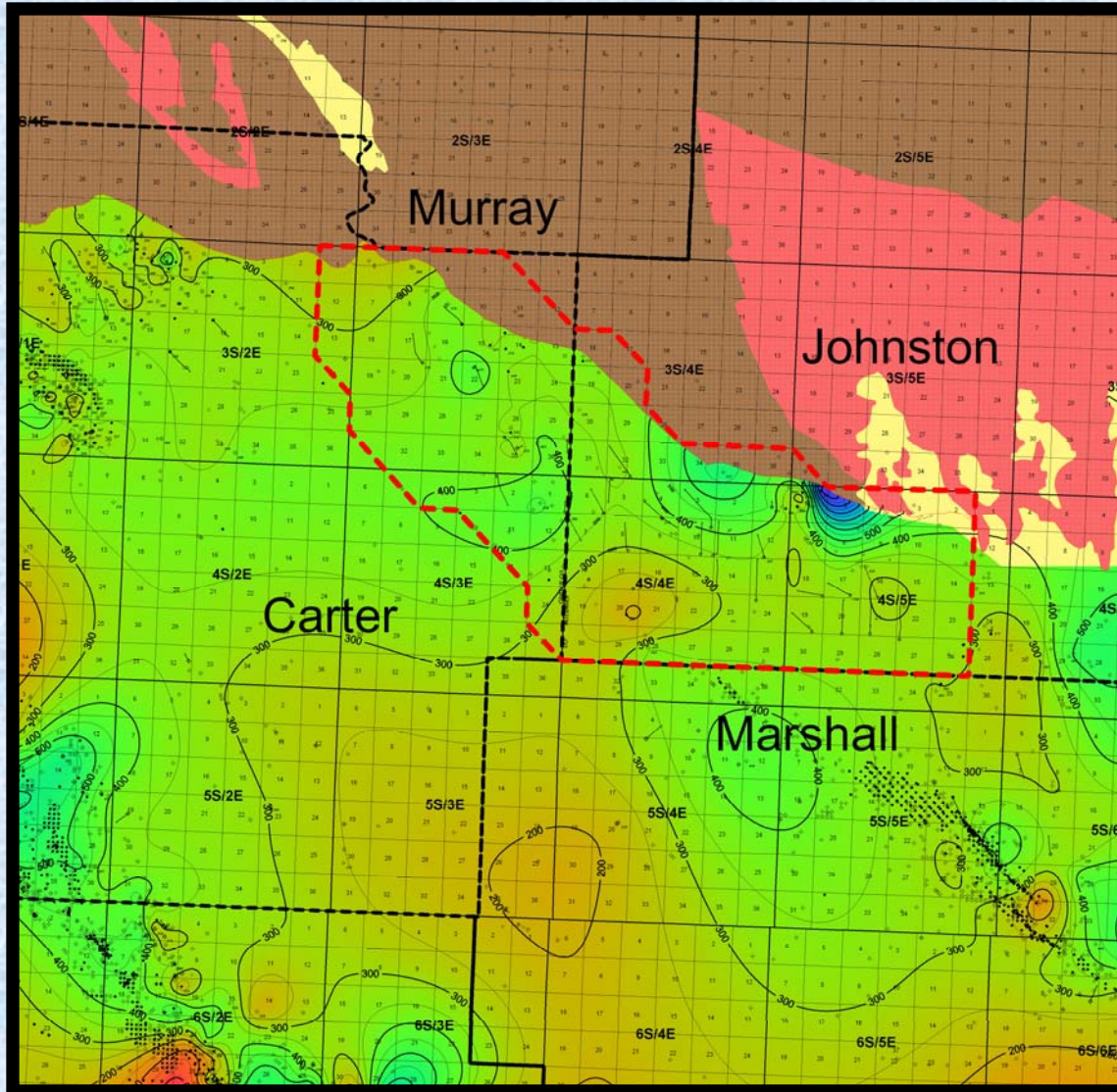
CI = 500 Feet

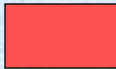


-  Pre Penn Outcrop
-  Granite Outcrop
-  Quaternary Fill
-  Washita River 3D Outline

ISOCHORE WOODFORD

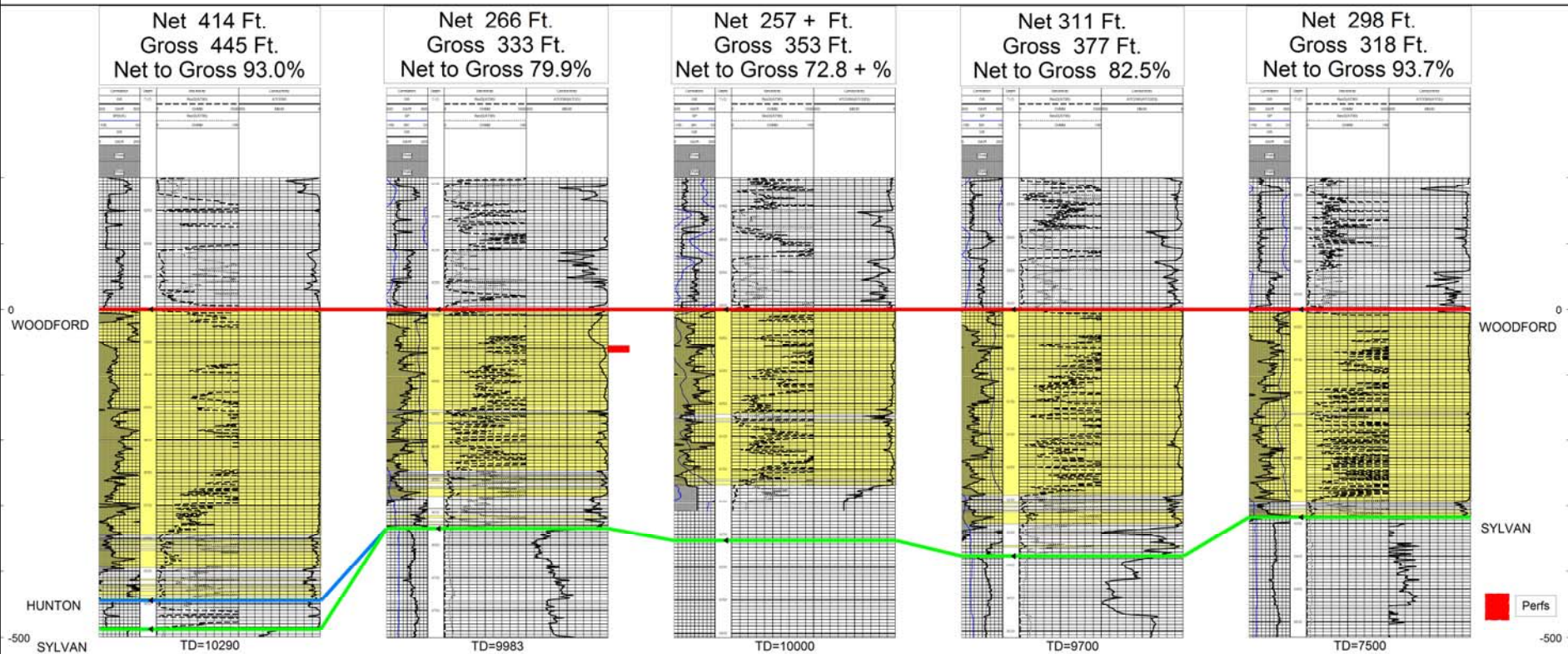
CI = 50 Feet



-  Pre Penn Outcrop
-  Granite Outcrop
-  Quaternary Fill
-  Washita River 3D Outline

Woodford Section
Carter - Johnston Counties, Oklahoma

35019251110000 10230 ft	35019250100000 13641 ft	35069200900000 11683 ft	35069200940000 29091 ft	35069200930000
WAGNER & BROWN LTD MAHER 1H-22 1740 FSL 1630 FWL/NW TWP: 3 S - Range: 3 E - Sec. 22	BNK PETROLEUM US INC NICKEL HILL 1-26 1320 FSL 1980 FWL TWP: 3 S - Range: 3 E - Sec. 26	ORACLE RES OKLA LP LEILA 1-31 1322 FSL 1328 FEL TWP: 3 S - Range: 4 E - Sec. 31	BNK PETROLEUM US INC BROCK 9-1H 2490 FSL 190 FWL/NE TWP: 4 S - Range: 4 E - Sec. 9	BNK PETROLEUM US INC WLC 17-1H 430 FSL 1500 FEL TWP: 4 S - Range: 5 E - Sec. 17



Woodford Section
Carter - Johnston Counties, Oklahoma

35019251110000 10230 ft	35019250100000 13641 ft	35069200900000 11683 ft	35069200940000 29091 ft	35069200930000
WAGNER & BROWN LTD MAHER 1H-22 1740 FSL 1630 FWL/NW TWP: 3 S - Range: 3 E - Sec. 22	BNK PETROLEUM US INC NICKEL HILL 1-26 1320 FSL 1980 FWL TWP: 3 S - Range: 3 E - Sec. 26	ORACLE RES OKLA LP LEILA 1-31 1322 FSL 1328 FEL TWP: 3 S - Range: 4 E - Sec. 31	BNK PETROLEUM US INC BROCK 9-1H 2490 FSL 190 FWL/NE TWP: 4 S - Range: 4 E - Sec. 9	BNK PETROLEUM US INC WLC 17-1H 430 FSL 1500 FEL TWP: 4 S - Range: 5 E - Sec. 17

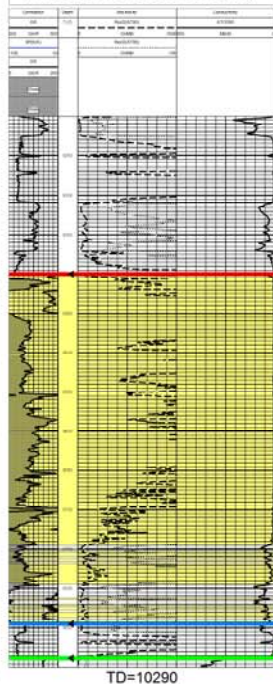
Net 414 Ft.
Gross 445 Ft.
Net to Gross 93.0%

Net 266 Ft.
Gross 333 Ft.
Net to Gross 79.9%

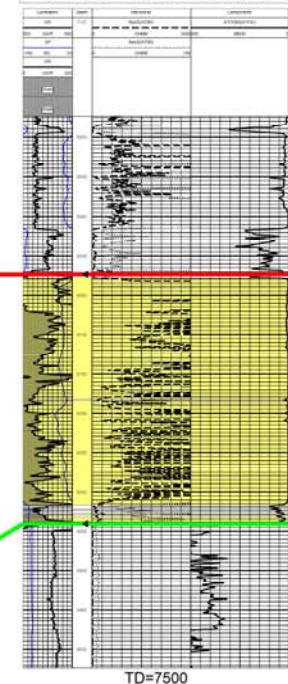
Net 257 + Ft.
Gross 353 Ft.
Net to Gross 72.8 + %

Net 311 Ft.
Gross 377 Ft.
Net to Gross 82.5%

Net 298 Ft.
Gross 318 Ft.
Net to Gross 93.7%



Formation Area	AVG. NET Ft.	AVG. GROSS Ft.	AVG. NET to GROSS %
WOODFORD Carter, Johnston, Marshall	266	330	80.7
WOODFORD Atoka, Coal, Hughes, Pittsburg	116	142	82.3
BARNETT Wise	268	429	62.4
BARNETT Johnson	285	329	86.5
FAYETTEVILLE Cove Creek, Gravel Hill	94	277	34.0



WOODFORD

SYLVAN

Perfs

Murray

Johnston

Carter

Marshall

3S/4E

3S/5E

4S/3E

4S/4E

4S/5E

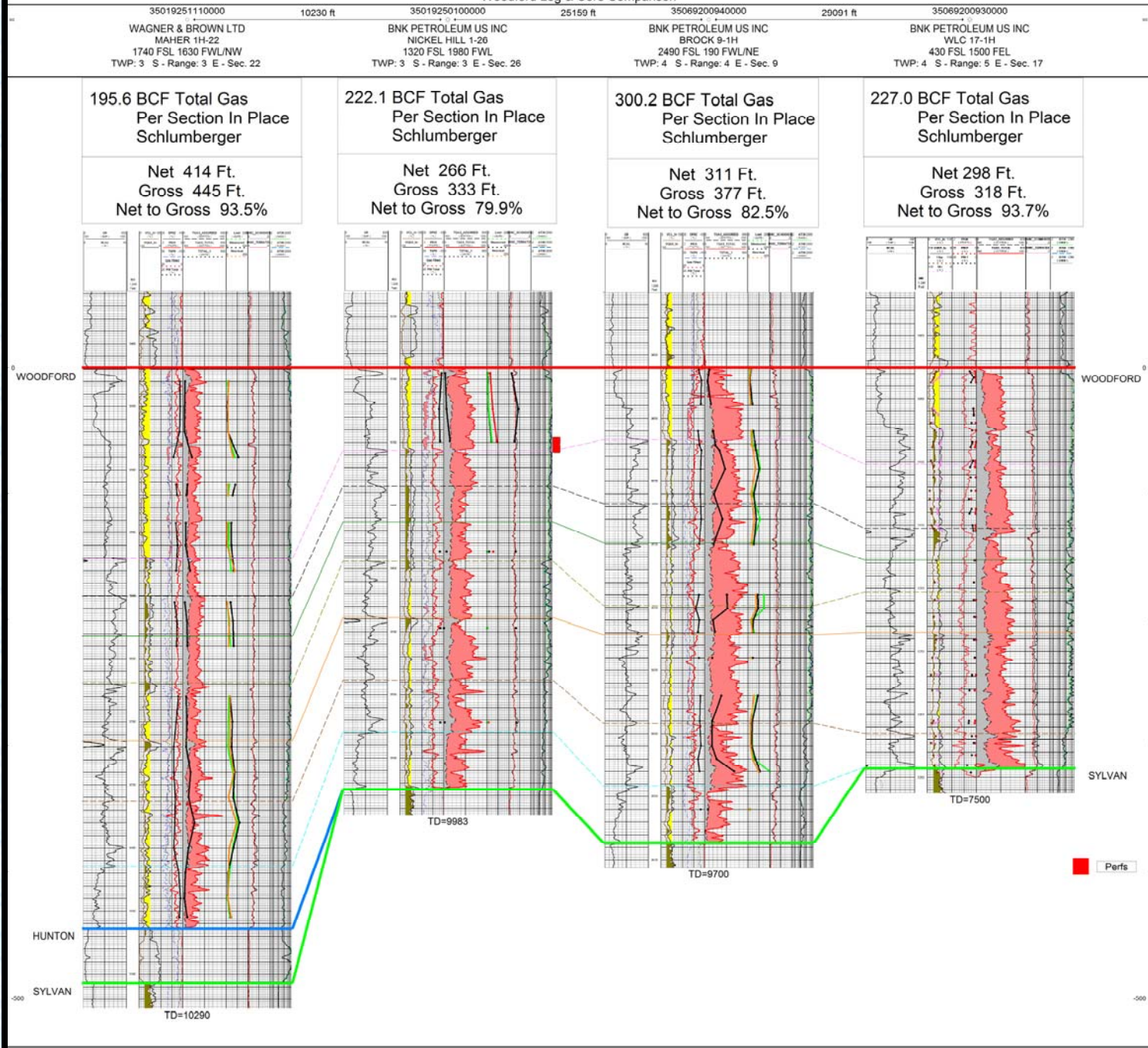
CARTER CO.
JOHNSTON

6/2E

2E



Woodford Log & Core Comparison



Murray

Johnston

Carter

Marshall

3S/4E

3S/5E

4S/3E

4S/4E

4S/5E

CARTER CO
JOHNSTON CO

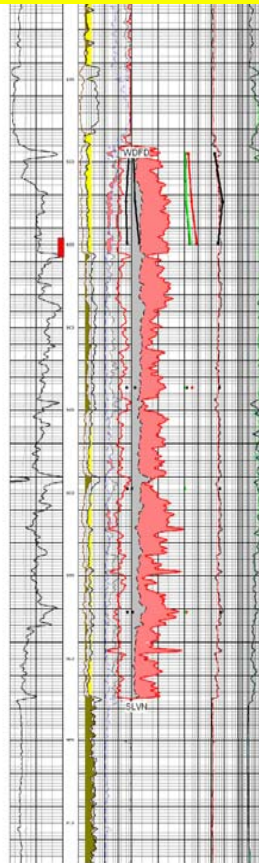


BNK Petroleum US, Inc.
Nickel Hill #1-26
T3S R3E Section 26
Carter County, Oklahoma

Perf'd 9,346-56

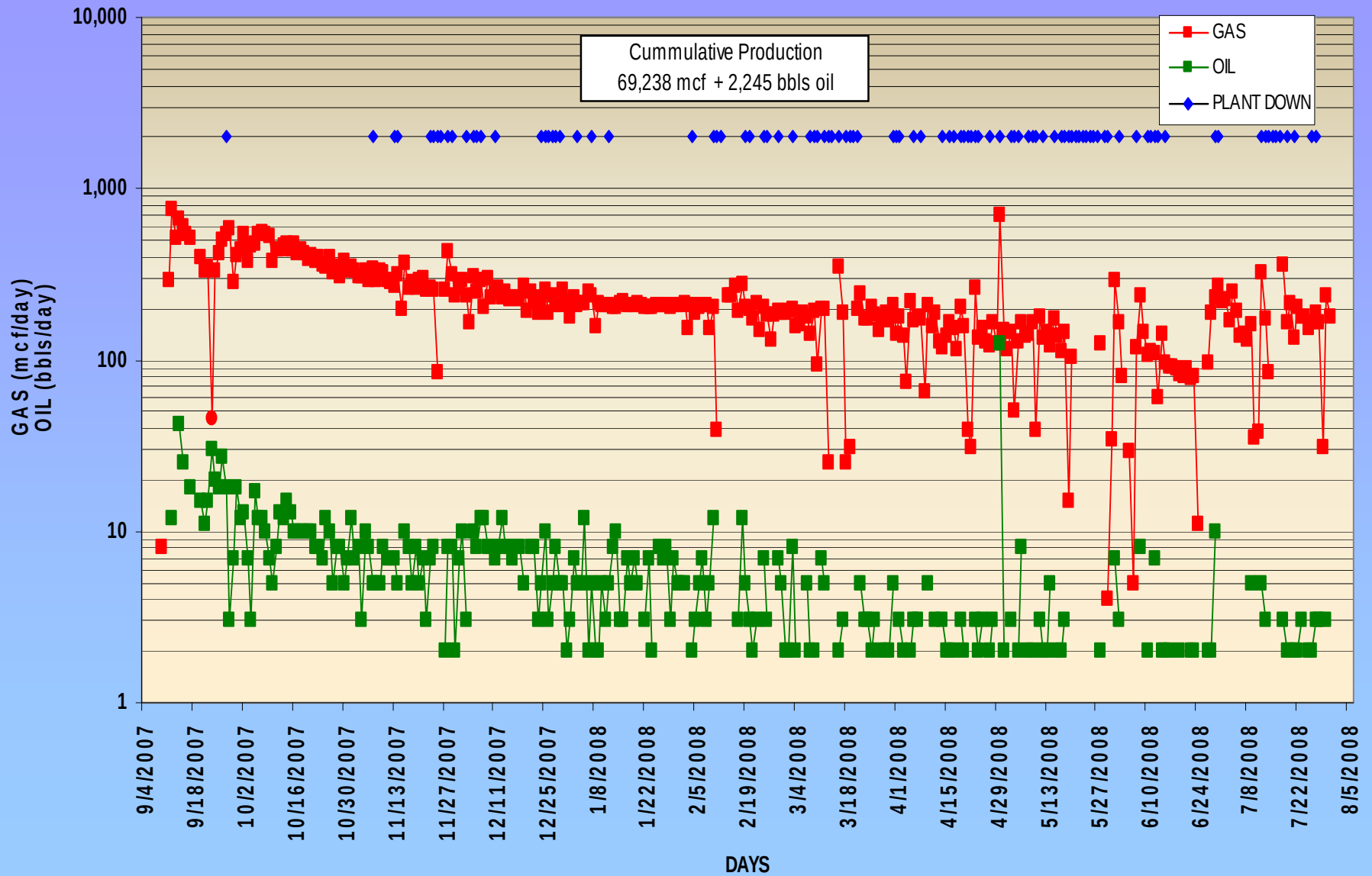
Frac'd with 15,238 bbls and

225,000# of 100 Mesh, 30/50 Mesh and 20/40 Mesh



Perf 9,346-56' with 6 spf
Spearhead with 4,500 gals 15% HCL
with A262 corrosion inhib @ 2 gpt,
L058 iron control @10#/1000 gals,
W054 non-emulsifier @ 2 gpt
followed by fresh water with B182 friction reducer @ 0.35 gpt,
B244 biocide @ 0.2 gpt, and
L064 clay stabilizer @ 2 gpt
Breakdown @ 3,505 psi, 26 bpm,
then increased rate to 80 bpm.
Acid at formation @ 4,723 psi, then pressure declined
to 3,400 psi after all acid in formation.
Pumped frac according to design, injected 10,300# of 100 mesh sd,
101,960# of 30/50 Jordan sd and 112,740# 20/40 Jordan sand at
average rate of 80 bpm and average pressure of 2,964 psi.
Max pressure 4,763 psi and max rate 90.2 bpm,
max prop concentration 2.1 #/gal.
ISIP 2,325 psi, 15 min SIP 2,232 psi.
Total volume slurry 15,238 bbls
Total volume fluid pumped 14,981 bbls,
Total load to recover est 15,161 bbls

Nickel Hill #1-26



Murray

5 Stage Frac

Frac'd with 52,773 bbls and

1,075,022 # of 100 Mesh, and 30/50 Mesh

nston

2E

3S/4E

3S/5E

2E

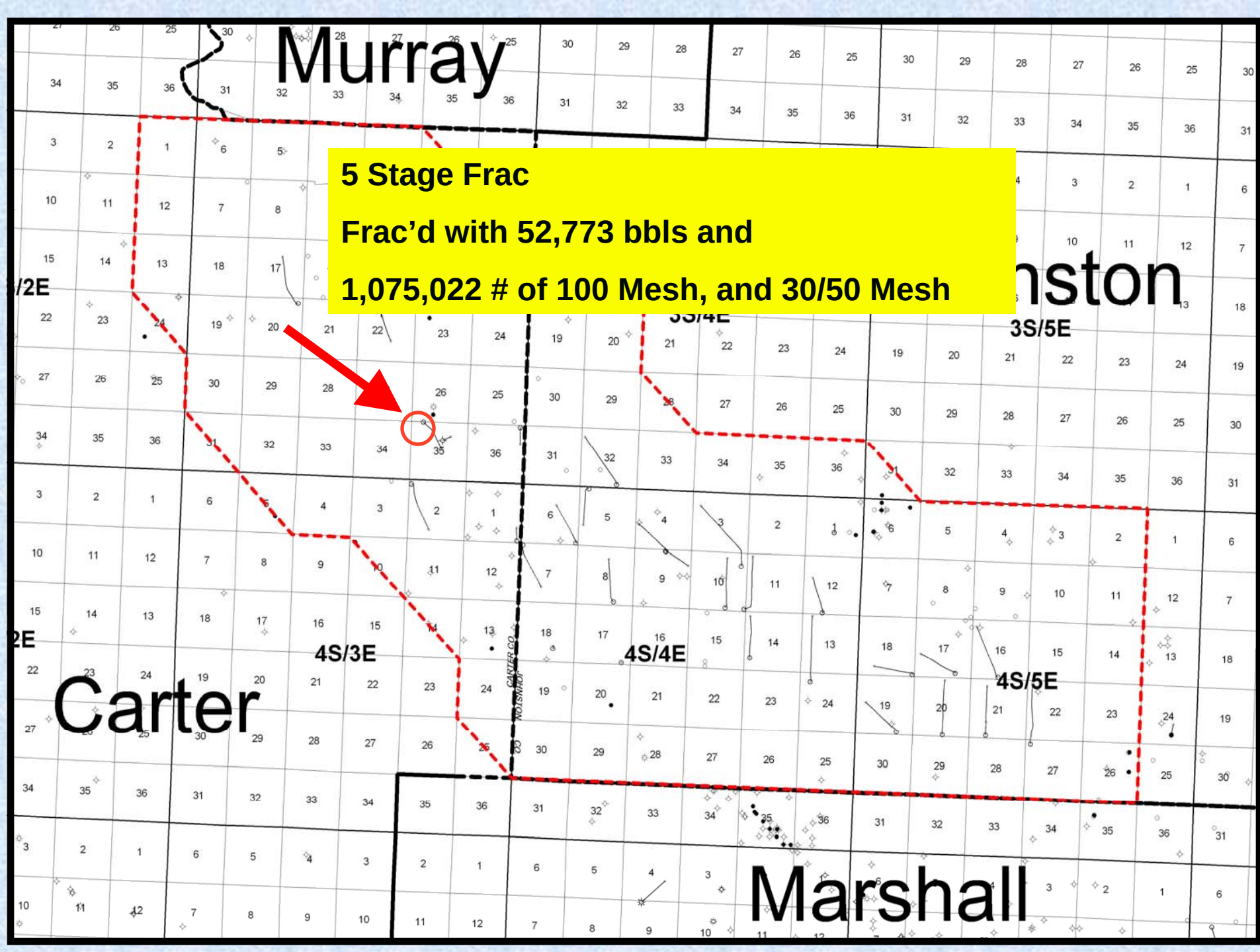
4S/3E

4S/4E

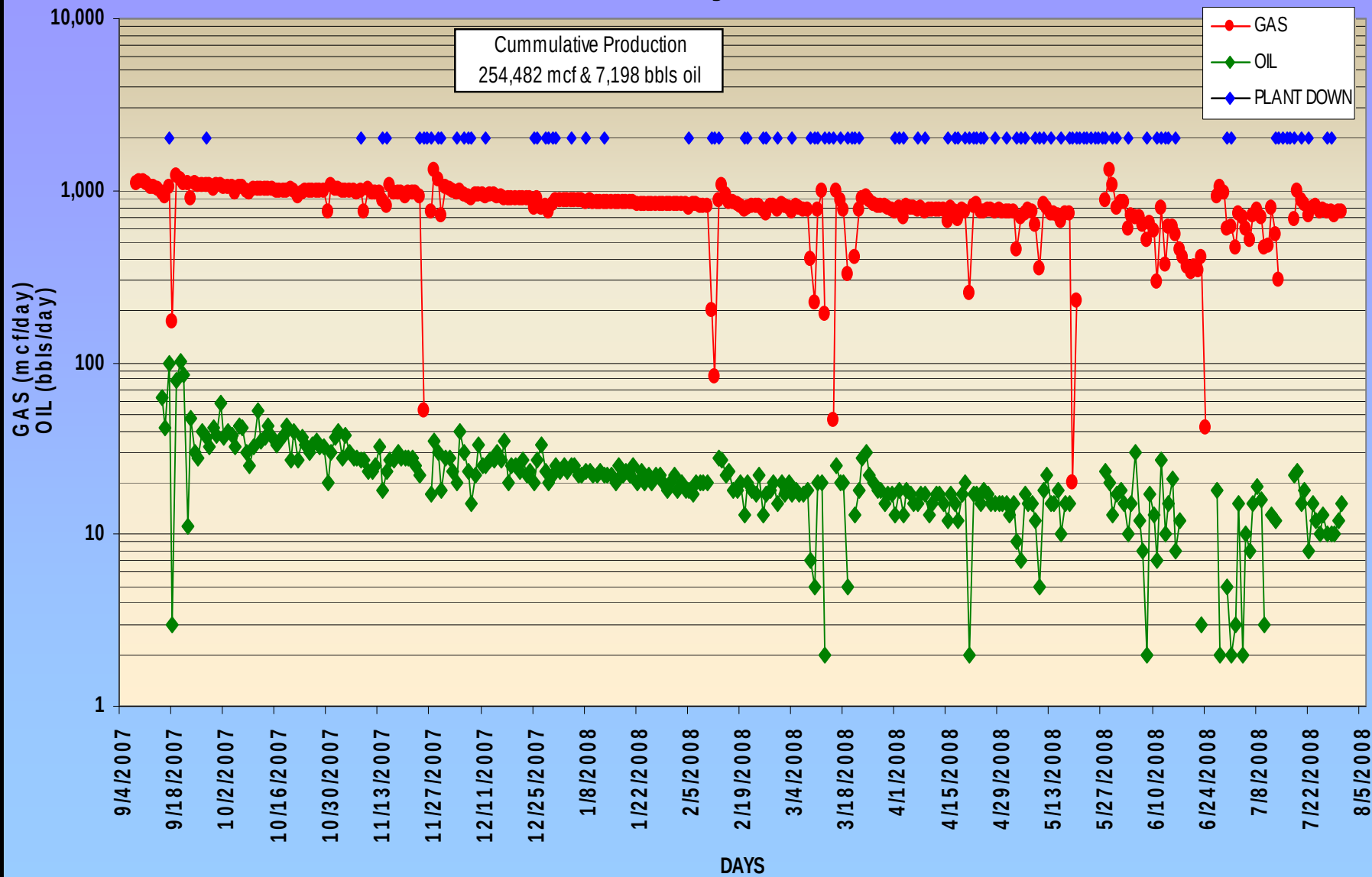
4S/5E

Carter

Marshall



Greenway #35-1H



Murray

9 Stage Frac

Frac'd with 94,056 bbls and

1,943,509 # of 100 Mesh, 40/70 Mesh, and 20/40 Mesh

Johnston

3S/4E

3S/5E

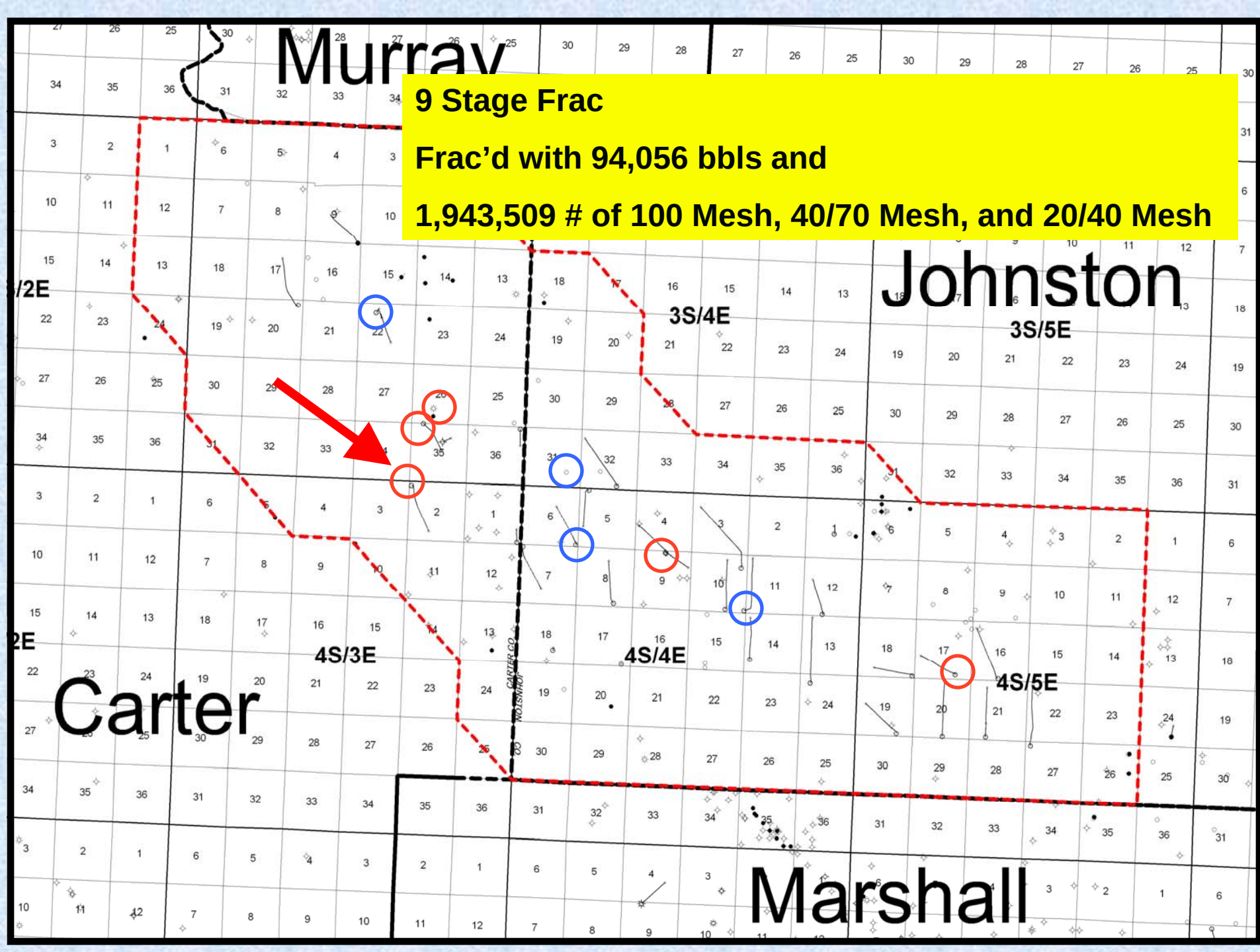
4S/3E

4S/4E

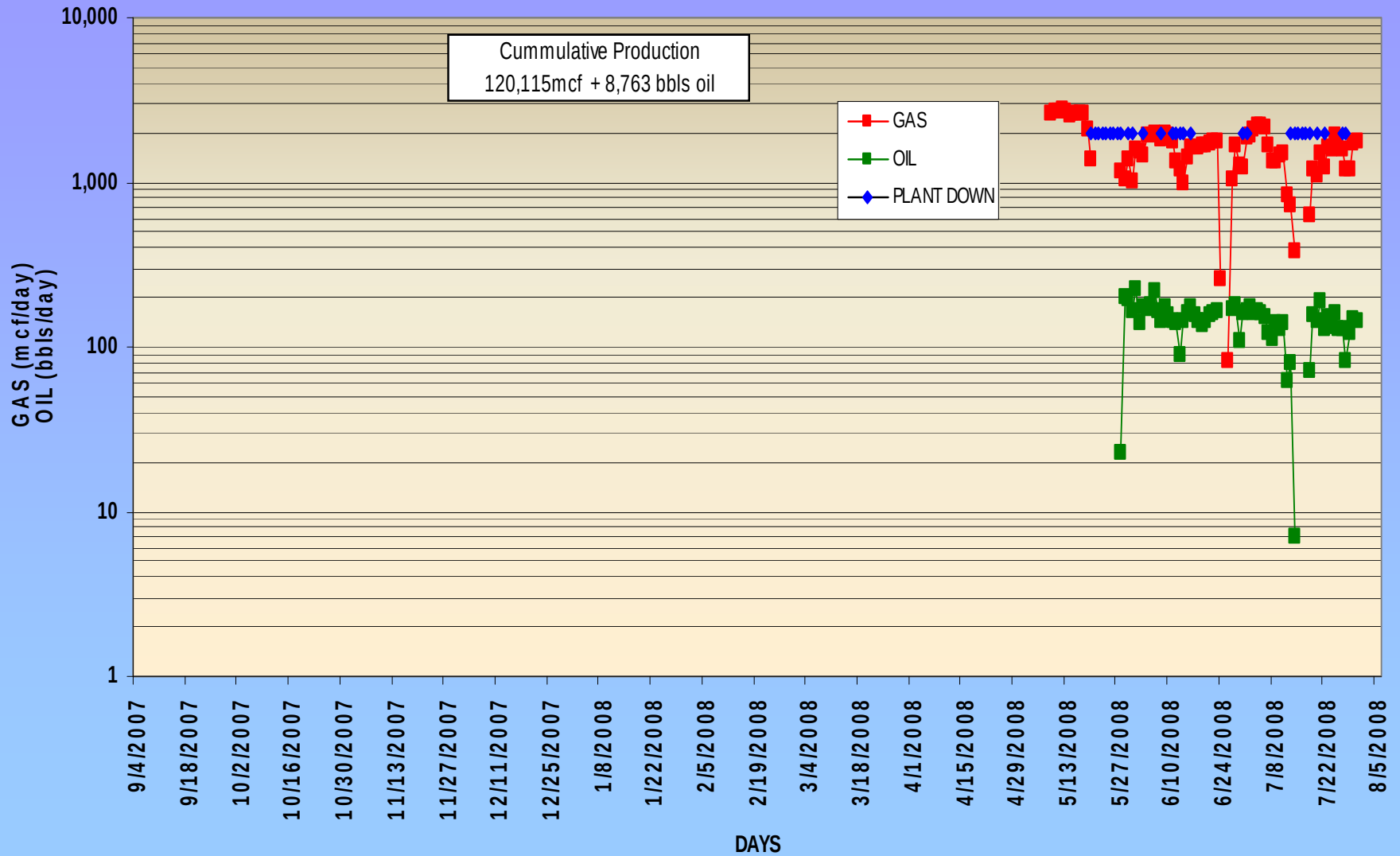
4S/5E

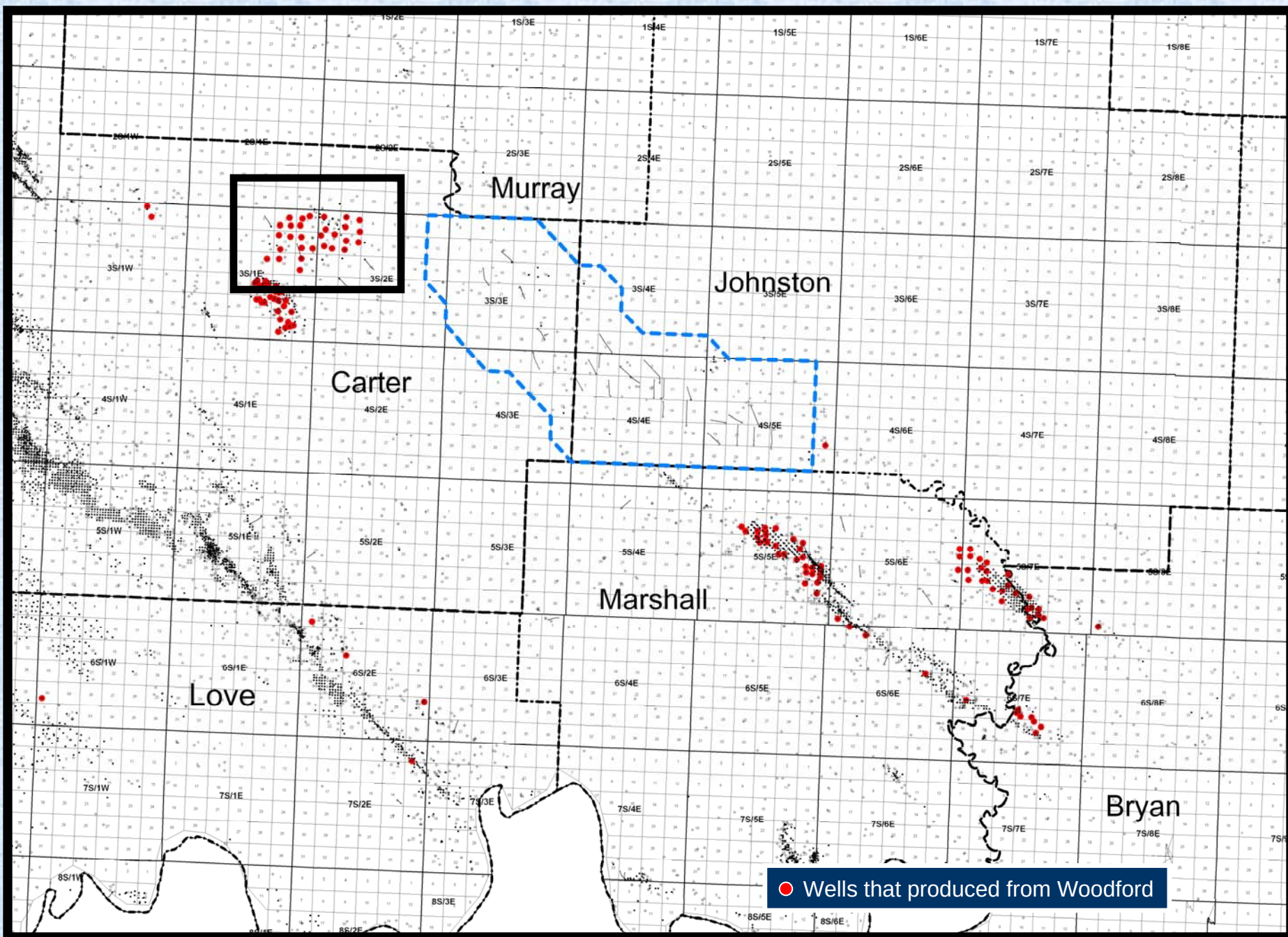
Carter

Marshall

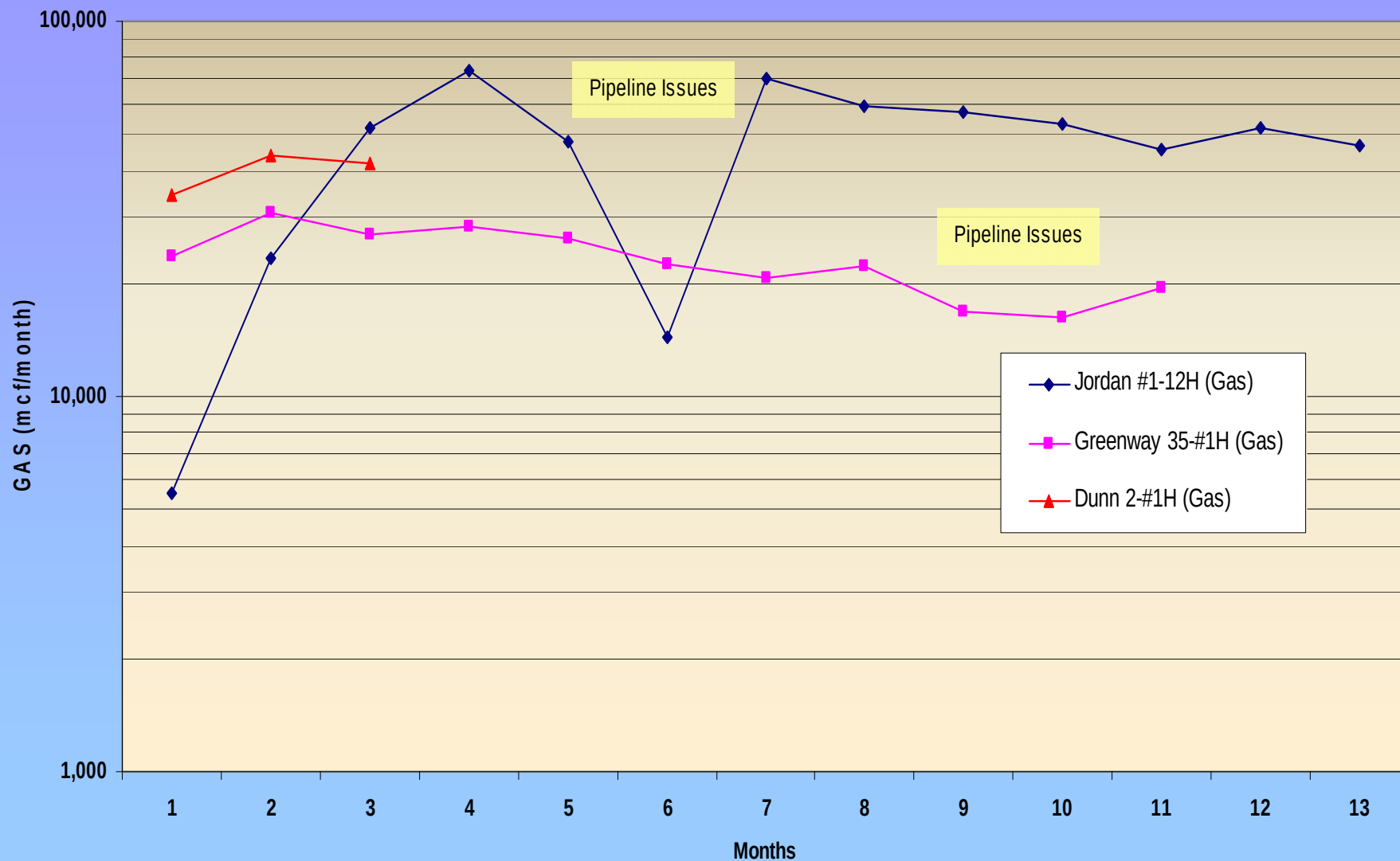


Dunn #1H-2

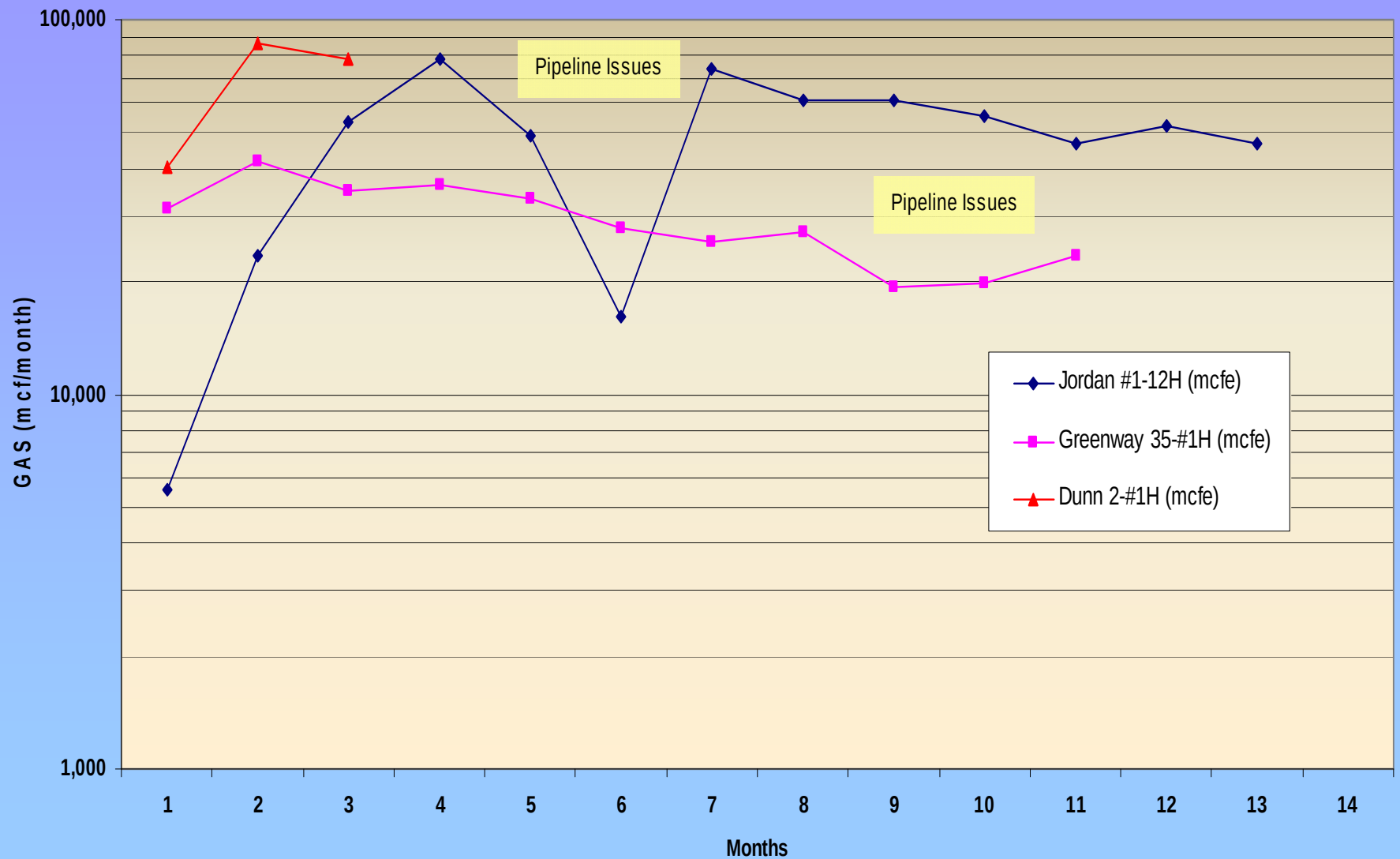


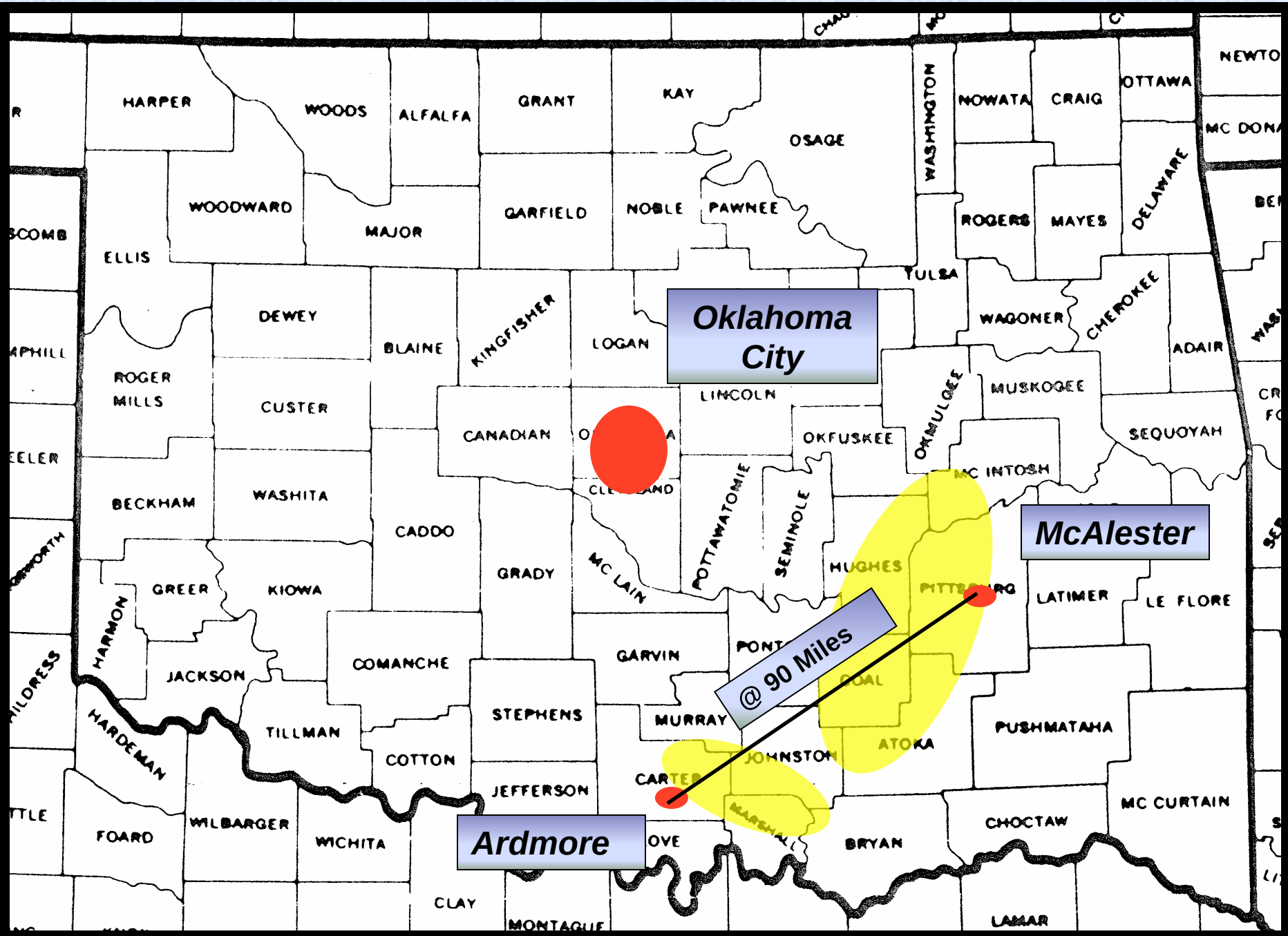


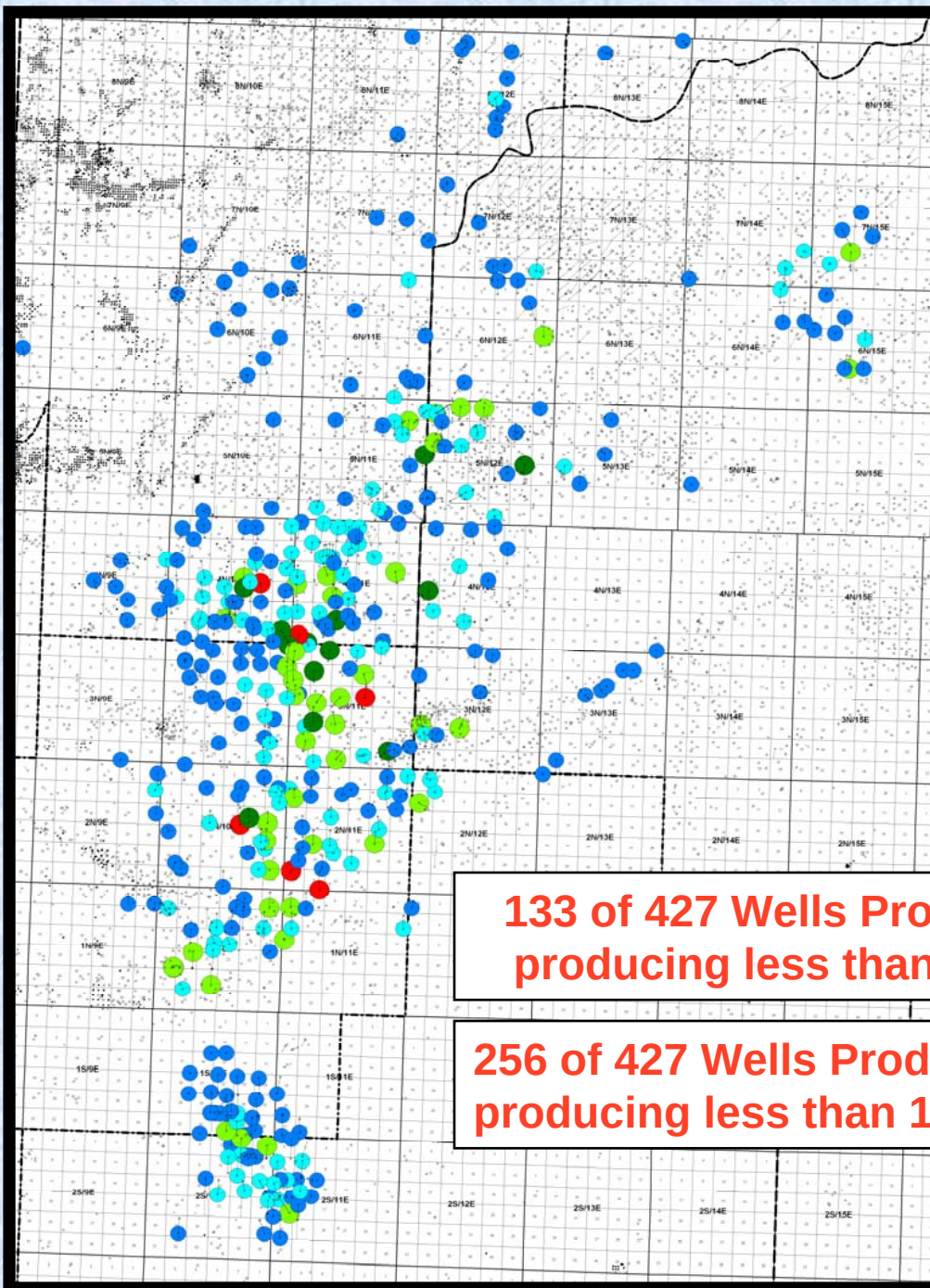
Comparison of Jordan #1-12H, Greenway 35-#1H and Dunn 2-#1H



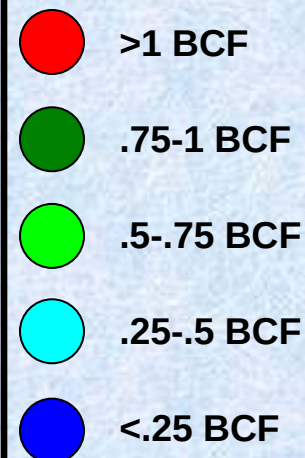
Comparison of Jordan #1-12H, Greenway 35-#1H and Dunn 2-#1H





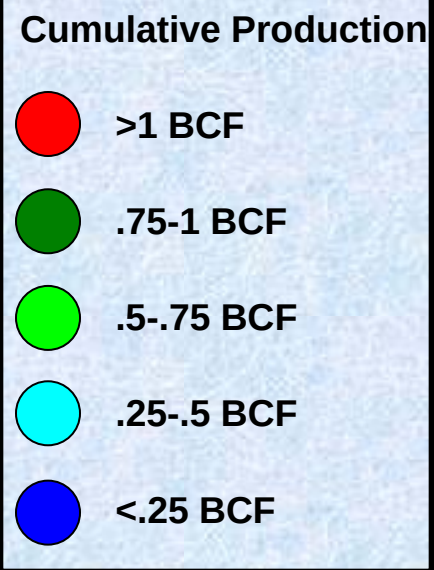
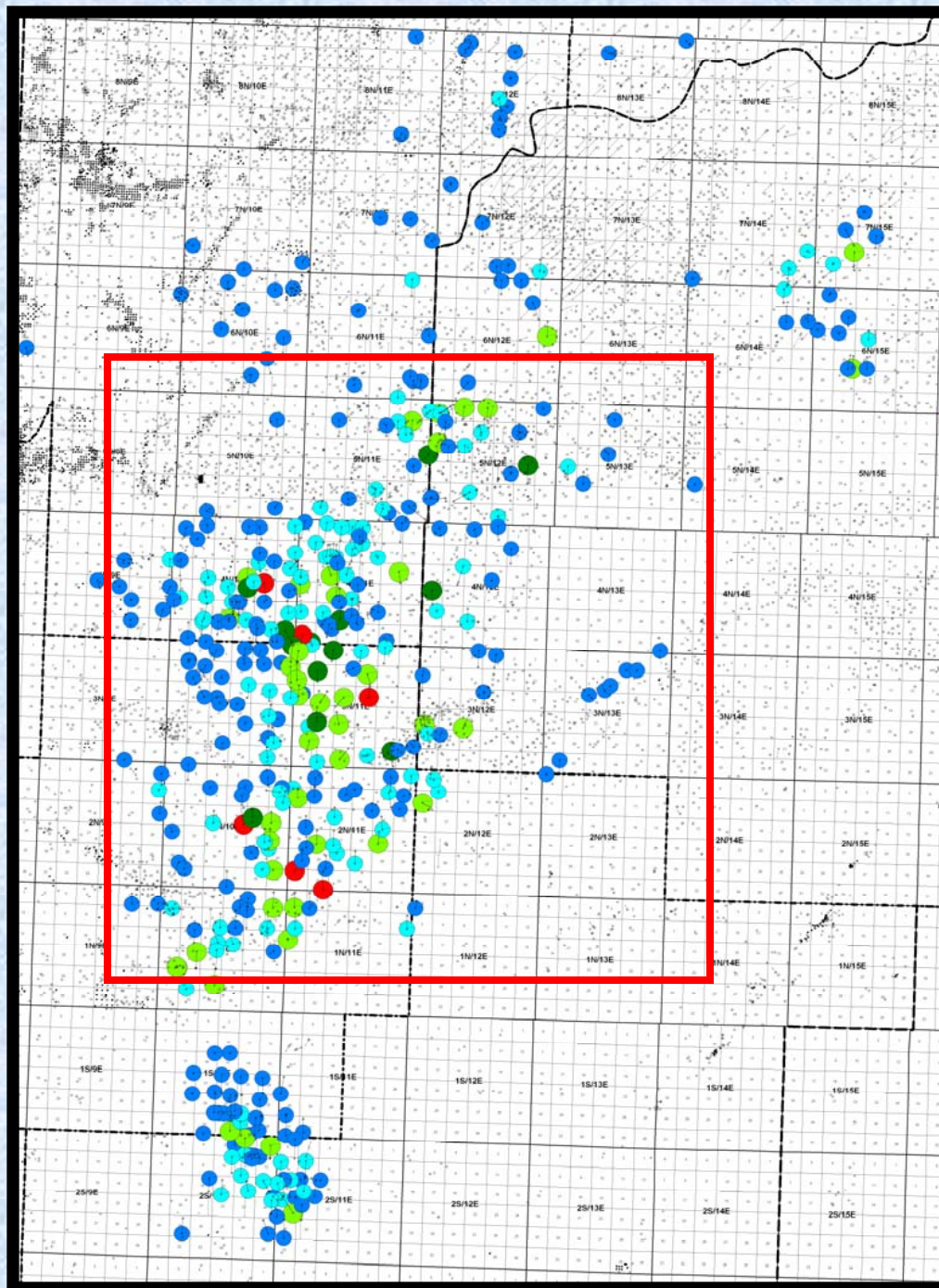


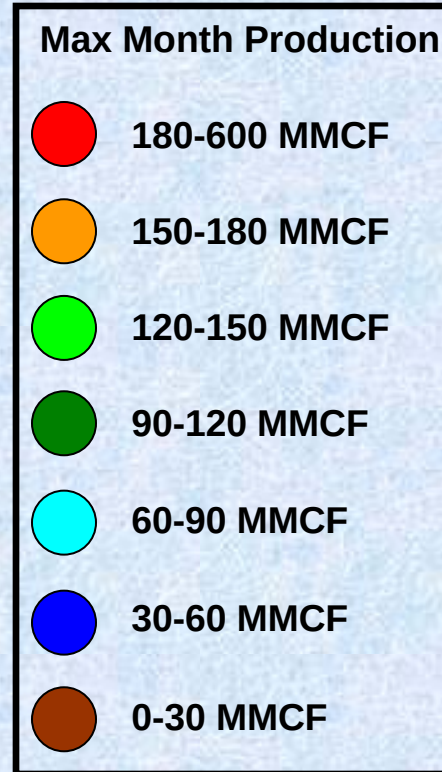
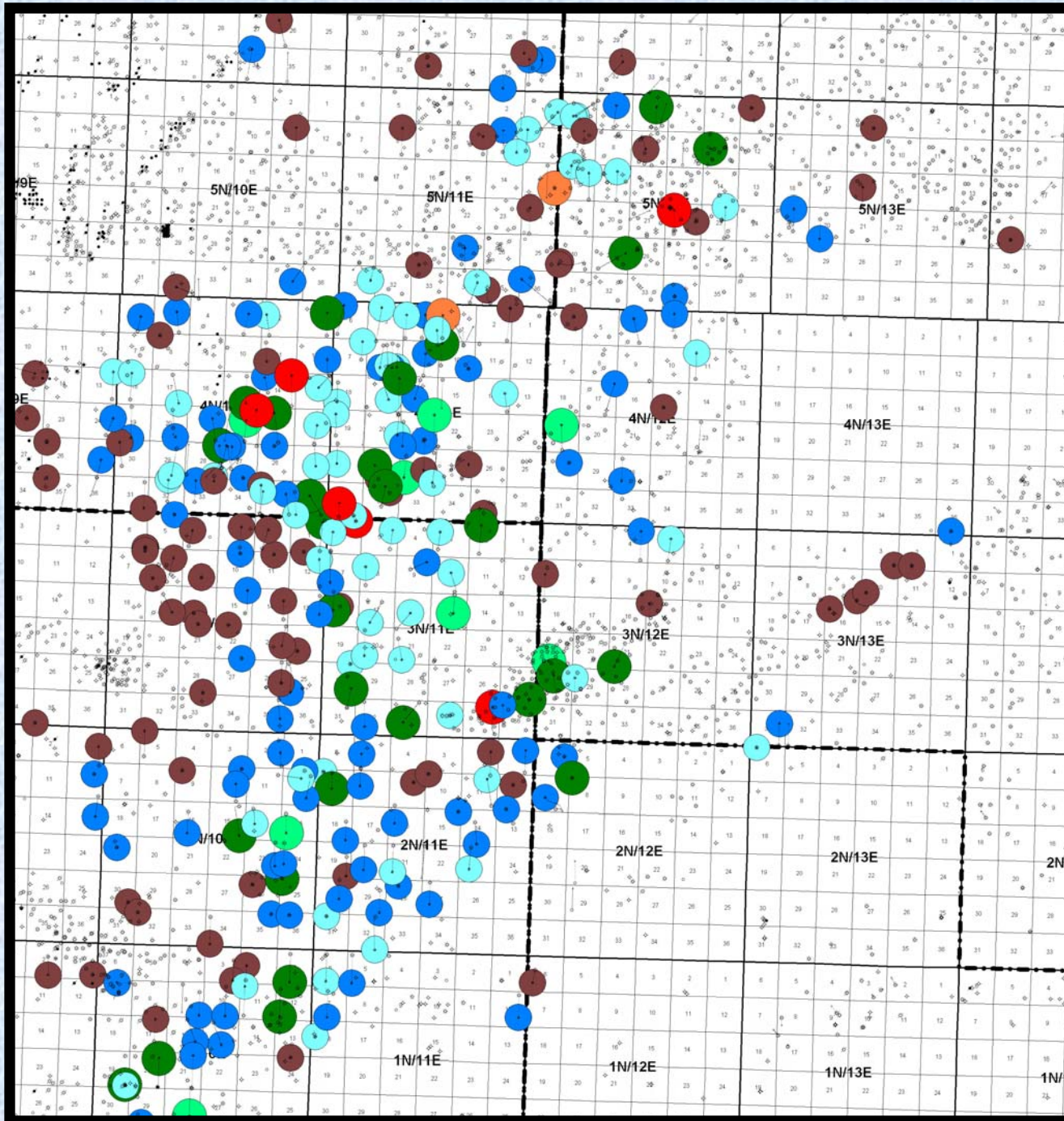
Cumulative Production



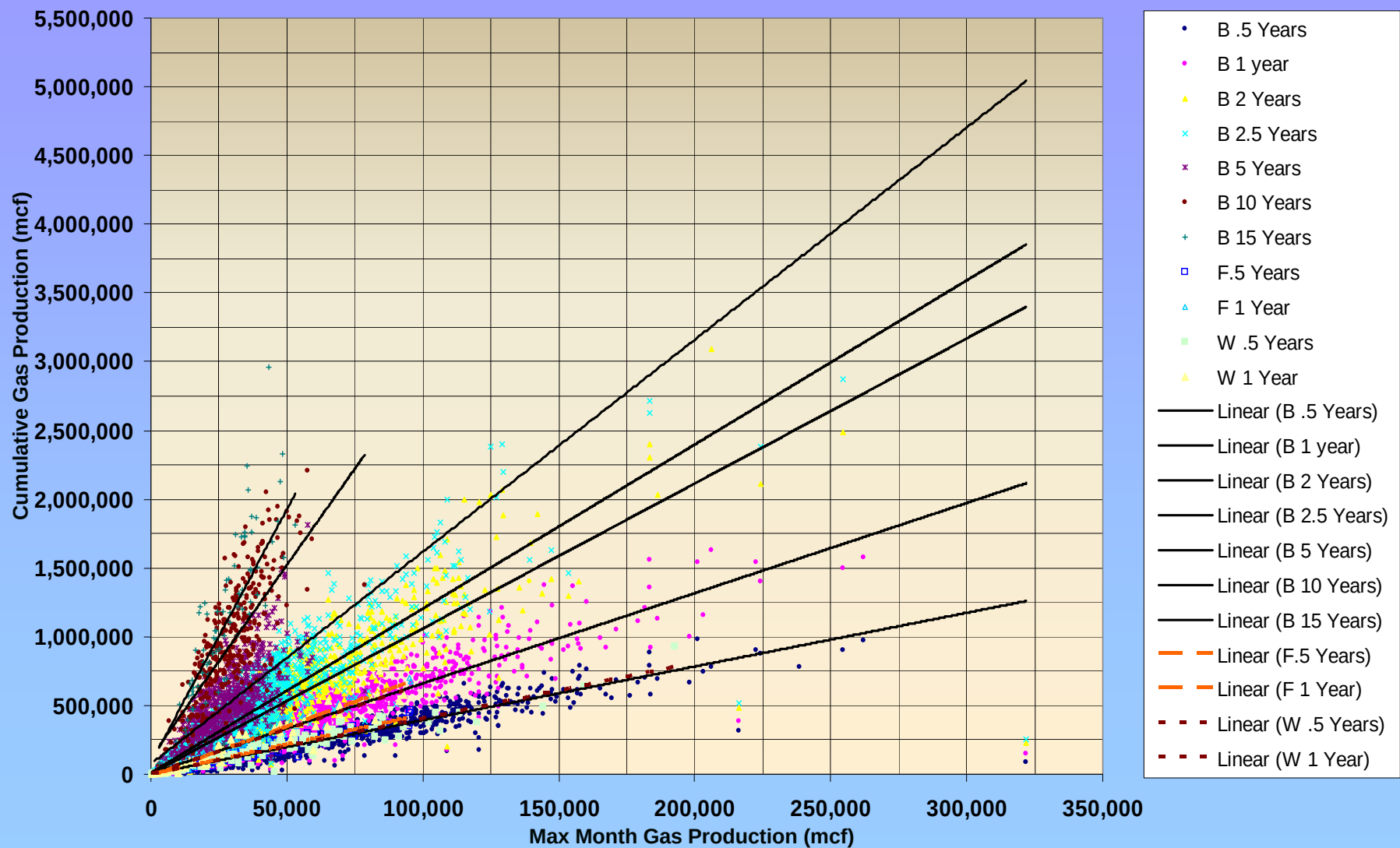
133 of 427 Wells Producing have been producing less than 6 Months (31%)

256 of 427 Wells Producing have been producing less than 12 Months (60%)

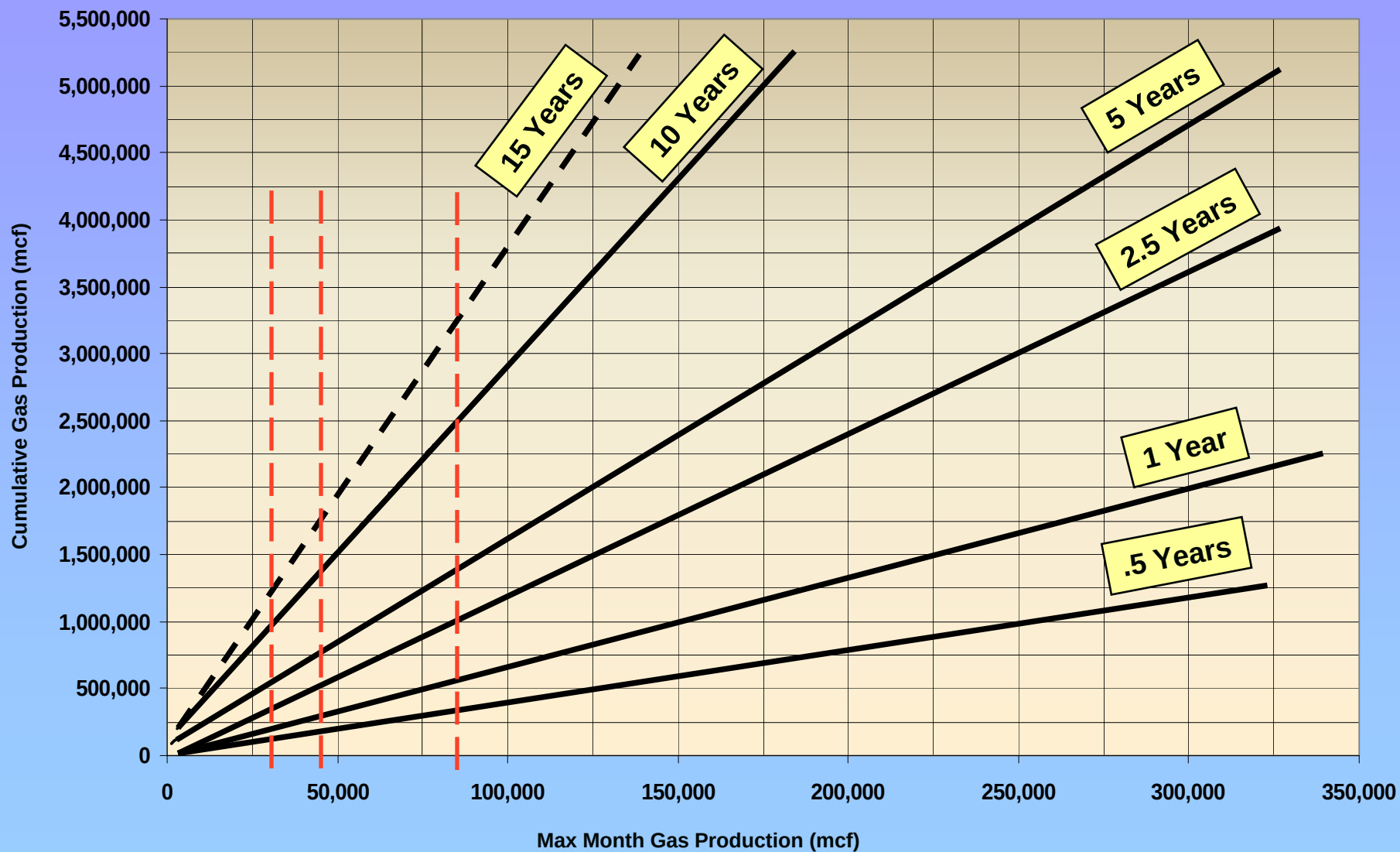




Max Month Production versus Cumulative Production



Max Month Production versus Cumulative Production



Woodford Section **Comparison Carter - Johnston Counties to Coal - Hughes - Pittsburg Counties, Oklahoma**

35121232840000 362711 ft	35019251110000 34447 ft	35069200940000 29091 ft	35069200930000 320225 ft	35121232260000 54544 ft	35029206860000
NEWFIELD EXPLORATION SHERMAN ELLIS 3-22 NE TWP: 5 N - Range: 12 E - Sec. 22 Cum Gas All Zones: 115 MMCF	WAGNER & BROWN LTD MAHER 1H-22 1740 FSL 1630 FWL/NW TWP: 3 S - Range: 3 E - Sec. 22	BNK PETROLEUM US INC BROCK 9-1H 2490 FSL 190 FWL/NE TWP: 4 S - Range: 4 E - Sec. 9	BNK PETROLEUM US INC WLC 17-1H 430 FSL 1500 FEL TWP: 4 S - Range: 5 E - Sec. 17	NEWFIELD EXPLORATION LOFTIS 1-8 C NE TWP: 4 N - Range: 12 E - Sec. 6 Cum Gas All Zones: 158 MMCF	DEVON ENERGY PROD DOUBLE 5 RANCH 1-18 SE SE NW TWP: 3 N - Range: 11 E - Sec. 18 Cum Gas All Zones: 77 MMCF

Net 127 Ft.
Gross 139 Ft.
Net to Gross 91.4%

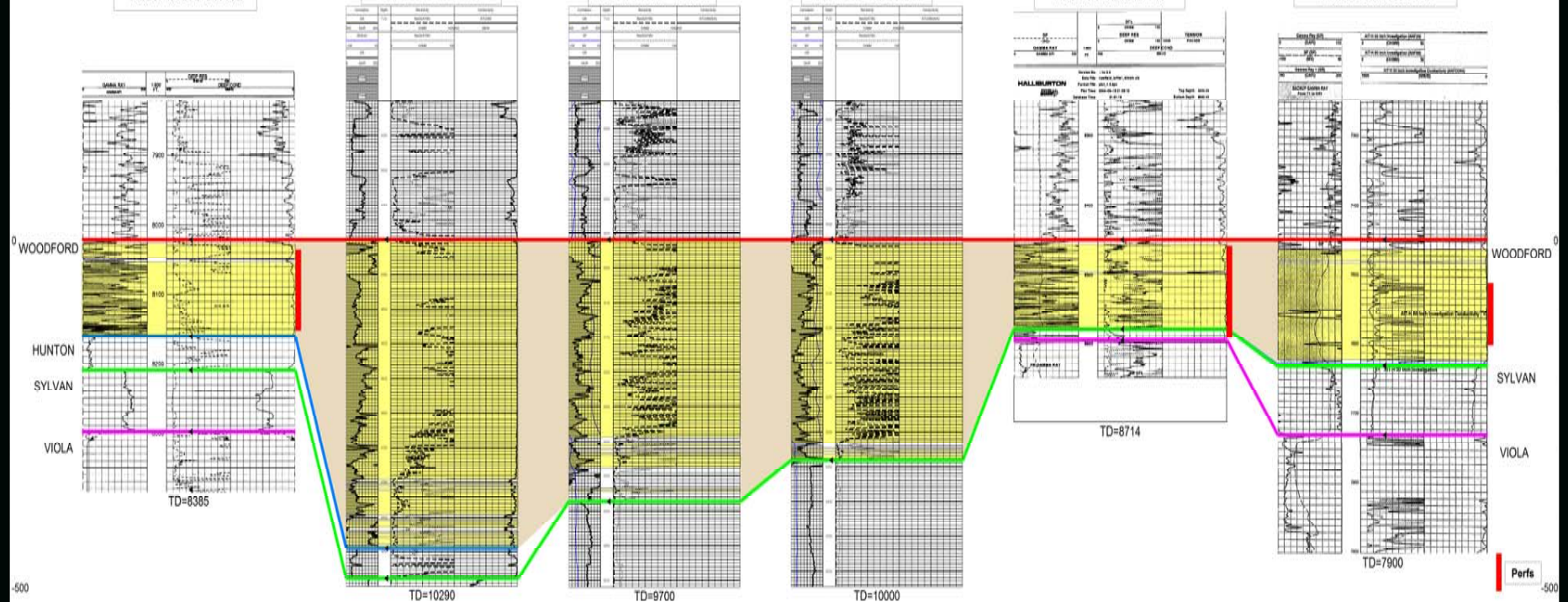
Net 414 Ft.
Gross 445 Ft.
Net to Gross 93.0%

Net 311 Ft.
Gross 377 Ft.
Net to Gross 82.5%

Net 298 Ft.
Gross 318 Ft.
Net to Gross 93.7%

Net 119 Ft.
Gross 129 Ft.
Net to Gross 92.2%

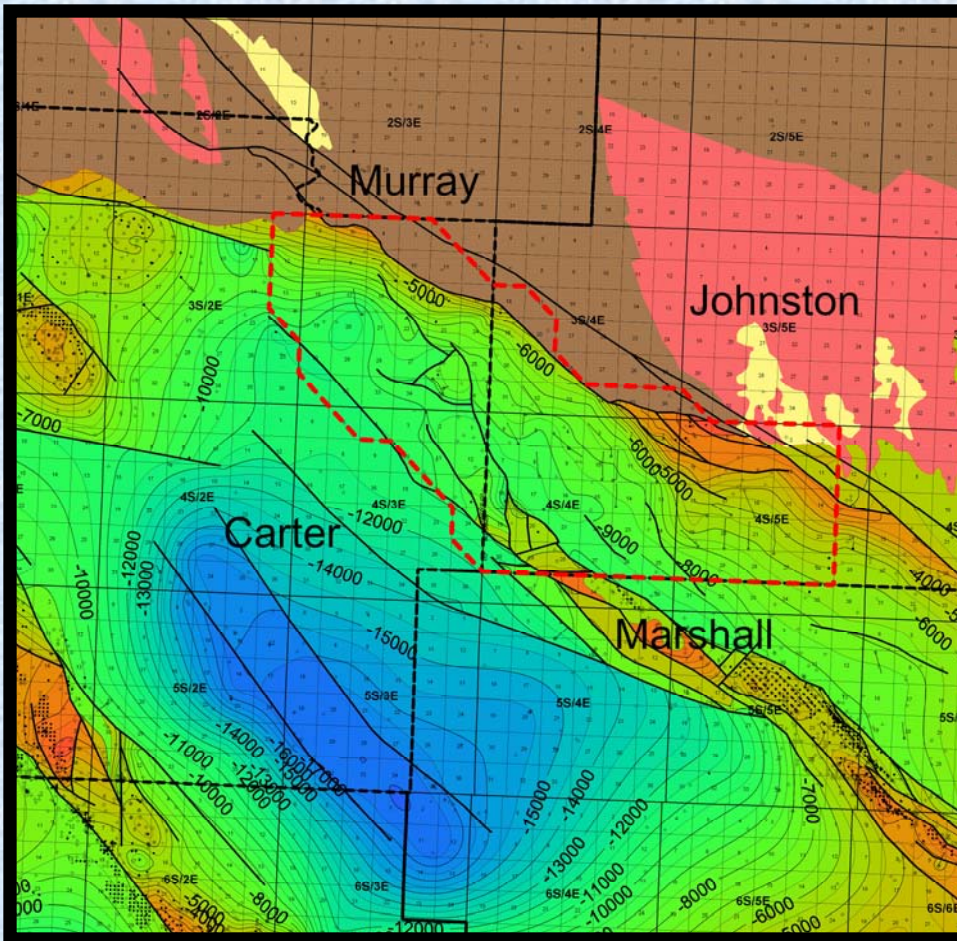
Net 154 Ft.
Gross 182 Ft.
Net to Gross 84.6%



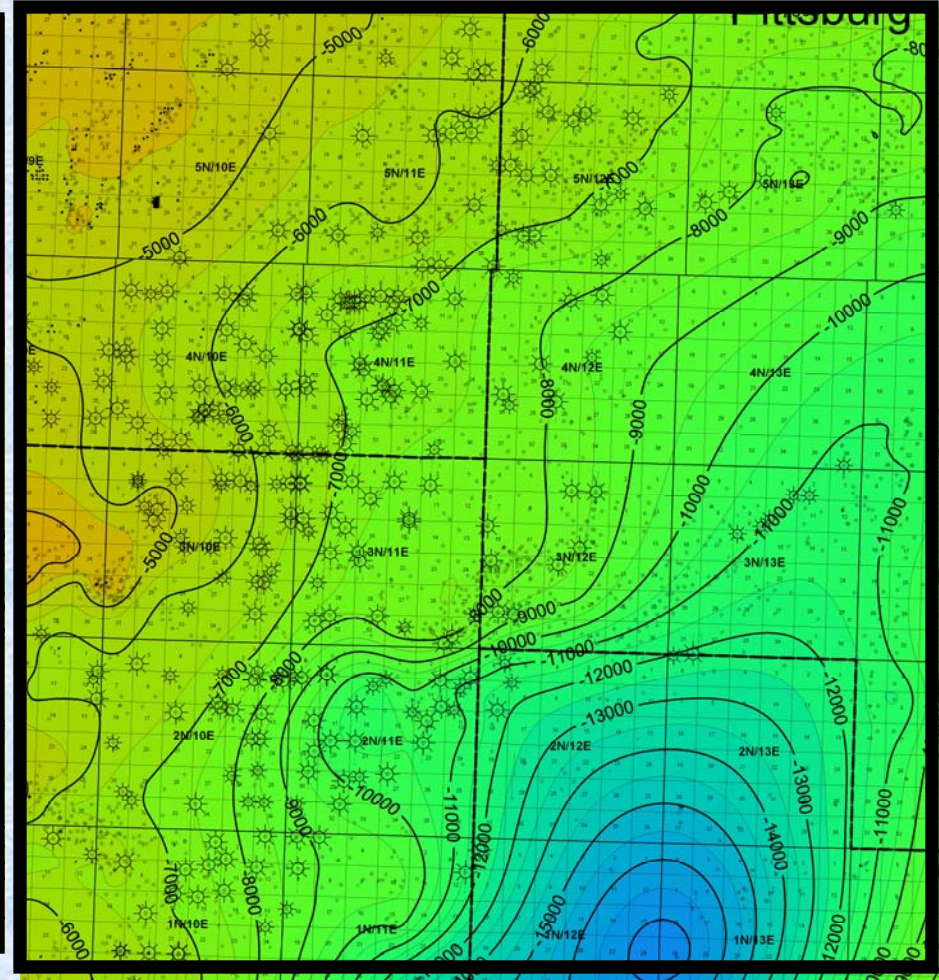
Carter - Johnston

Woodford Structure Comparison

CI = 500 Feet



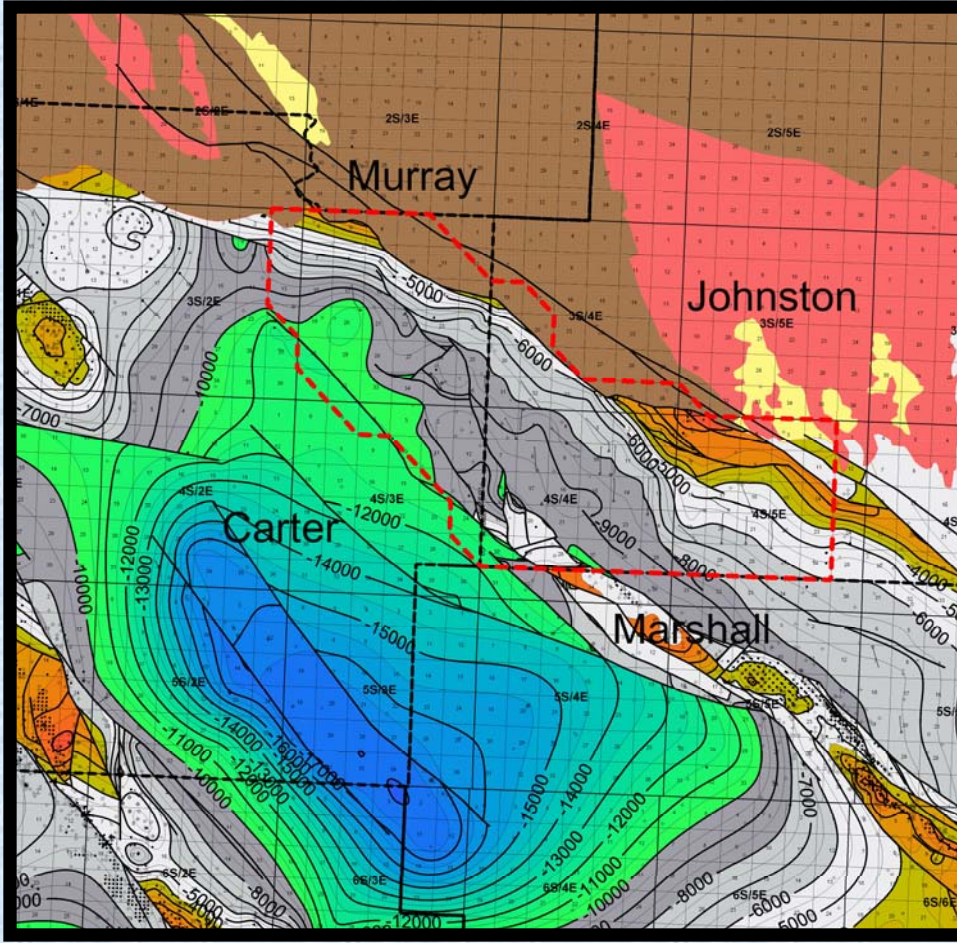
Carter & Johnston Counties Area



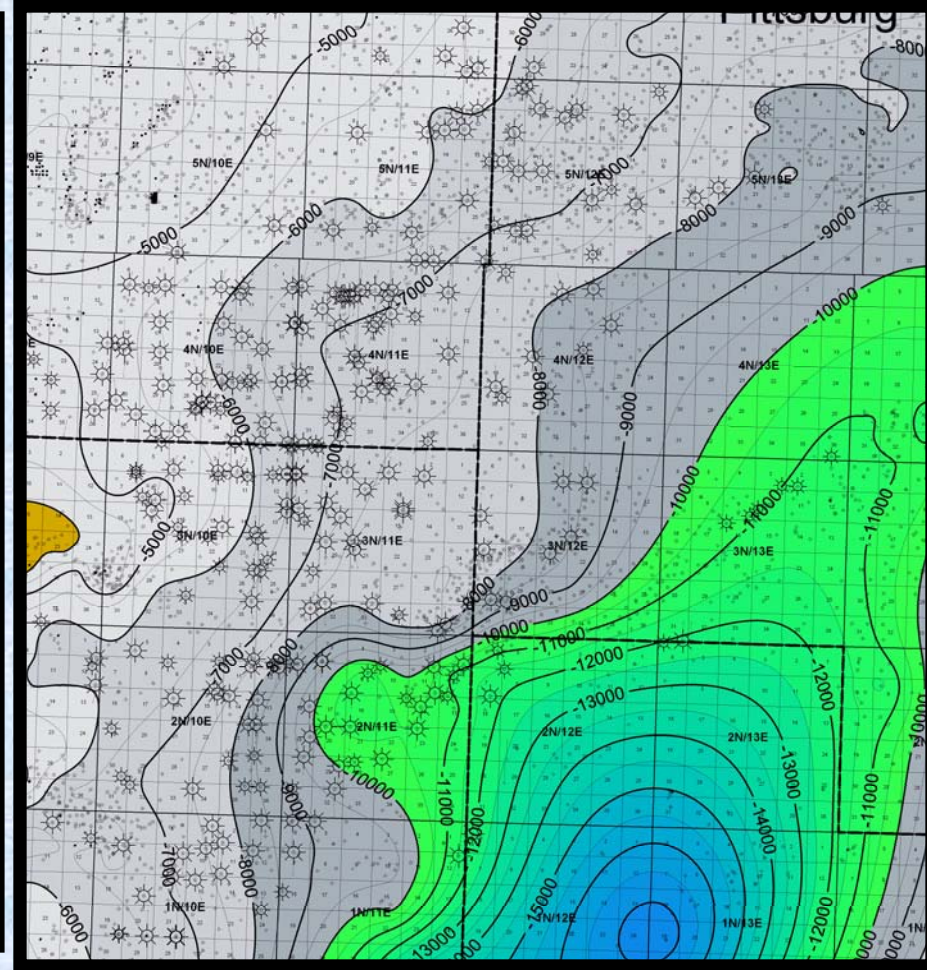
Pittsburg & Hughes Counties Area

Woodford Structure Comparison (Shading)

CI = 500 Feet



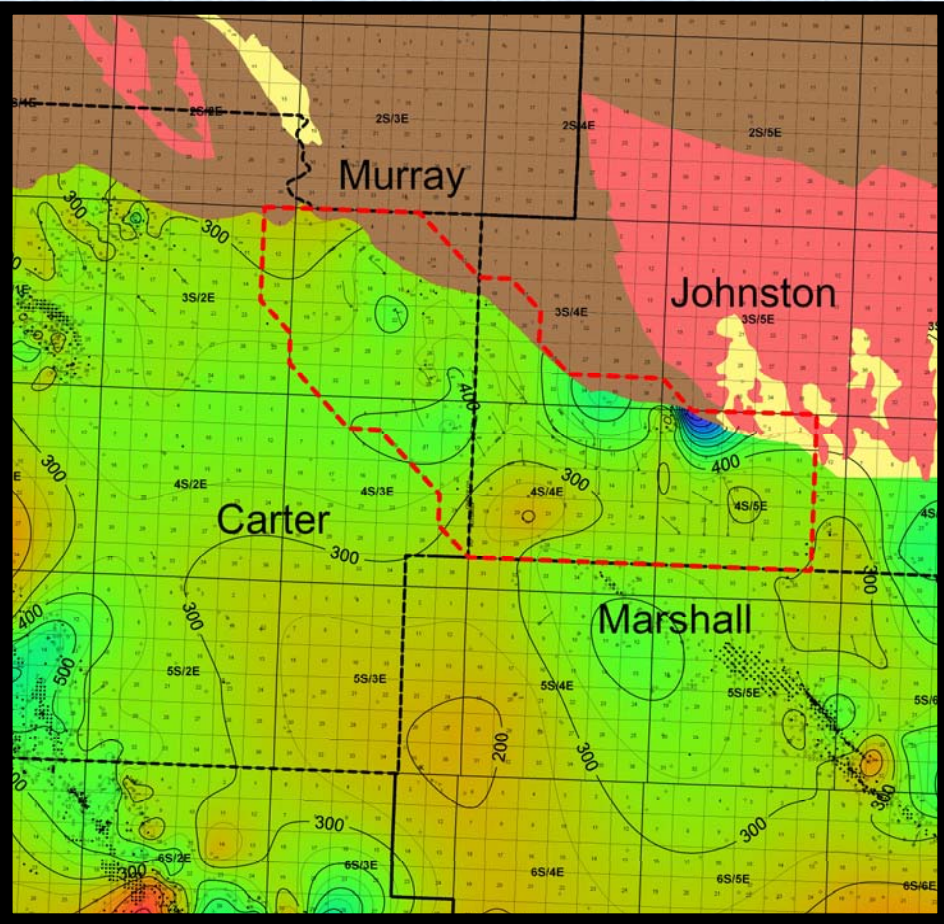
Carter & Johnston Counties Area



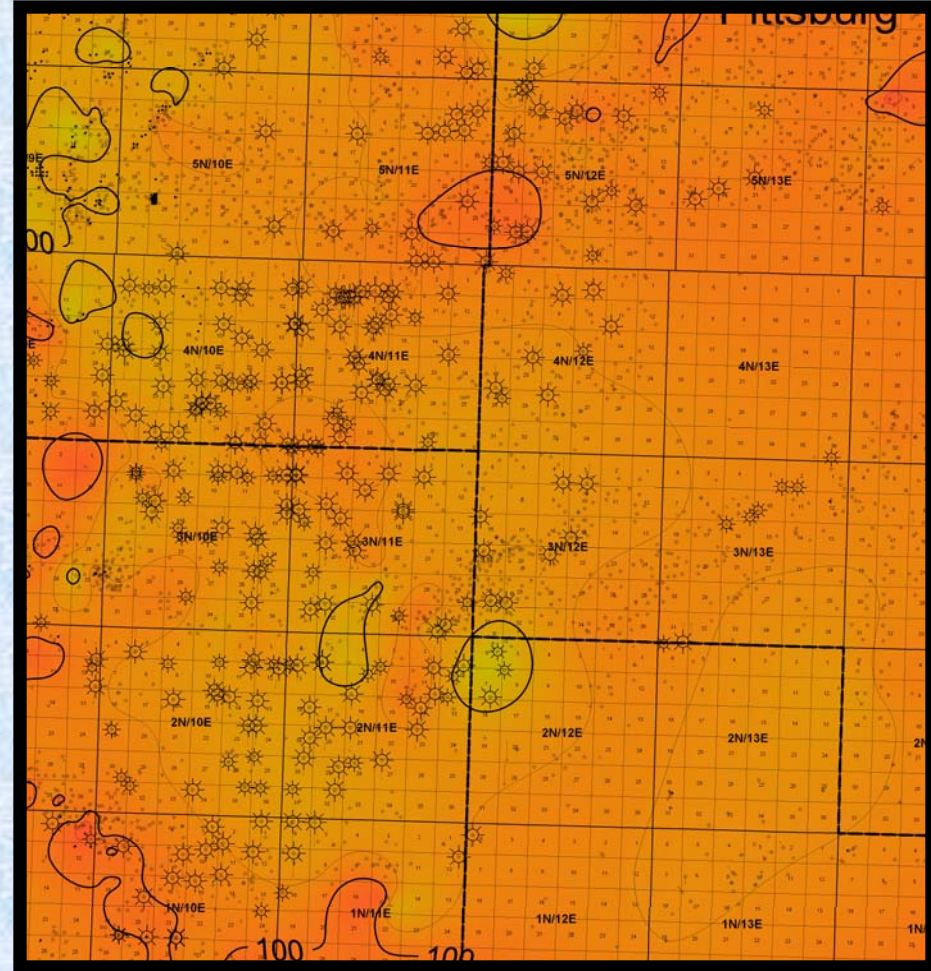
Pittsburg & Hughes Counties Area

Woodford Isochore Comparison

CI = 50 Feet



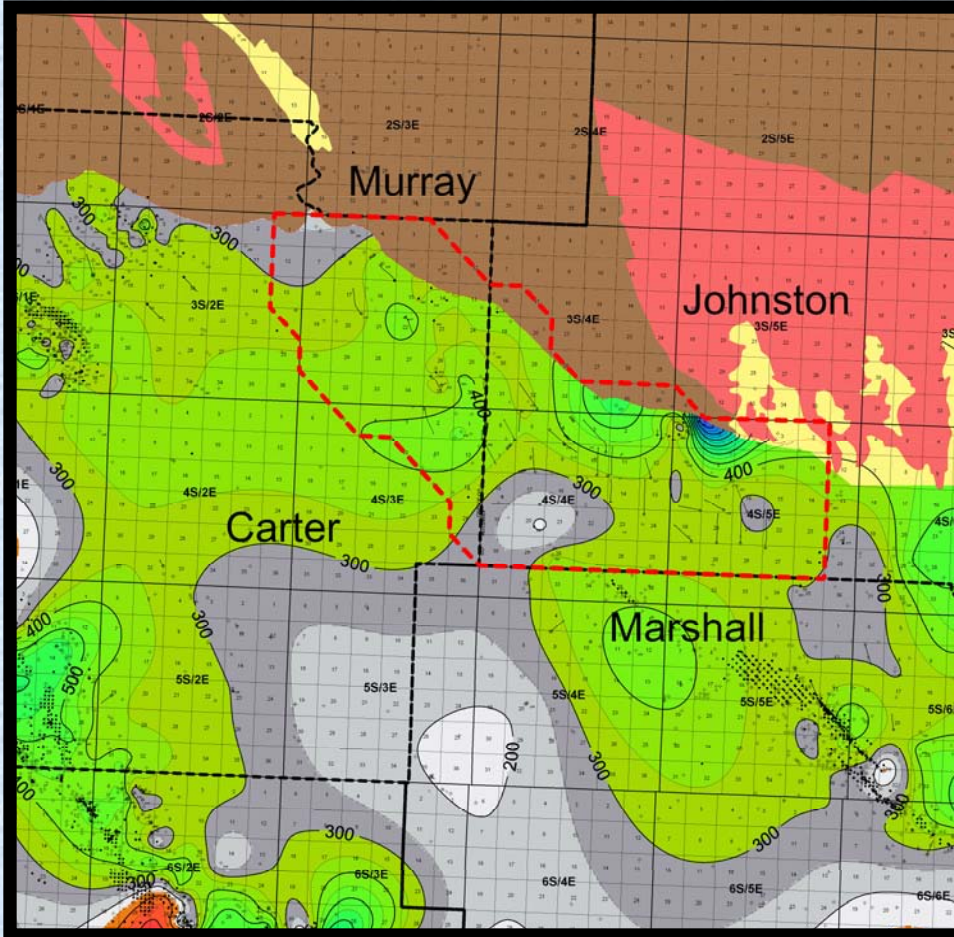
Carter & Johnston Counties Area



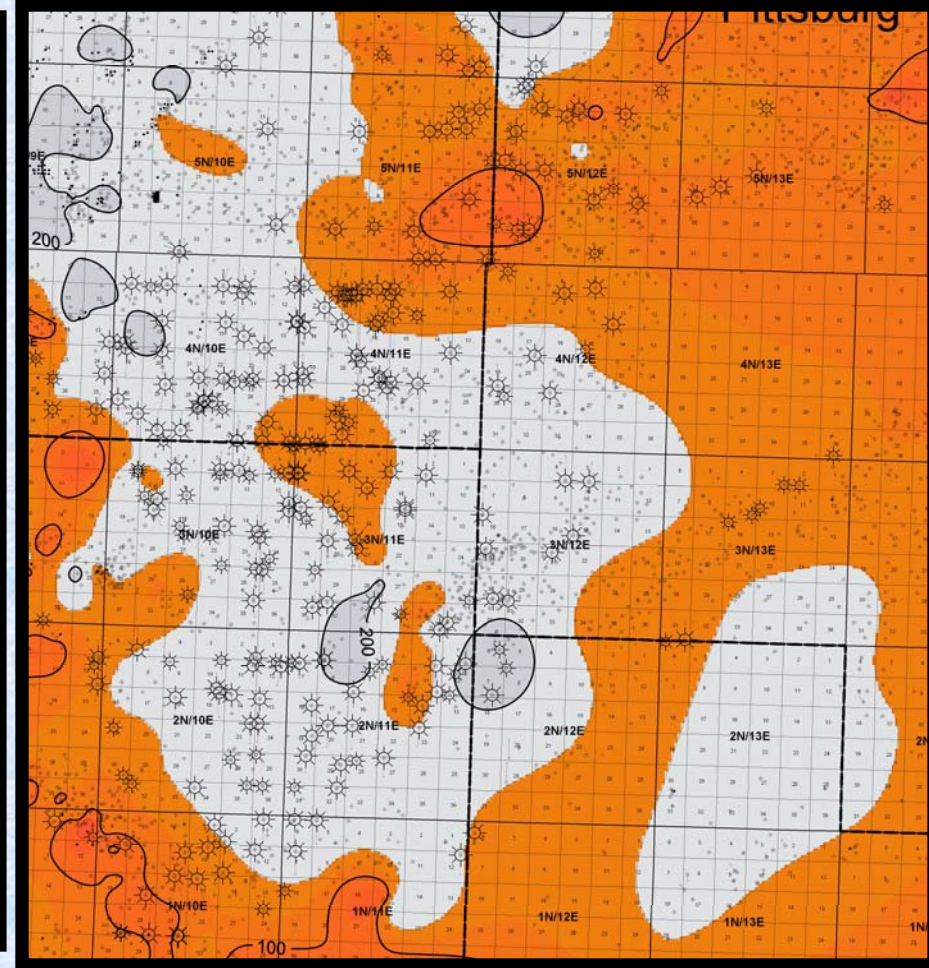
Pittsburg & Hughes Counties Area

Woodford Isochore Comparison (Shading)

Cl = 50 Feet



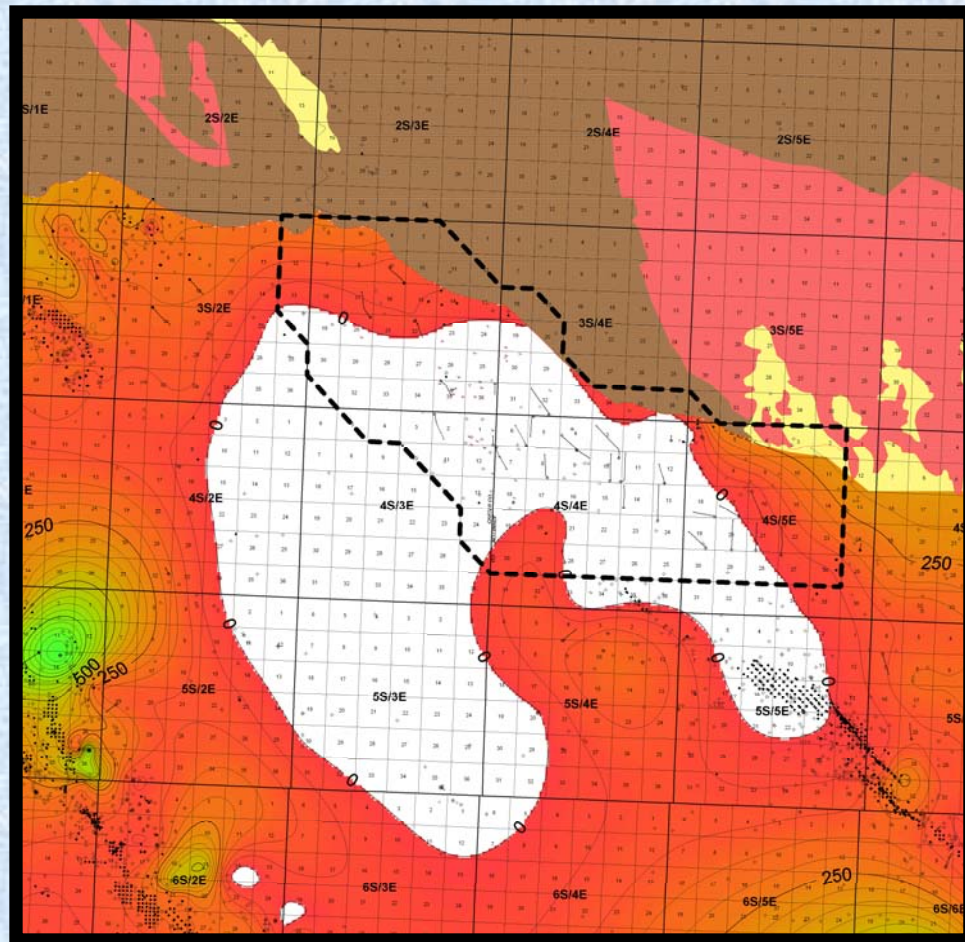
Carter & Johnston Counties Area



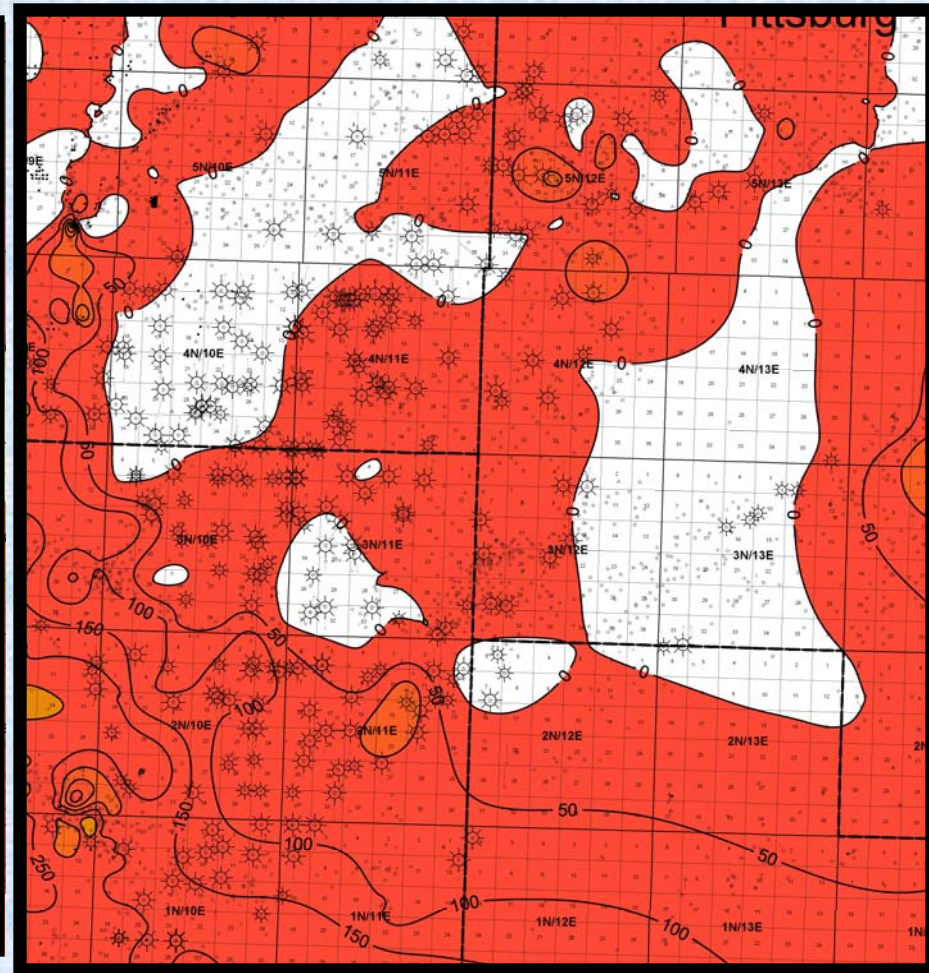
Pittsburg & Hughes Counties Area

Hunton Isochore Comparison

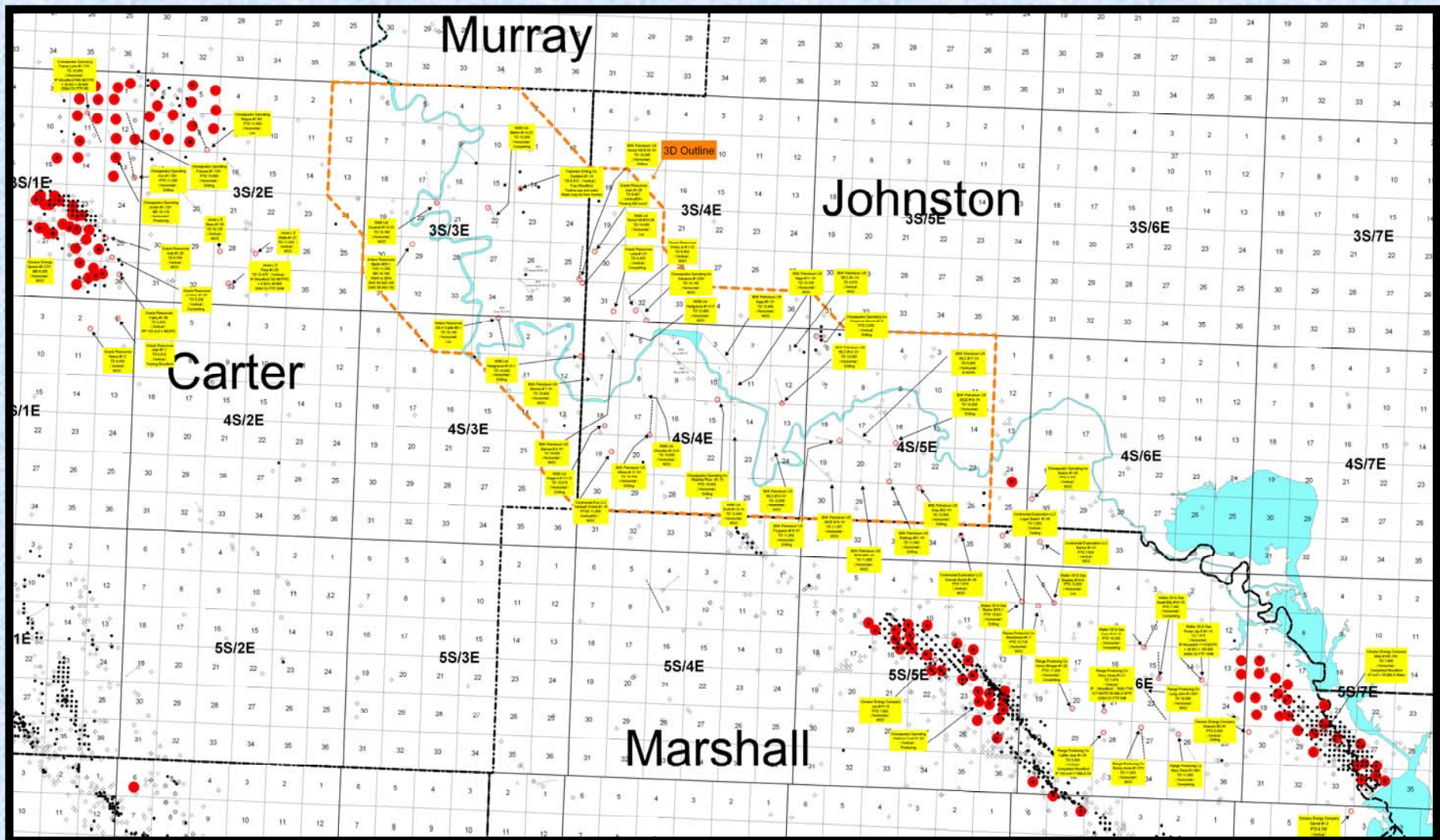
CI = 50 Feet



Carter & Johnston Counties Area

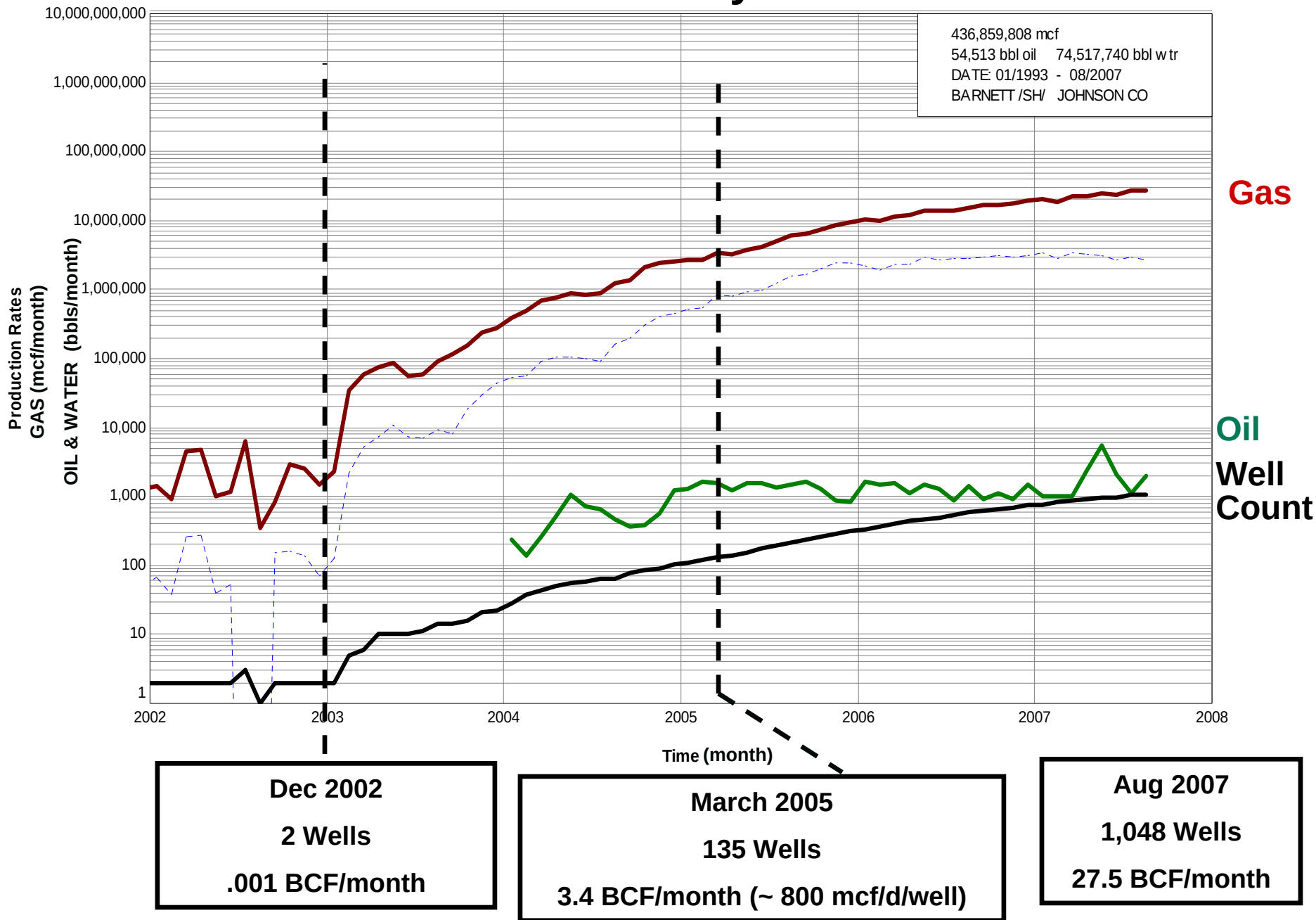


Pittsburg & Hughes Counties Area

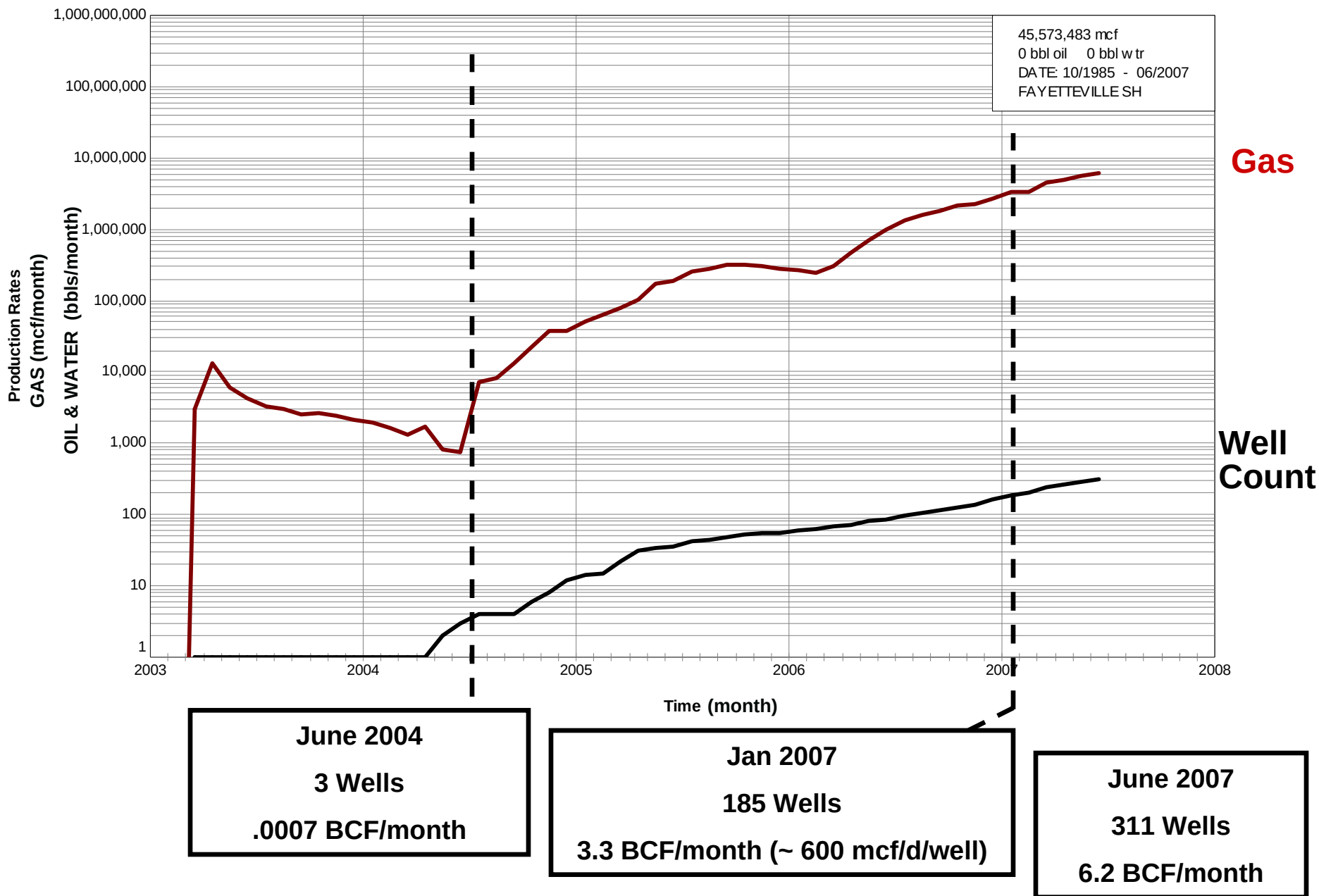


Activity Map

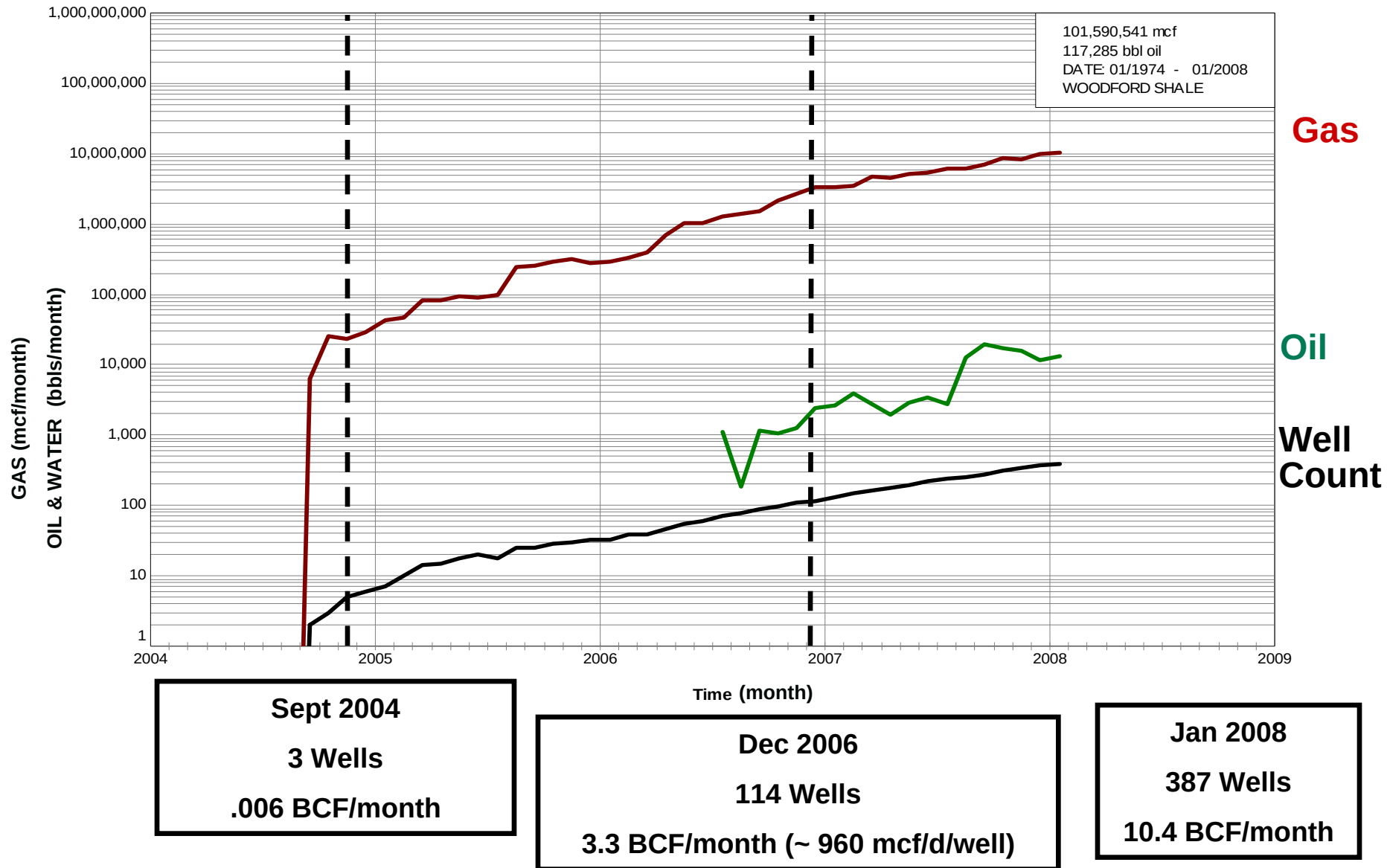
Johnson County Barnett



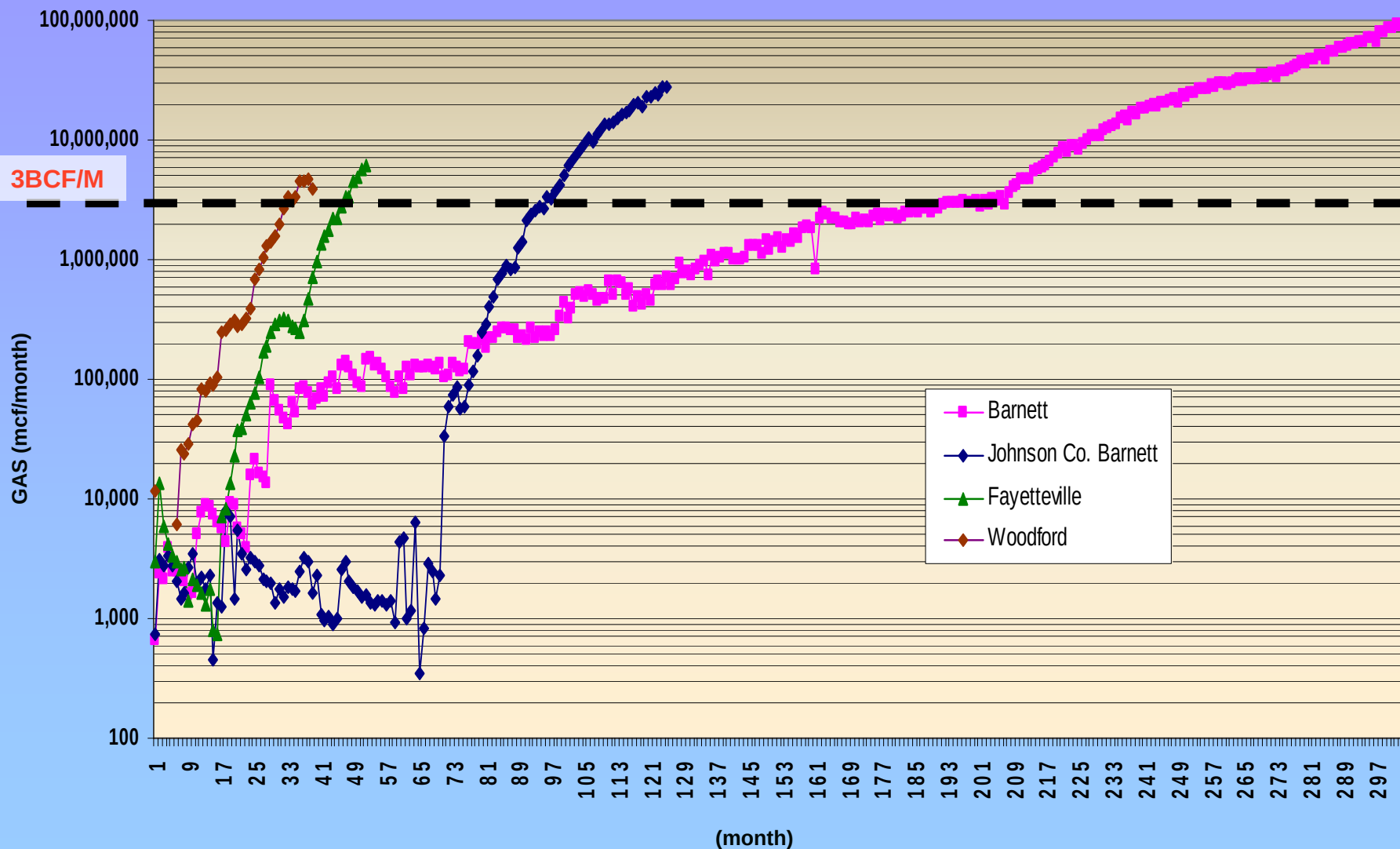
Fayetteville Shale



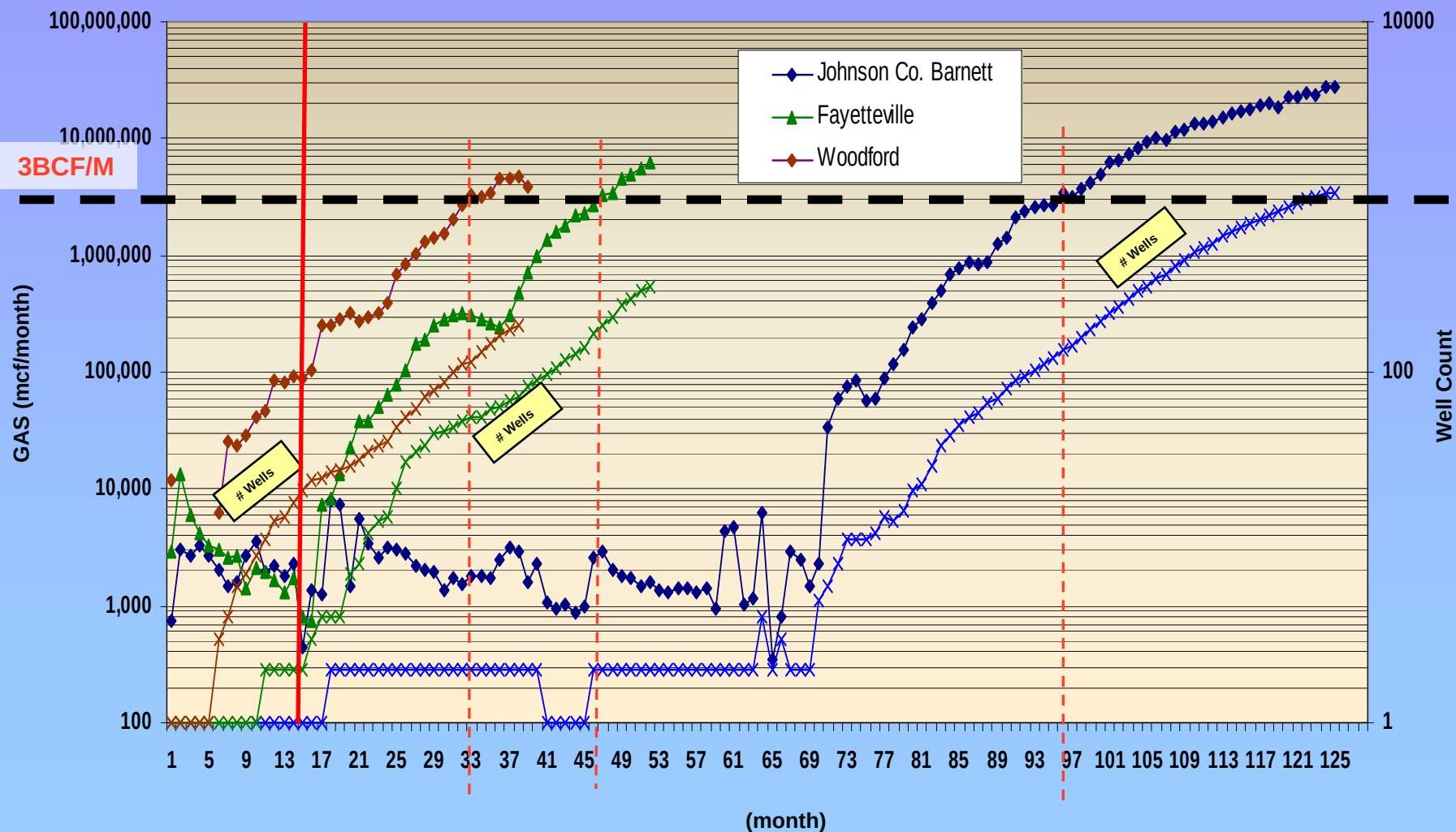
Woodford Shale (Arkoma Basin)



Development Time For Shale Plays



Development Time For Shale Plays



A dramatic seascape with waves crashing against dark rocks under a grey sky with two rainbows. The text "THE END" is overlaid in the center.

THE END