

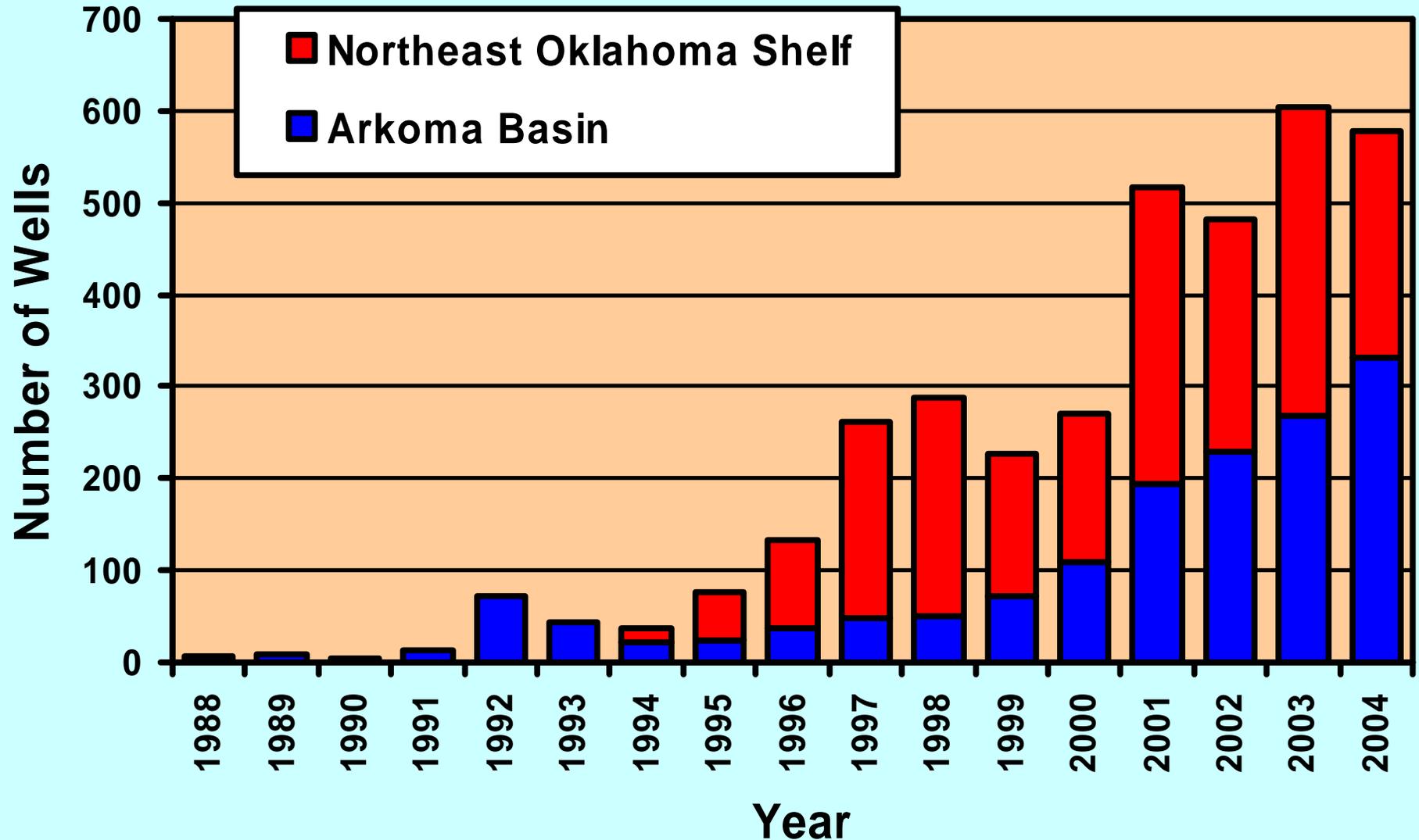
Oklahoma Coalbed-Methane Activity, 2006 Update

Brian J. Cardott

Oklahoma Geological Survey

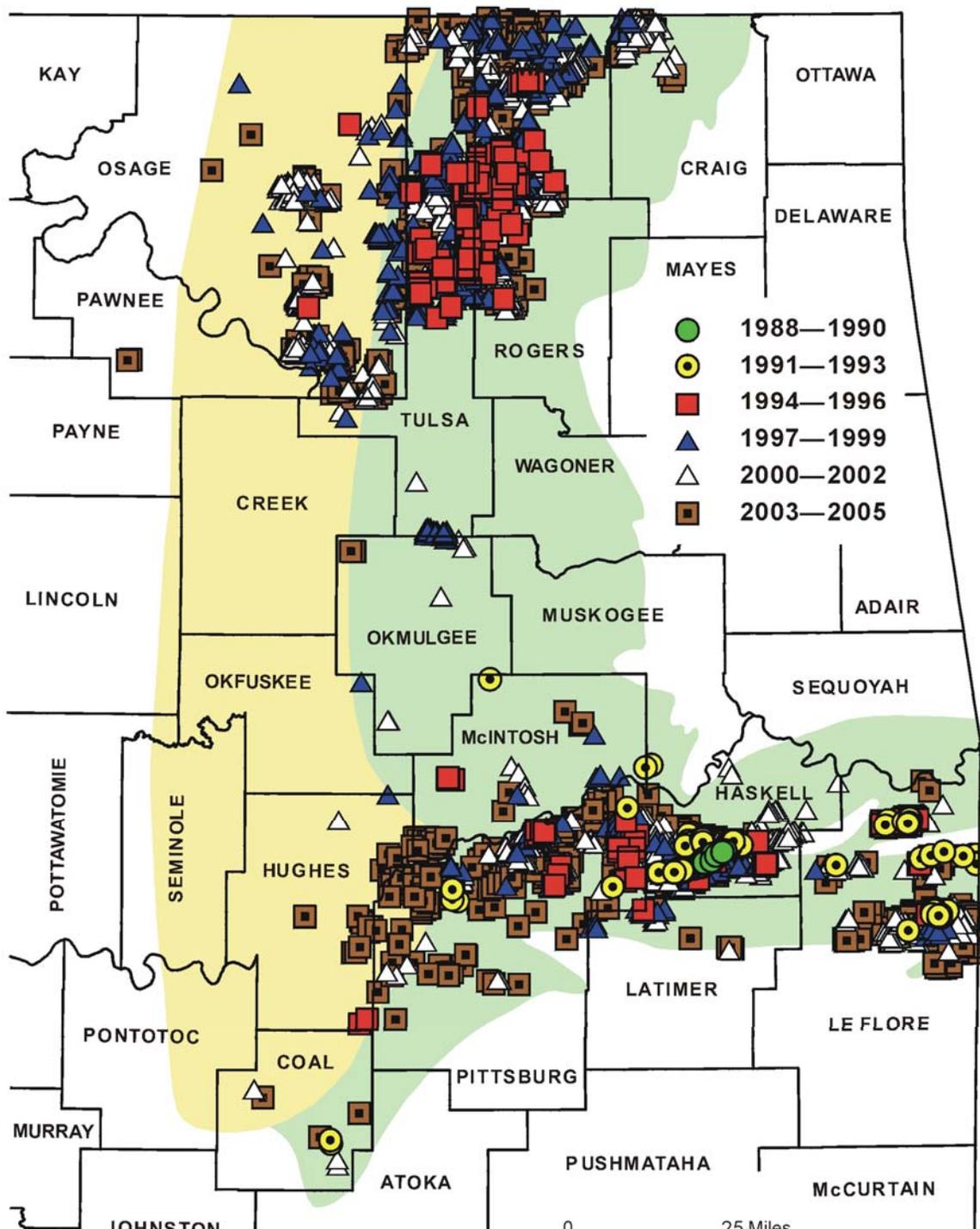
Presented at OGS conference on “Coalbed Methane and Gas Shales
in the Southern Midcontinent” in Oklahoma City on March 21, 2006

CBM Well Completions in Oklahoma



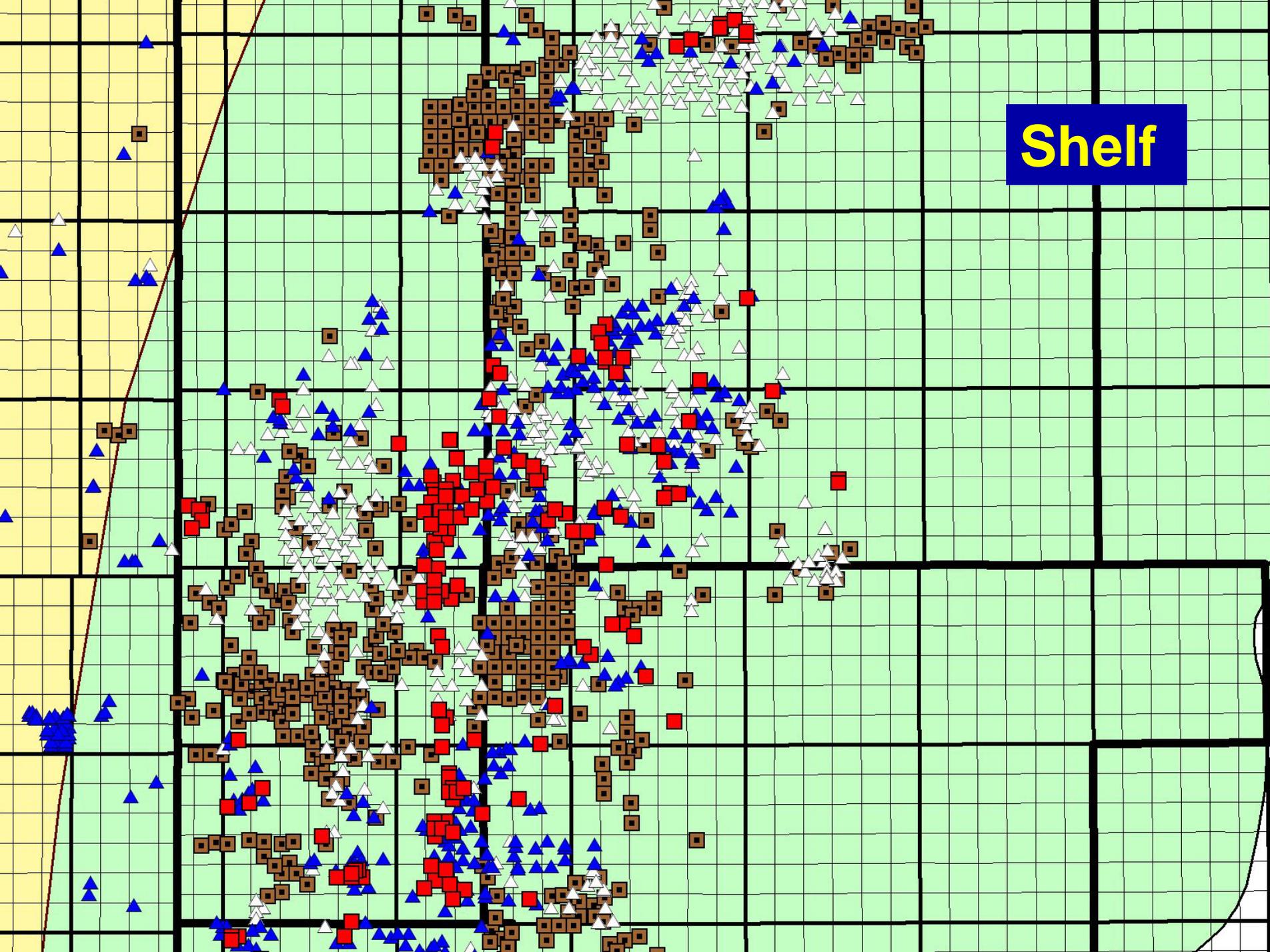
3,621 CBM Completions 1988-2004

578 wells in 2004

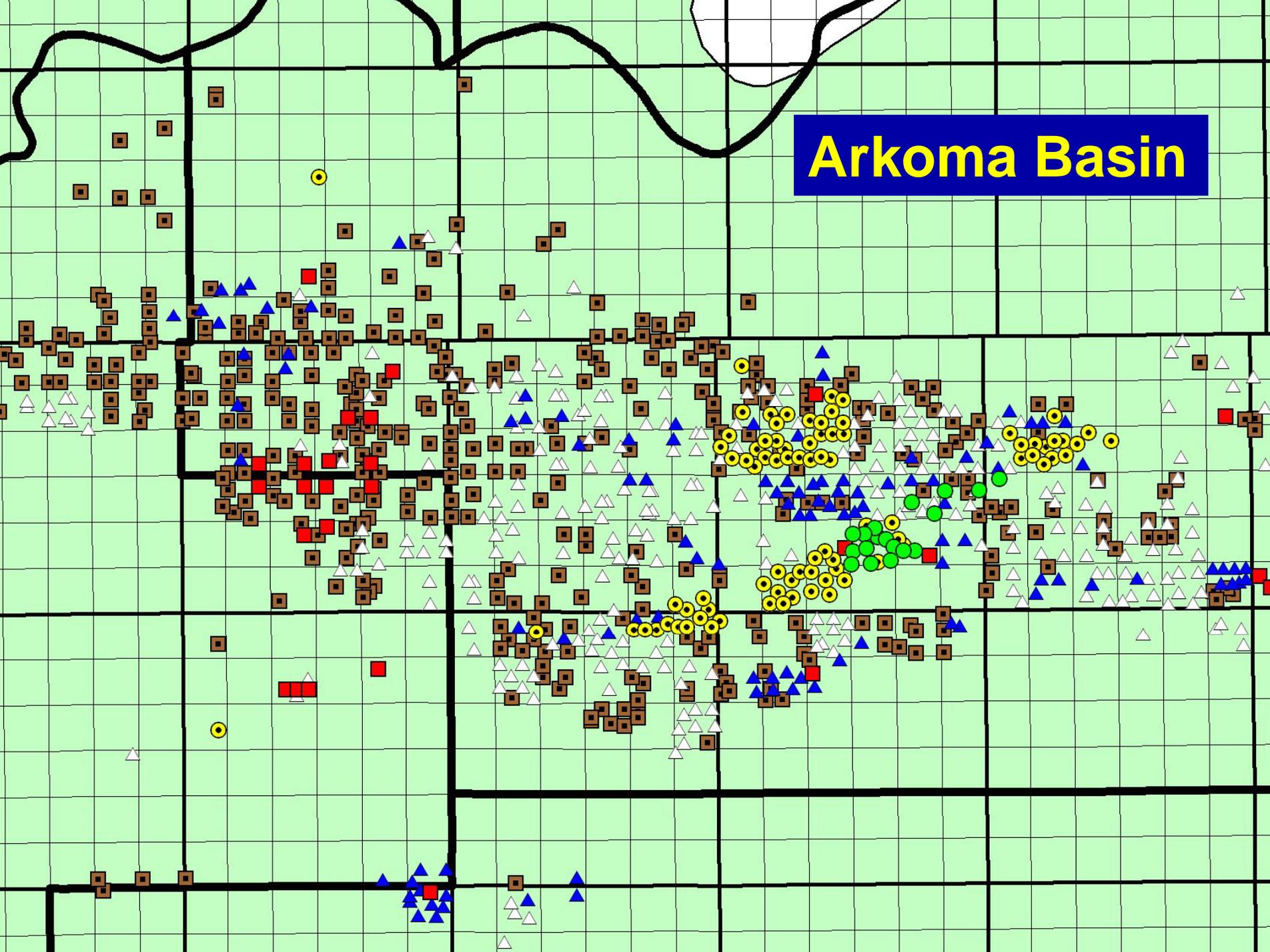


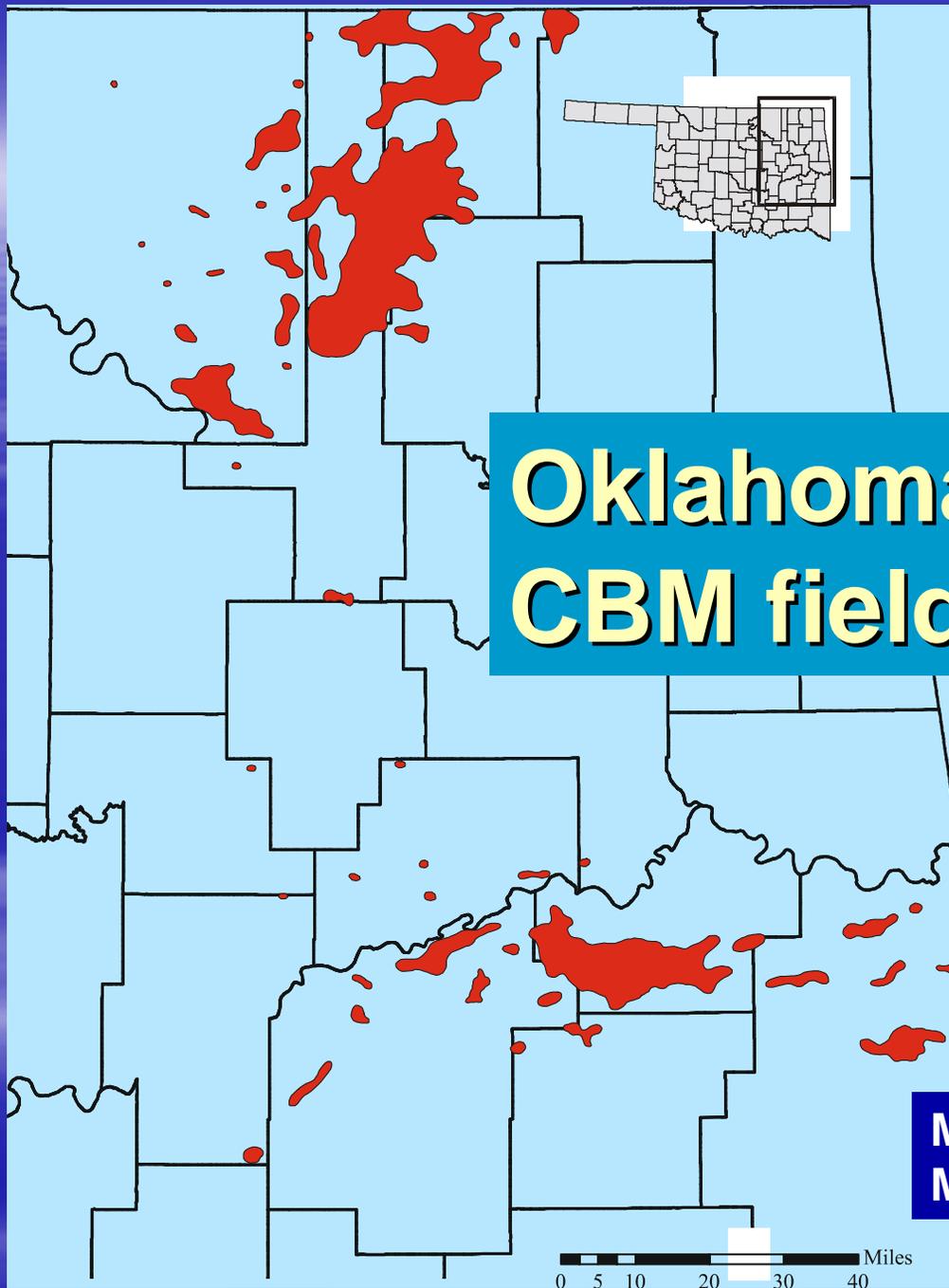
Oklahoma CBM Completions by Year

Shelf



Arkoma Basin

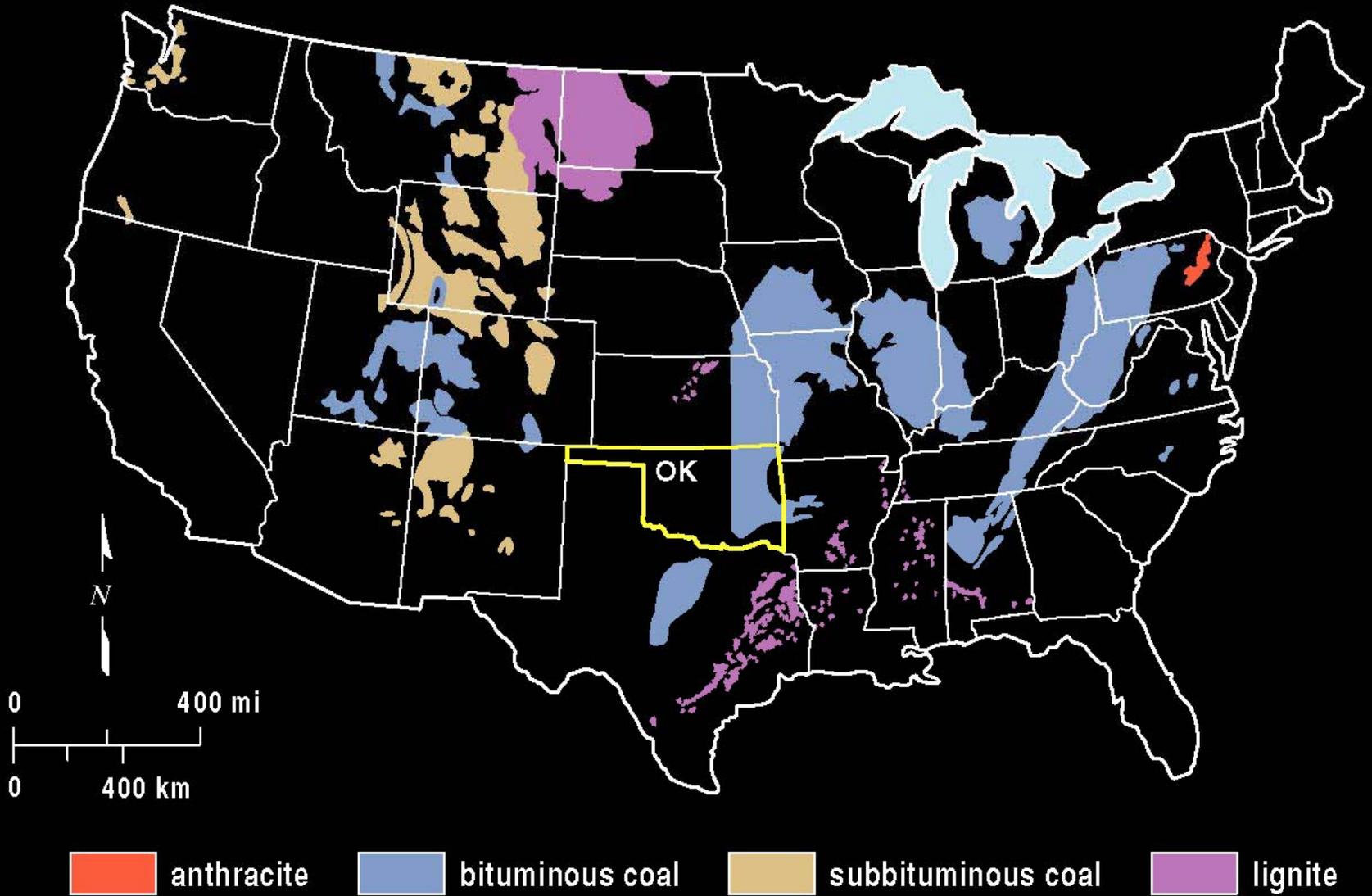




Oklahoma CBM fields

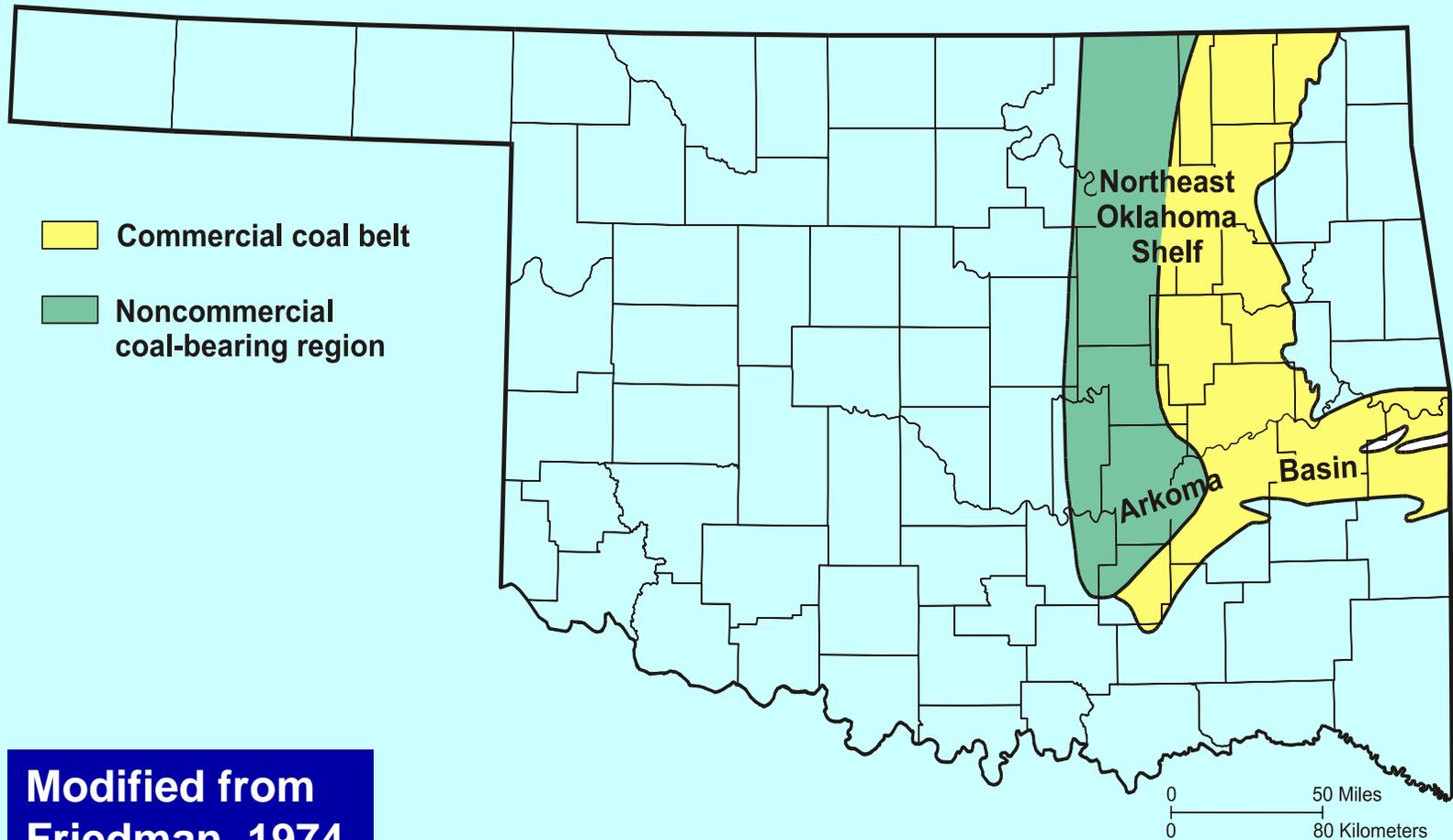
Modified from OGS
Map GM-36

Coalfields of the United States

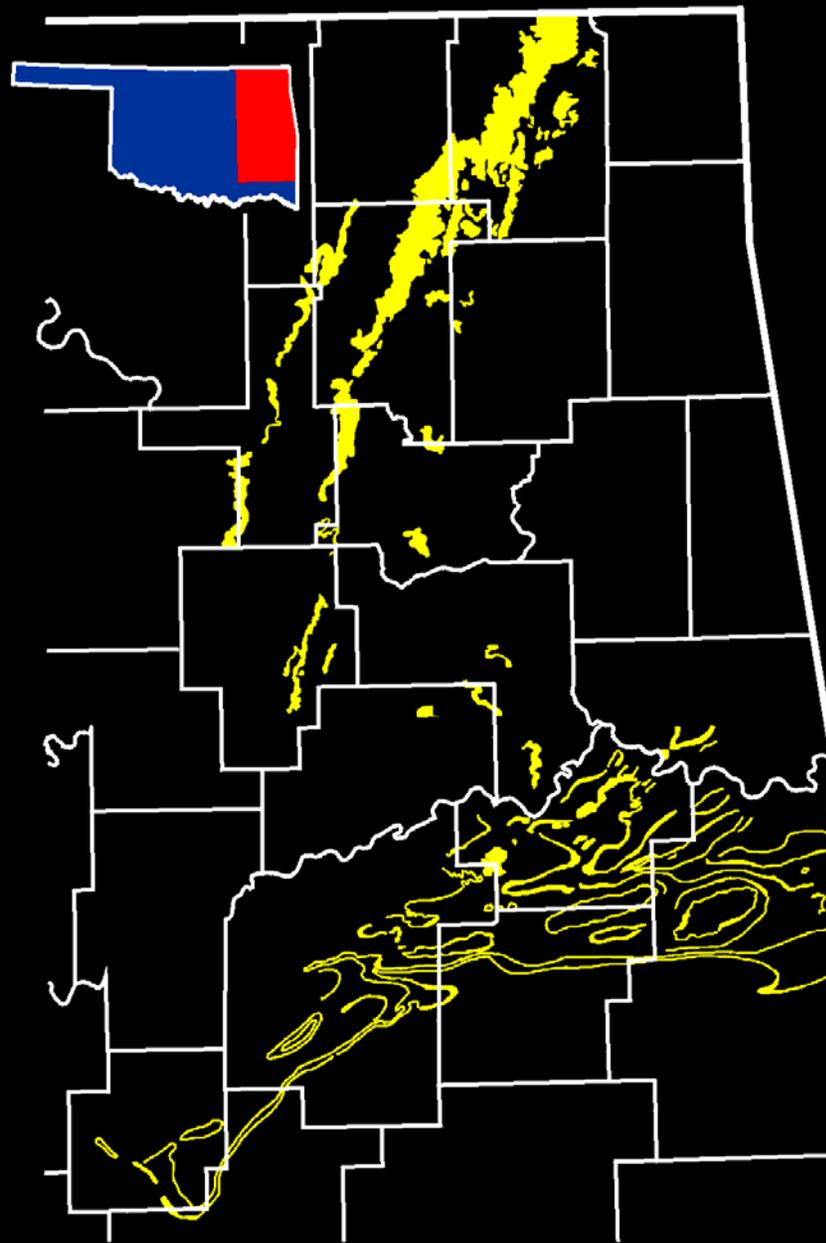


modified from Trumbull, 1960 (USGS)

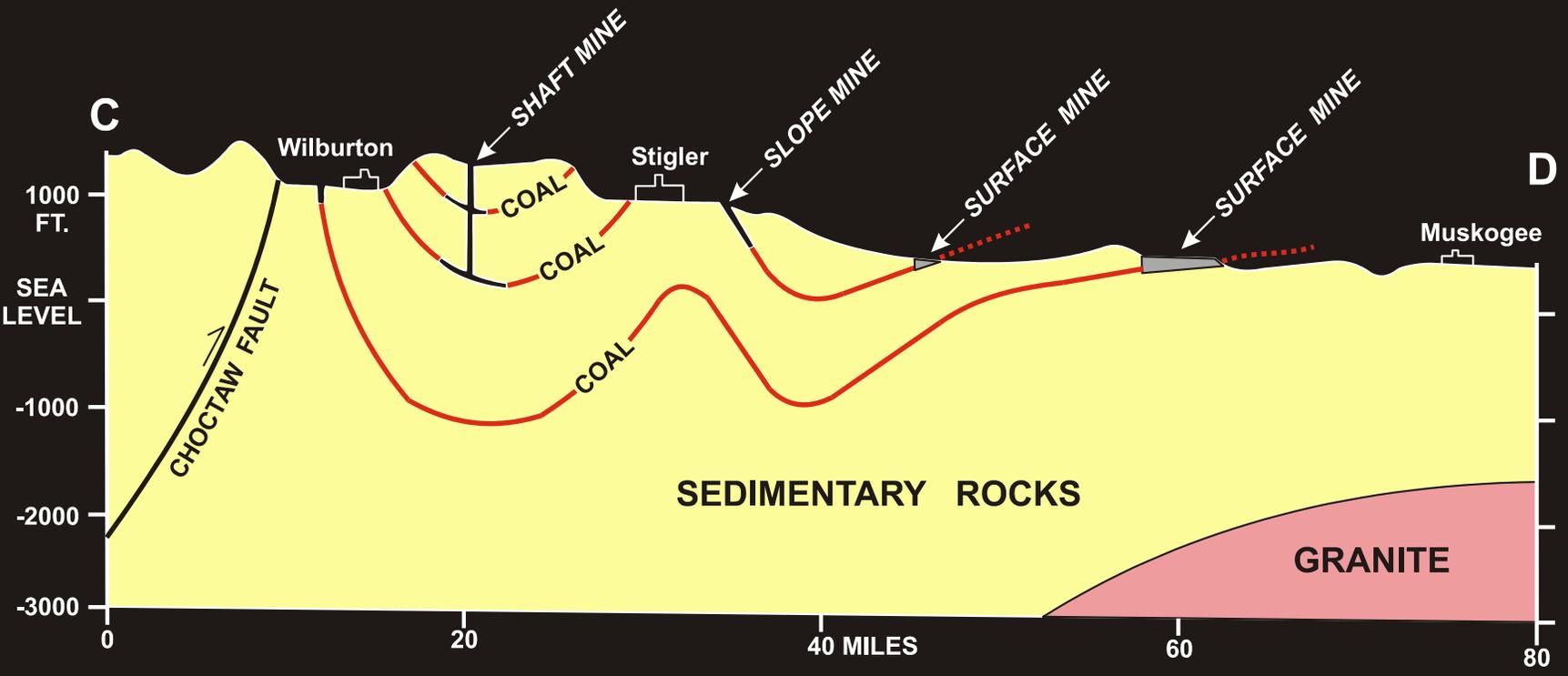
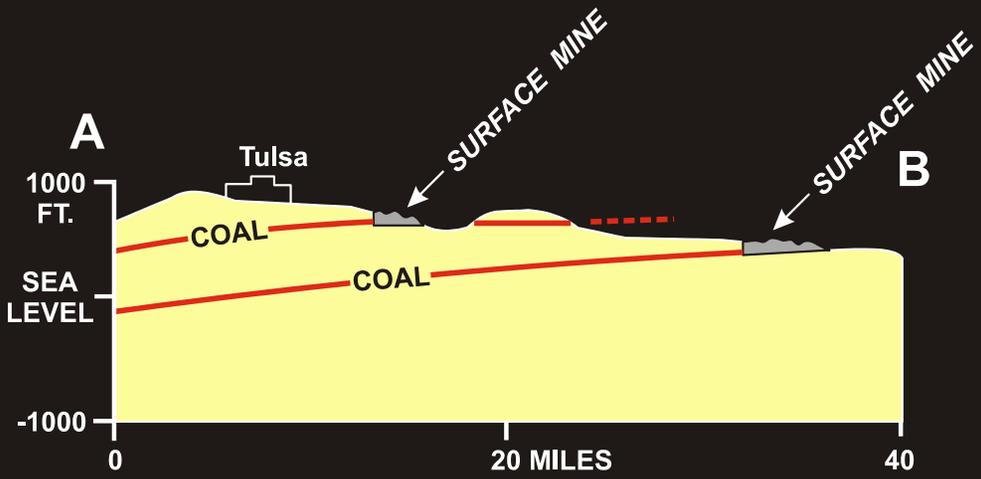
Oklahoma Coalfield



Modified from
Friedman, 1974



**COAL OUTCROP AND SUBCROP MAP
OF OKLAHOMA COALFIELD (Friedman, 1982)**



Modified from Johnson, 1974

OKLAHOMA COAL RANK Generalized for all coals, at or near the surface

High-volatile
bituminous



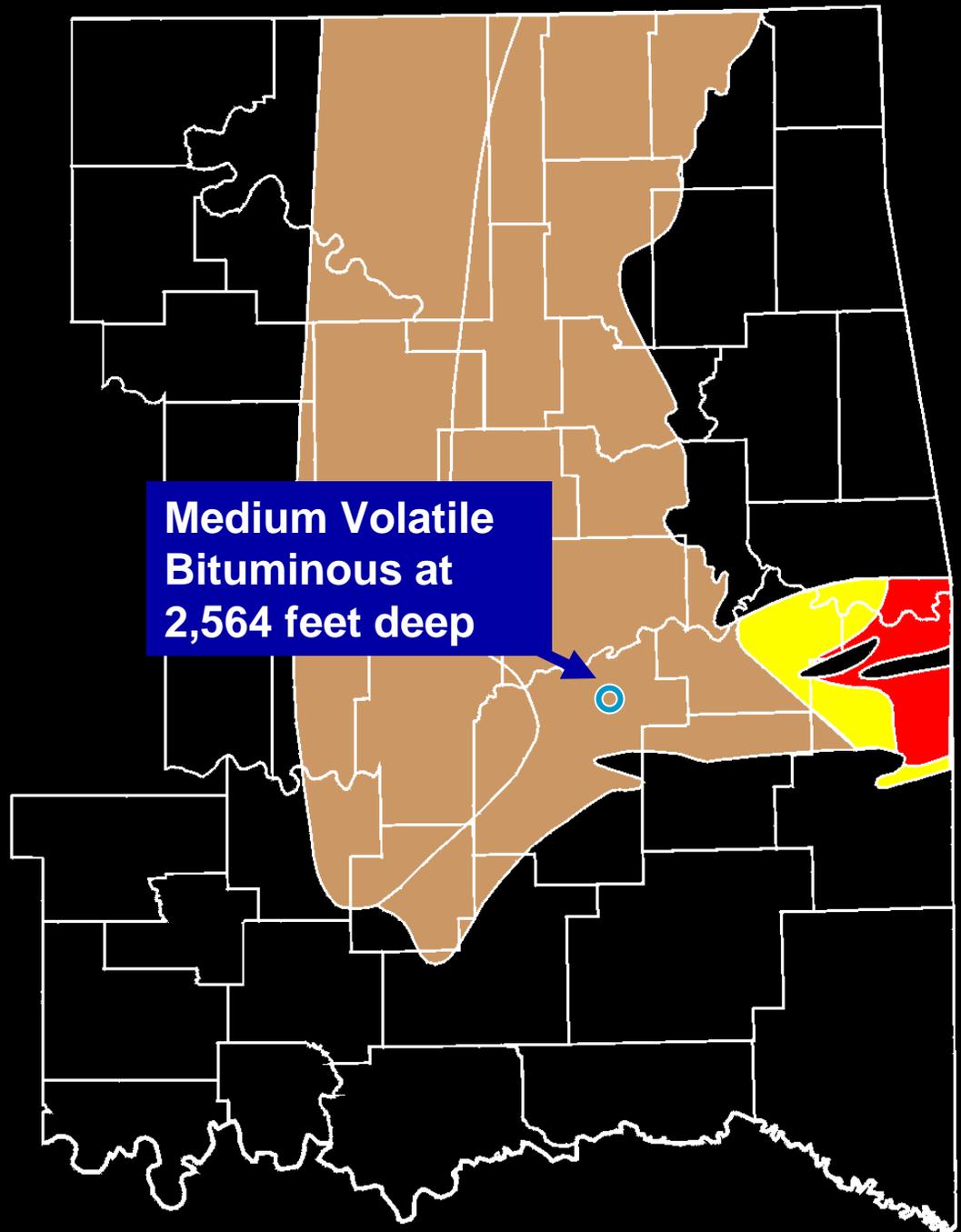
Medium-volatile
bituminous



Low-volatile
bituminous

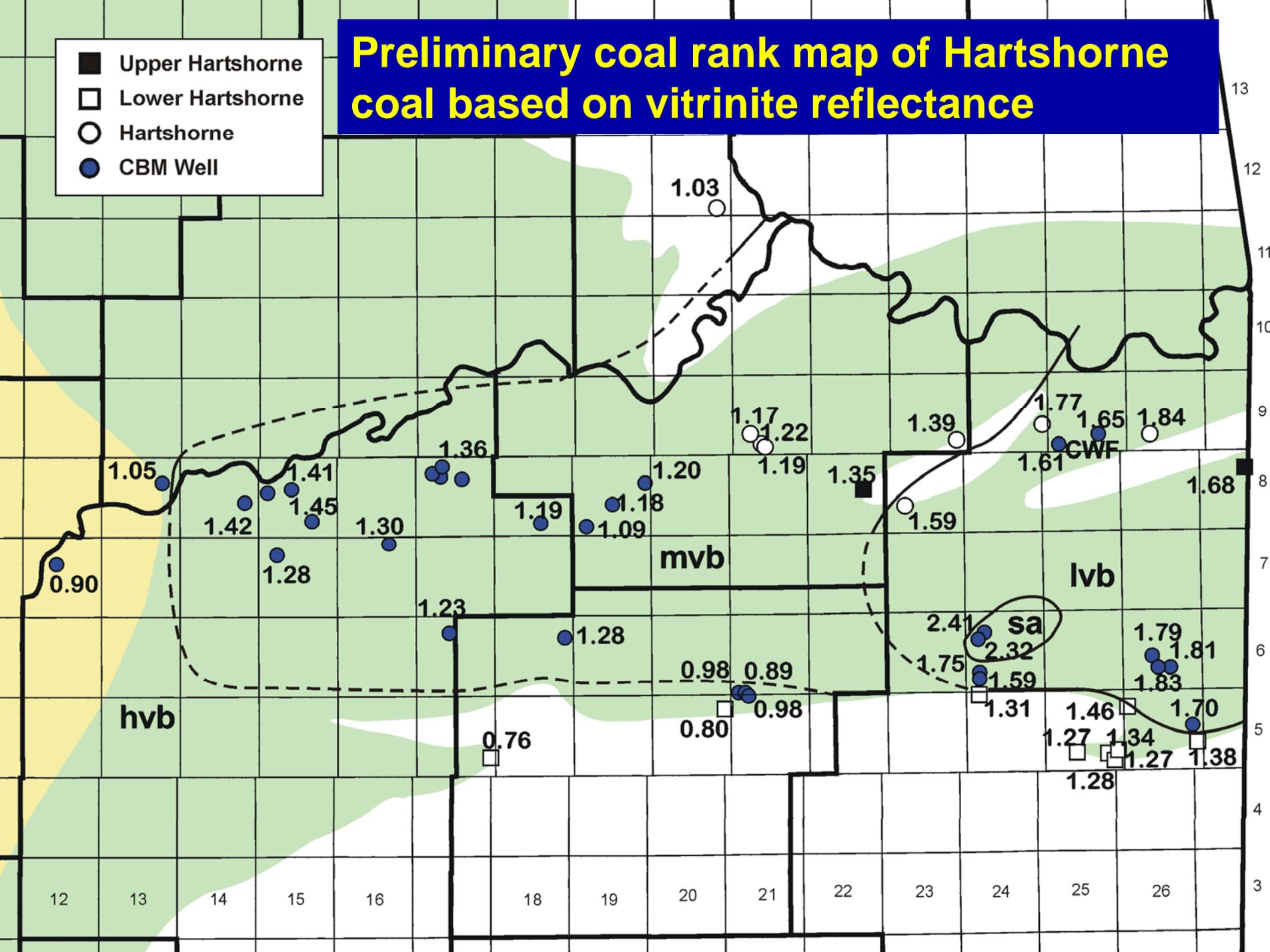


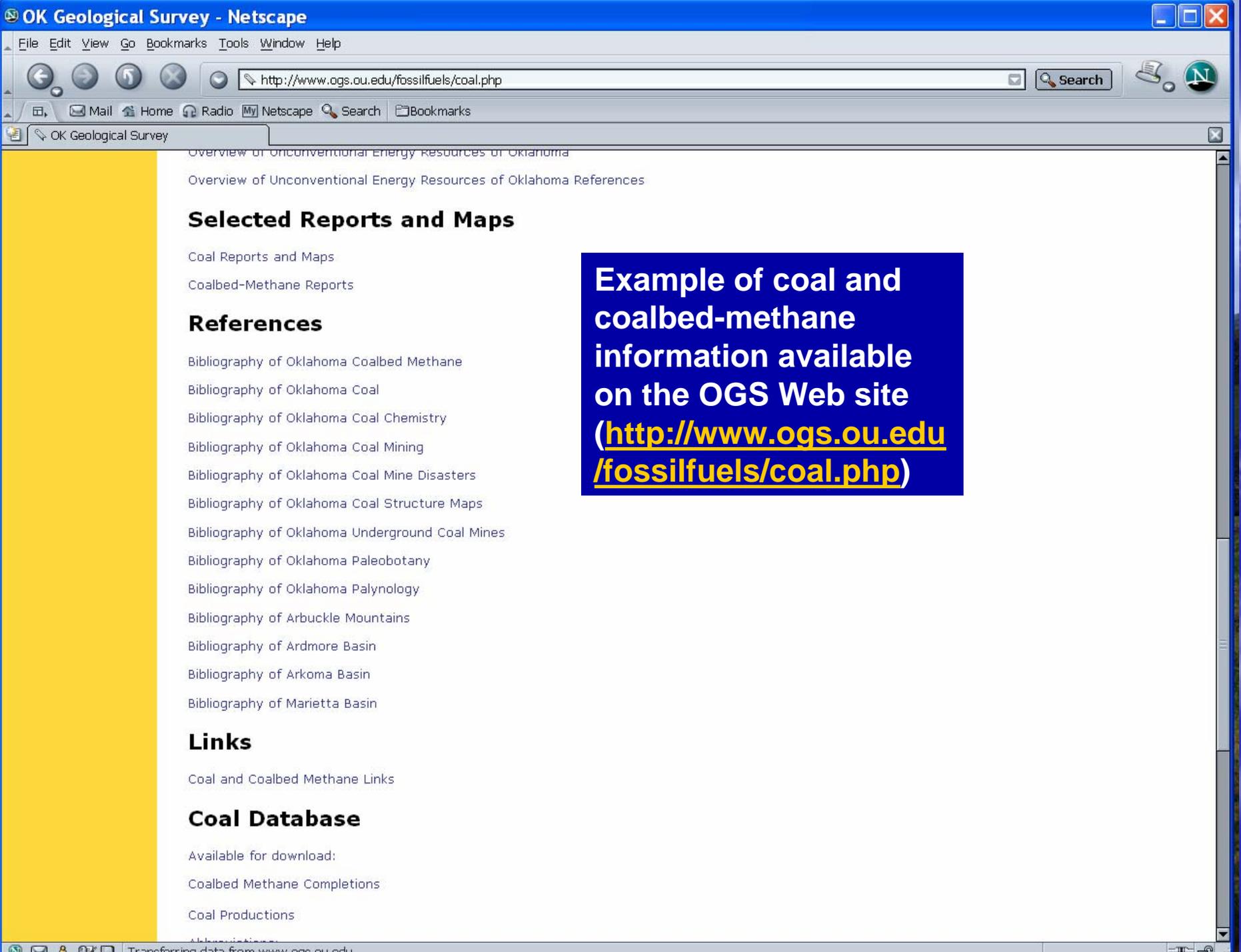
0 50 Miles
0 80 Kilometers



Preliminary coal rank map of Hartshorne coal based on vitrinite reflectance

- Upper Hartshorne
- Lower Hartshorne
- Hartshorne
- CBM Well





Overview of Unconventional Energy Resources of Oklahoma

Overview of Unconventional Energy Resources of Oklahoma References

Selected Reports and Maps

Coal Reports and Maps

Coalbed-Methane Reports

References

Bibliography of Oklahoma Coalbed Methane

Bibliography of Oklahoma Coal

Bibliography of Oklahoma Coal Chemistry

Bibliography of Oklahoma Coal Mining

Bibliography of Oklahoma Coal Mine Disasters

Bibliography of Oklahoma Coal Structure Maps

Bibliography of Oklahoma Underground Coal Mines

Bibliography of Oklahoma Paleobotany

Bibliography of Oklahoma Palynology

Bibliography of Arbuckle Mountains

Bibliography of Ardmore Basin

Bibliography of Arkoma Basin

Bibliography of Marietta Basin

Links

Coal and Coalbed Methane Links

Coal Database

Available for download:

Coalbed Methane Completions

Coal Productions

Abbreviations

Example of coal and coalbed-methane information available on the OGS Web site (<http://www.ogs.ou.edu/fossilfuels/coal.php>)

CBM Completions Table on OGS Web Site

Coalbed-Methane Completions : Table

Record	API Number	Operator	Completion Date	Well Name	Field Name	Sec	Town	Tc	Re
▶ 2571	35-061-21844	Williams Production	5/31/2003	2-32 Penny	Kinta	32	8 N	19	
1502	35-121-22664	Mannix Oil	11/20/2001	3-9 Snowball	Pittsburg County CBM Gas Area	9	8 N	17	
2219	35-121-22644	Mannix Oil	11/20/2001	1-9 Snowball	Pittsburg County CBM Gas Area	9	8 N	17	
1504	35-121-22684	Mannix Oil	11/20/2001	2-9A Snowball	Pittsburg County CBM Gas Area	10	8 N	17	
2187	35-121-28847	Davis Operating Company	1/28/2003	1 Belt	Kinta	24	8 N	18	
3762	35-121-23394	Petroquest Energy	4/8/2005	2-10 Hodges	Pittsburg County CBM Gas Area	10	7 N	15	
1577	35-061-21592	Mannix Oil	8/20/2001	3-13 Verdell	Kinta	13	8 N	18	
2184	35-121-22850	Davis Operating Company	2/18/2003	1 Higgins	Kinta	24	8 N	18	
1503	35-121-22645	Mannix Oil	11/20/2001	4-9 Snowball	Pittsburg County CBM Gas Area	9	8 N	17	
1242	35-061-21448	Mannix Oil	10/1/2000	3-31 Molly	Kinta	31	8 N	19	
1494	35-121-22624	Mannix Oil	12/1/2001	1-10 Hook	Pittsburg County CBM Gas Area	10	8 N	17	
4001	35-121-23515	Tag Team Resources	10/6/2005	1H-13 Luanne	Scipio NW	13	7 N	12	
1495	35-121-22620	Mannix Oil	11/22/2001	2-10 Hook	Pittsburg County CBM Gas Area	10	8 N	17	
3484	35-121-23315	Tag Team Resources	12/13/2004	1H-32 Charless III	Reams NW	32	7 N	13	
4003	35-121-23484	Tag Team Resources	10/6/2005	1H-20 Zachary	Scipio NW	20	7 N	13	
1511	35-121-22625	Mannix Oil	12/1/2001	4-10 Hook	Pittsburg County CBM Gas Area	10	8 N	17	
4002	35-121-23477	Tag Team Resources	9/30/2005	1H-17 Scipio	Scipio NW	17	7 N	13	
3920	35-121-23436	Tag Team Resources	7/8/2005	1H-32 Norma	Scipio NW	32	7 N	13	
3918	35-121-23411	Tag Team Resources	4/24/2005	1H-13D L	Scipio NW	13	7 N	12	
2483	35-061-21895	Questar Exploration & Production	9/20/2003	1-5 Chasyn	Brooken	5	8 N	18	
3274	35-061-21964	Questar Exploration & Production	2/6/2004	1-32 Meghan	Brooken	32	9 N	18	
2769	35-061-21965	Questar Exploration & Production	1/5/2004	1-5 Schmidt	Brooken	5	8 N	18	
3604	35-121-23328	Tag Team Resources	1/11/2005	1H-33 Sally	Reams NW	33	7 N	13	
1244	35-061-21556	Questar Exploration & Production	4/7/2001	1-33 Monks West	Brooken	28	9 N	18	
3919	35-121-23439	Tag Team Resources	7/10/2005	2H-32 Coop	Pittsburg County CBM Gas Area	32	7 N	13	
3742	35-121-23370	Tag Team Resources	4/14/2005	1H-20 Clifton	Scipio NW	19	7 N	13	
1409	35-061-21593	Mannix Oil	8/20/2001	2-13 Verdell	Kinta	13	8 N	18	
1278	35-061-21524	Mannix Oil	4/6/2001	4-34 Dooney	Kinta	34	8 N	19	
3905	35-121-23454	Tag Team Resources	8/13/2005	1H-33 Jacqueline	Reams NW	33	7 N	13	
4015	35-121-23506	Tag Team Resources	10/10/2005	4H-19 Bush	Scipio NW	19	7 N	13	
2875	35-061-21920	Questar Exploration & Production	2/9/2004	2-17 Ogle	Kinta	17	8 N	19	
3280	35-121-23256	Questar Exploration & Production	9/17/2004	1-1 Tyler	Brooken	1	8 N	17	
2625	35-061-21839	Williams Production	5/30/2003	3-32 Penny	Kinta	32	8 N	19	

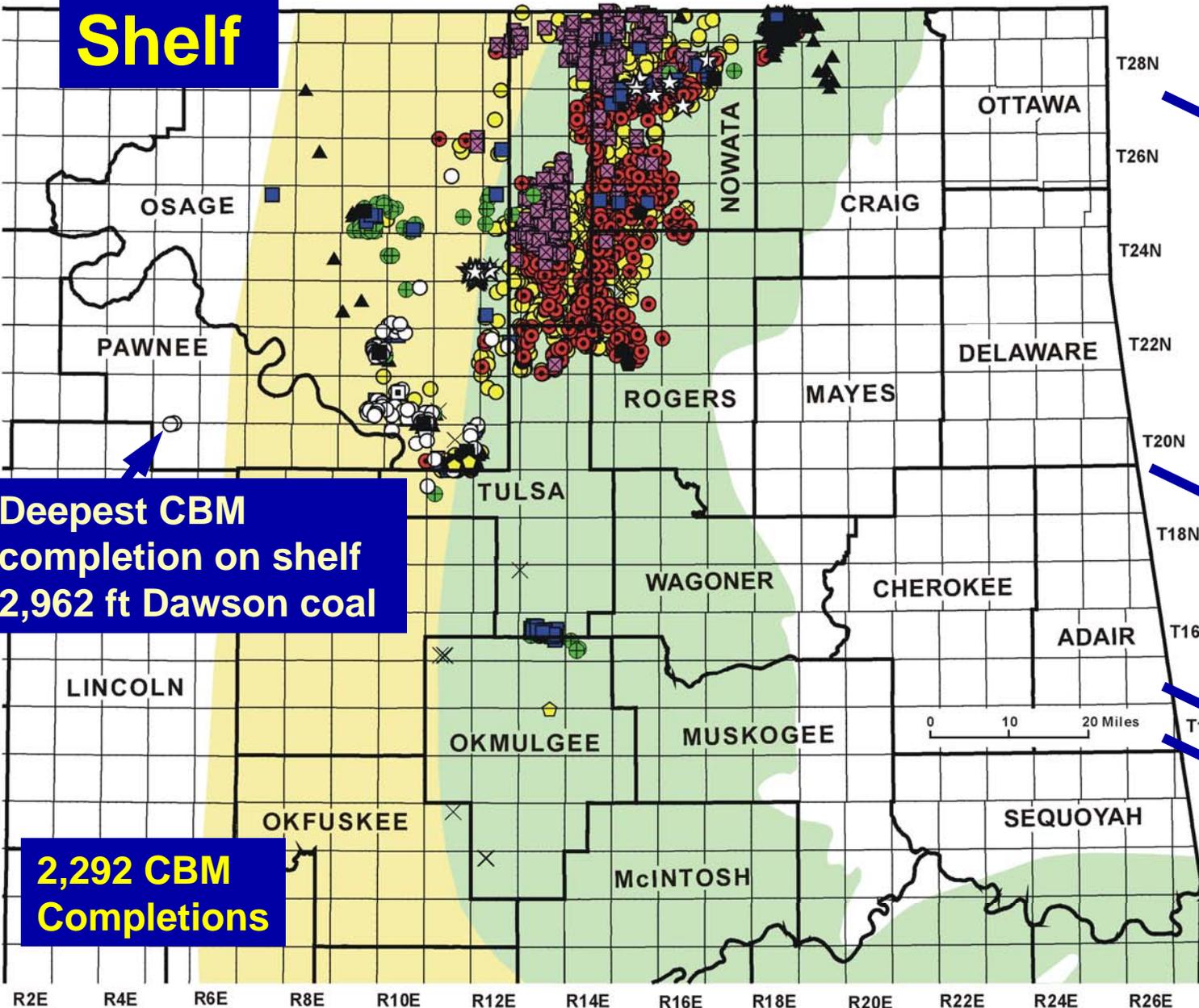
Shelf

Coal-Bed Symbols

- Dawson
- Mulky
- Iron Post (Fort Scott)
- ☆ Bevier
- × Croweburg
- ◊ Mineral
- Tebo
- ▲ Weir-Pittsburg
- ◻ Wainwright
- Bluejacket
- ◆ Drywood
- Rowe
- ◊ Riverton

Deepest CBM completion on shelf 2,962 ft Dawson coal

2,292 CBM Completions



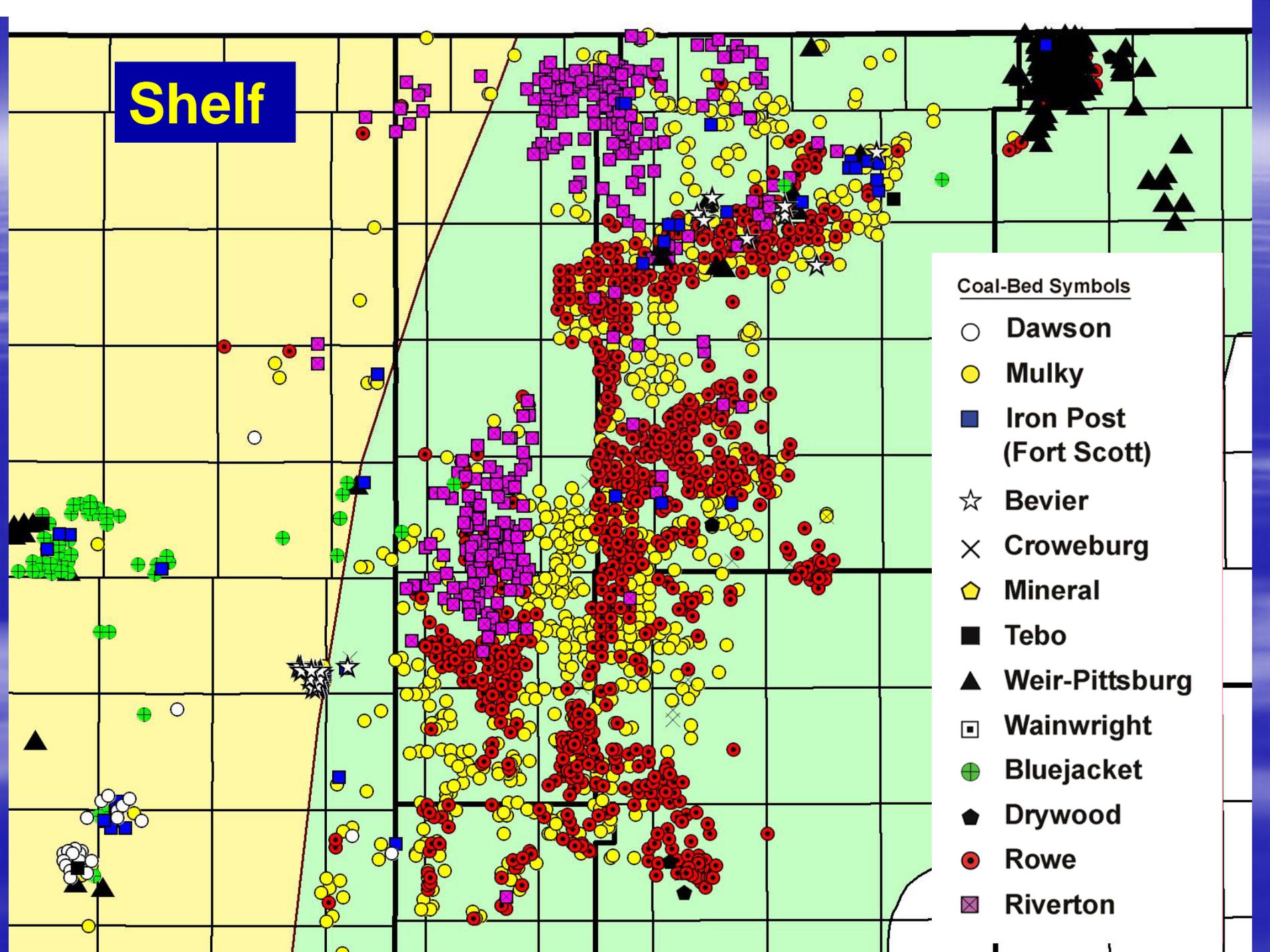
T28N
T26N
T24N
T22N
T20N
T18N
T16N
T14N
T12N
T10N

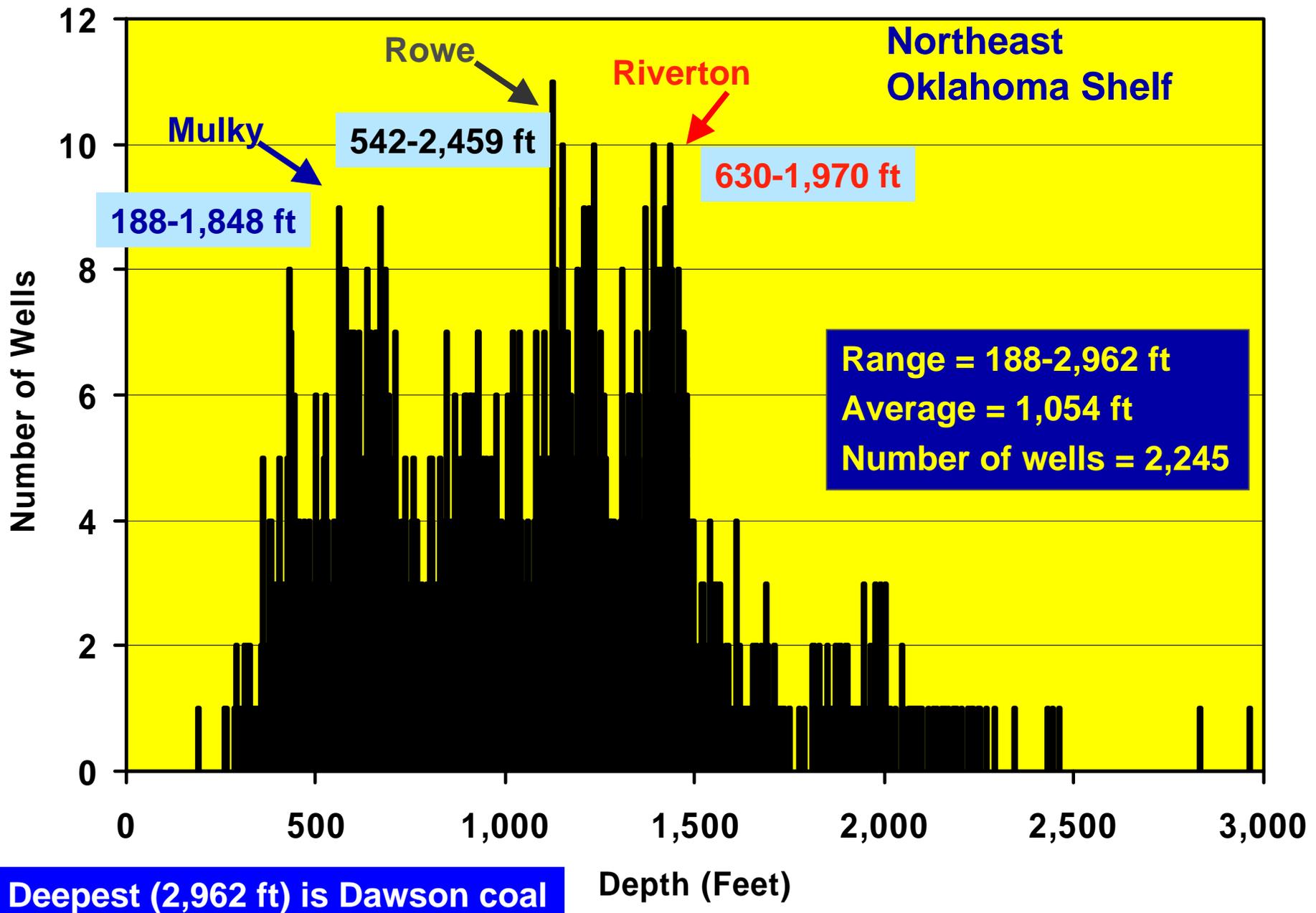
R2E R4E R6E R8E R10E R12E R14E R16E R18E R20E R22E R24E R26E

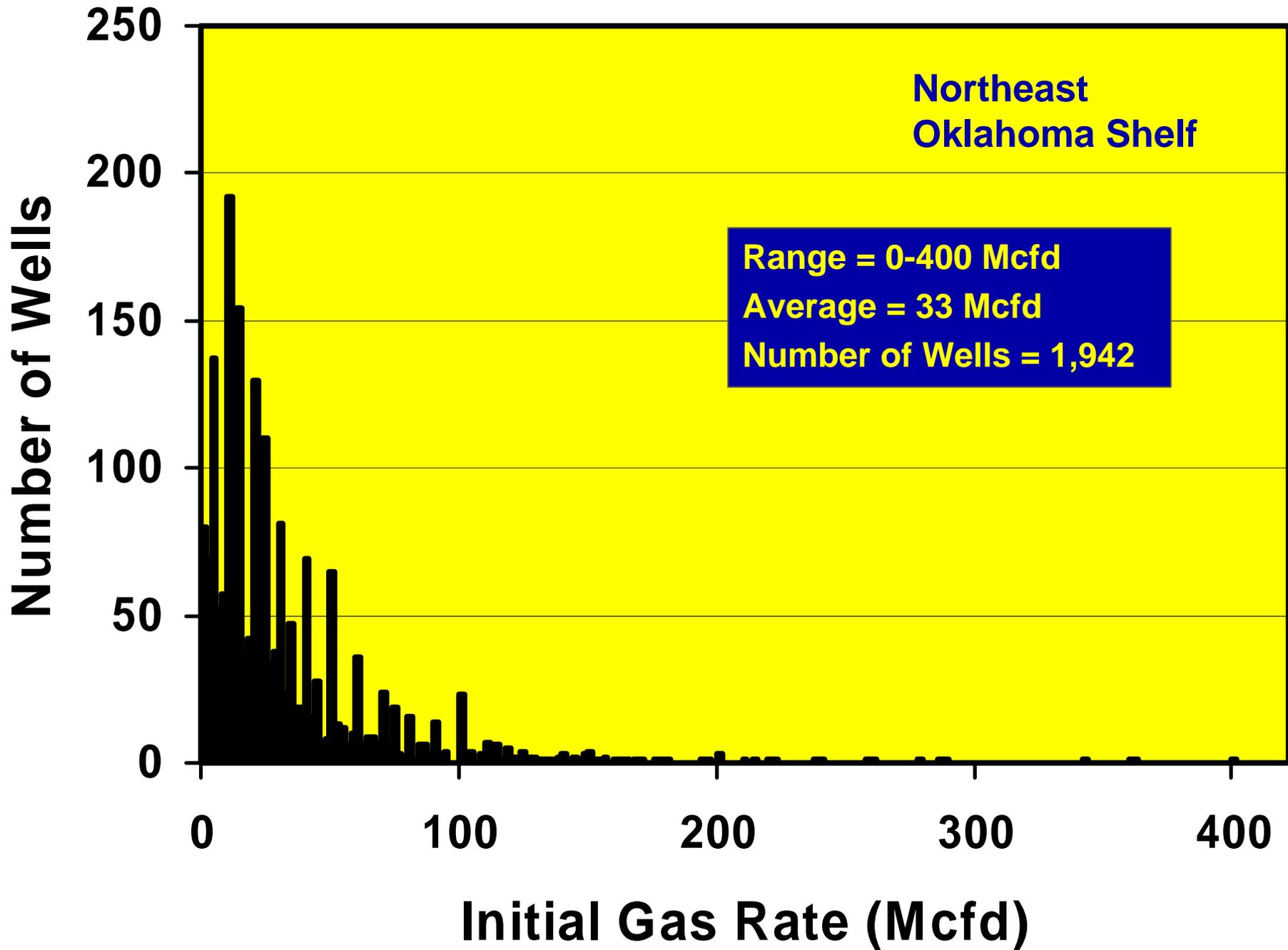
Shelf

Coal-Bed Symbols

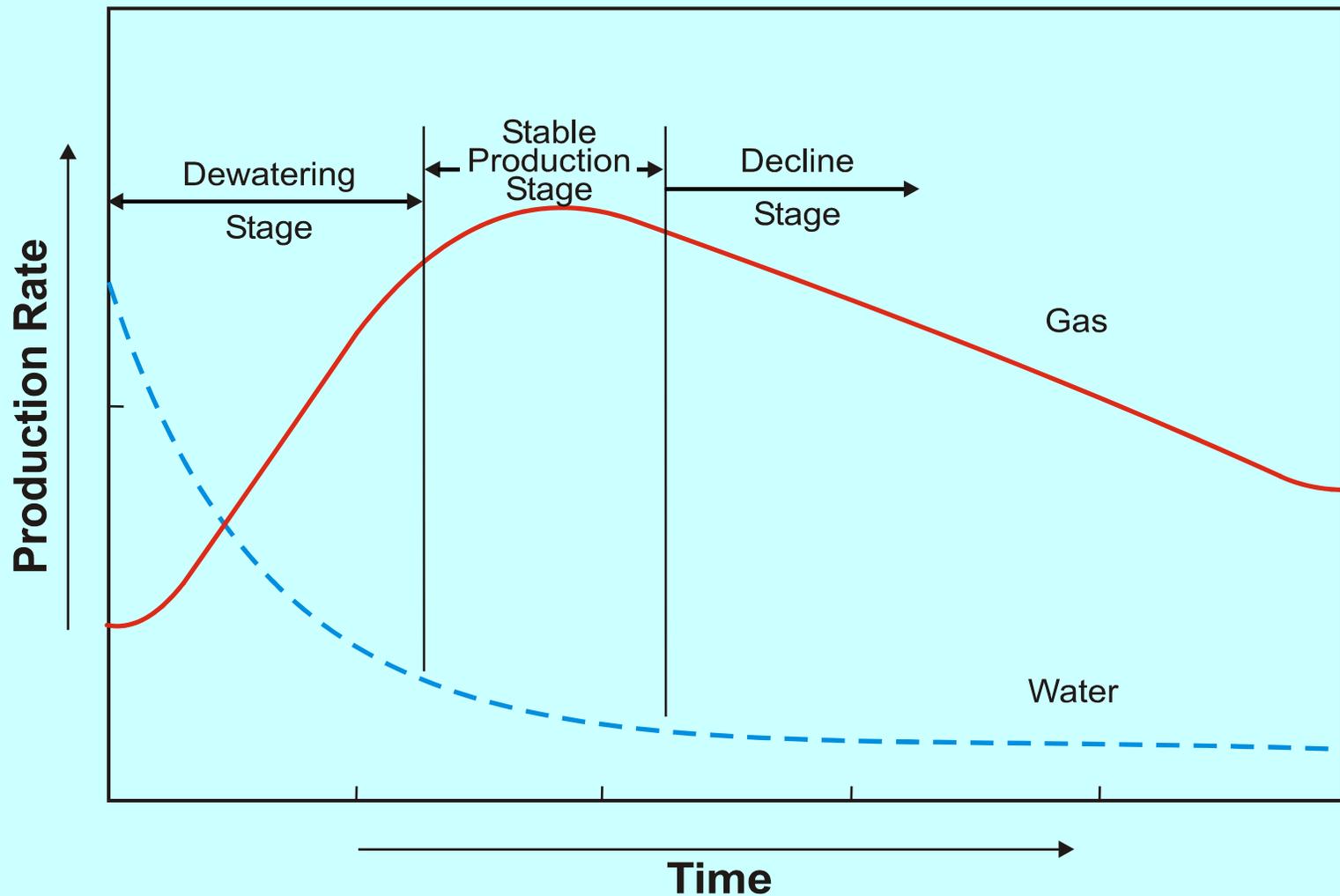
- Dawson
- Mulky
- Iron Post (Fort Scott)
- ☆ Bevier
- × Croweburg
- ◊ Mineral
- Tebo
- ▲ Weir-Pittsburg
- ◻ Wainwright
- Bluejacket
- ◆ Drywood
- Rowe
- ◻ Riverton







Theoretical decline curve for CBM well



From Schraufnagel, 1993

**Northeast
Oklahoma Shelf**

**258 ft
commingled**

1,969 ft

**379 ft
single bed**

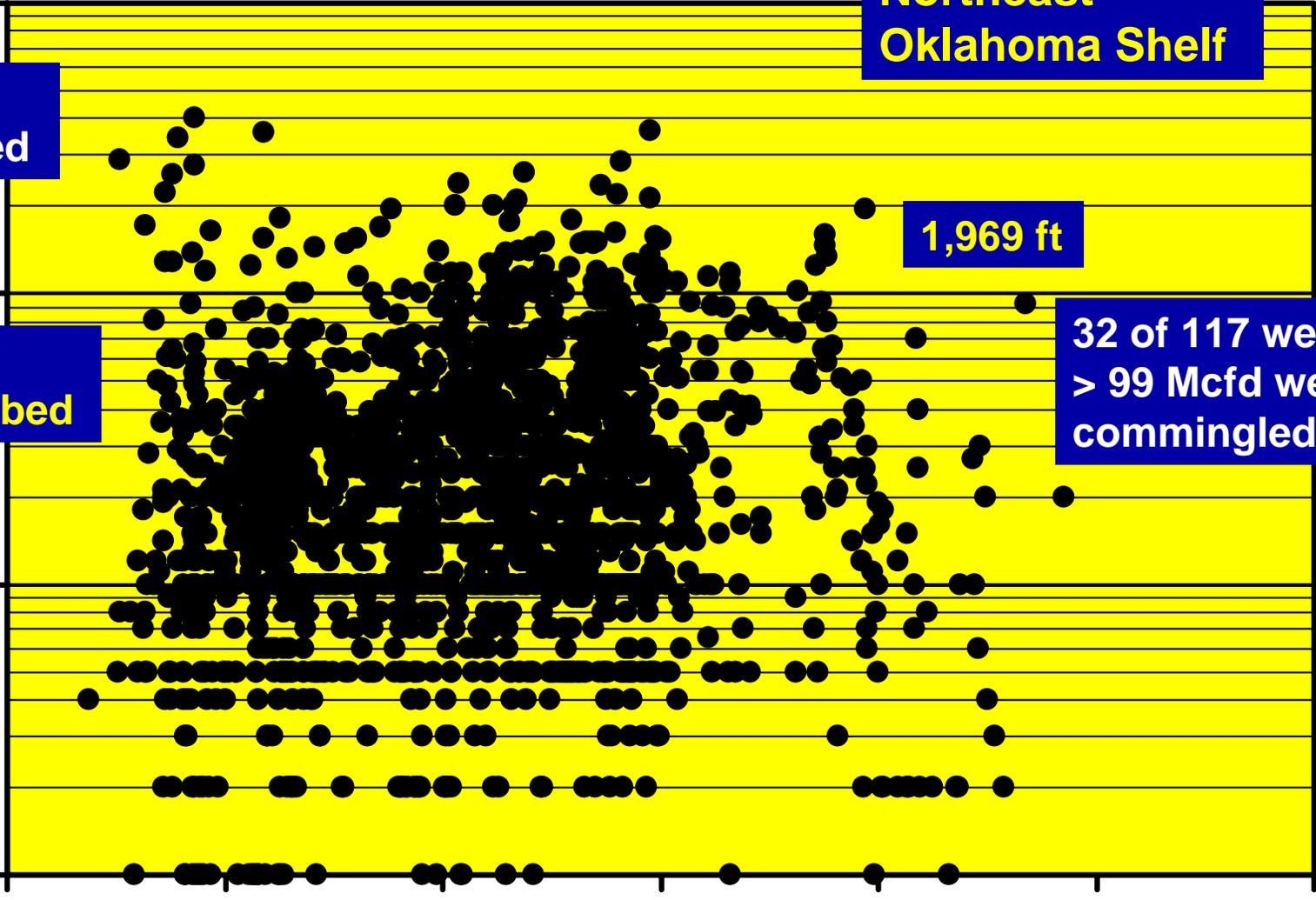
**32 of 117 wells
> 99 Mcfd were
commingled**

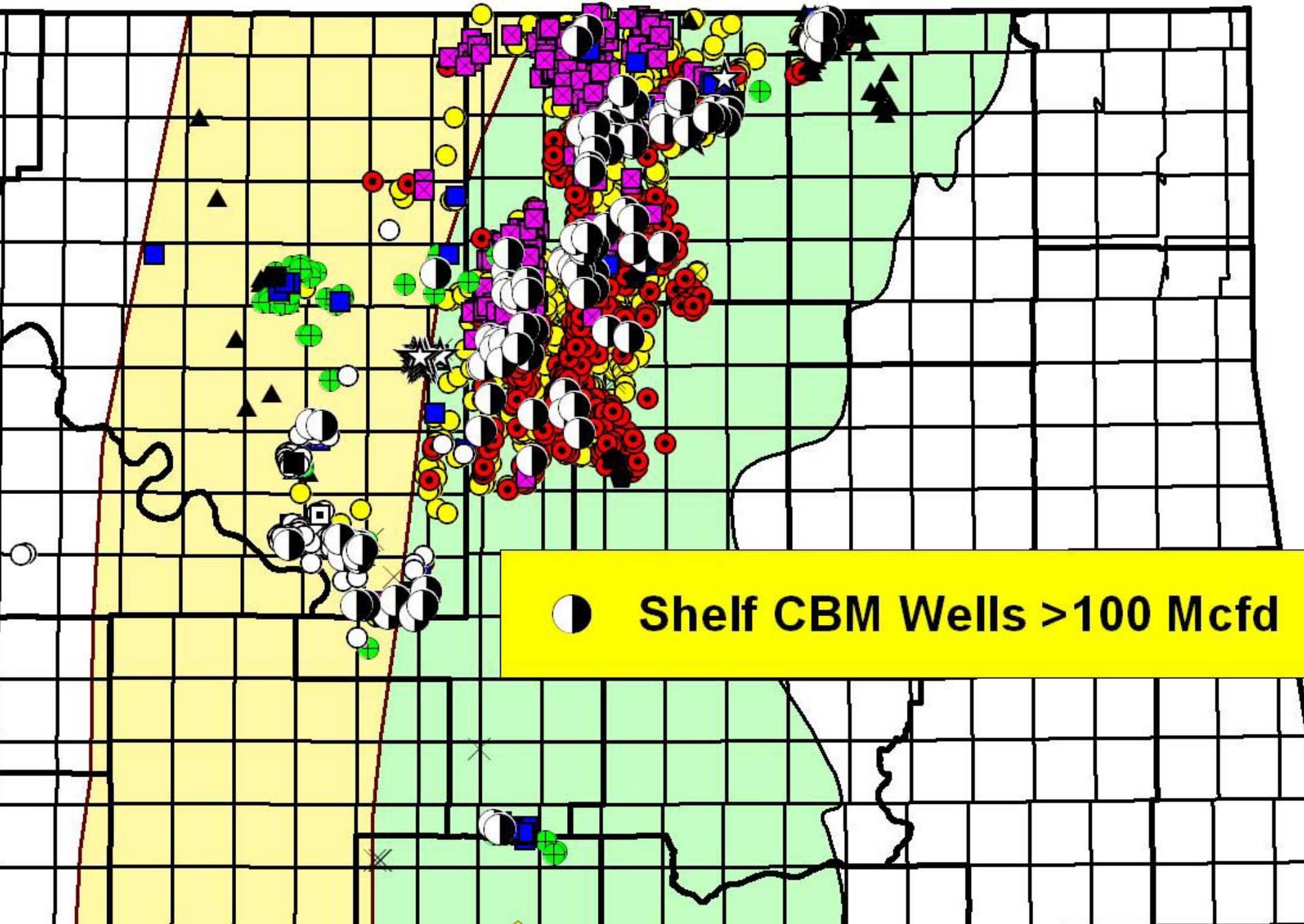
Initial Potential (Mcfd)

1,000
100
10
1

0 500 1,000 1,500 2,000 2,500 3,000

Depth (feet)





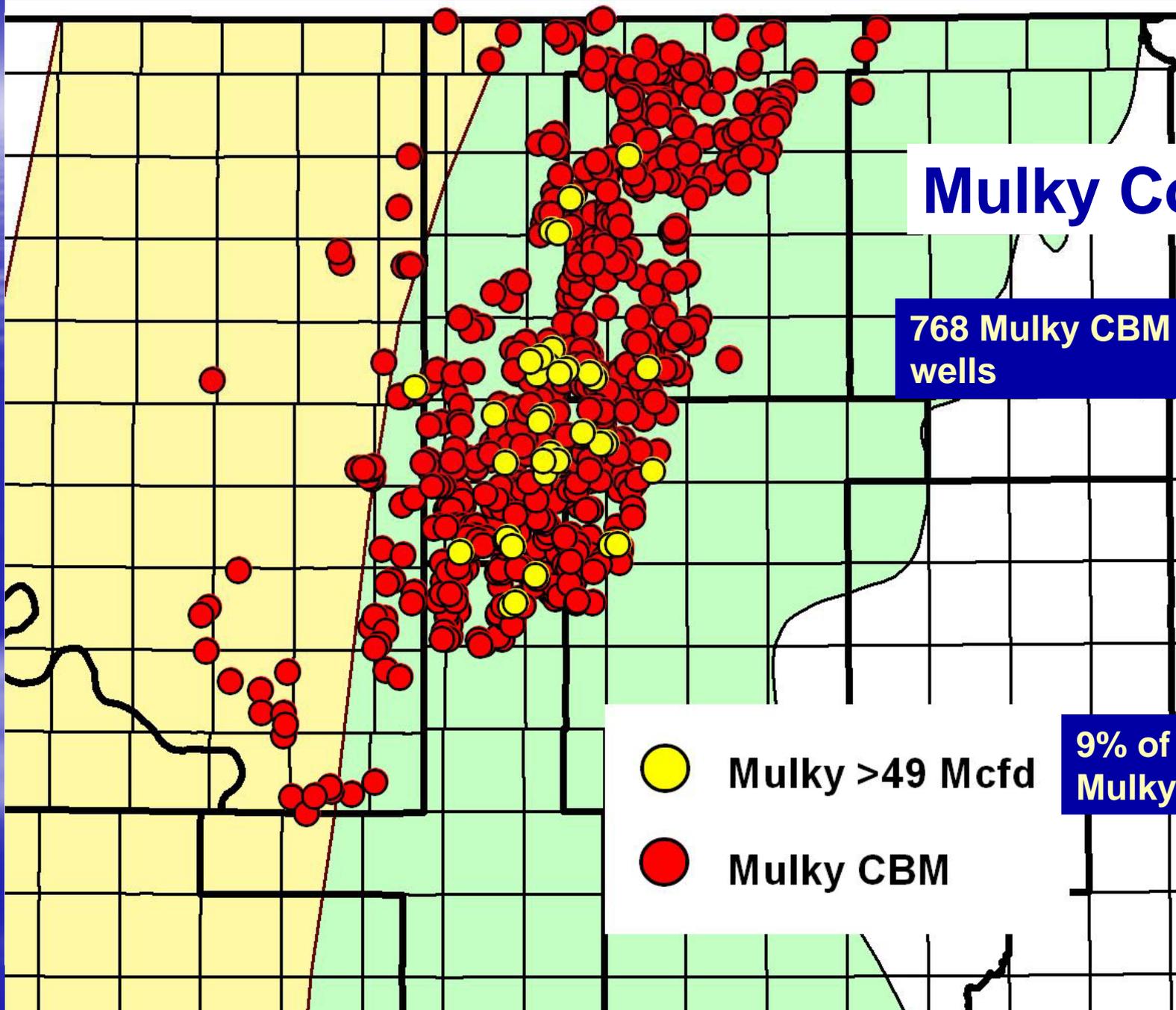
Shelf CBM Wells >100 Mcfd

Mulky Coal

768 Mulky CBM wells

- Mulky >49 Mcfd
- Mulky CBM

9% of 421
Mulky-only

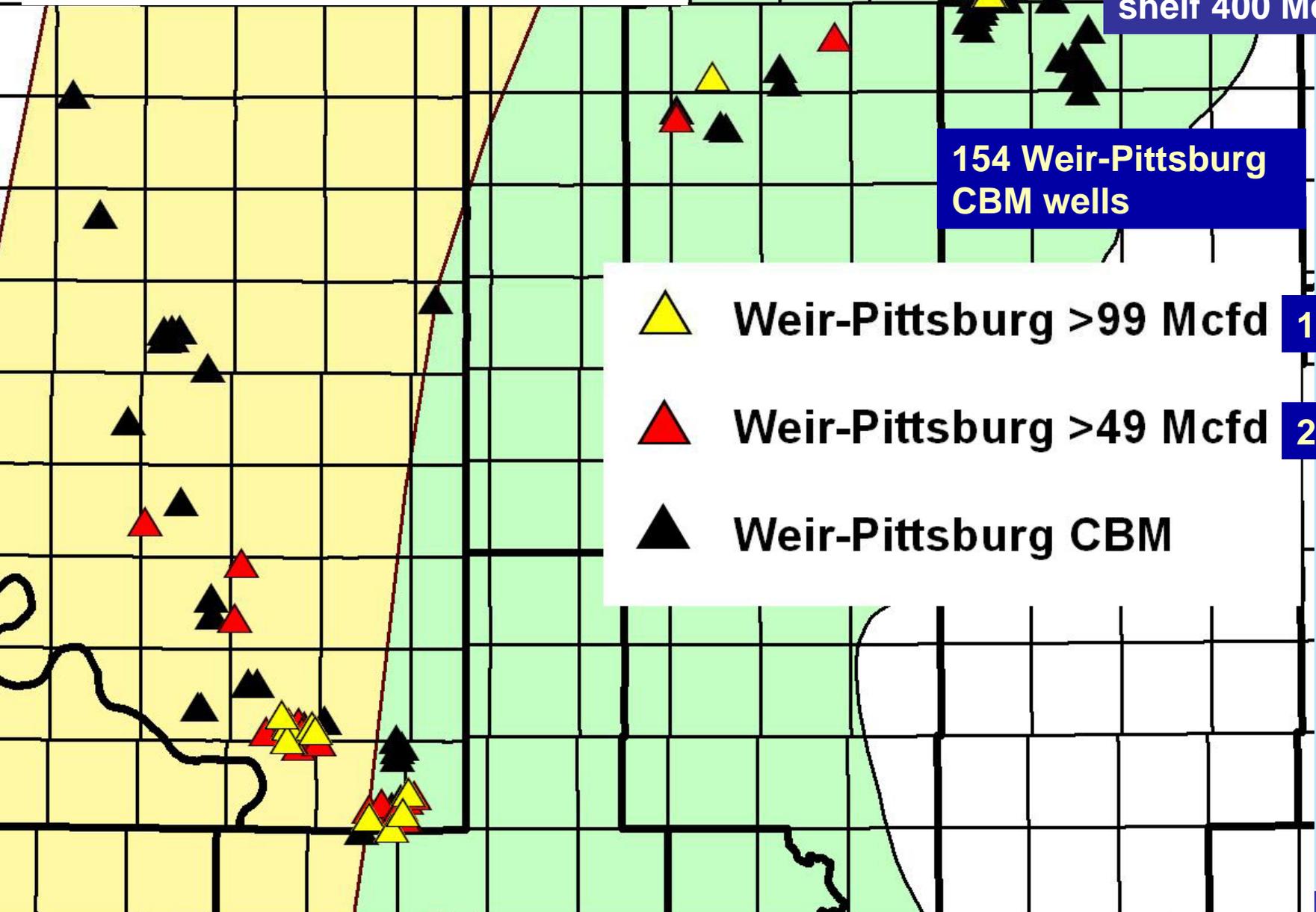


Weir-Pittsburg Coal

Highest IP from single coal on shelf 400 Mcfd

154 Weir-Pittsburg CBM wells

-  Weir-Pittsburg >99 Mcfd **11%**
-  Weir-Pittsburg >49 Mcfd **28%**
-  Weir-Pittsburg CBM



Rowe Coal

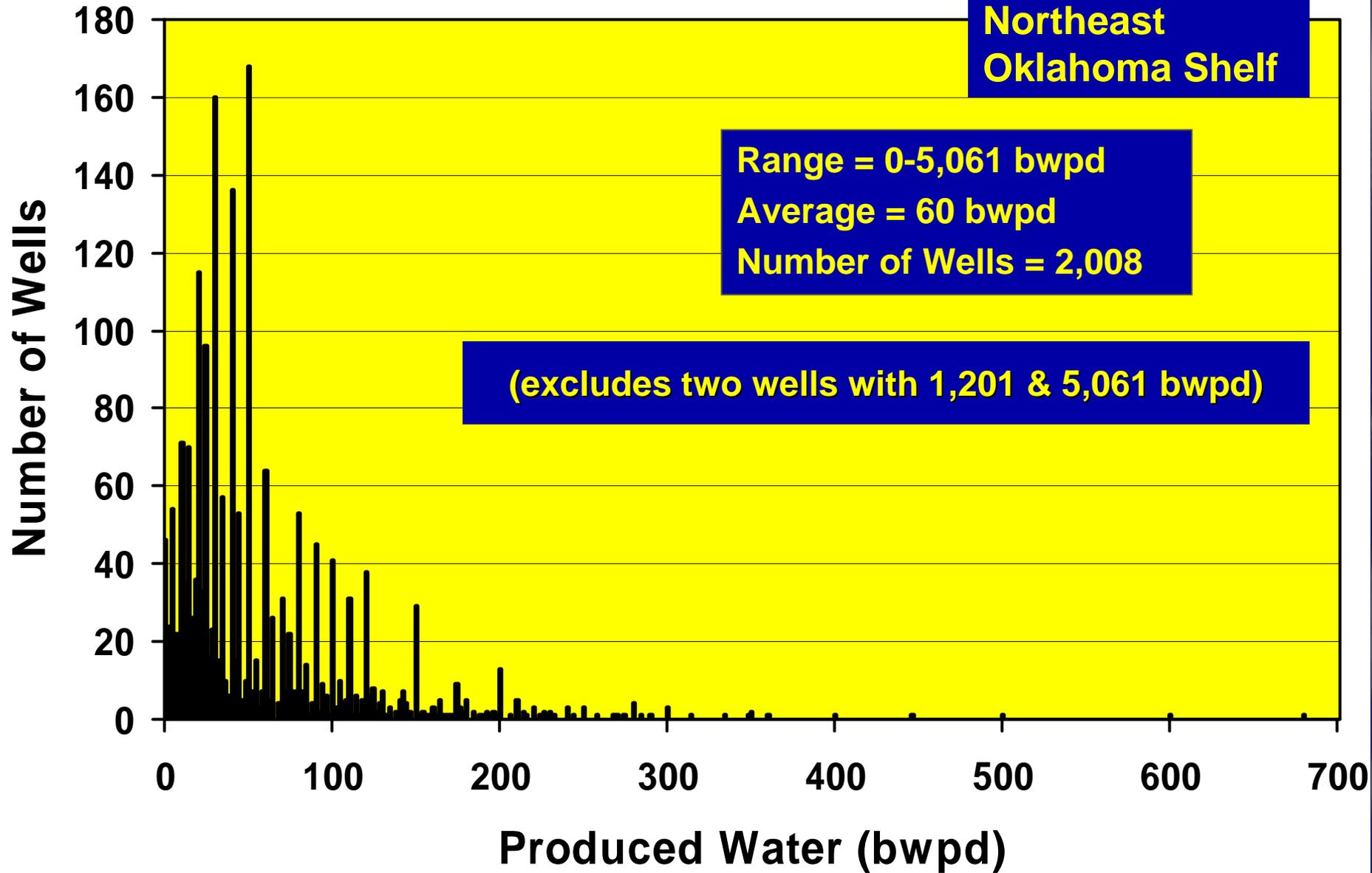
775 Rowe CBM wells



Riverton Coal

285 Riverton CBM wells



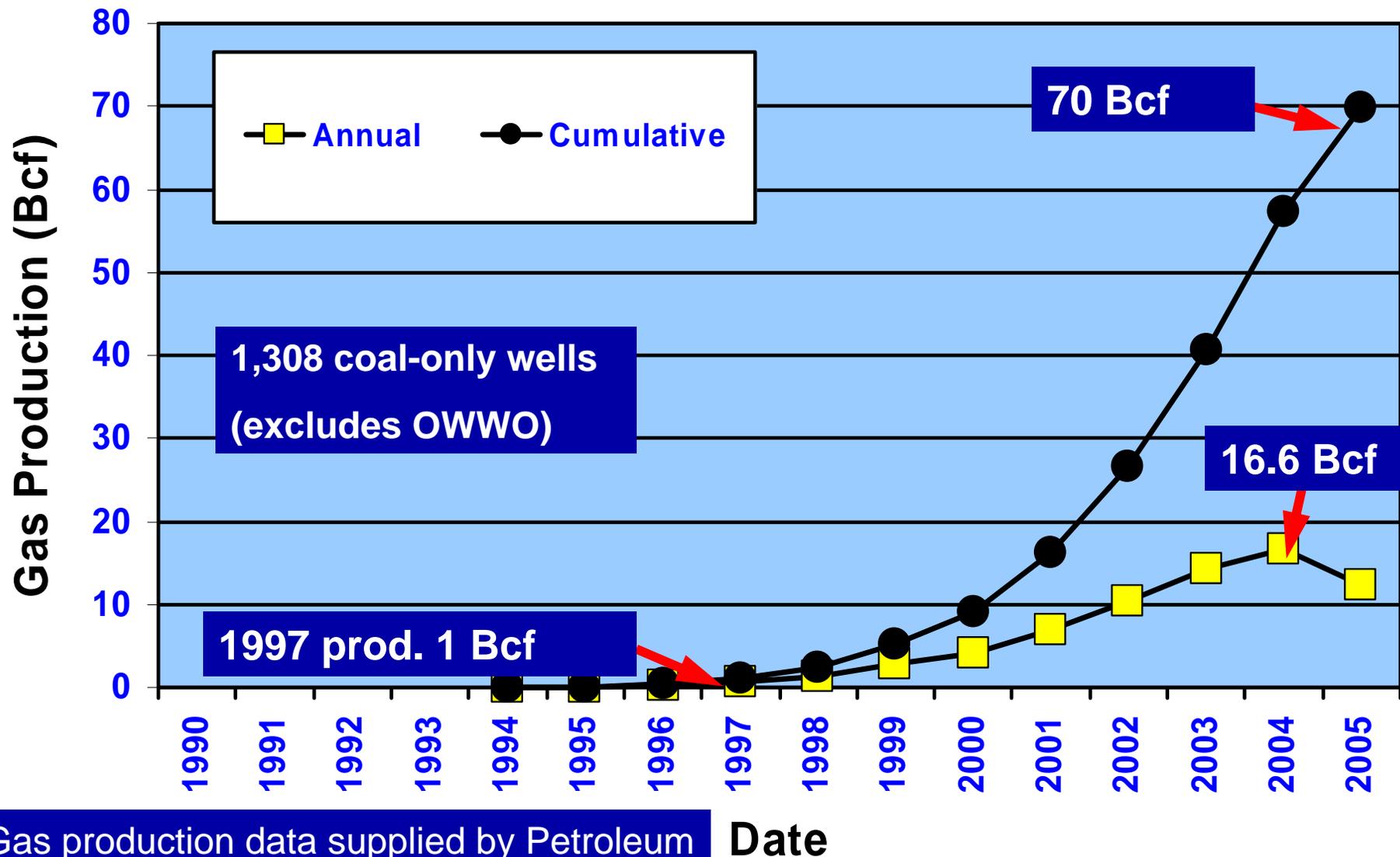


Water Quality

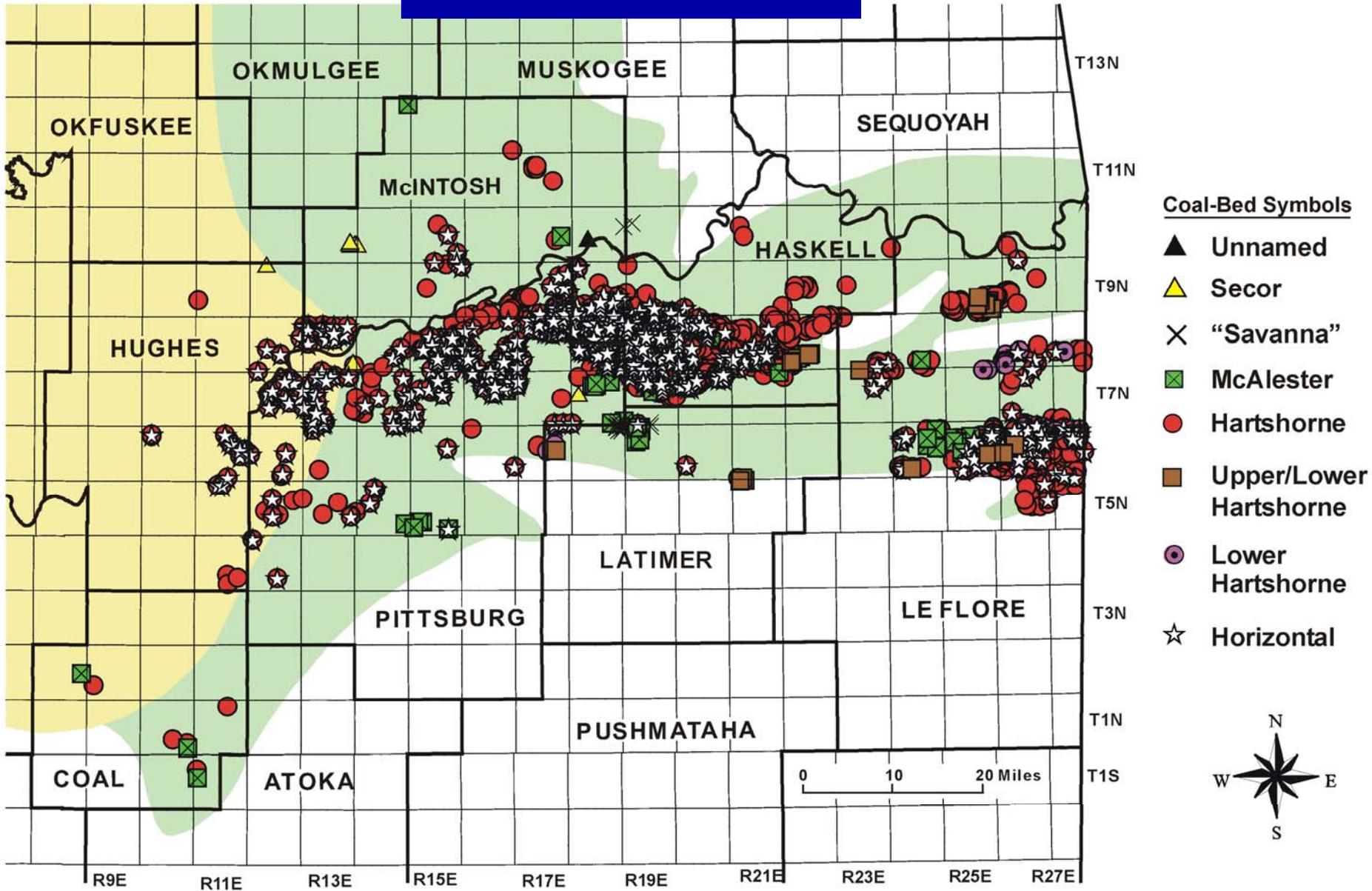
Water samples from the Mulky and Rowe coals in 4 wells in Nowata and Osage Counties had 86,200-152,900 mg/L Total Dissolved Solids (TDS)

[Underground Sources of Drinking Water (USDW) contain <10,000 mg/L TDS; seawater is @35,000 mg/L TDS]

Northeast Oklahoma Shelf CBM Production

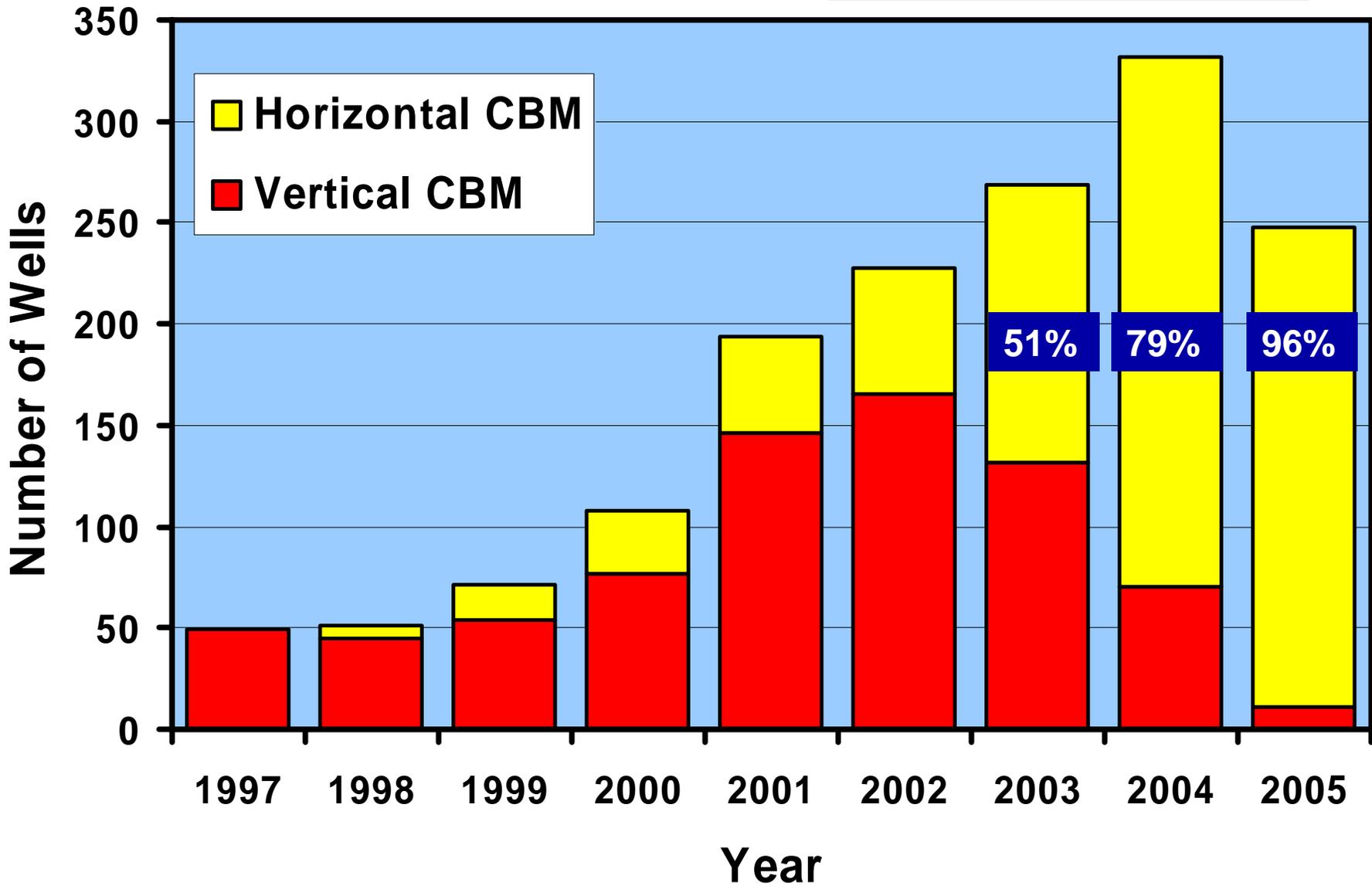


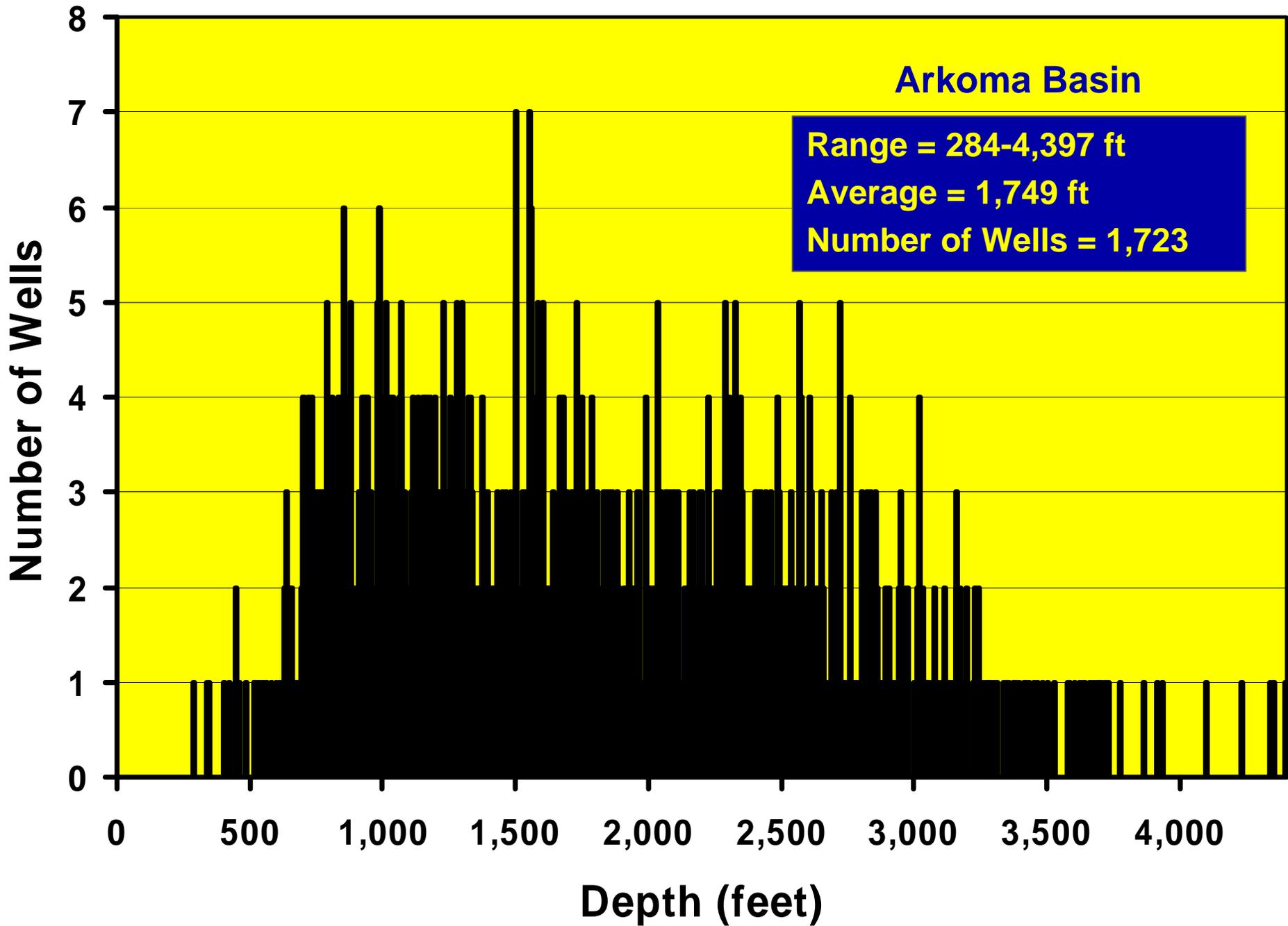
Arkoma Basin



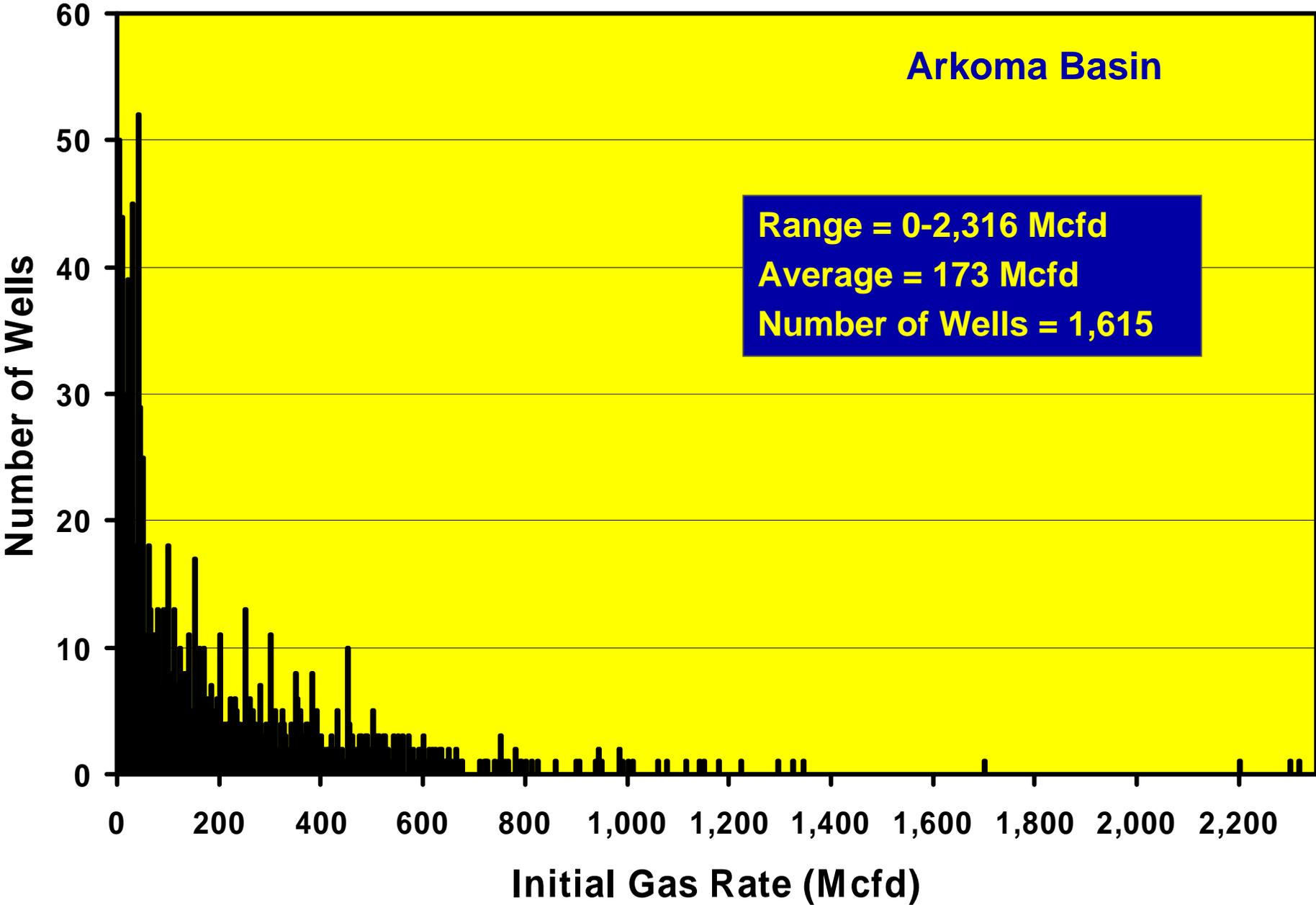
1,779 CBM Completions

Arkoma Basin

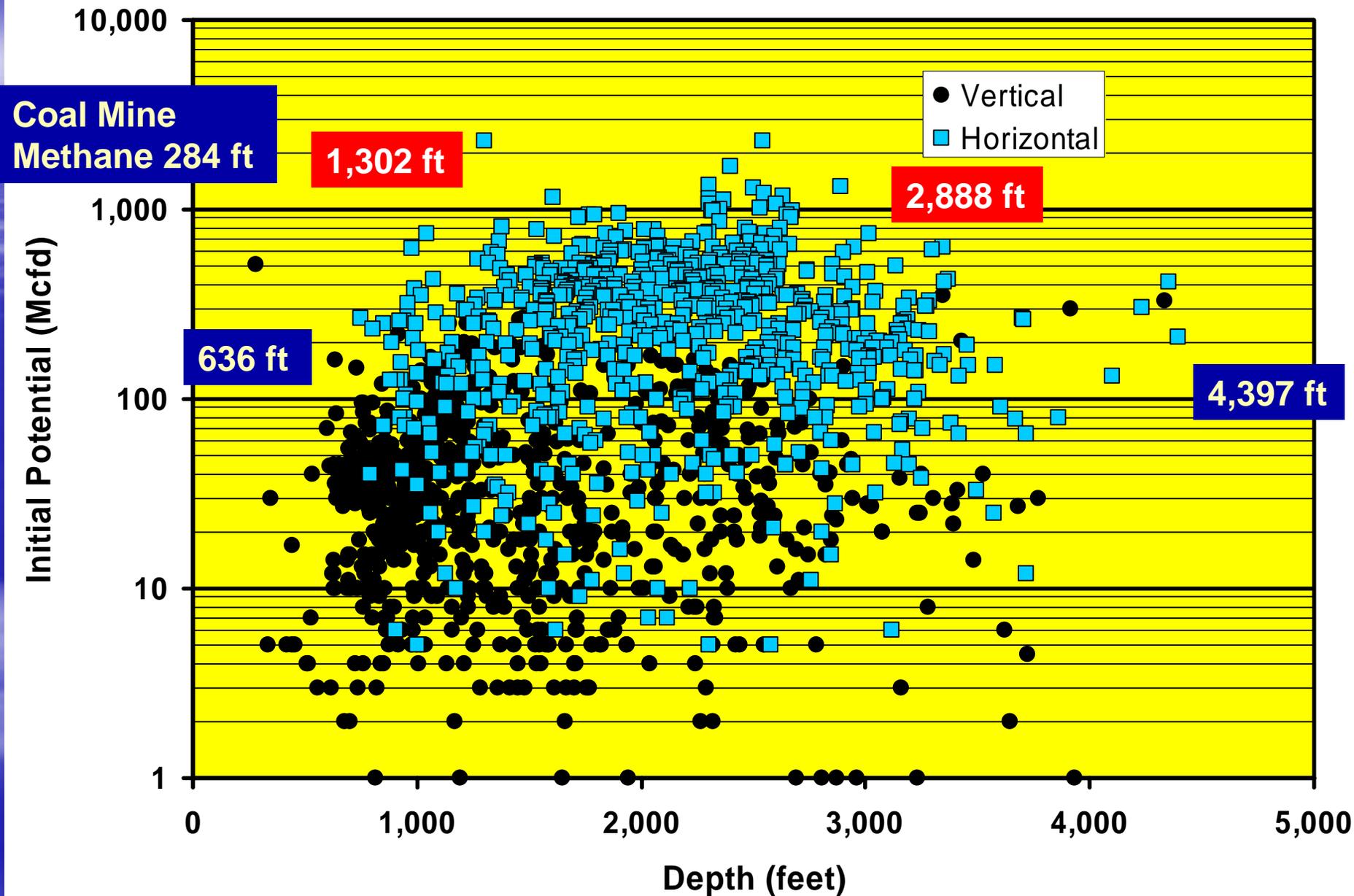




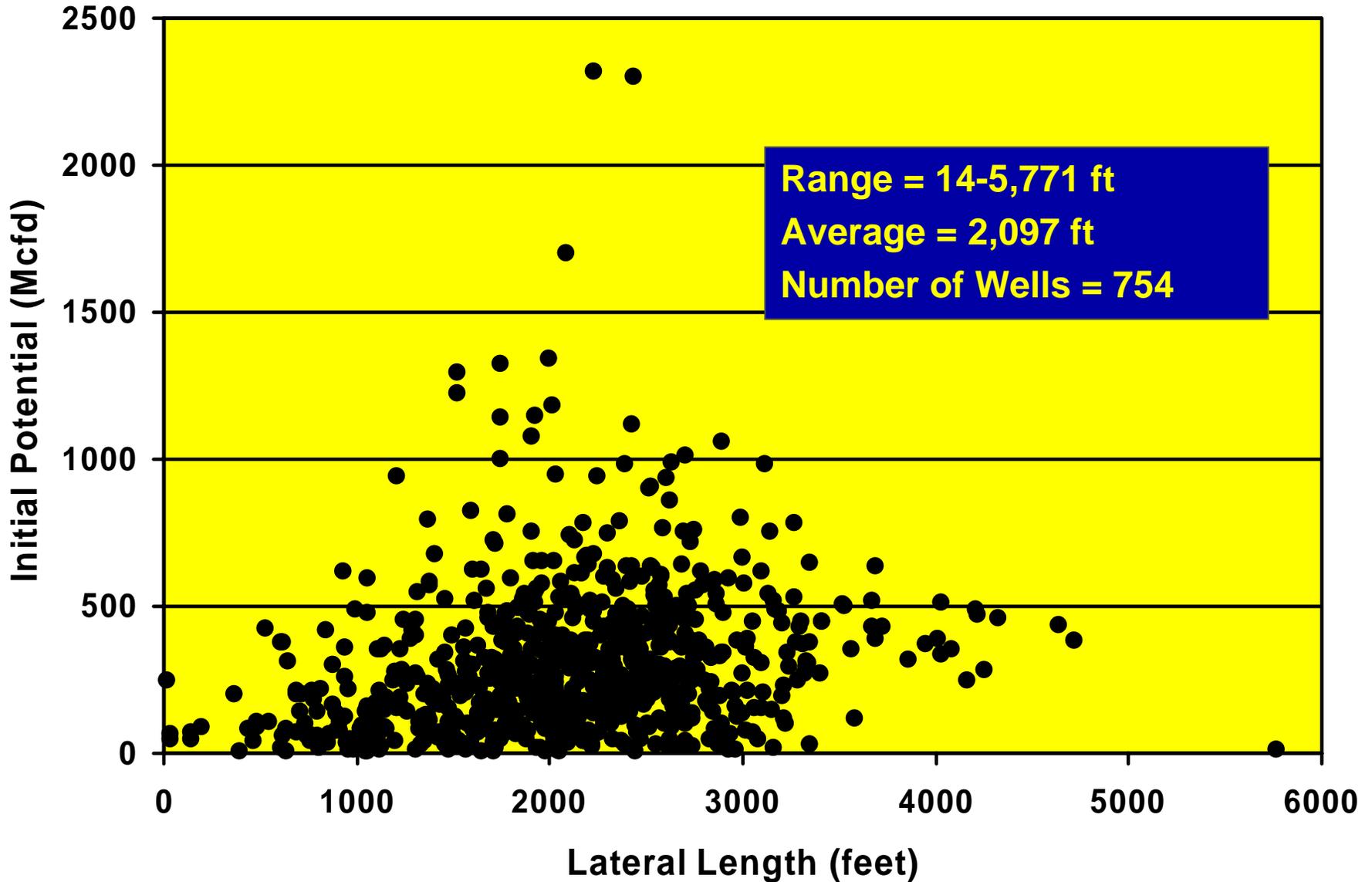
Arkoma Basin



Arkoma Basin



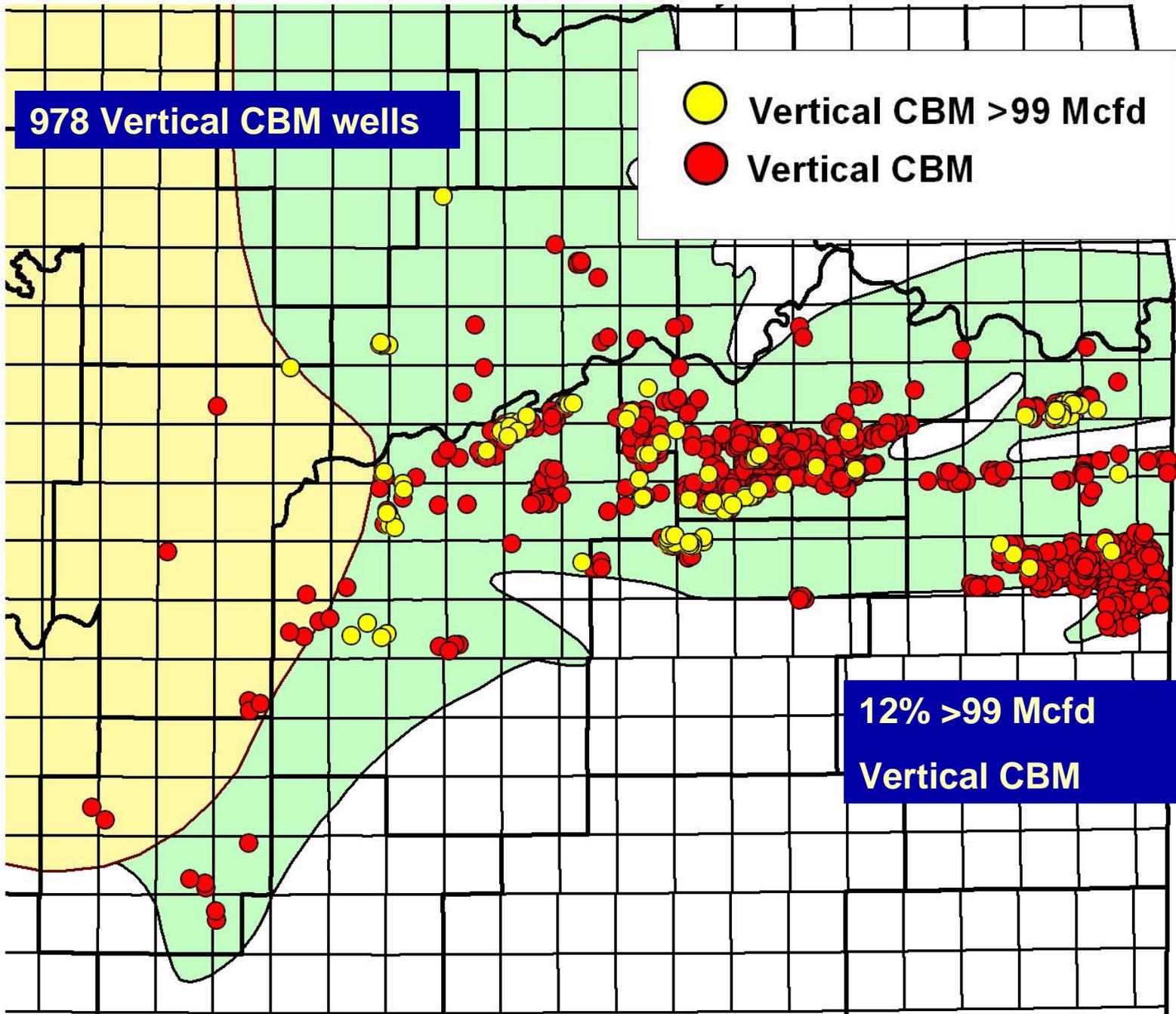
Horizontal CBM Wells



978 Vertical CBM wells

- Vertical CBM >99 Mcfd
- Vertical CBM

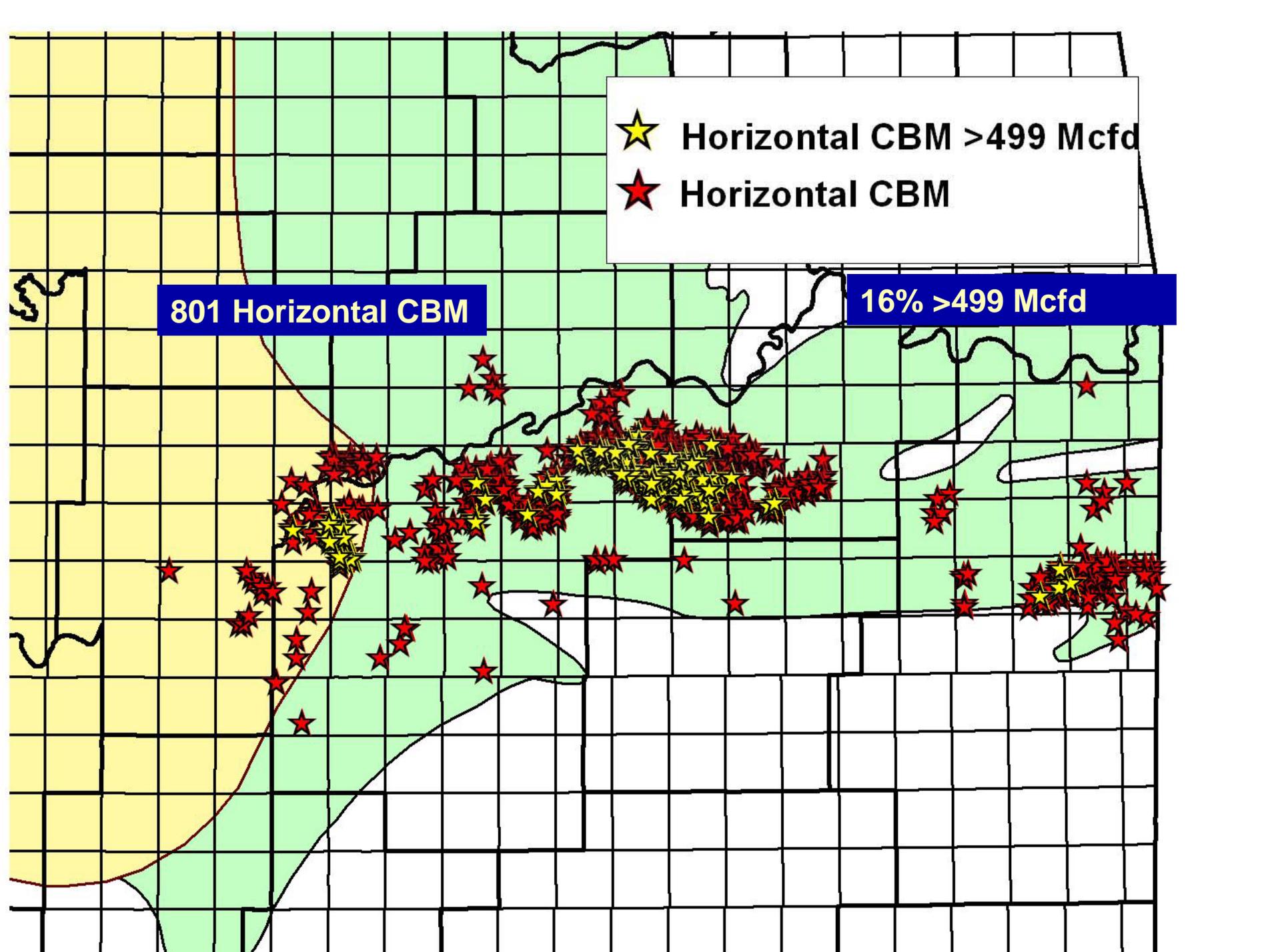
12% >99 Mcfd
Vertical CBM

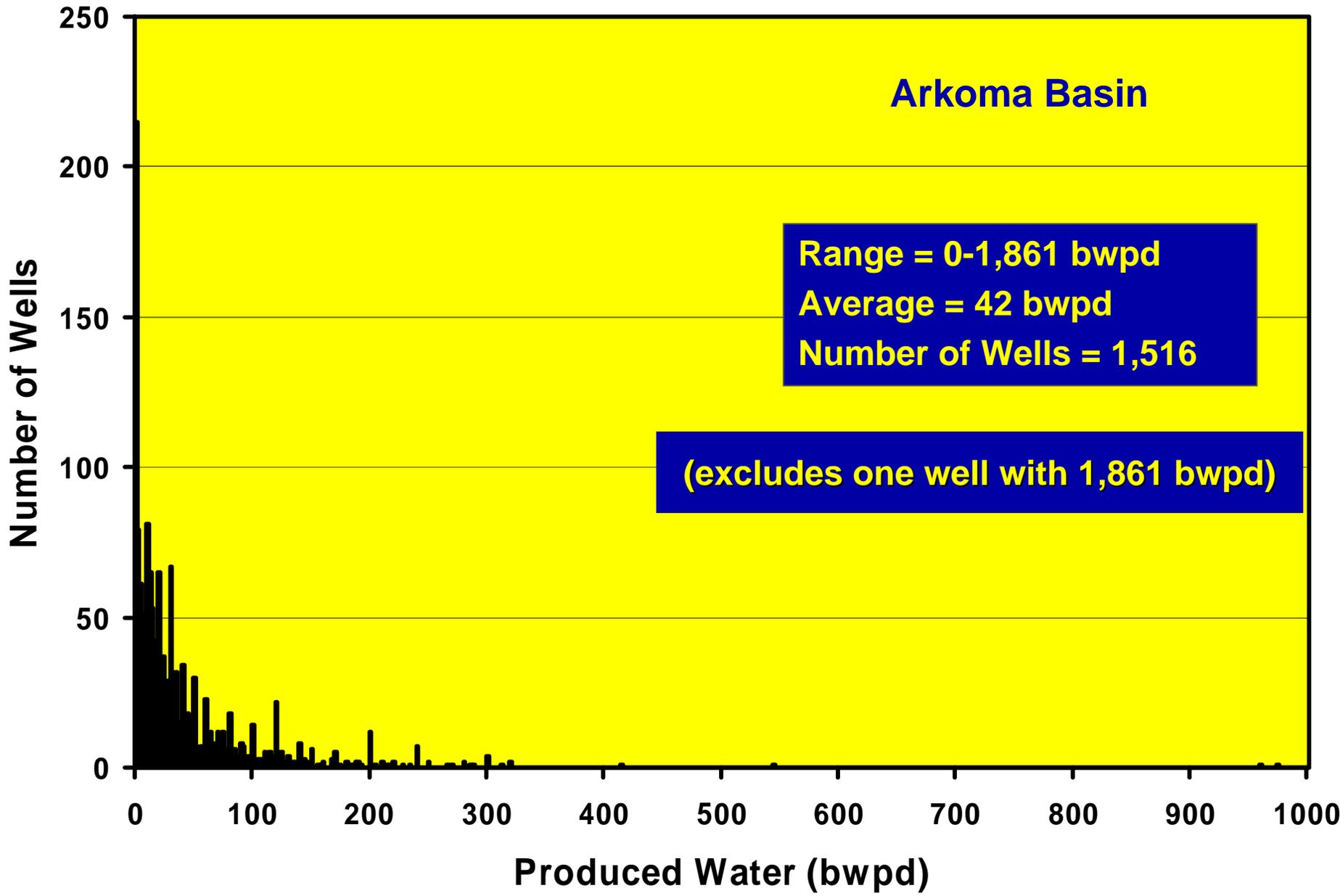


★ Horizontal CBM >499 Mcfd
★ Horizontal CBM

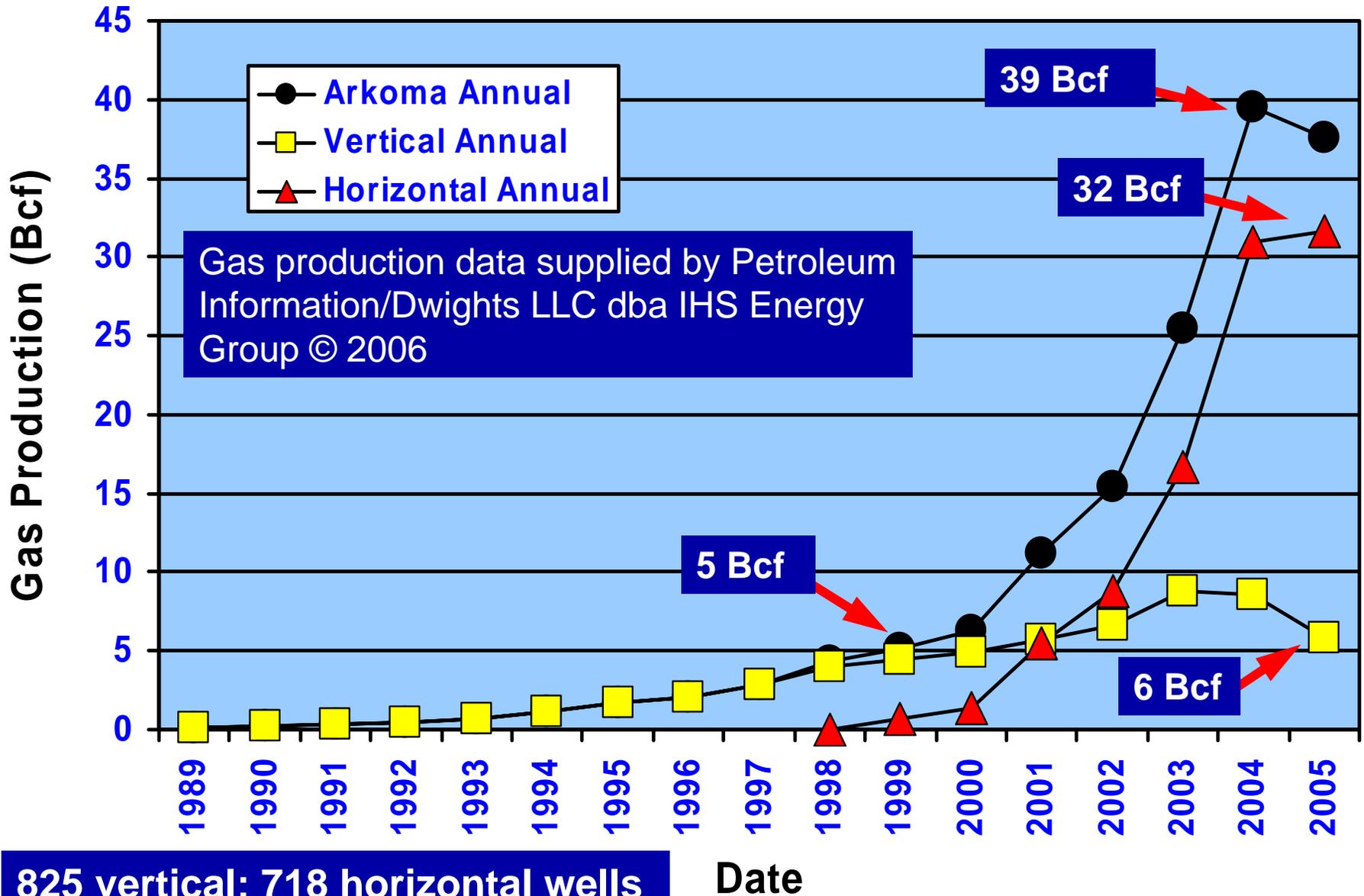
801 Horizontal CBM

16% >499 Mcfd





Arkoma Basin Annual CBM Production



Arkoma Basin Cumulative CBM Production

