Unconventional Wisdom

EIA Annual Meeting
Washington DC
April 12, 2005

Doug Wight
VP Corporate Development
CDX Gas LLC

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The Challenges and Solutions to America's Energy Security

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Challenges to Meeting America's Demand for Natural Gas

LNG ..... **Costs, NIMBY, Asia, Transportation, Security**
Alaska ..... **Costs, NIMBY, Environmental**
Access ..... **NIMBY, Environmental**
Pipelines ..... **Costs, Permitting, Timing, Environmental**
Permitting ..... **Bureaucracy, Personnel, Environmental**
Steel ..... **Lack of manufacturing (Rigs & Pipe), Costs**
Environment .. **Water, Surface disturbance, Wildlife**
Exploration ..... **Mergers, Lack of risk capital, Geoscientists**
People ..... **Lack of laborers, Engineers, and Geoscientists**
Energy Policy . **109th Congress? Access, Incentives, Special Ints.**
Technology ..... **Lack of R&D, Risk Capital, Creative minds**

Formidable obstacles, but is there hope?

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The Solutions

Efficiency and Conservation ..... **Public Support**

Fuel Diversity ..... **Gasification, Nuclear, Clean Coal, Renewables**

Infrastructure ..... **Storage Incentives, Pipelines, Rigs**

People ..... **Attract youth, Job Security, and Compensation**

New Supply .... **LNG, Alaska, Offshore & Onshore permits & access**
Hydrates, Coalbed Methane, and Shales

Technology ..... **Production, Stimulations, Completions, Processes**
Inventions, Fuel Cells

It will take all of this and more !!

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An Unconventional Solution

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Unconventional Reservoirs (Low Permeability)

- Coalbeds
- Shales
- Tight Gas Sands
- Heavy Oil Sands
- Fractured Carbonates

Technically Challenging

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Largest U.S. onshore gas discoveries in last 25 years

	Producing
San Juan Basin CBM (1986)	**2,000 MMcfd**
Powder River Basin CBM (1991)	**930 MMcfd**
Barnett Shale (1981)	**700 MMcfd**
Jonah – TGS (1995)	**650 MMcfd**
Pinedale Anticline TGS (2001)	**220 MMcfd**
Madden TGS (1999)	**200 MMcfd**

REQUIRES CUTTING EDGE TECHNOLOGY

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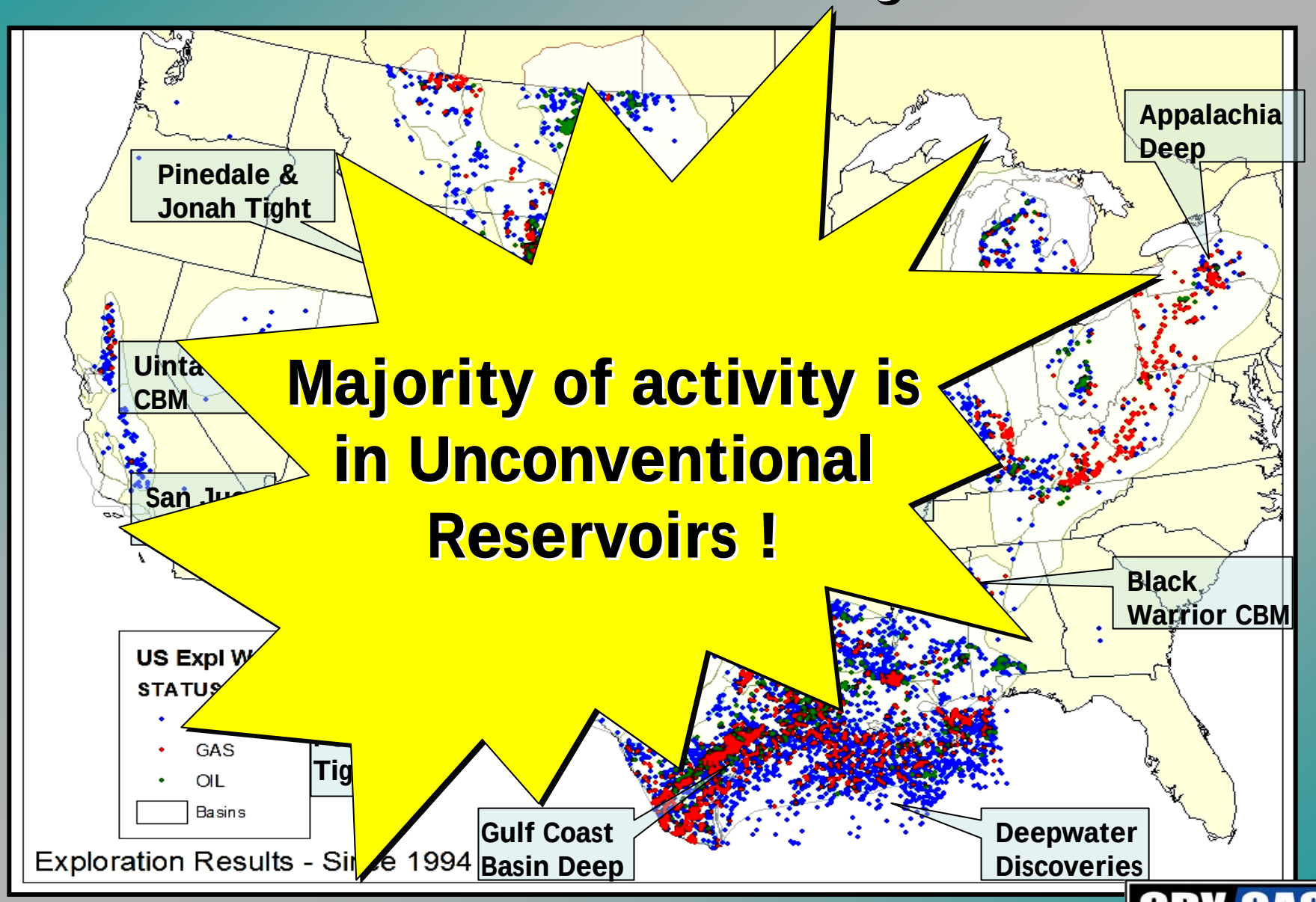
Most Active US Drilling Areas



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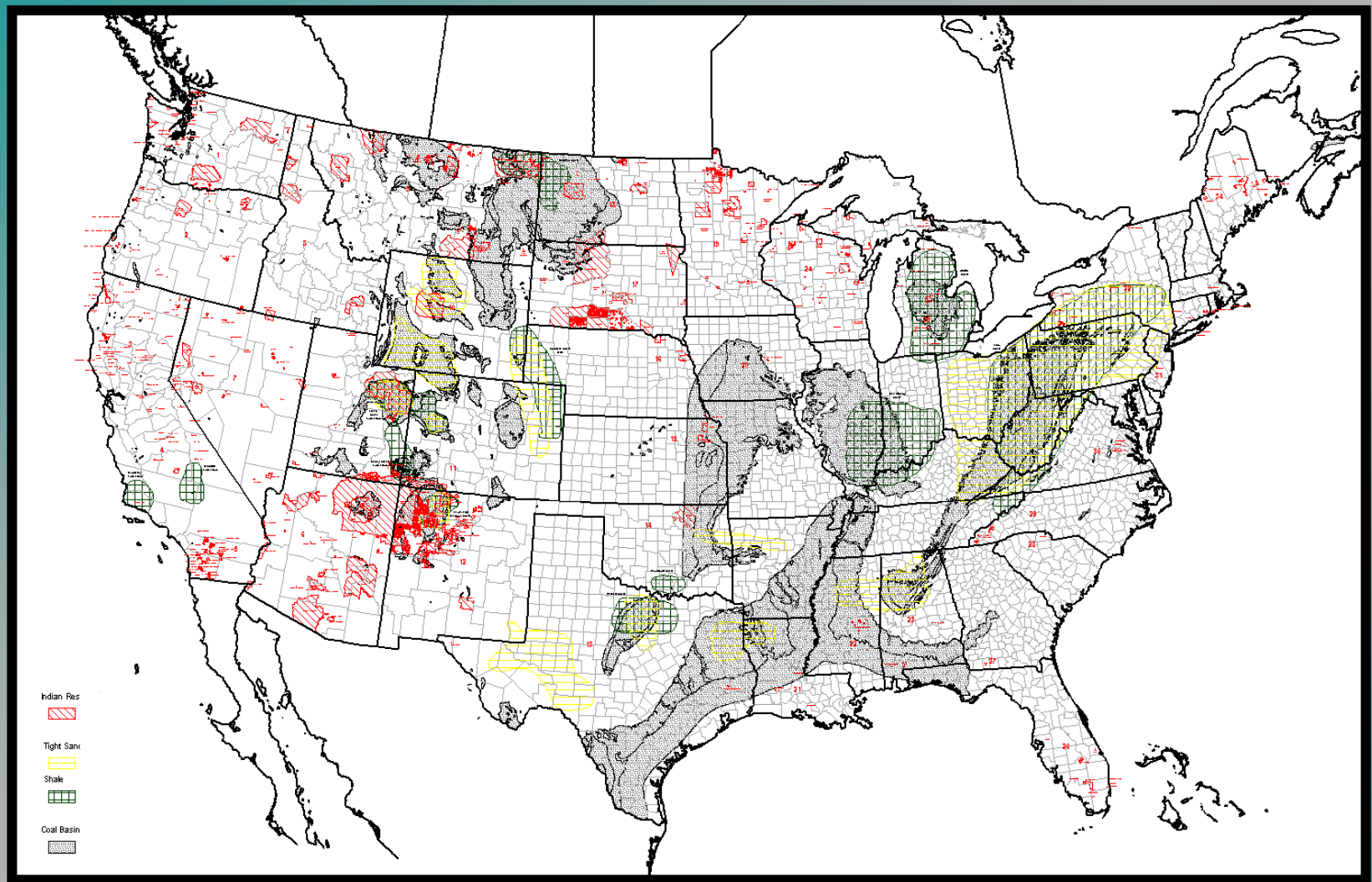
Source: IHS Energy well data



Unconventional Resources of North America

Shale Gas

Tight Sand Plays

Coal Basins

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Drilling Technologies

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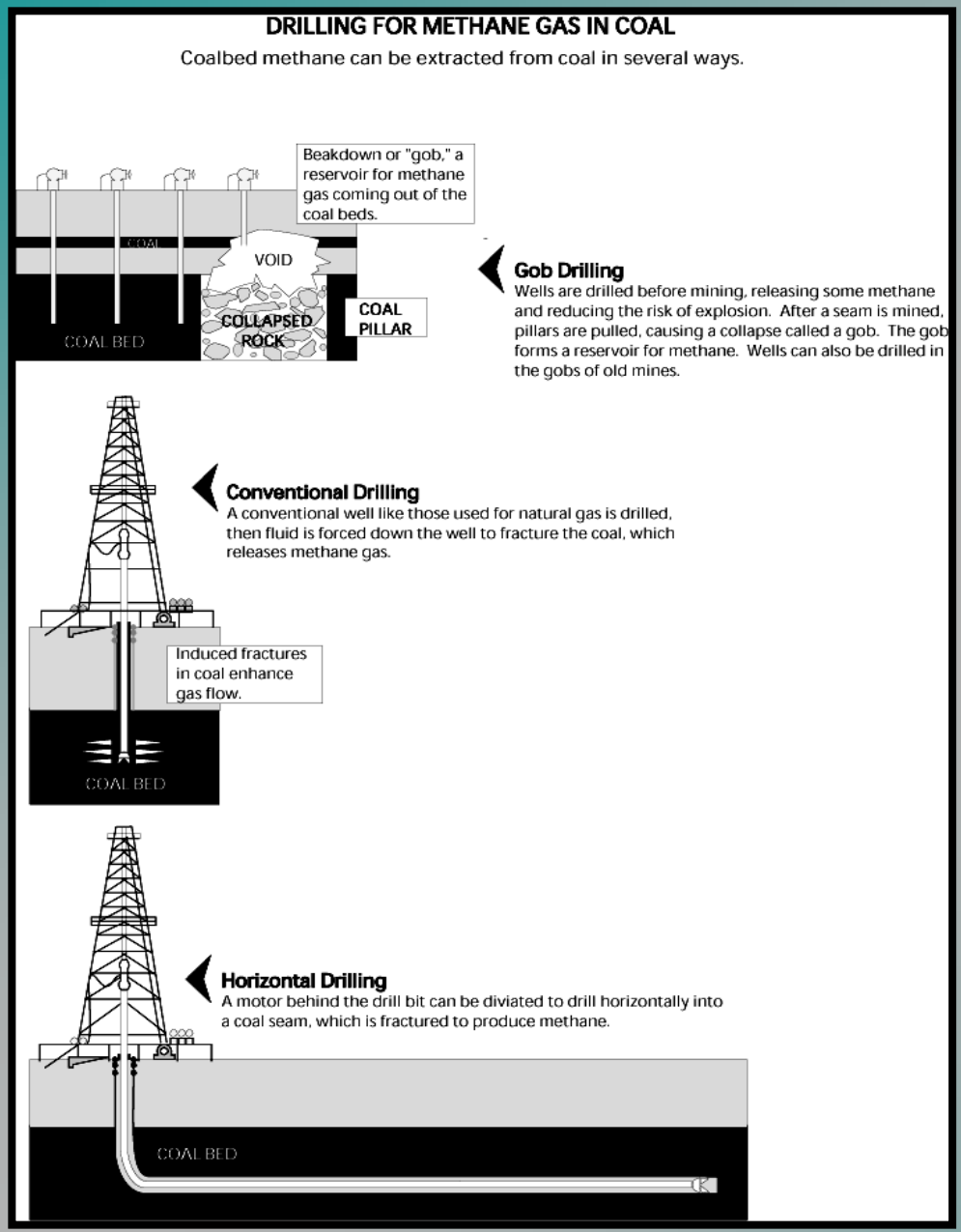

Surface Degasification Methods

Gob Drilling (CMM)

Conventional Vertical Drilling

Horizontal Drilling

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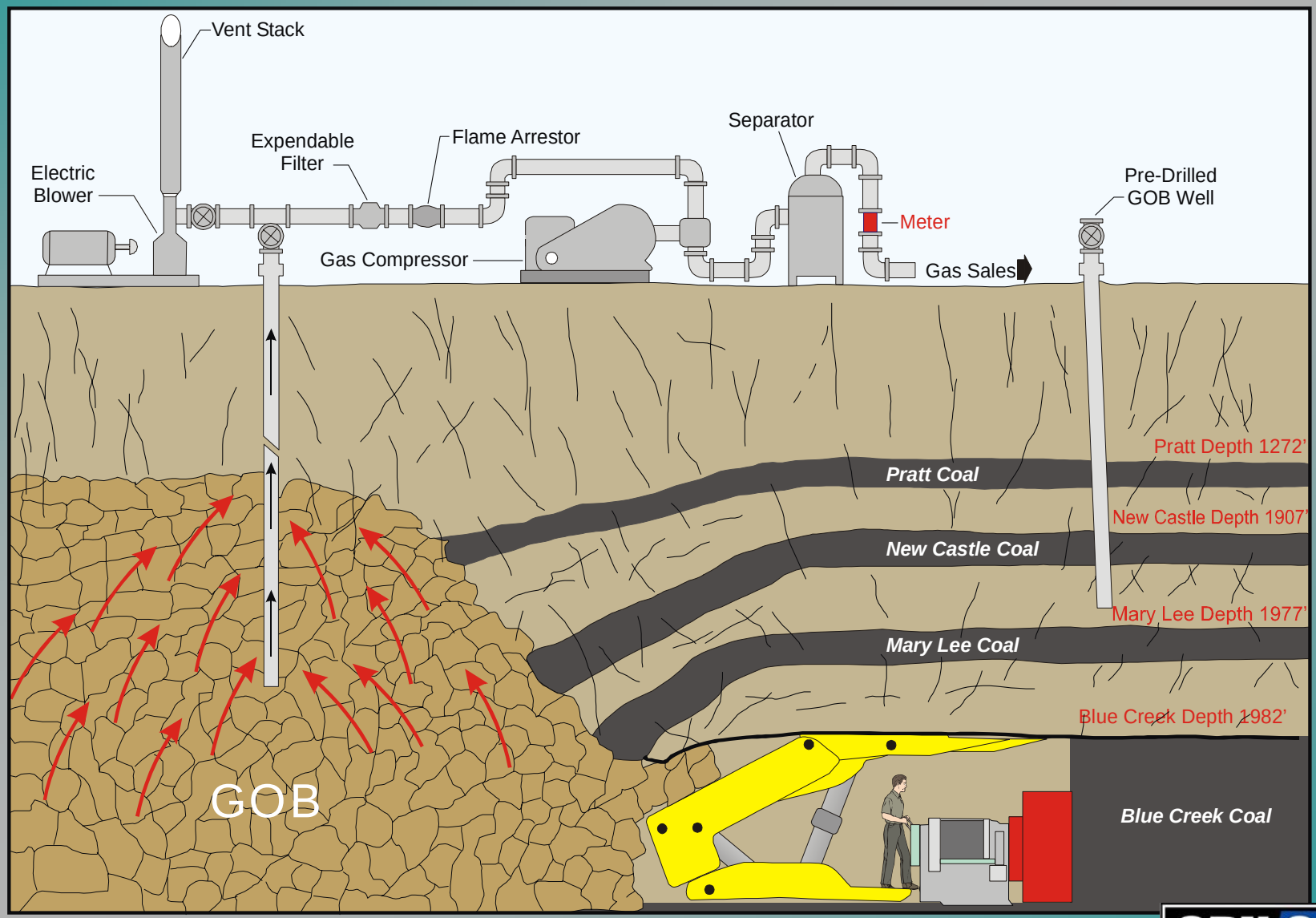
Coalmine Methane/ Gob Well



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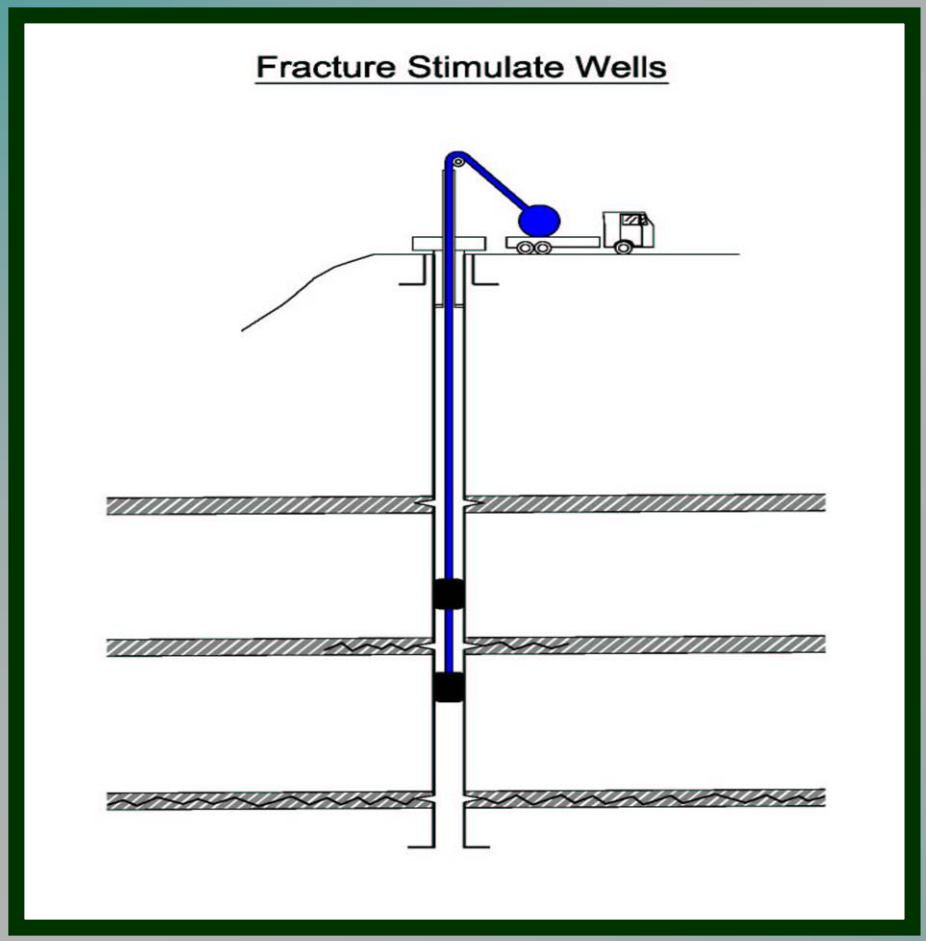
Vertical Drill and Frac Well



- **Slick Water Frac**
- **Typically, 10,000 lbs of Propant per Foot of Coal**
- **Horizontal “Pancake” Typical In Shallow Coals**

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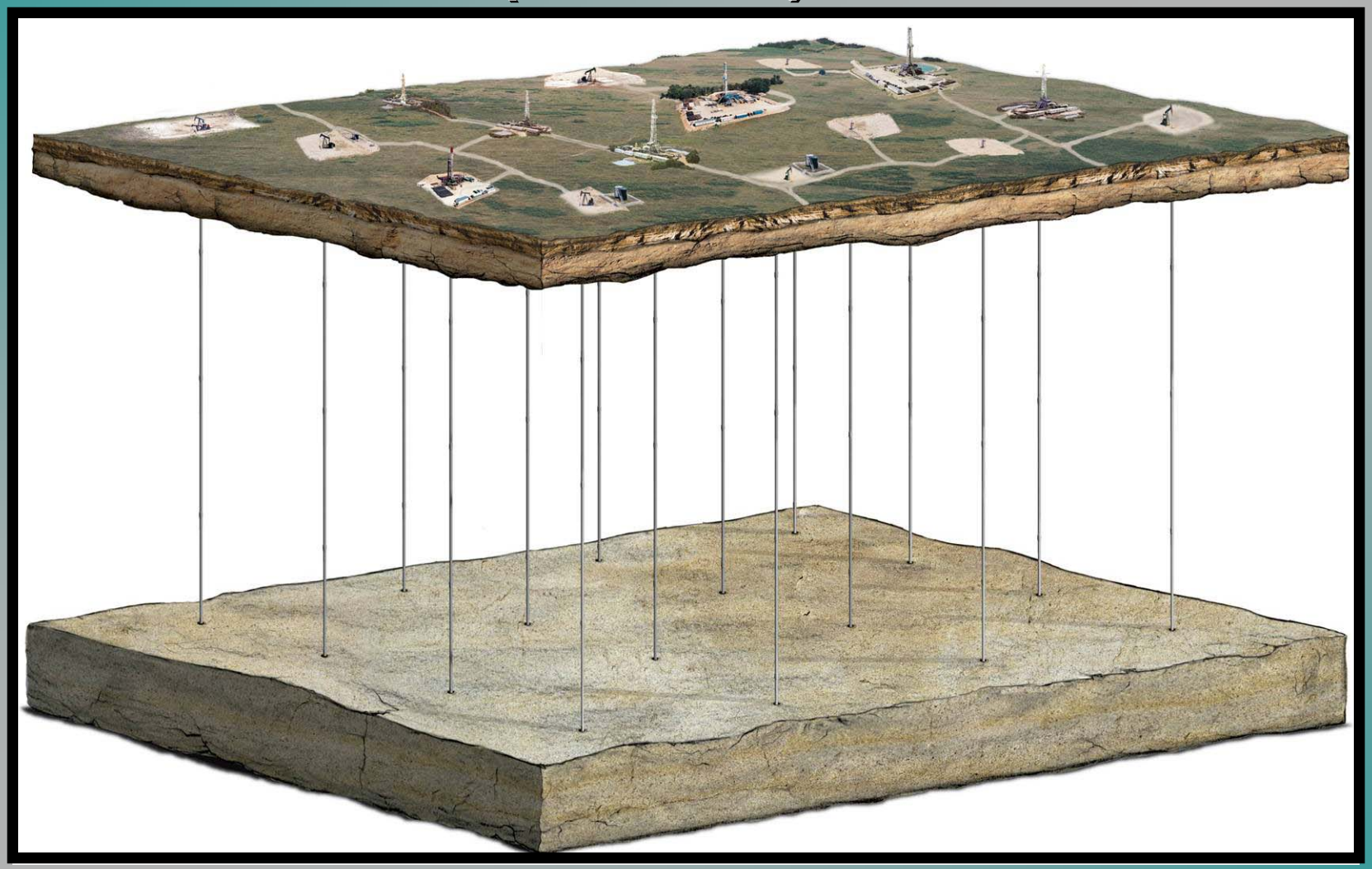
Conventional Development 16 locations (1280 acres)



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Horizontal Technology

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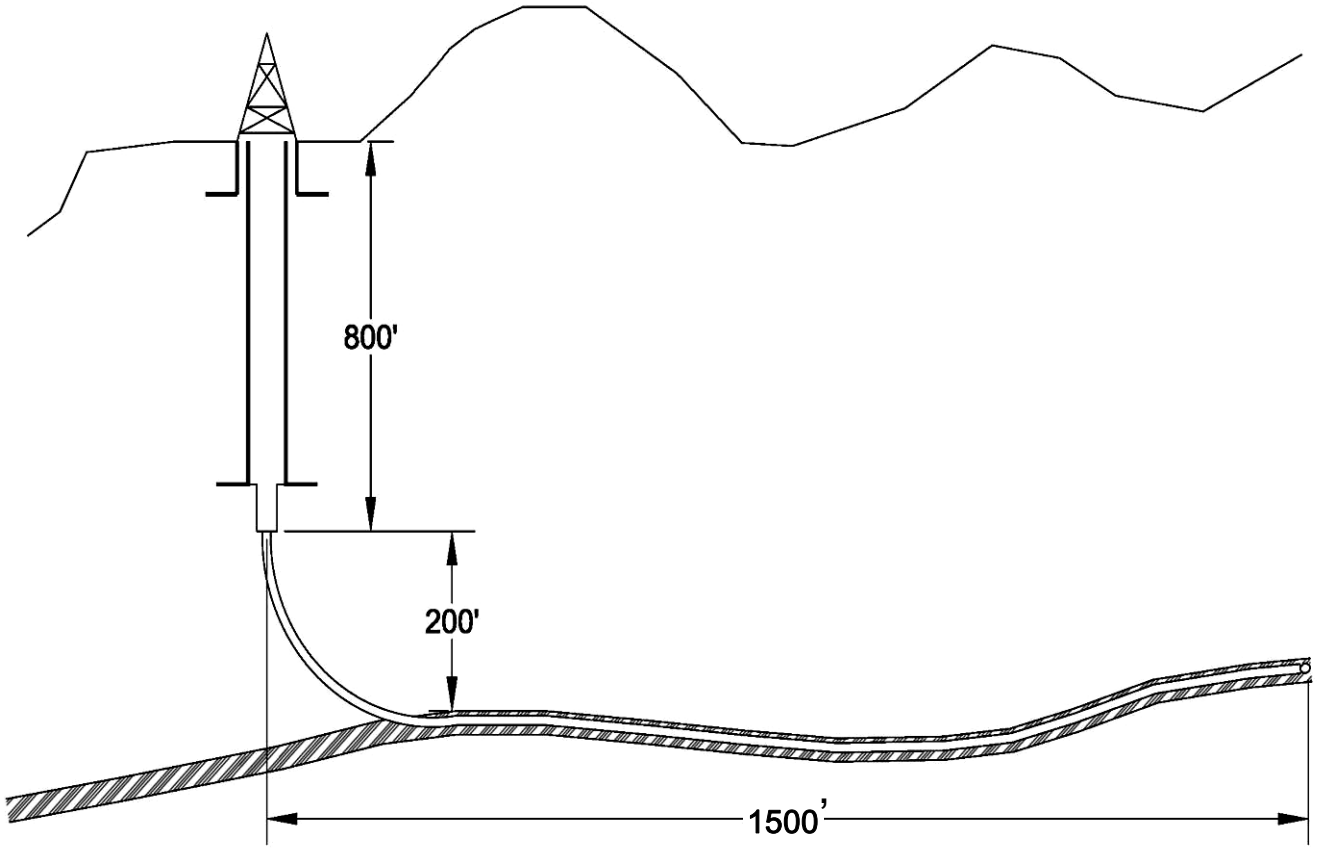
Horizontal CBM Well



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Horizontal Development Well

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CDX Technology

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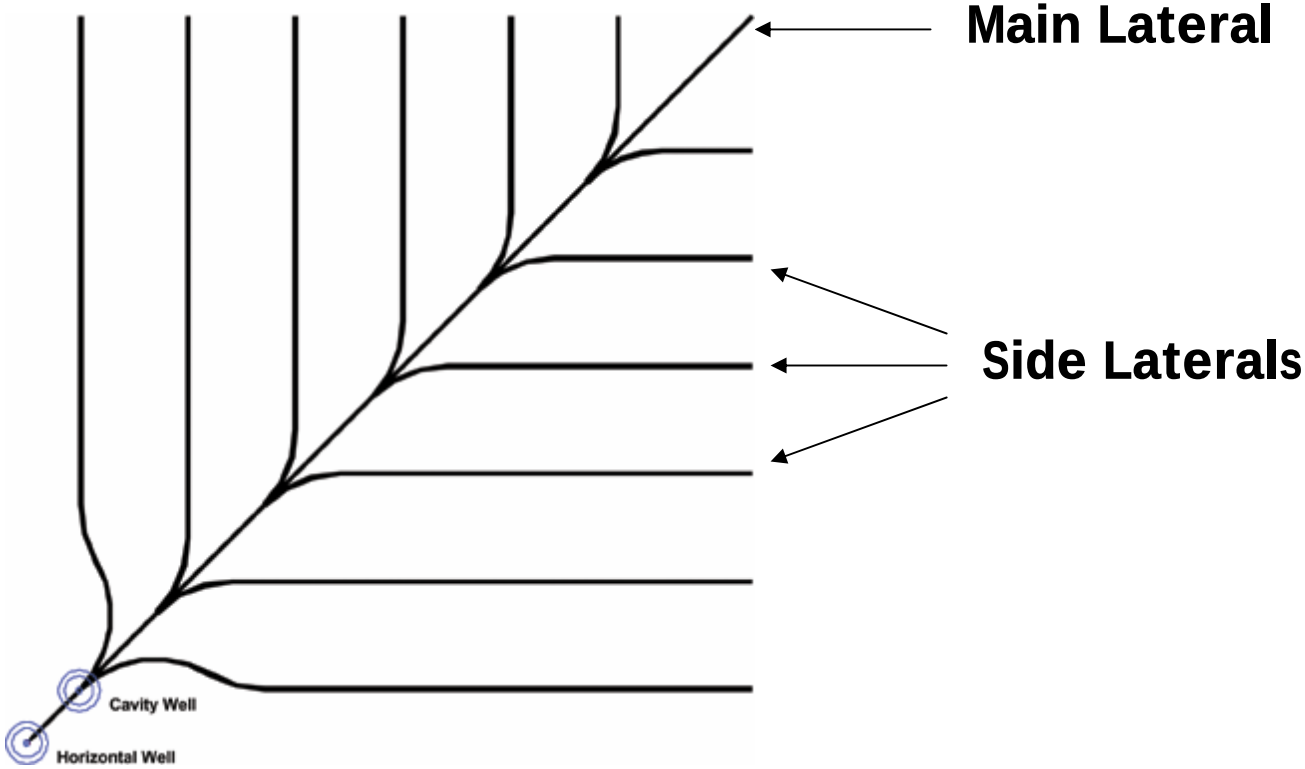
CDX's Horizontal Drilling System:
The Pinnate Drainage Pattern



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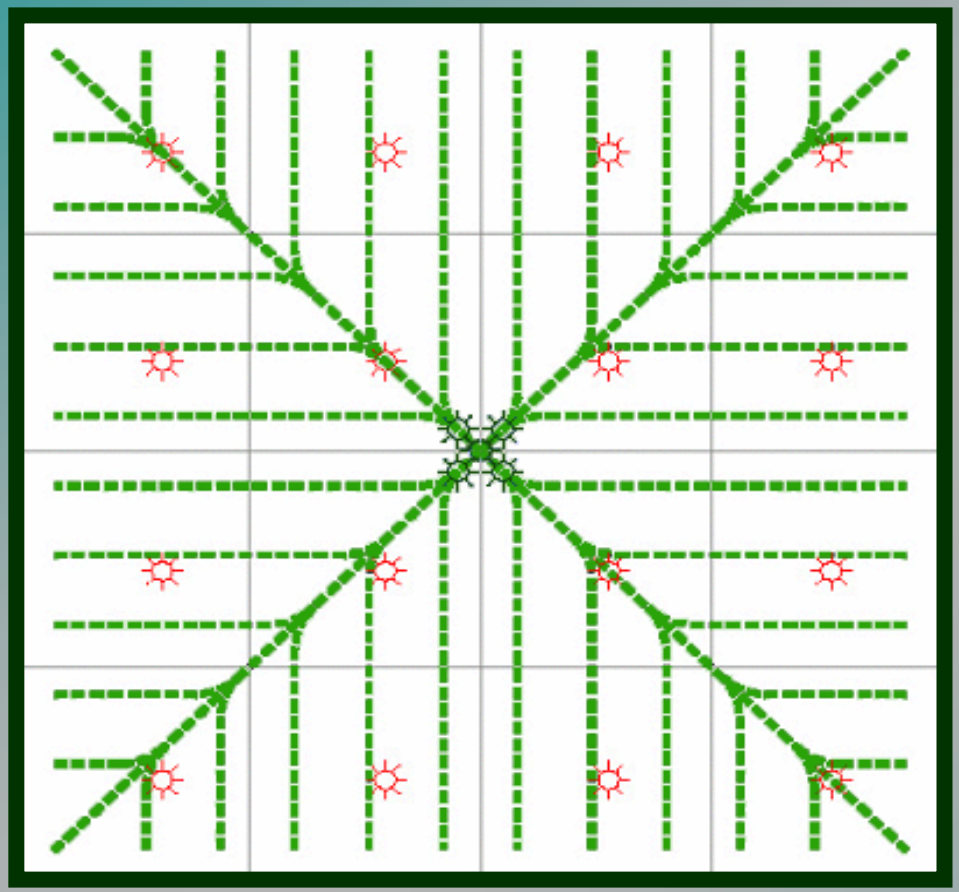
Z-PINNATE™ Drilling and Completion System



- One small well site
- Pinnate pattern drains 1,280 acres and replaces 16 standard 80 acre locations
- 360 Degree Drainage Pattern
- Quicker and Higher Gas Recoveries
- Uniform Drainage and Pressure Depletion
- Significant environmental advantages
- Patterns expanding to drain over 2,000 acres (25 to 1 well sites)

1 Quad Z-Pinnate™ Pattern Conventional Wells

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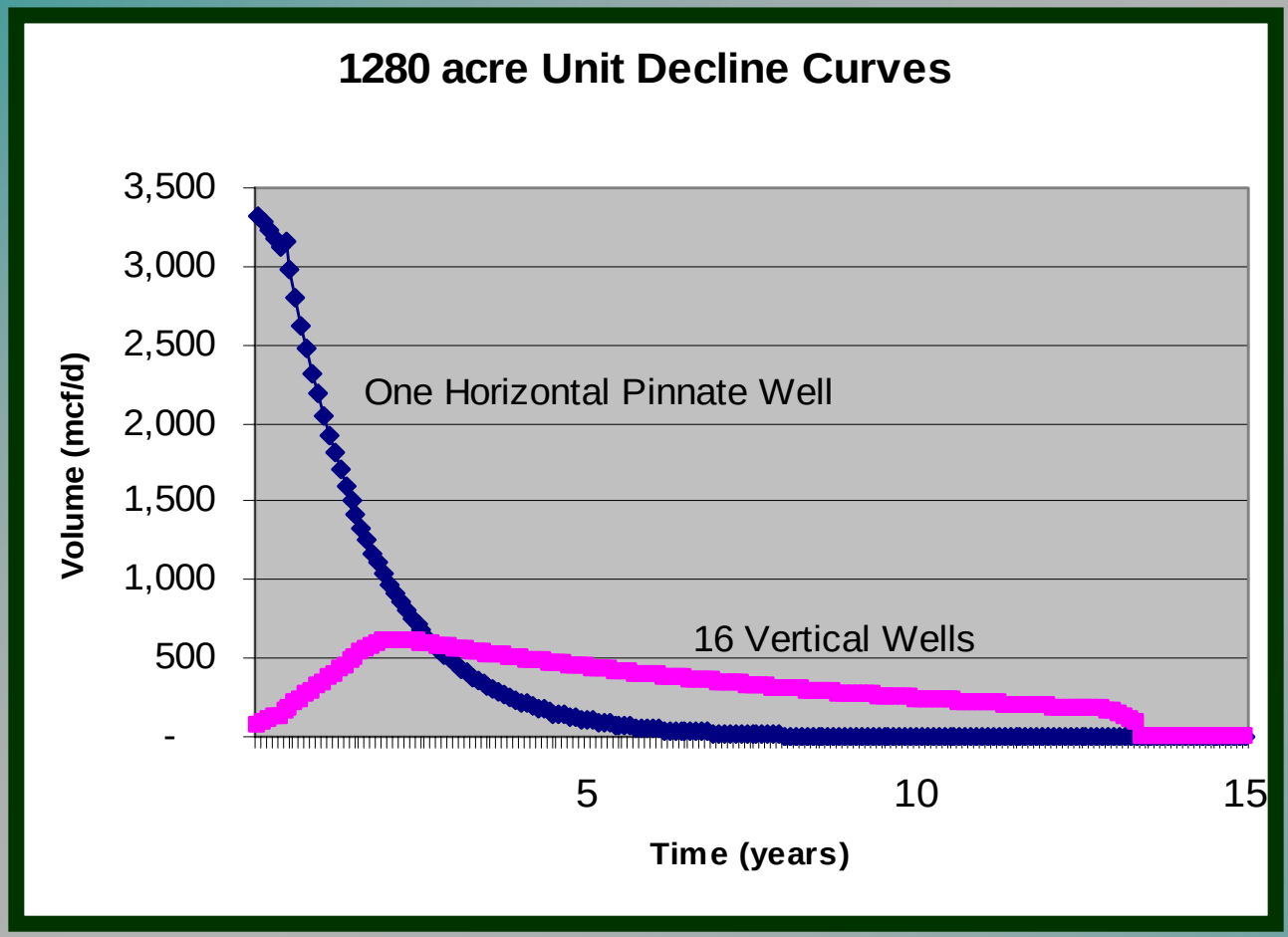
Understanding the Production Profiles:
Rate versus Time Comparison



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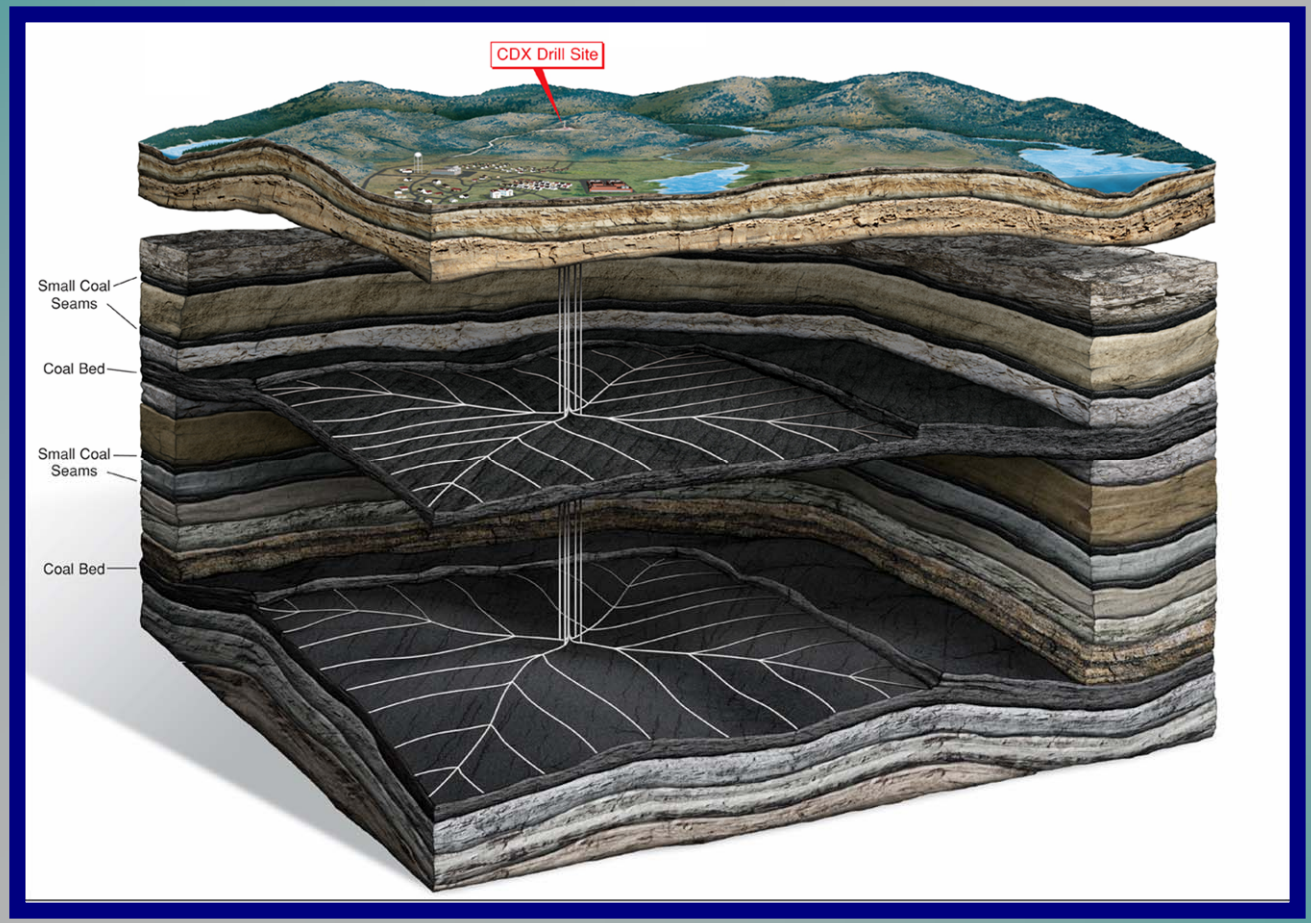
Dual Seam Completion
Pinnate Development 1 well
(1280 acres)



The Environmental Solution to Unconventional Gas Development

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The CDX Footprint...one well site for 1200 acres

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CDX Gas 93 Well Pinnacle Operations, West Virginia
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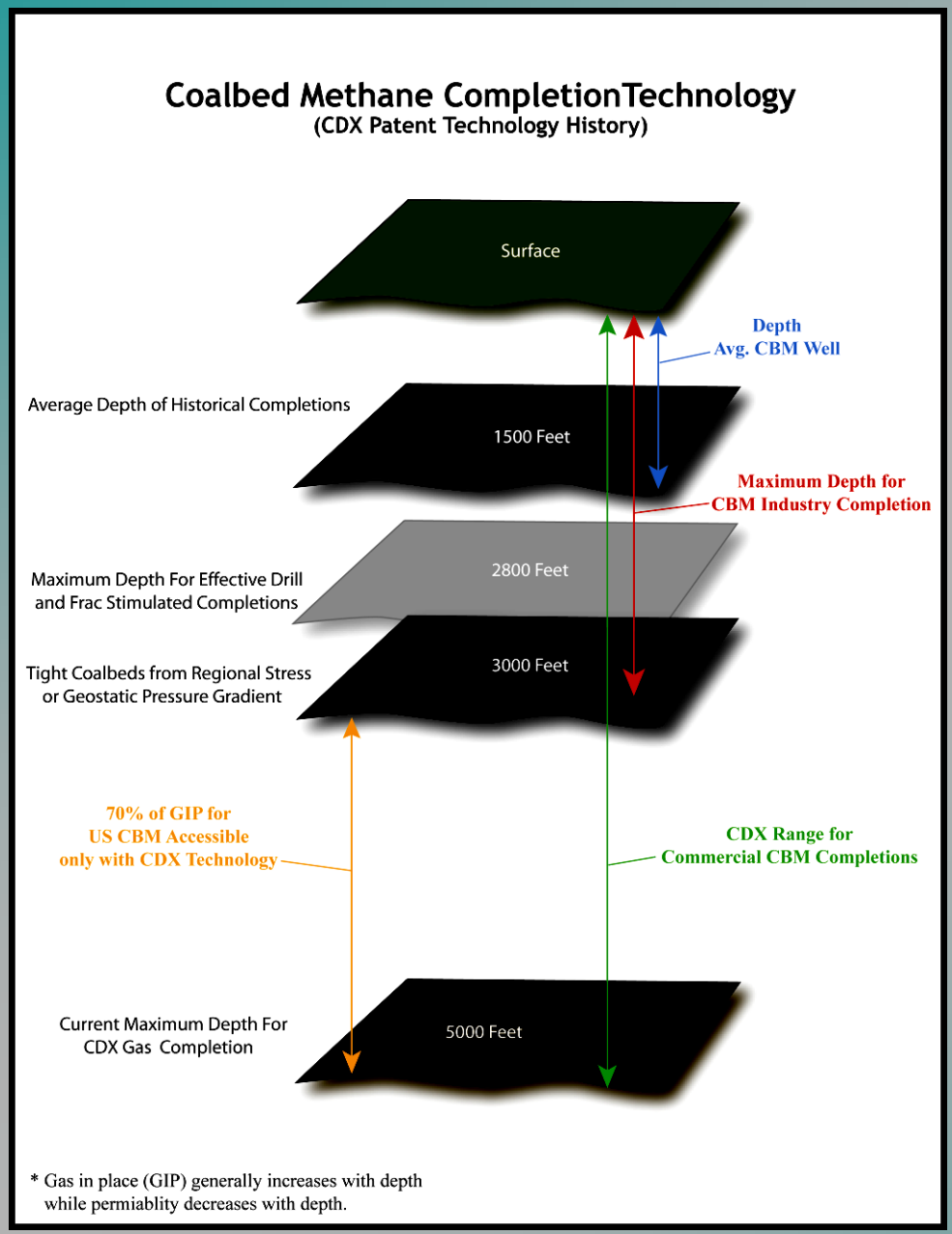

CDX Gas Technology vs. CBM Industry

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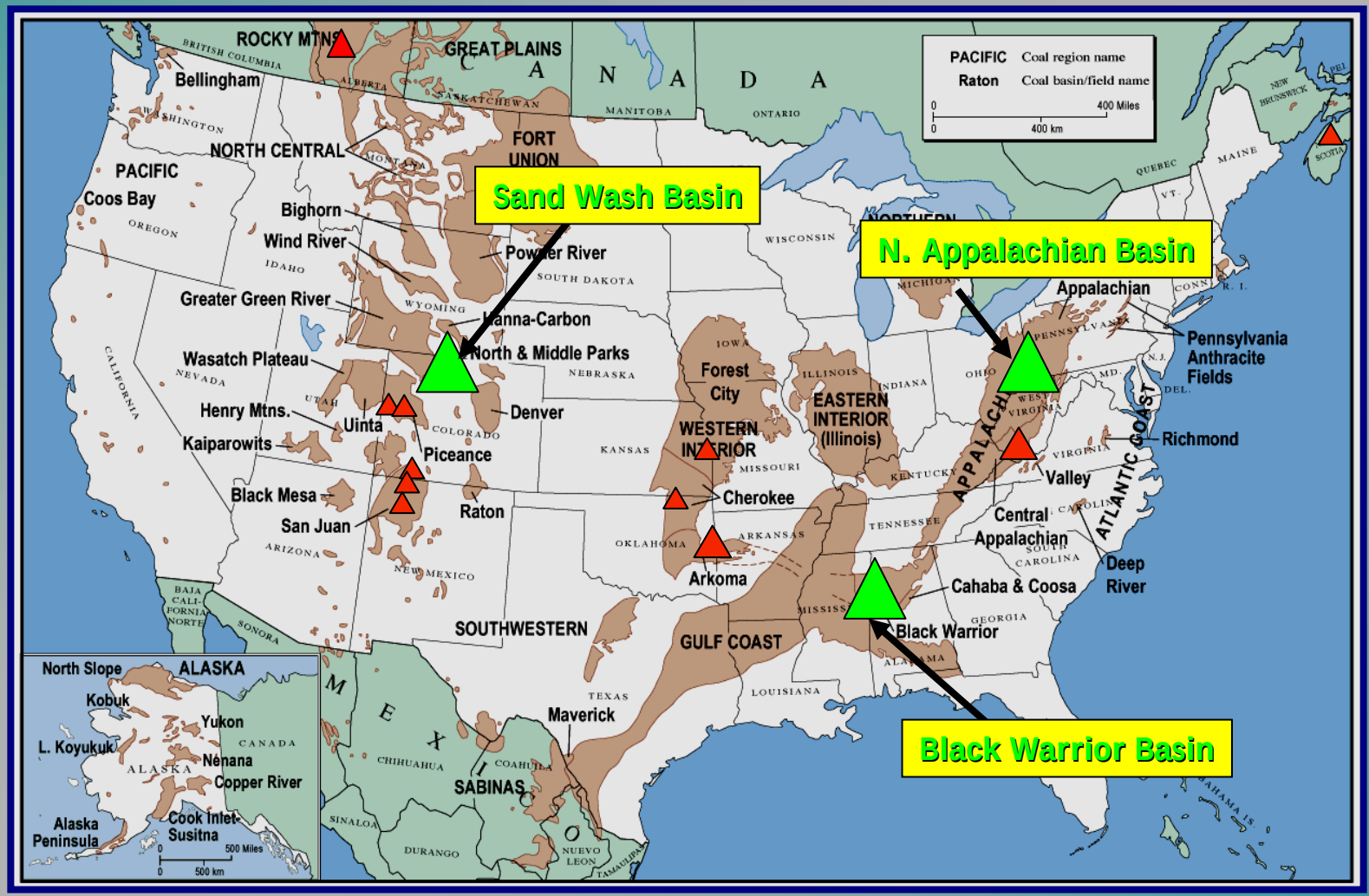
Coalbed Horizontal Drilling Activity

2005 New Horizontal Basinal Tests



Existing Horizontal CBM Wells

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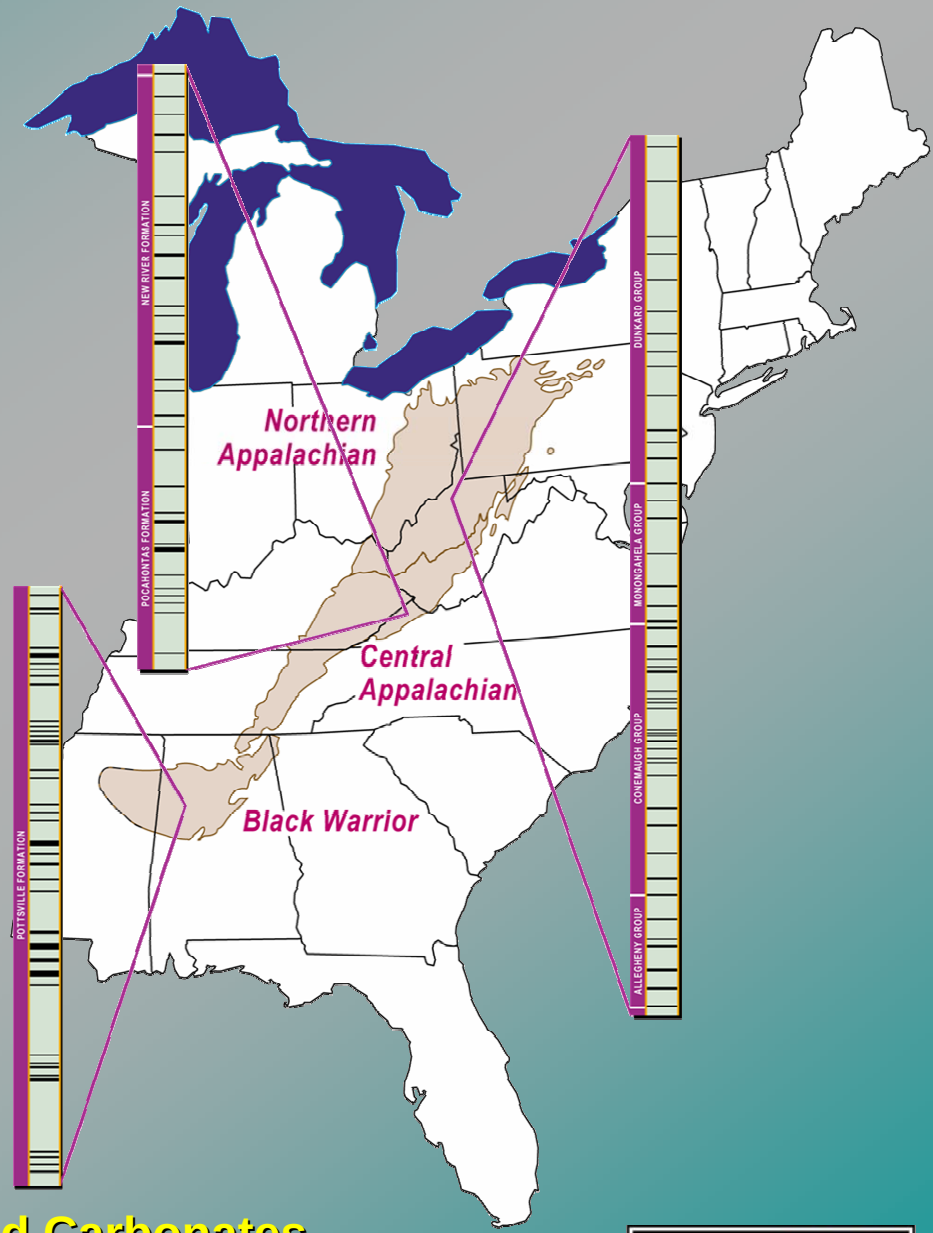
Appalachian Coal Region

Basins: Black Warrior, Central Appalachian, Northern Appalachian
Coal Age: Pennsylvanian
Coal Rank: hvA/Bb-lvb, minor semianthracite; anthracite in Pa. Anthr. Fields
Typical Gas Content: 250-350scf/t
Typical Well Spacing: 80 acres



Deeper Coals, Shales, Tight Sands and Carbonates

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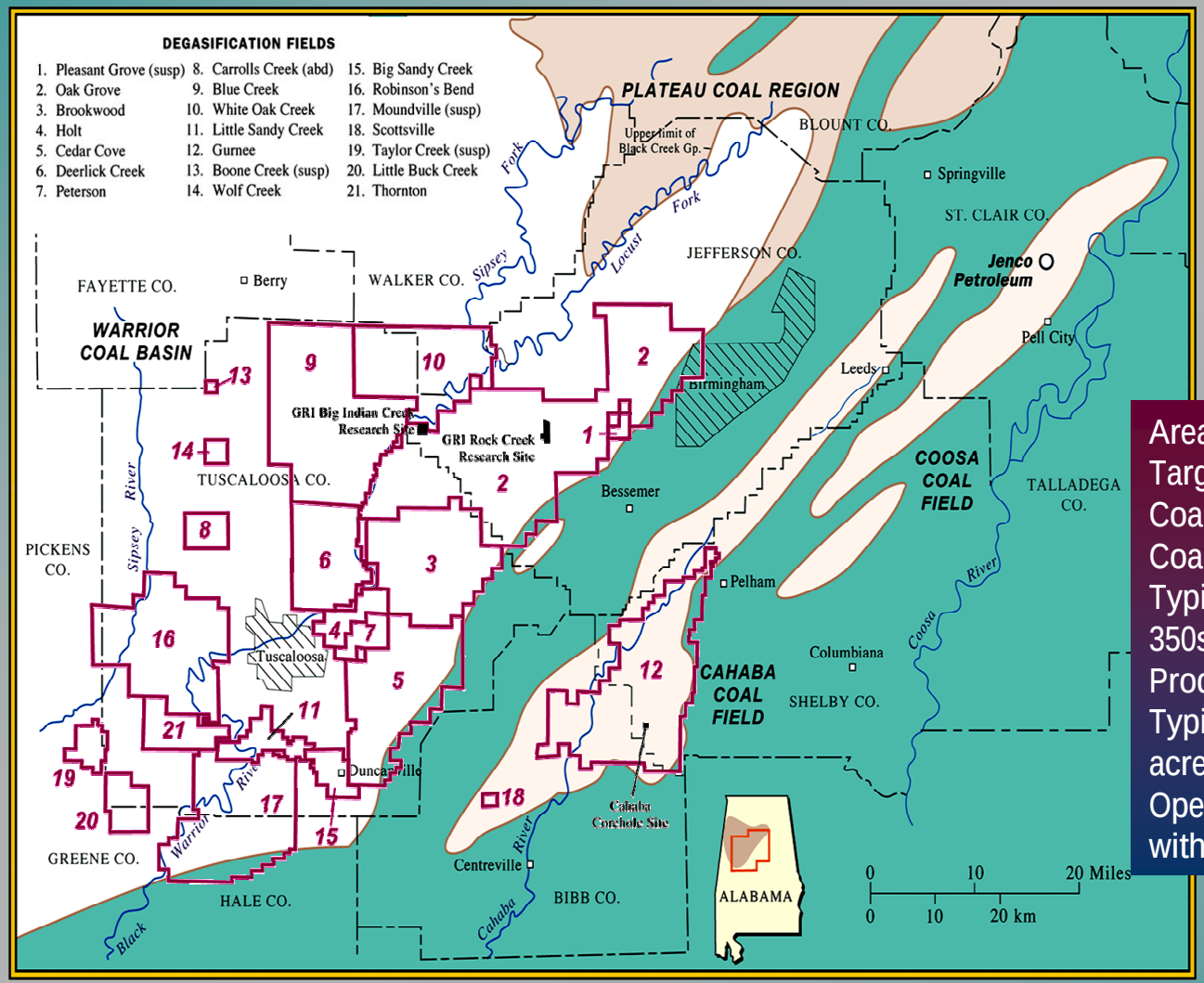
Black Warrior Basin CBM



Area: 35,000 mi²
Target Coals: Pottsville Fm.
Coal Age: Pennsylvanian
Coal Rank: hvA/Bb-lvb
Typical Gas Content: 350scf/t
Producing Wells: ~3,000
Typical Well Spacing: 80 acres
Operators: 12 (consolidated with maturity)

Deeper Coals, Shales, Tight Sands and Deep Carbonates

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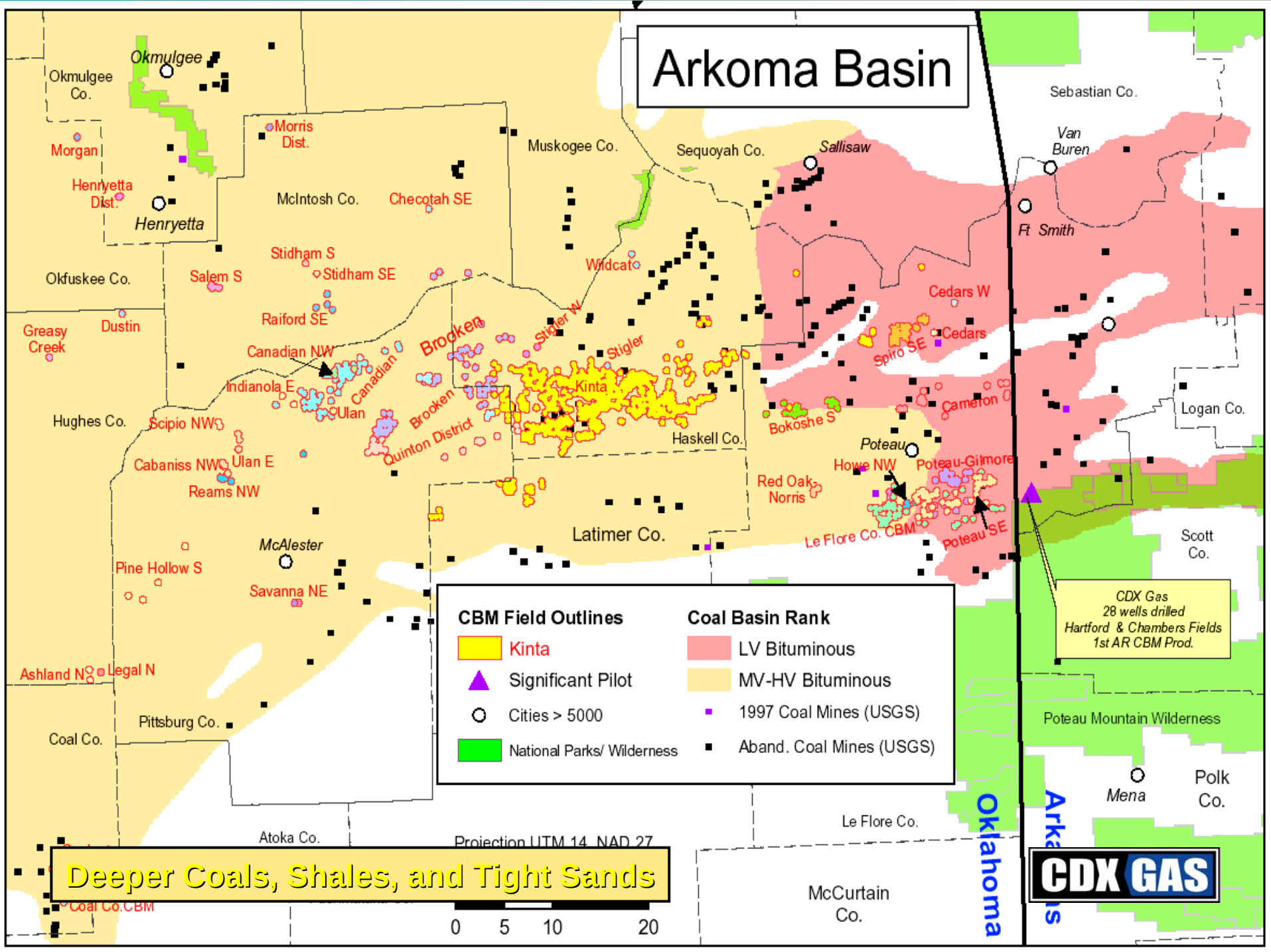
Arkoma Basin
Okmulgee
Okmulgee Co.
Morris Dist.
Morgan
Henryetta Dist.
Henryetta
McIntosh Co.
Checotah SE
Muskogee Co.
Sequoyah Co.
Sallisaw
Sebastian Co.
Van Buren
Ft Smith
Stidham S
Stidham SE
Wildcat
Okfuskee Co.
Salem S
Raiford SE
Greasy Creek
Dustin
Canadian NW
Canadian
Brooken
Stigler W
Stigler
Kinta
Indianola E
Ulan
Brooken Quinton District
Cedars W
Cedars
Spiro SE
Cameron
Bokoshe S
Logan Co.
Hughes Co.
Scipio NW
Haskell Co.
Poteau
Howe NW
Poteau-Gilmore
Red Oak Norris
Cabaniss NW
Ulan E
Reams NW
Le Flore Co. CBM
Poteau SE
Latimer Co.
McAlester
Scott Co.
Pine Hollow S
Savanna NE
CDX Gas
28 wells drilled
Hartford & Chambers Fields
1st AR CBM Prod.
CBM Field Outlines
Kinta
Significant Pilot
Cities > 5000
National Parks/ Wilderness
Coal Basin Rank
LV Bituminous
MV-HV Bituminous
1997 Coal Mines (USGS)
Aband. Coal Mines (USGS)
Ashland N
Legal N
Pittsburg Co.
Coal Co.
Poteau Mountain Wilderness
Mena
Polk Co.
Atoka Co.
Projection UTM 14, NAD 27
Le Flore Co.
Oklahoma
Arkansas
Coal Co.CBM
McCurtain Co.
Deeper Coals, Shales, and Tight Sands
0 5 10 20
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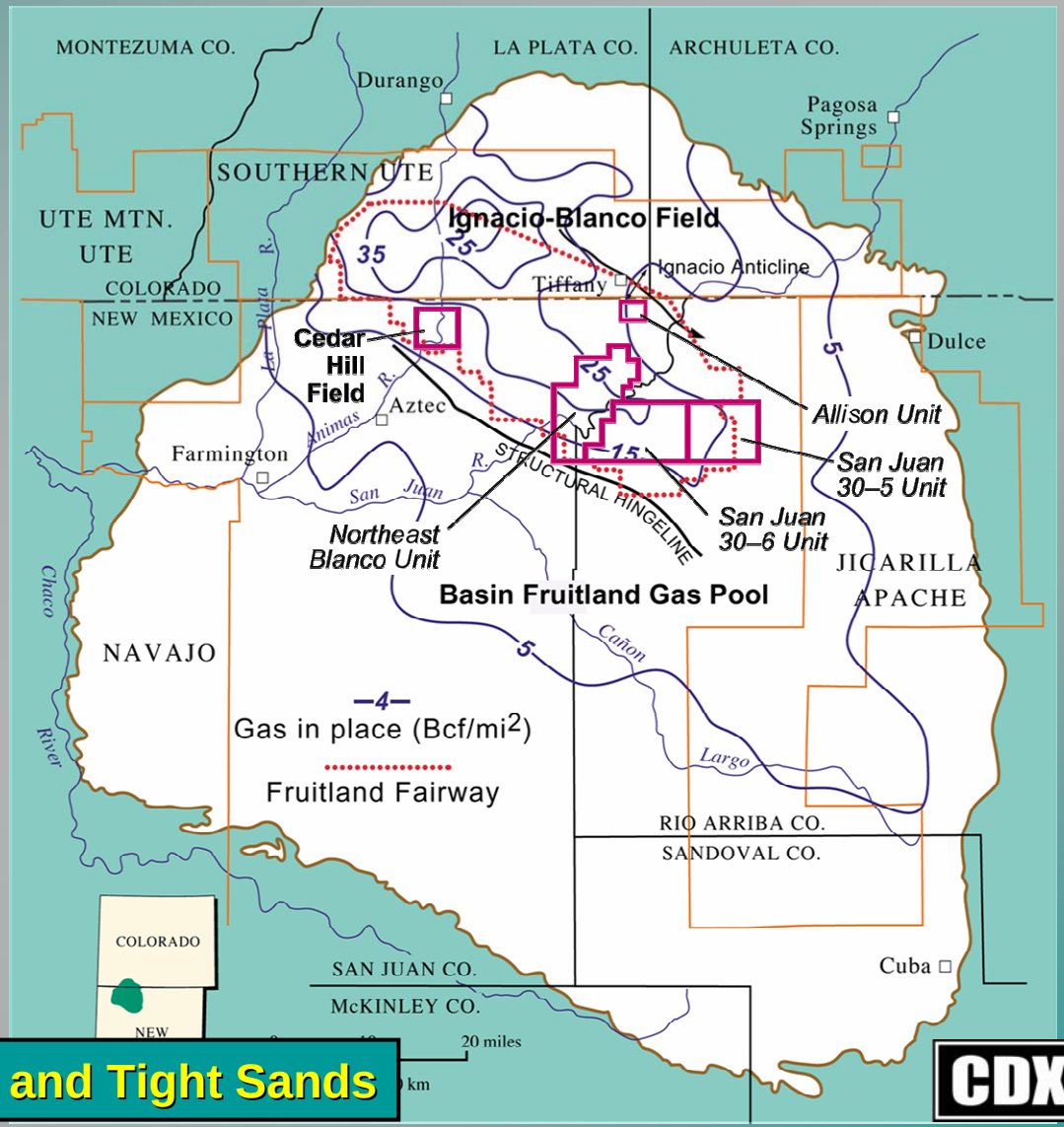
San Juan Basin CBM

Area: 7,500 mi²
Target Coals: Fruitland Fm.; Menefee Fm. (untested)
Coal Age: Late Cretaceous
Coal Rank: hvCb-lvb
Typical Gas Content: 430 scf/t
Producing Wells: ~3,000
Typical Well Spacing: 320 acres, 160 acres (infill)
Operators: ~80



Deeper Coals, Shales, and Tight Sands

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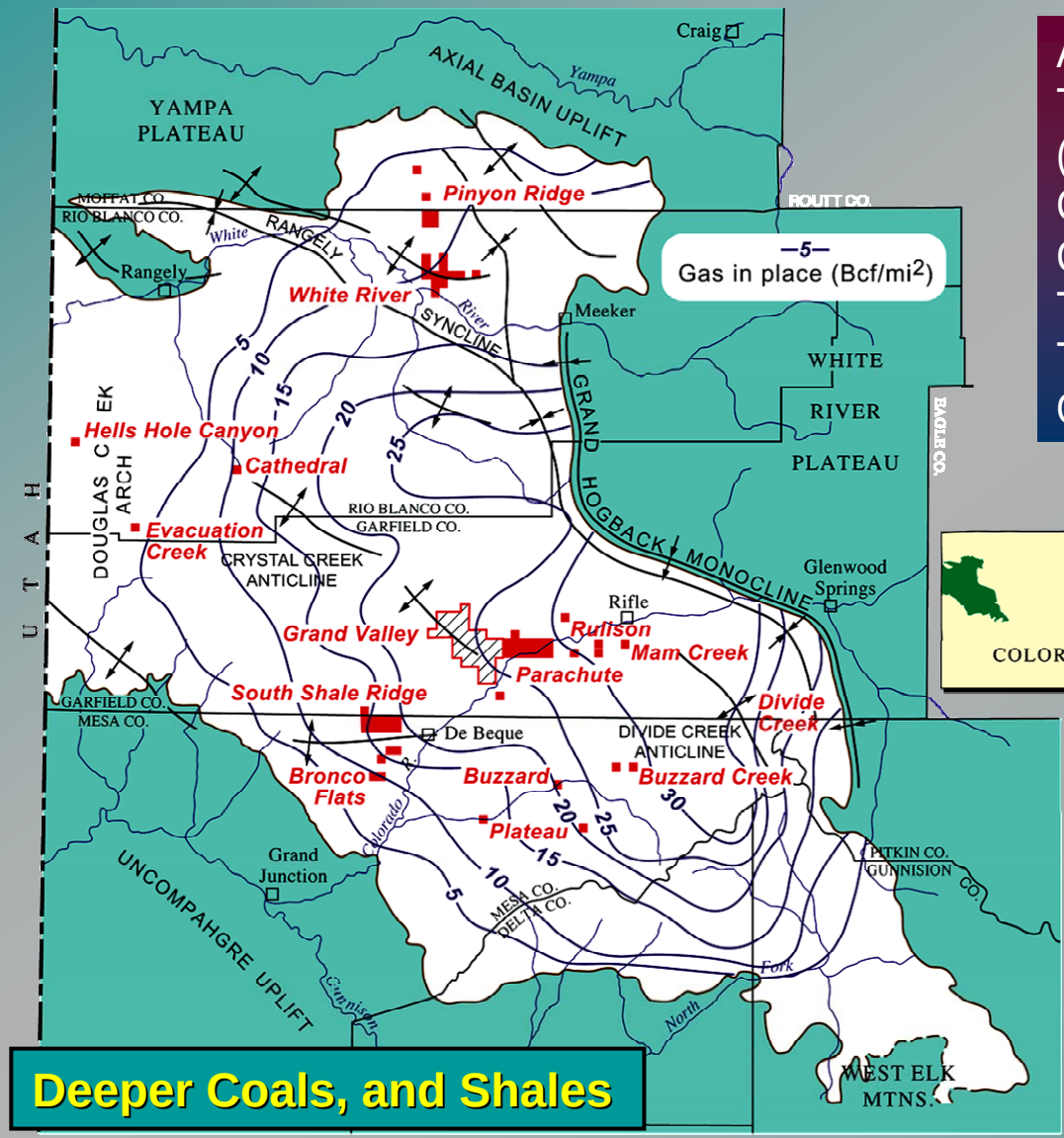
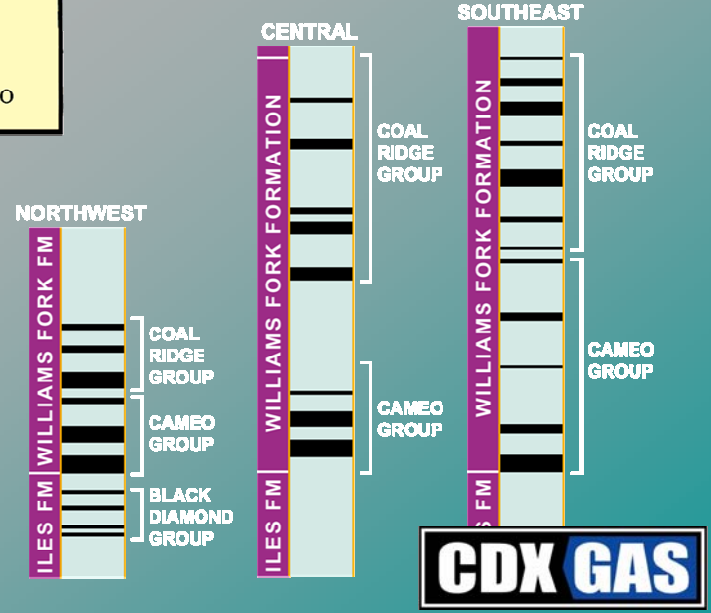
Piceance Basin CBM



Area: 6,700 mi^2
Target Coals: Williams Fork and Iles Fms. (Mesaverde Group)
Coal Age: Late Cretaceous
Coal Rank: hvCb-lvb, some semianthracite
Typical Gas Content: 125-325 scf/t
Typical Well Spacing: 80 acres
Operators: <10



Deeper Coals, and Shales

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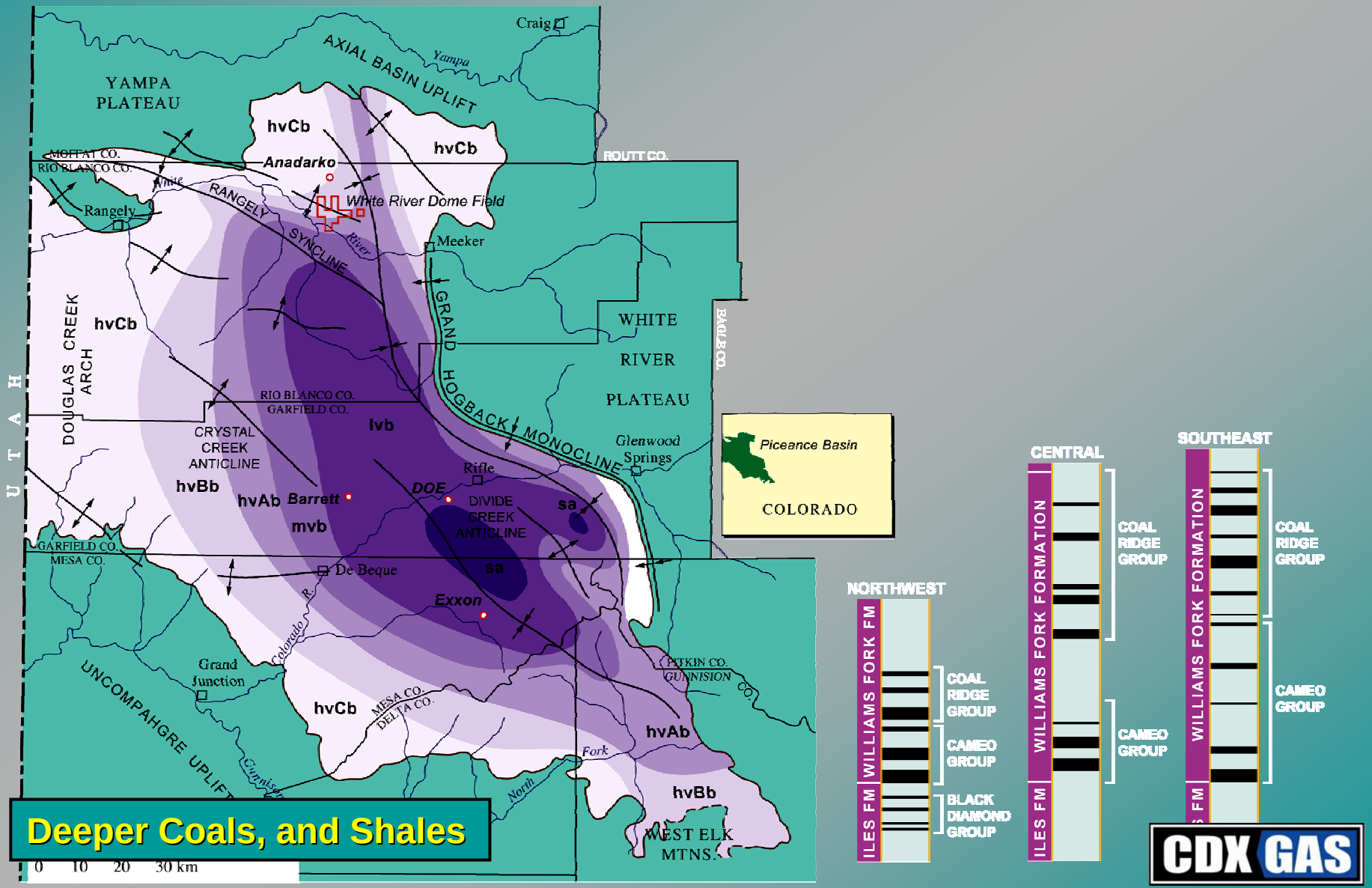
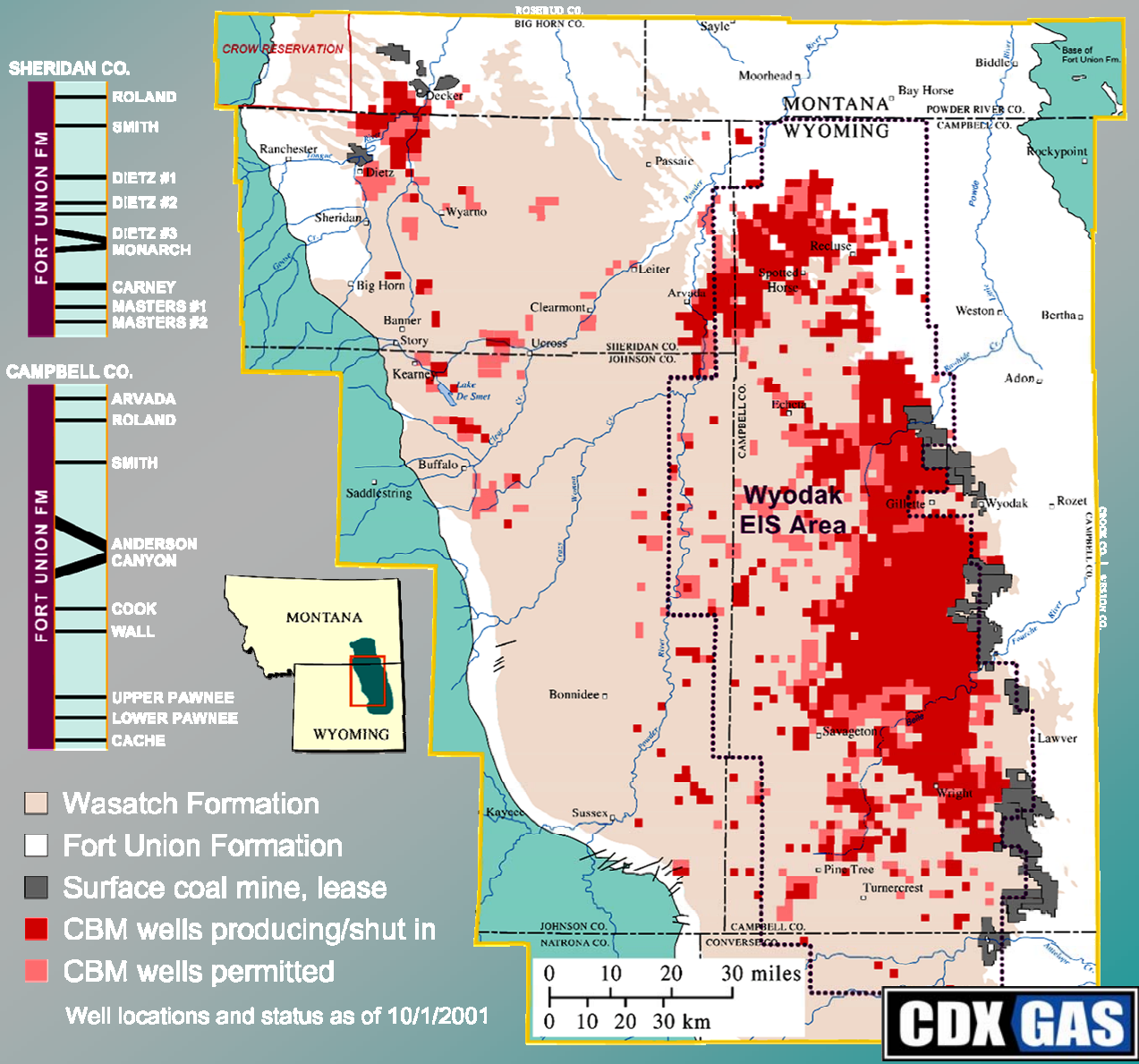
Piceance Basin Coal Rank



Adapted from McFall and others (1986)

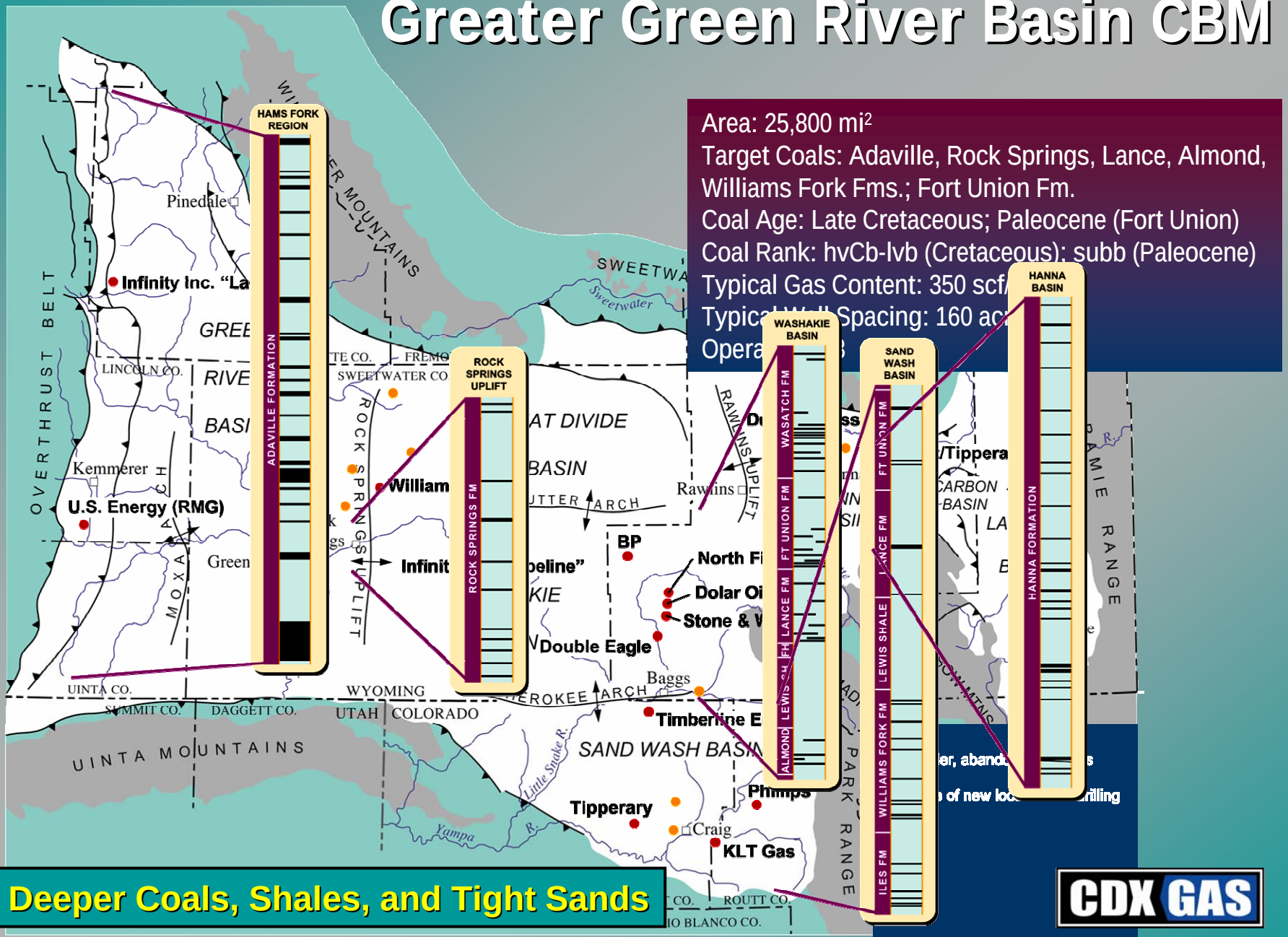
Powder River Basin CBM

Area: 25,800 mi²
Target Coals: Fort Union Fm.
Coal Age: Paleocene
Coal Rank: subbituminous
Typical Gas Content: 30 scf/t
Permits: >25,000
Producing Wells: ~12,000
Typical Well Spacing: 80 acres
Operators: ~120



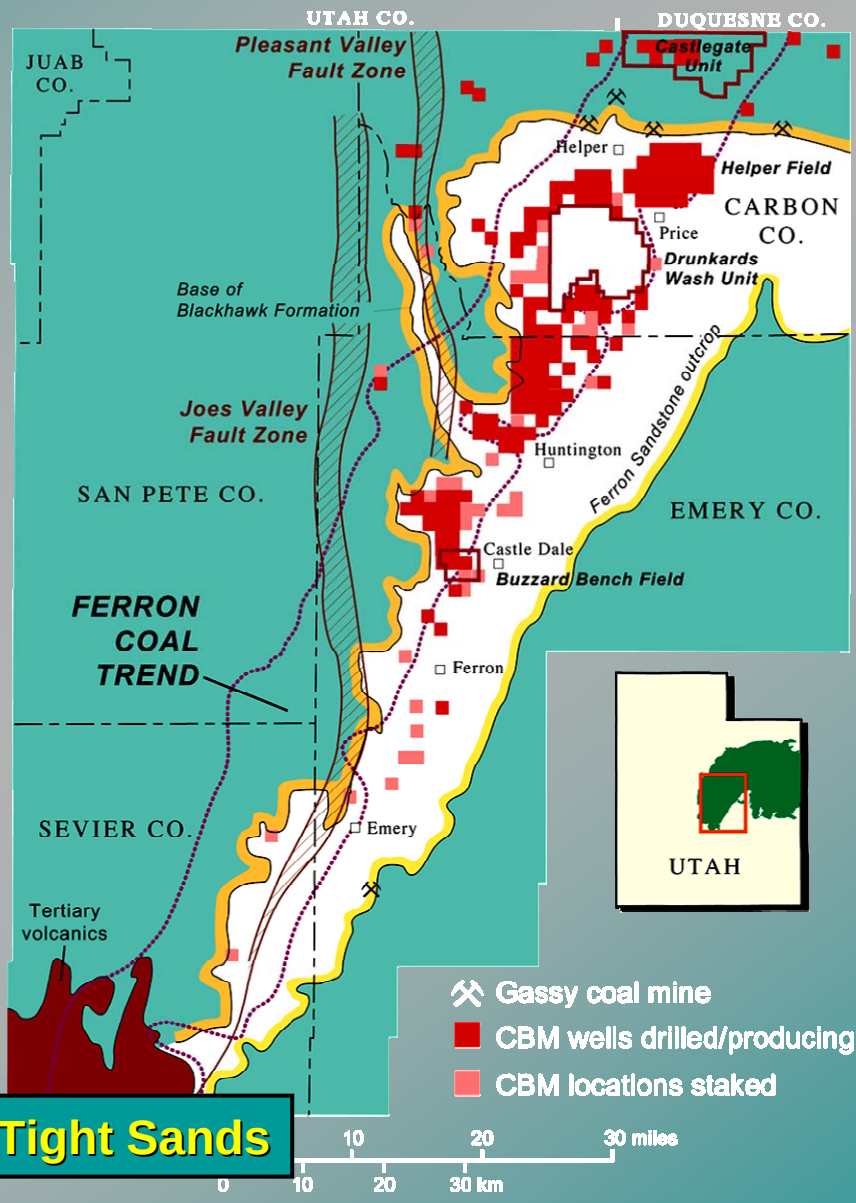
Deeper Coals

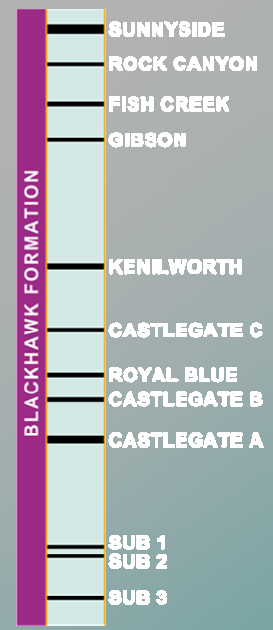
Greater Green River Basin CBM

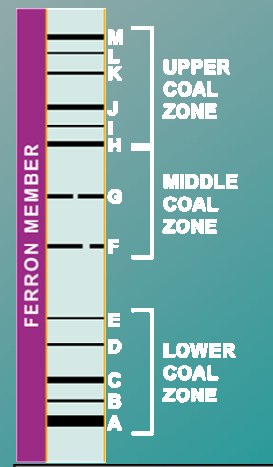


Uinta Basin CBM

Area: 14,450 mi²
Target Coals: Ferron Sandstone Mbr. Of Mancos Shale; Blackhawk Fm.
Coal Age: Late Cretaceous
Coal Rank: hvB/Cb
Typical Gas Content: 400 scf/t
Producing Wells: ~580
Typical Well Spacing: 160 acres
Operators: 10







Deeper Coals, Shales, and Tight Sands

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Pacific Coal Region

Target Coals: Puget Group
Coal Age: Eocene
Coal Rank: subC/A-mvb, minor anthracite

Coals, Shales, and Tight Sands

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Alaska Coal Region

Coals, Shales, and Tight Sands

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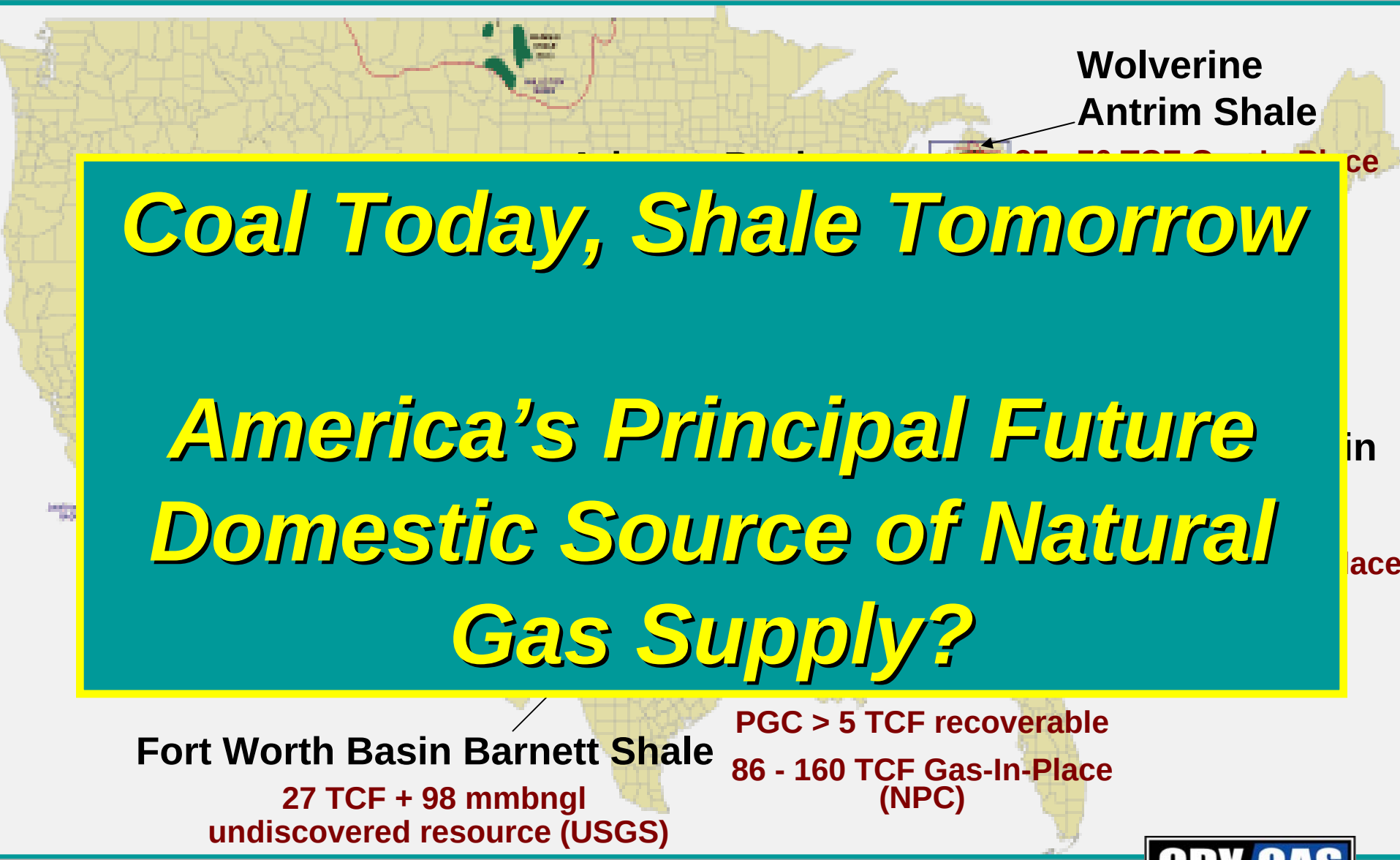
Shale Gas Resources




The Future Is Unconventional
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