COALBED METHANE--A NON-CONVENTIONAL ENERGY SOURCE

WHAT IS IT AND WHY IS IT IMPORTANT

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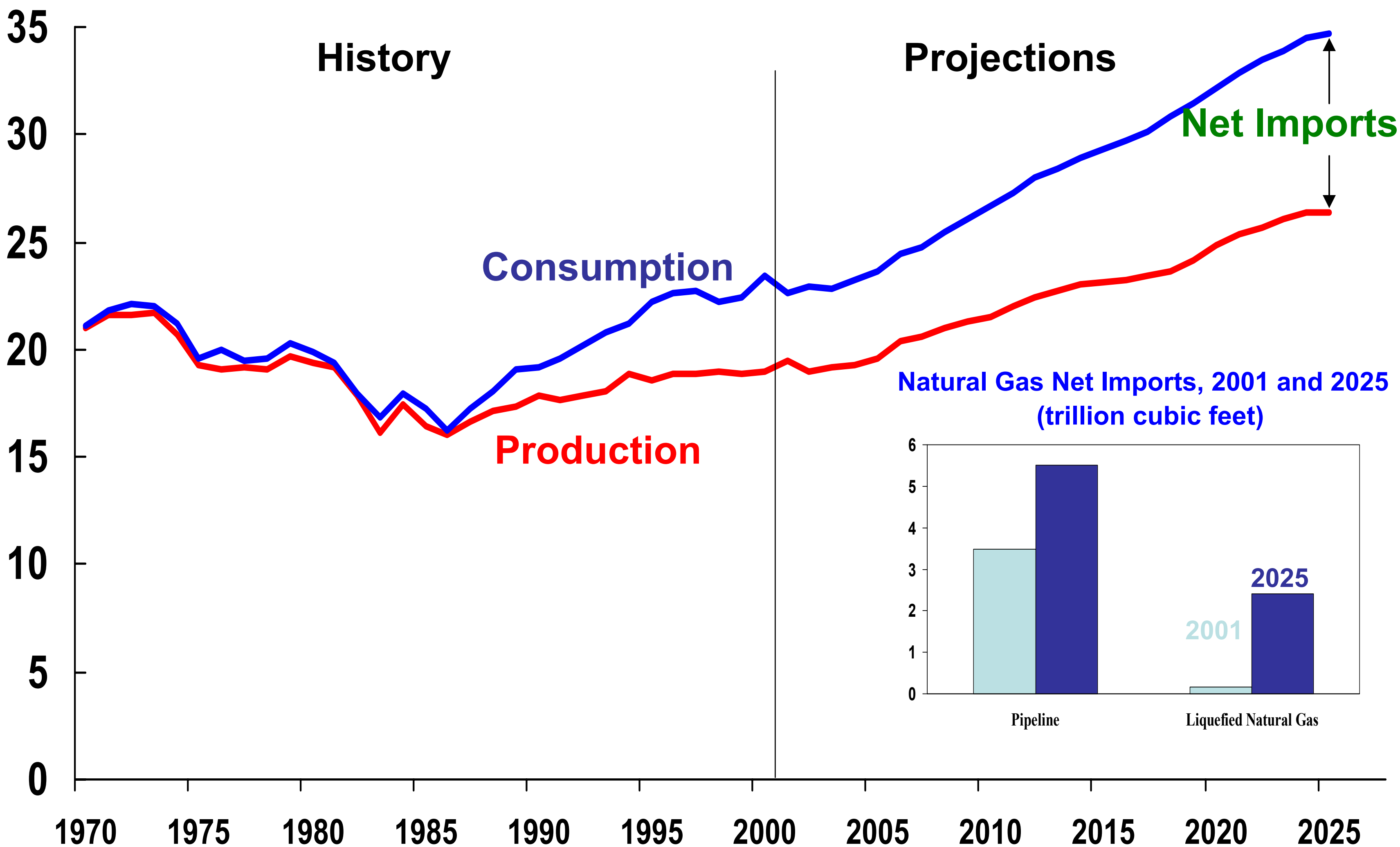
Fueling The Future

25^{th} Annual North American Conference of the USAEE/IAEE

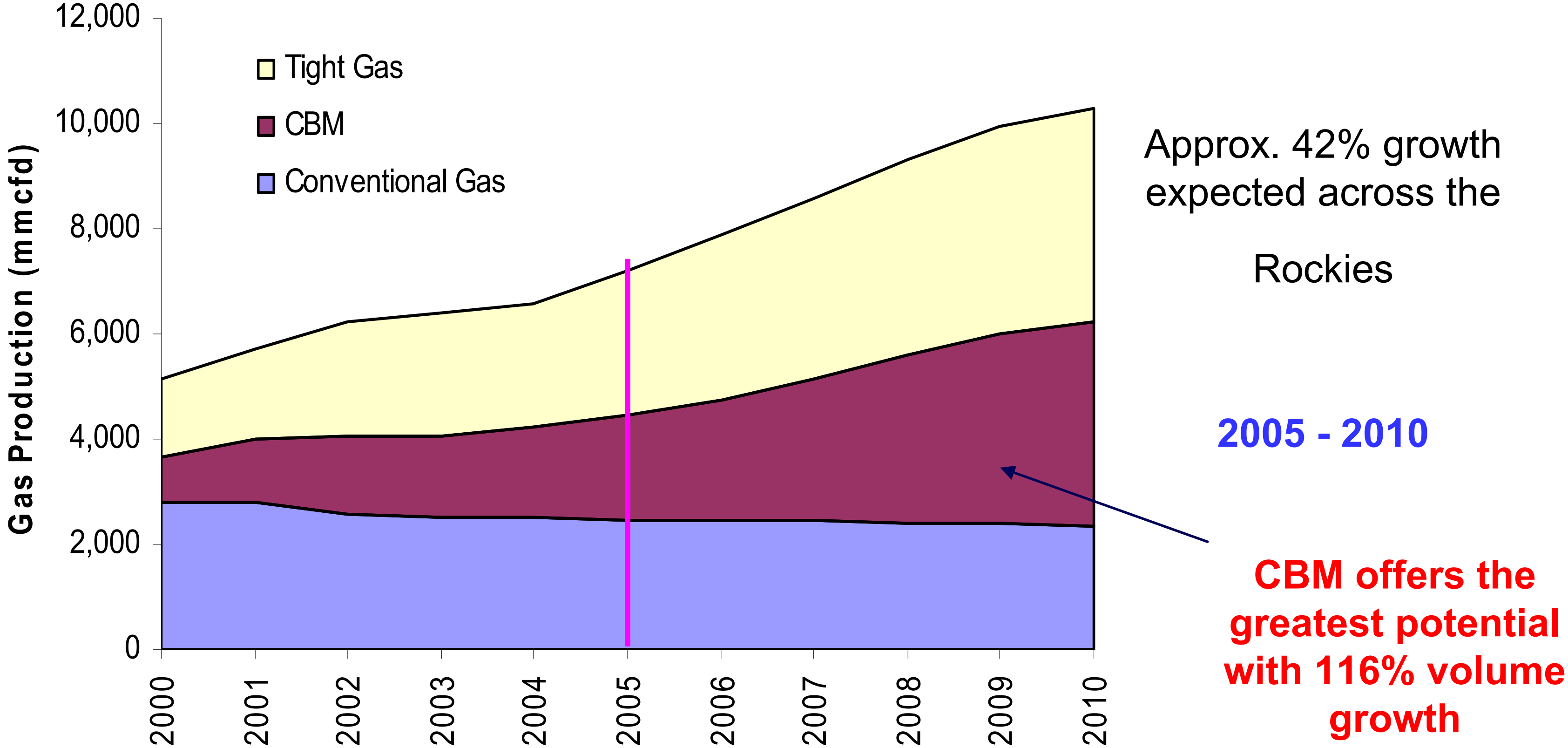
Sept. 20, 2005

Natural Gas Production, Consumption, and Imports, 1970 - 2025 (trillion cubic feet)



(EIA)

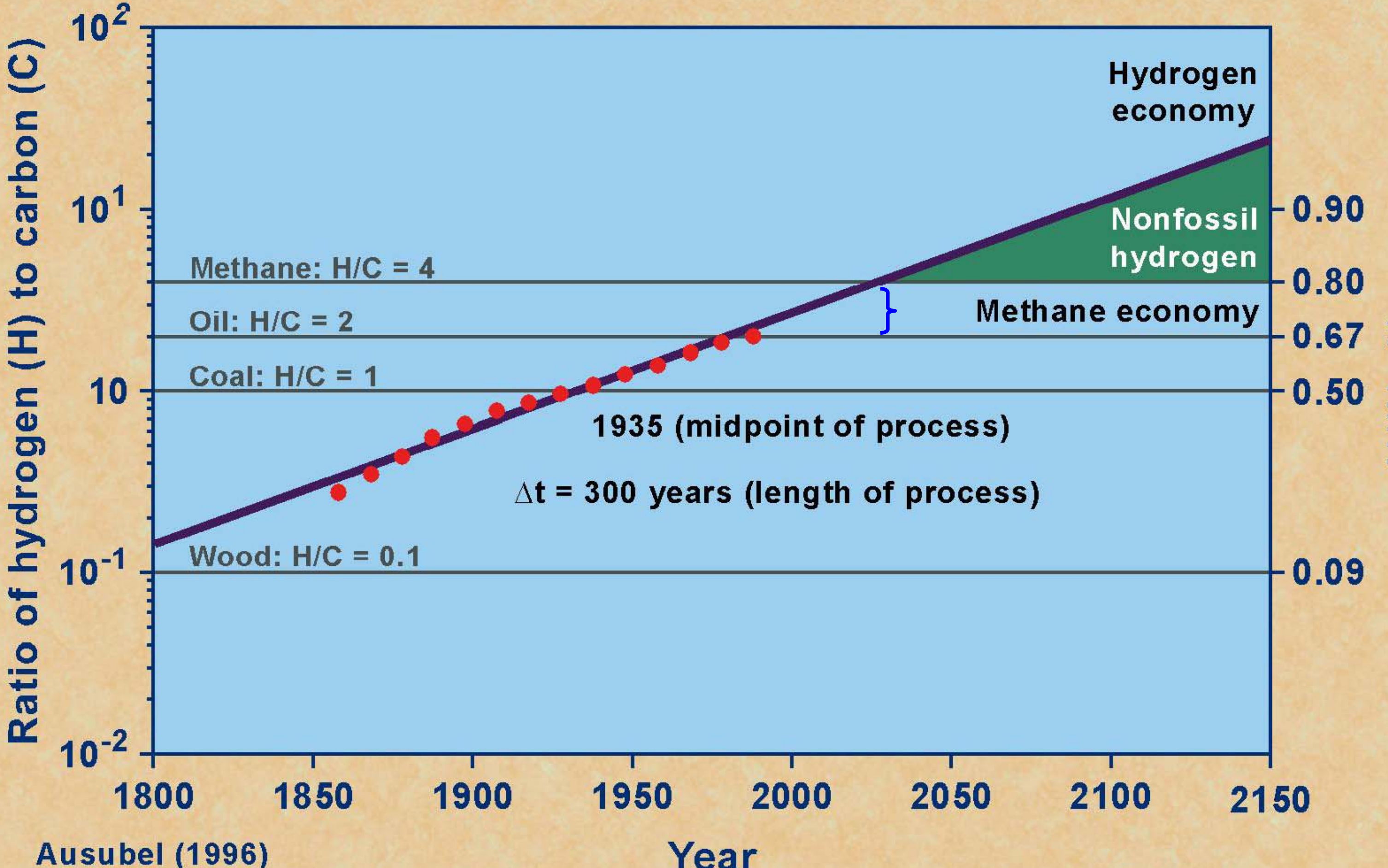
Major Growth in Production from Unconventional Resources



- Tight Gas - 2.3 bcfd in 2004 to 4.1 bcfd in 2010
- **CBM - 1.8 bcfd in 2004 to 3.9 bcfd in 2010**
- Conventional Gas - 2.5 bcfd in 2004 to 2.3 bcfd in 2010

Wood Mackenzie
Woodmac.com

RATIO OF HYDROGEN (H) TO CARBON (C) FOR GLOBAL PRIMARY ENERGY CONSUMPTION SINCE 1860 & PROJECTIONS FOR THE FUTURE

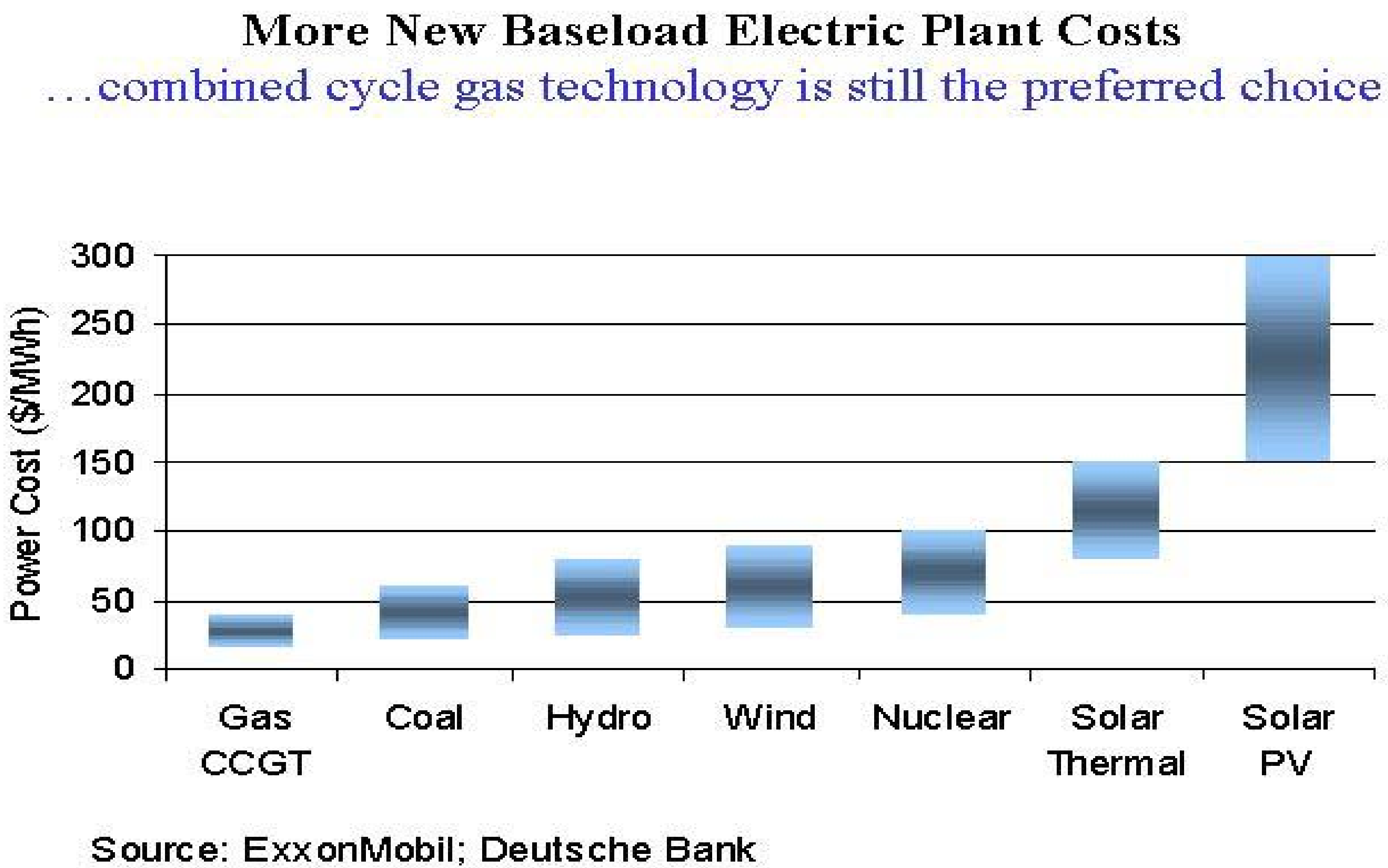


Ausubel (1996)

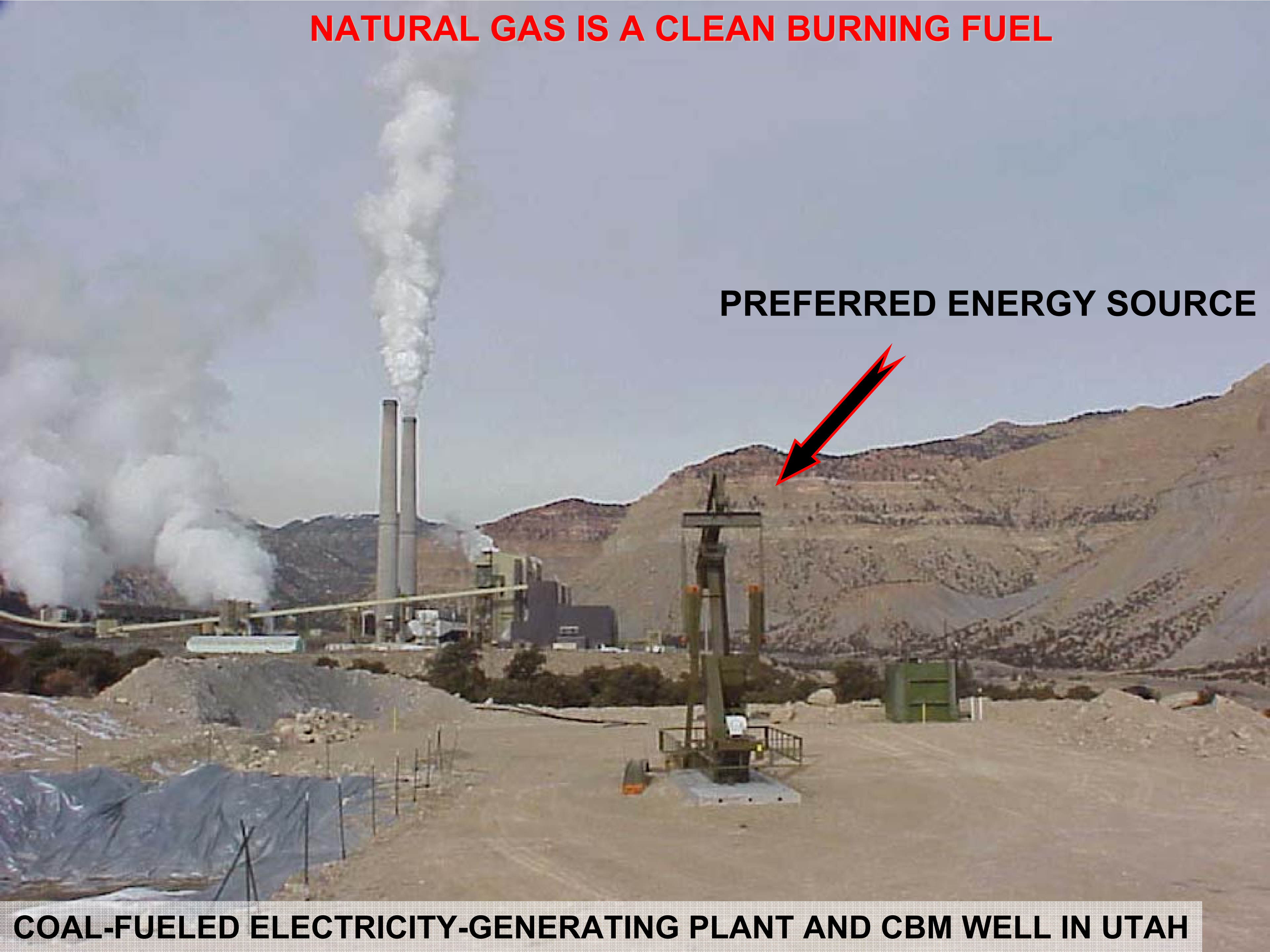
Scott Tinker, Director
Bureau of Economic Geology
August 4, 2003

QAb8552c

Why Natural Gas?
Efficiency

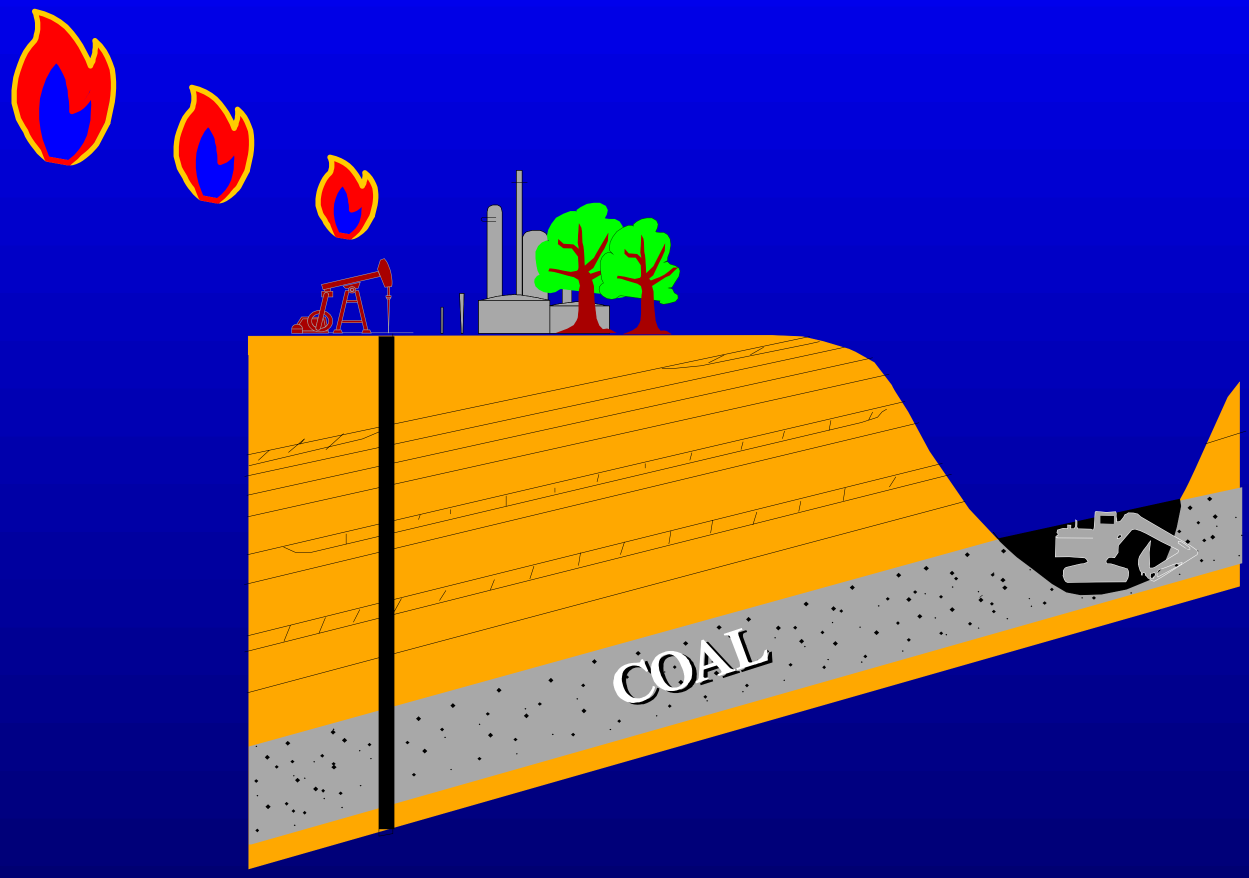


NATURAL GAS IS A CLEAN BURNING FUEL



COAL-FUELED ELECTRICITY-GENERATING PLANT AND CBM WELL IN UTAH

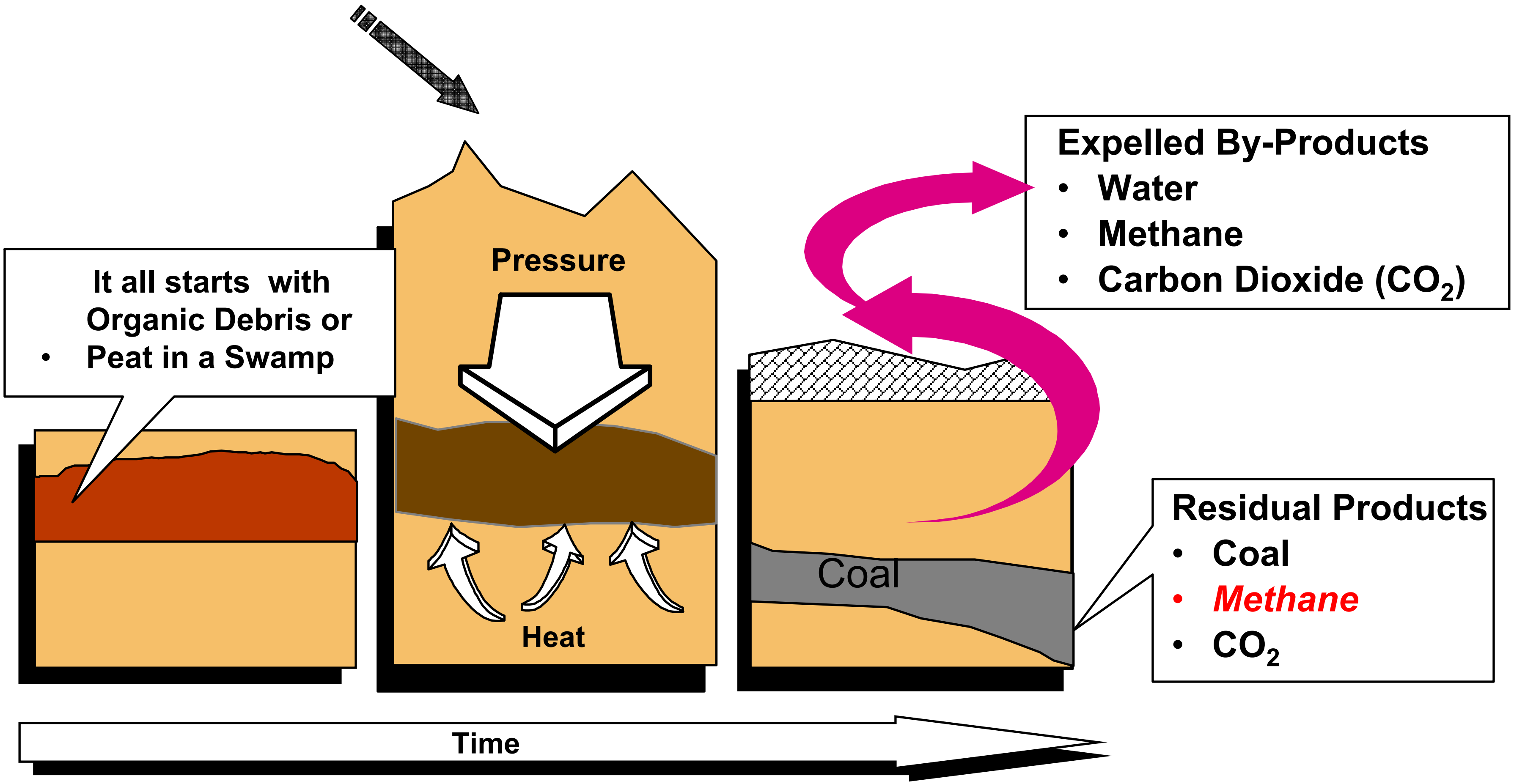
WHAT IS COALBED METHANE ?



METHANE GAS PRODUCED FROM UNDERGROUND COAL BEDS

COALBED METHANE IS FORMED DURING THE CONVERSION OF PEAT TO COAL

Coal is formed from peat over time by heat and pressure

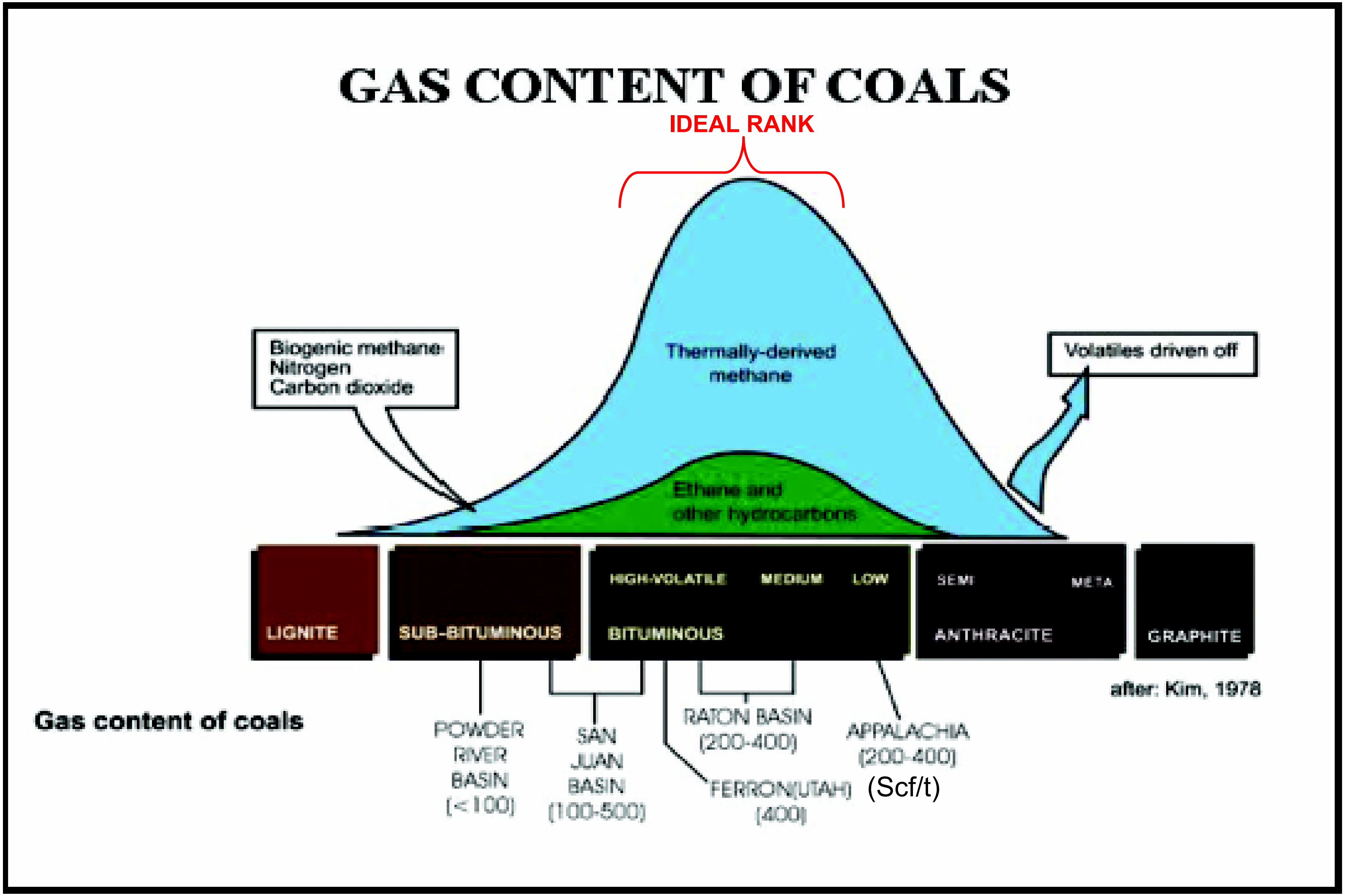


PEAT SWAMP

ALL Consulting 2/04

Picture 28
Cast of an in-situ tree rooted in the Jagger Seam and encased in the crevasse splay deposit that terminated peat deposition in the swamp in the Black Warrior Basin, Alabama. (Picture by Walter Ayers, S. A. Holditch & Associates, Inc., College Station, Texas; shown are William Kaiser (left) and Richard Winston.)

GAS CONTENTS OF VARIOUS ROCKY MTN. BASINS



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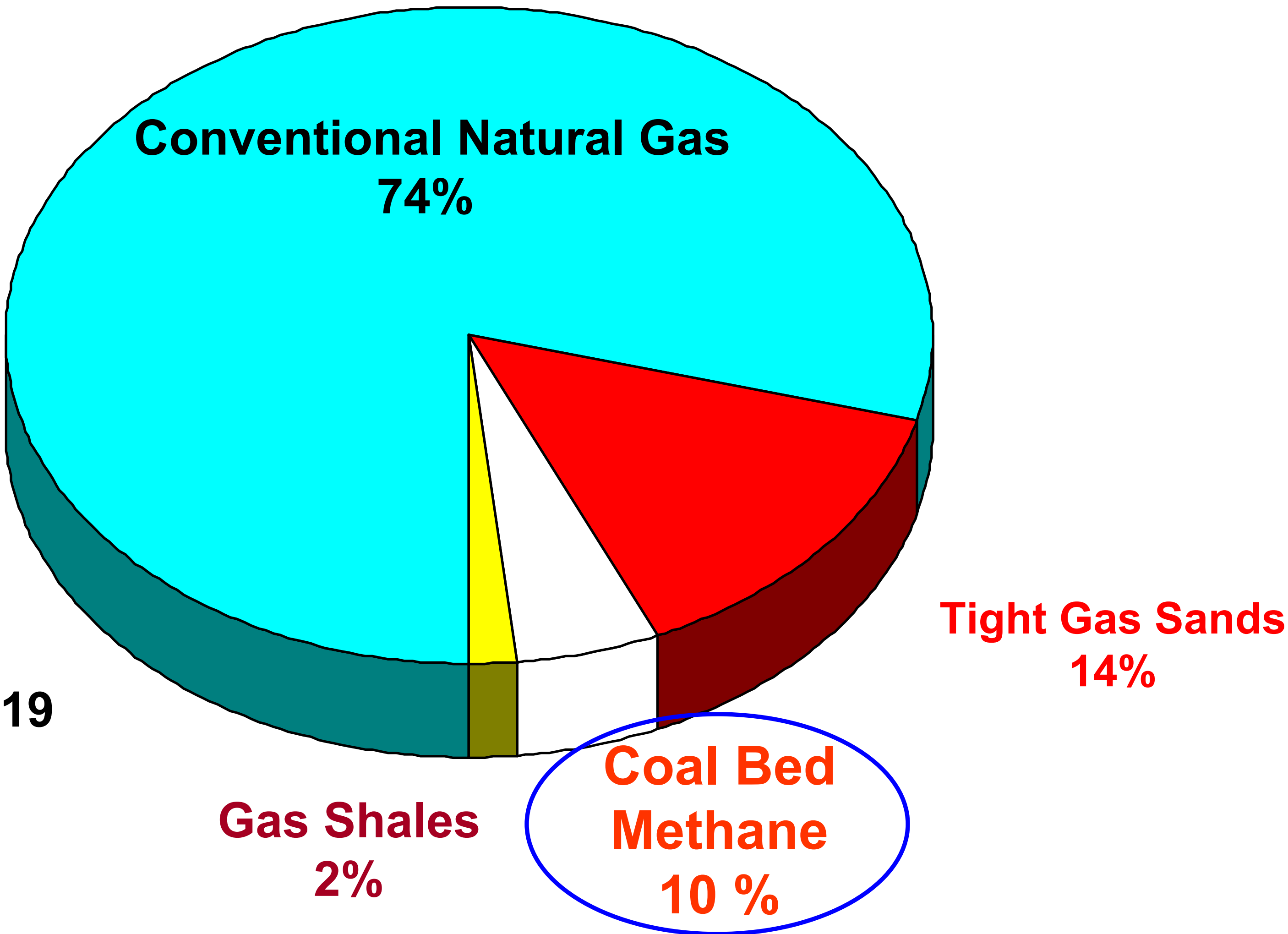
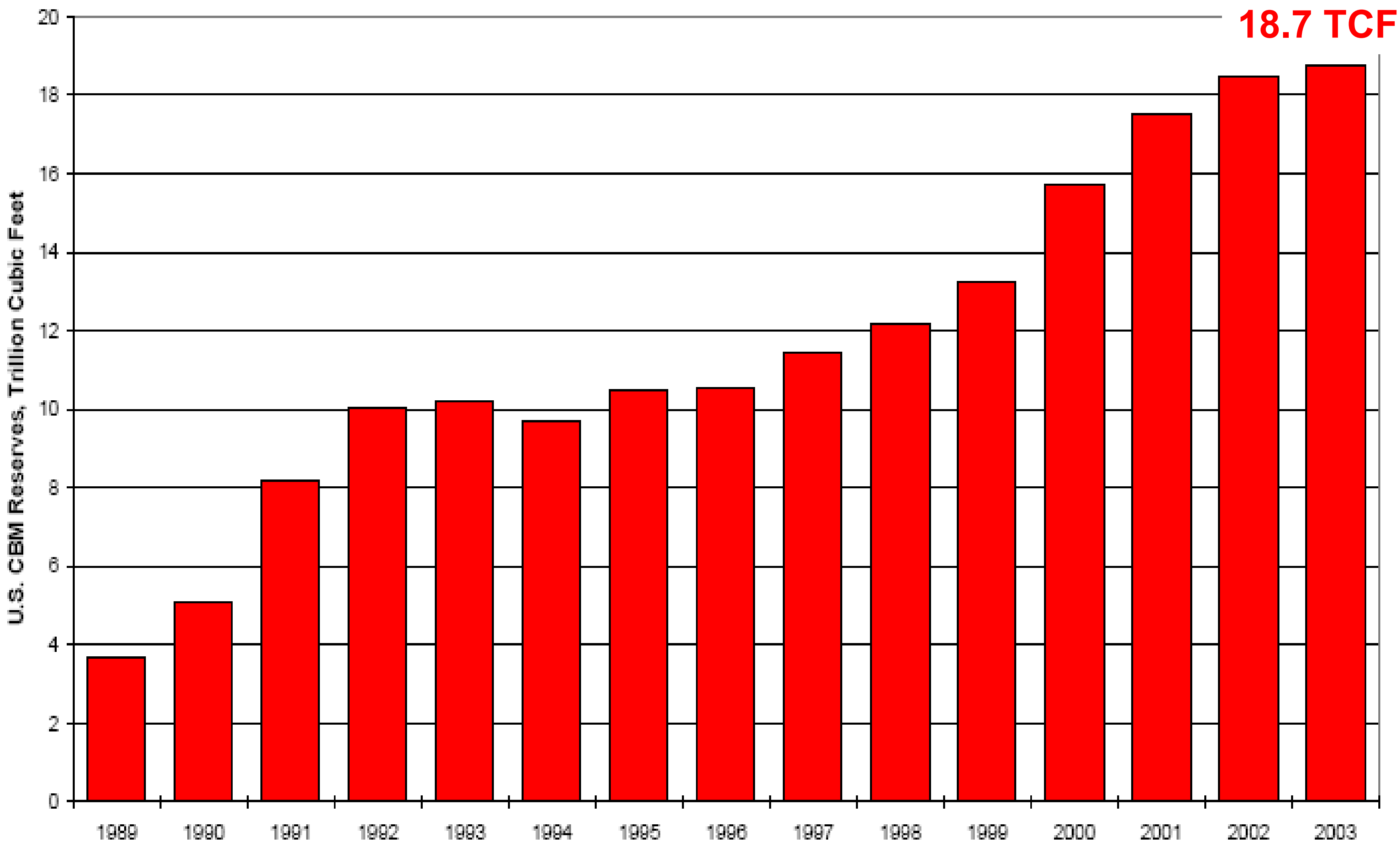
CBM HAS BECOME AN IMPORTANT SEGMENT OF US GAS PRODUCTION



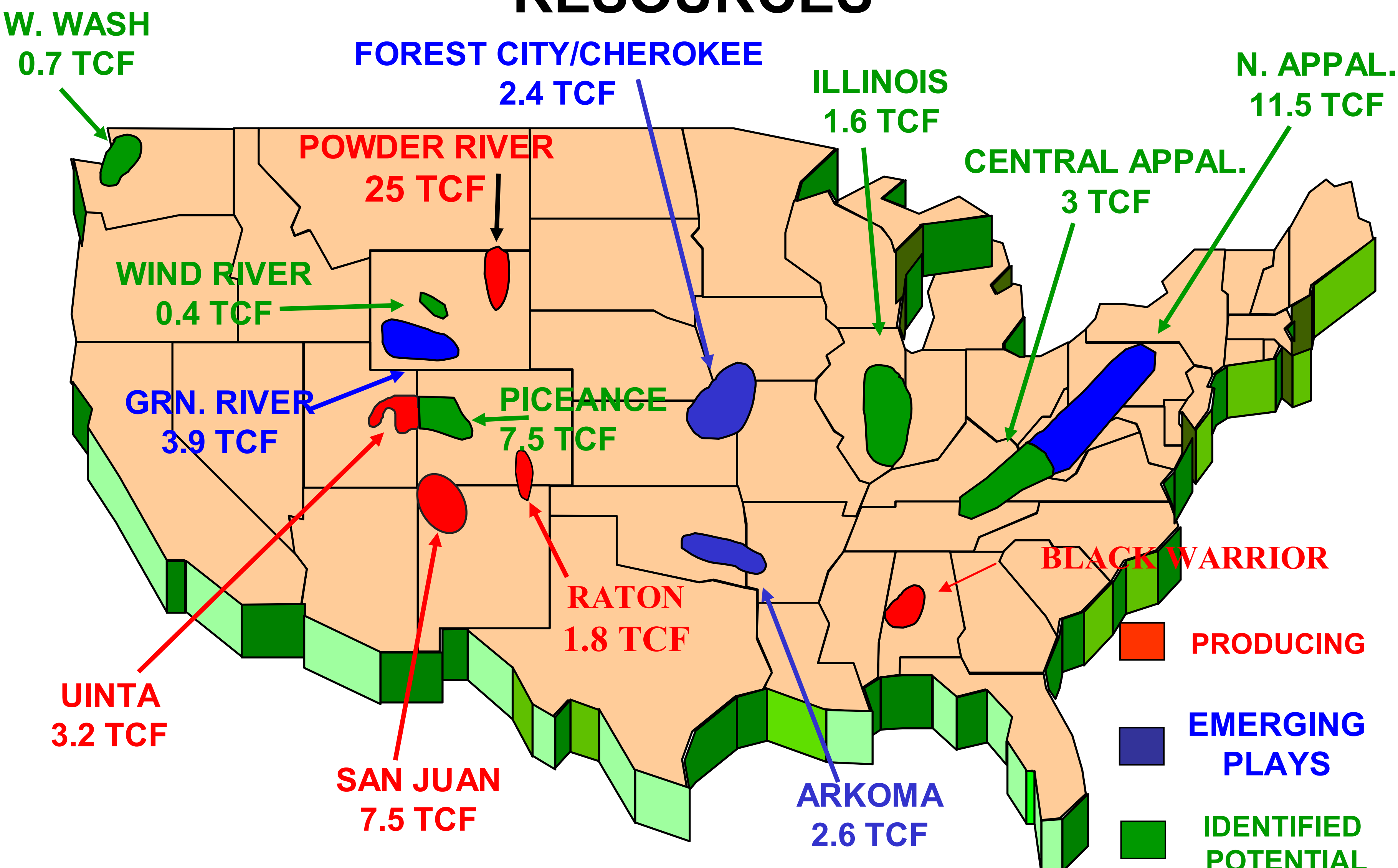
U.S. CONSUMES 19 TCF OF GAS ANNUALLY

U.S COALBED METHANE PROVED RESERVES, 1989-2003



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1989 through 2003 annual reports, DOE/EIA-0216.

U.S. CONTAINS 703 TCF OF CBM RESOURCES



GRI

U.S. CBM RESOURCES

• Greater Green River Basin	314 Tcf
• Piceance Basin	99 Tcf
• San Juan Basin	50 Tcf
• Powder River Basin	30 Tcf
• Uinta Basin	10 Tcf
• Raton Basin	10 Tcf
TOTAL	**513 TCF**

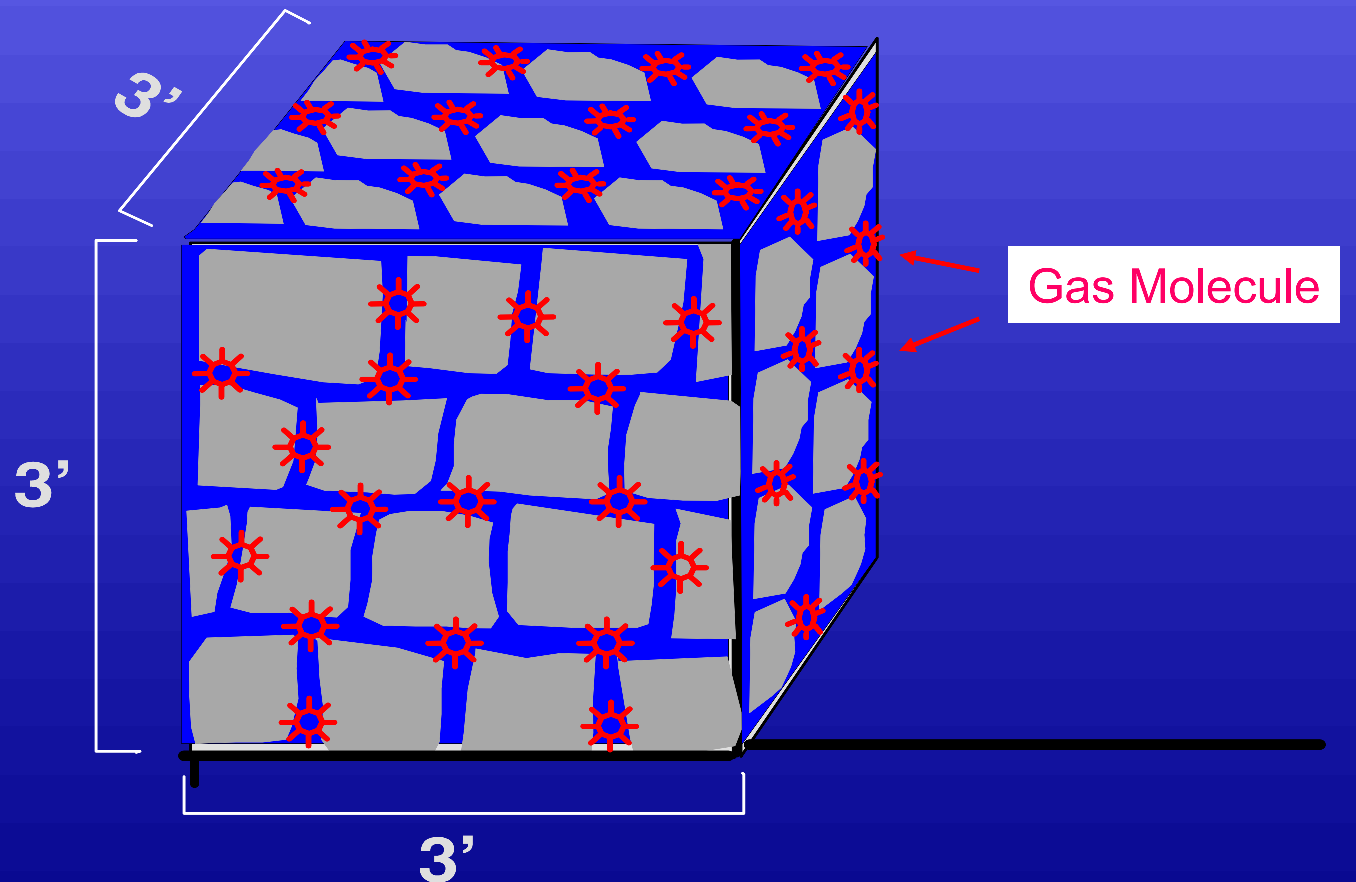
Meissner

CBM IN U. S. LOWER 48 STATES

- 13 TCF PRODUCED
- 18.7 TCF PROVED RESERVES
- 42.3 TCF ECONOMICALLY RECOVERABLE
- 101.2 TCF UNDISCOVERED
- 703 TCF TOTAL RESOURCE ESTIMATE
- >14,000 WELLS
- 1.6 TCF PRODUCED IN 2003
- >10% OF U.S. NATURAL GAS PRODUCTION

Data as of 12/03

GAS IS ADSORBED ON INTERNAL SURFACES OF COAL



1 TON OF COAL CONTAINS 1 BILLION SQ. FT. OF INTERNAL SURFACE AREA

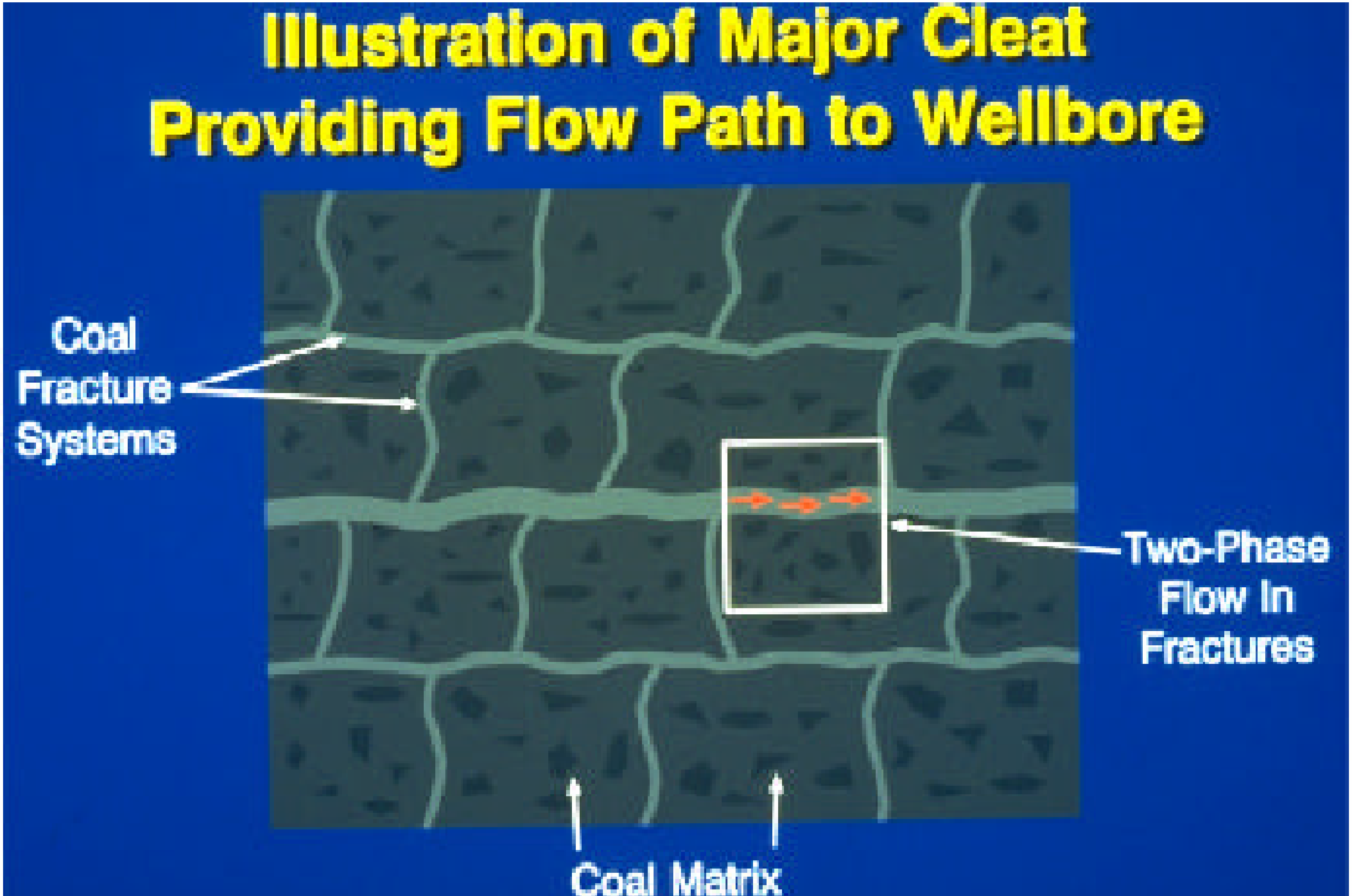


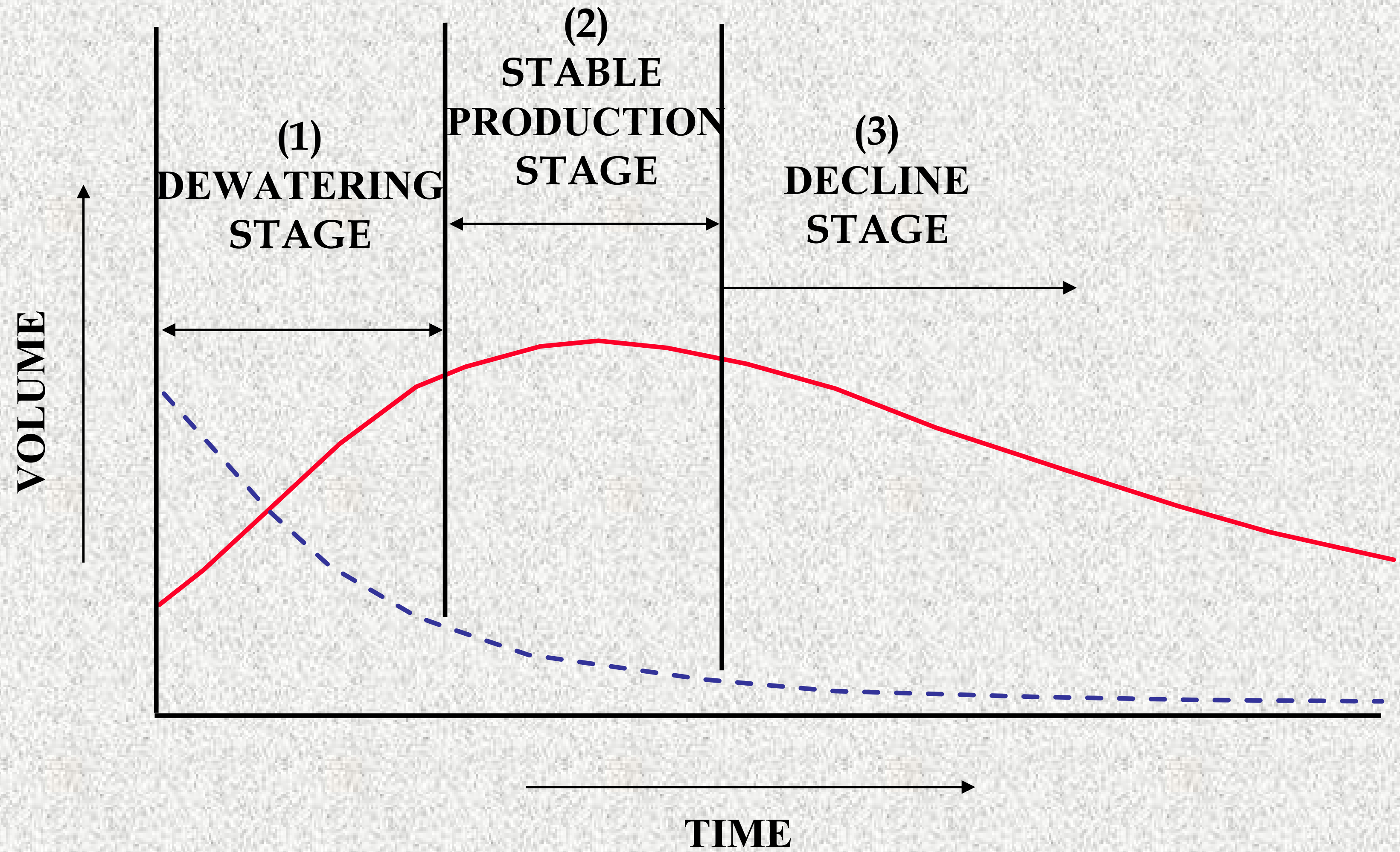
Illustration of Major Cleat
Providing Flow Path to Wellbore
Coal
Fracture
Systems
Two-Phase
Flow In
Fractures
Coal Matrix

Picture 1
Cleats in a coal exposure of the Cretaceous Fruitland Formation in the Star Lake area, southern San Juan Basin, New Mexico. Note the termination of the cleats at a tonstein parting (few exceptions). Both face and butt cleats are well-developed and the butt cleat is iron-stained. (Picture by Walter Ayers, S. A. Holditch & Associates, Inc., College Station, Texas.)

ADVANTAGES OF COALS AS RESERVOIRS

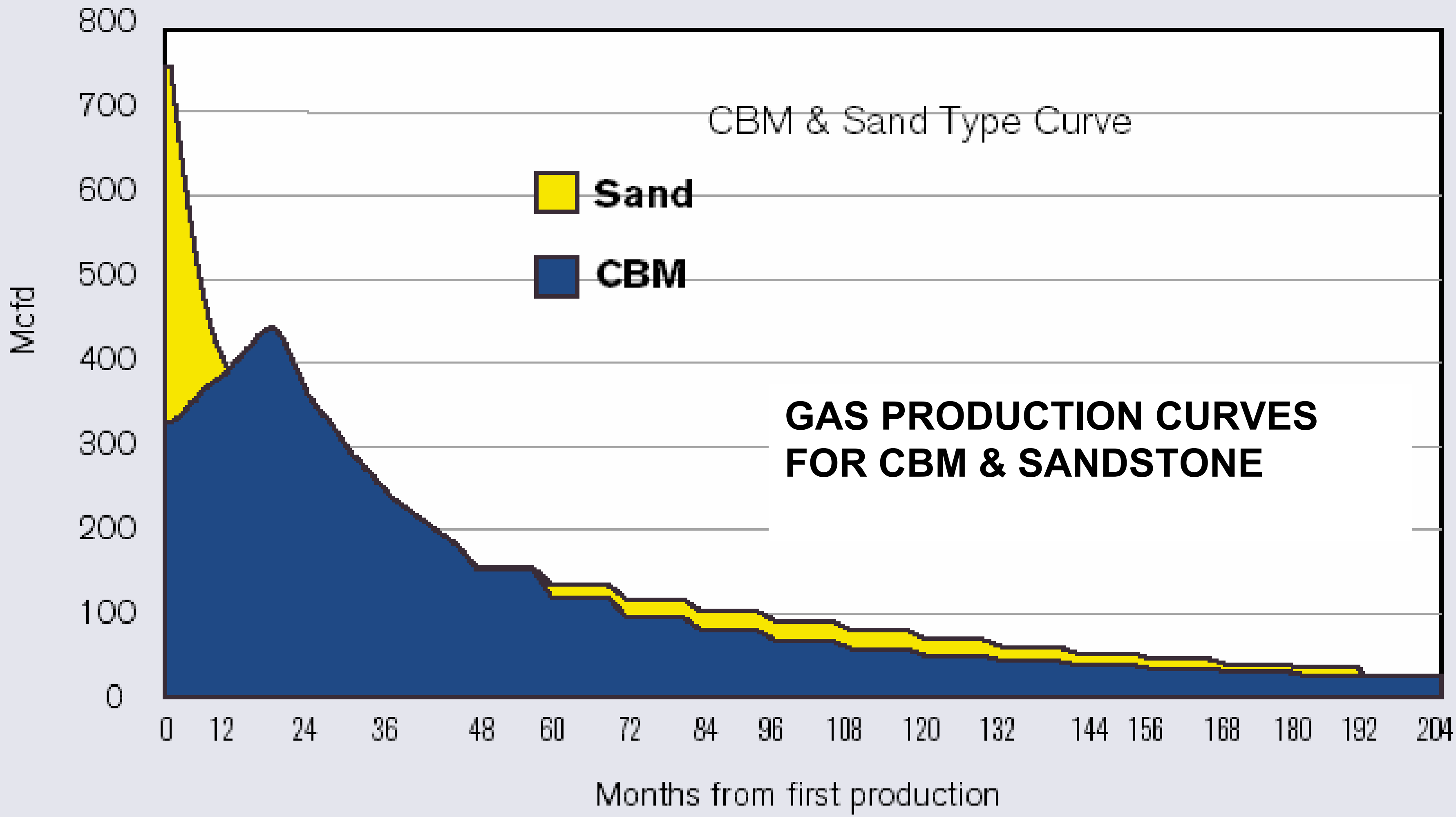
- Large gas storage capacity
- Shallow depths
- Relatively low cost
- Very good economics
- Most coal basins have been mapped
- Abundant data from logs of older wells

PRODUCTIVE STAGES OF A COALBED METHANE WELL



TYPICAL PUMPING UNIT ON A CBM WELL

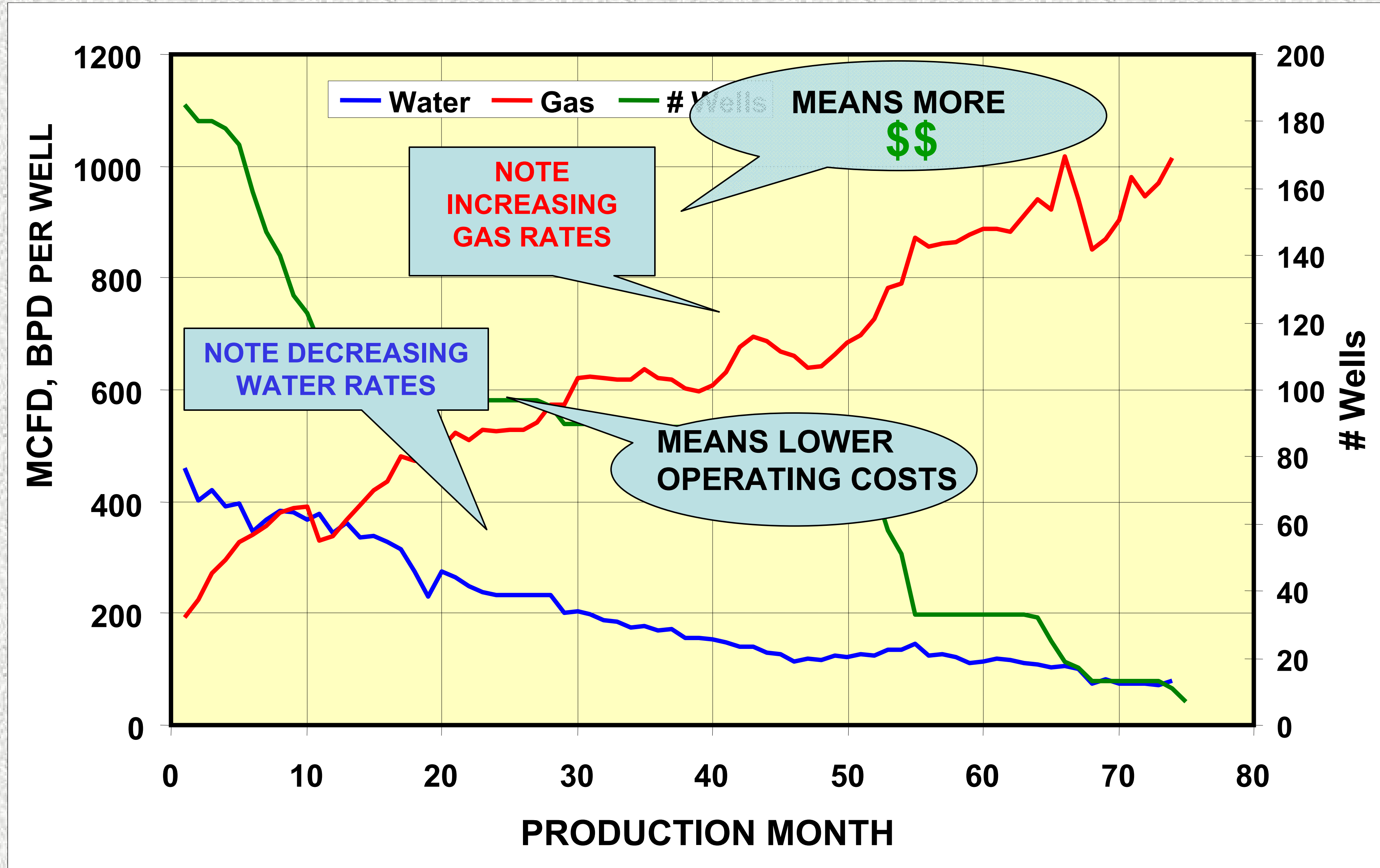
Exh. # 9 COMPARISON OF GAS PRODUCTION CURVES



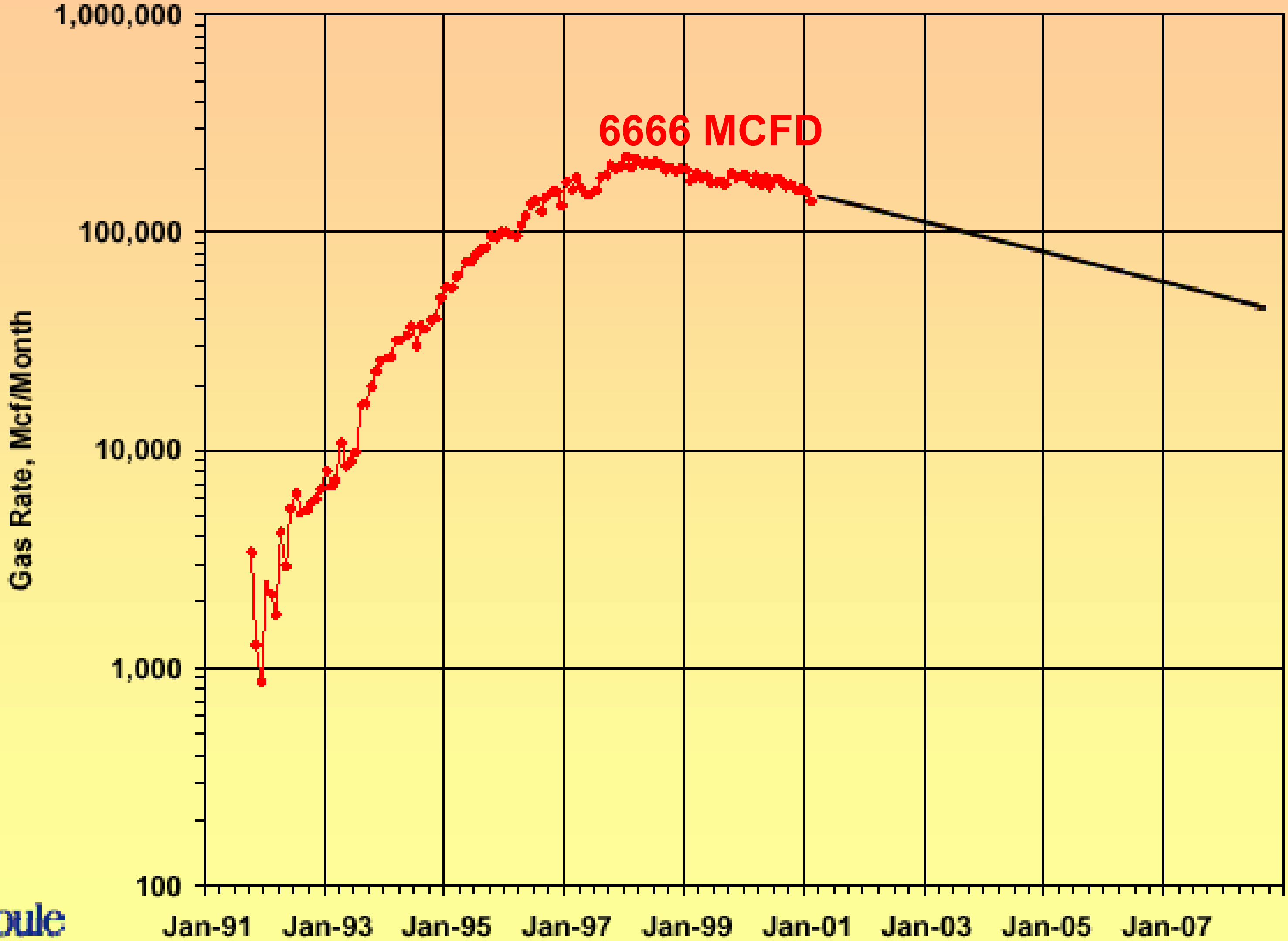
New technologies improve the time to first production of coalbed methane after the sands in a CBM well begin to play out.

Schwochow, Oil & Gas Investor Supplement Coalbed Methane, Dec. 2003, page CBM-11

EXAMPLE OF SUCCESSFUL DRUNKARD'S WASH CBM PROJECT



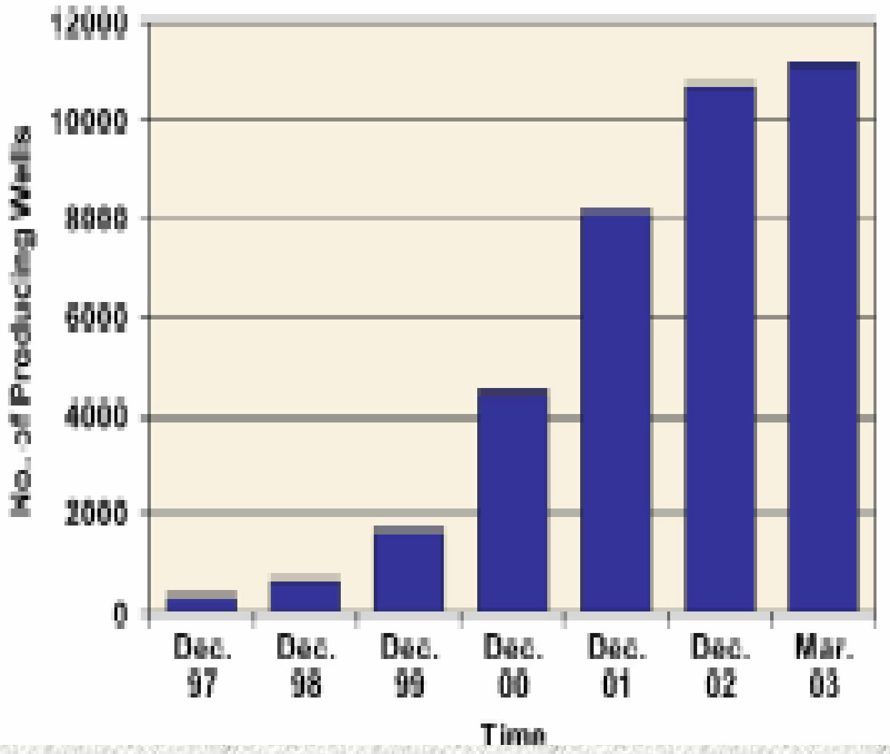
Typical SJB Fairway Production

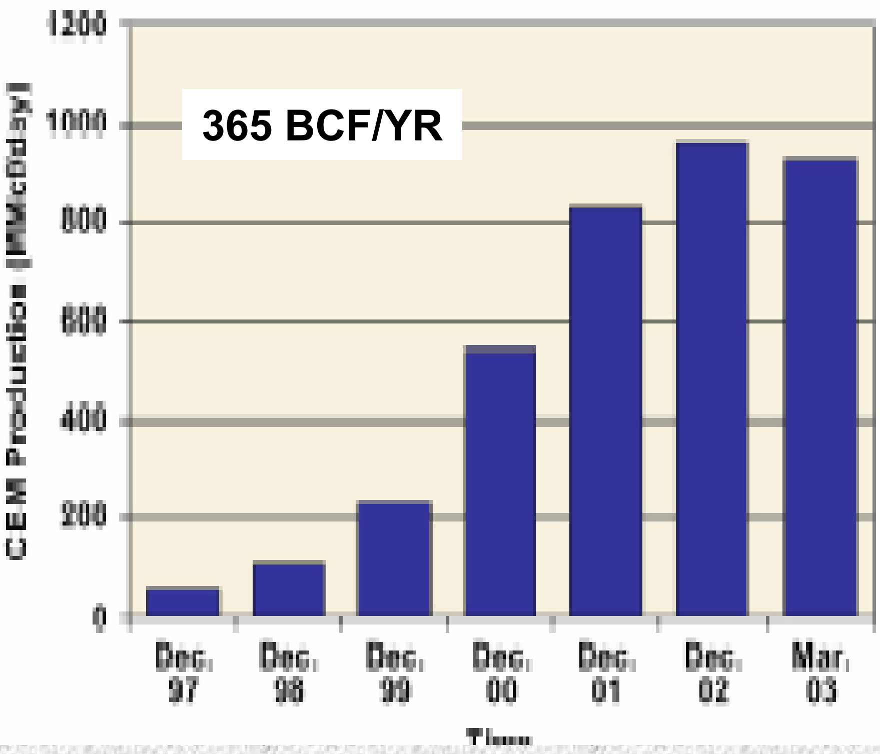


Sproule

From Sproule

NUMBER OF WELLS AND DAILY PRODUCTION VERSUS TIME IN POWDER RIVER BASIN



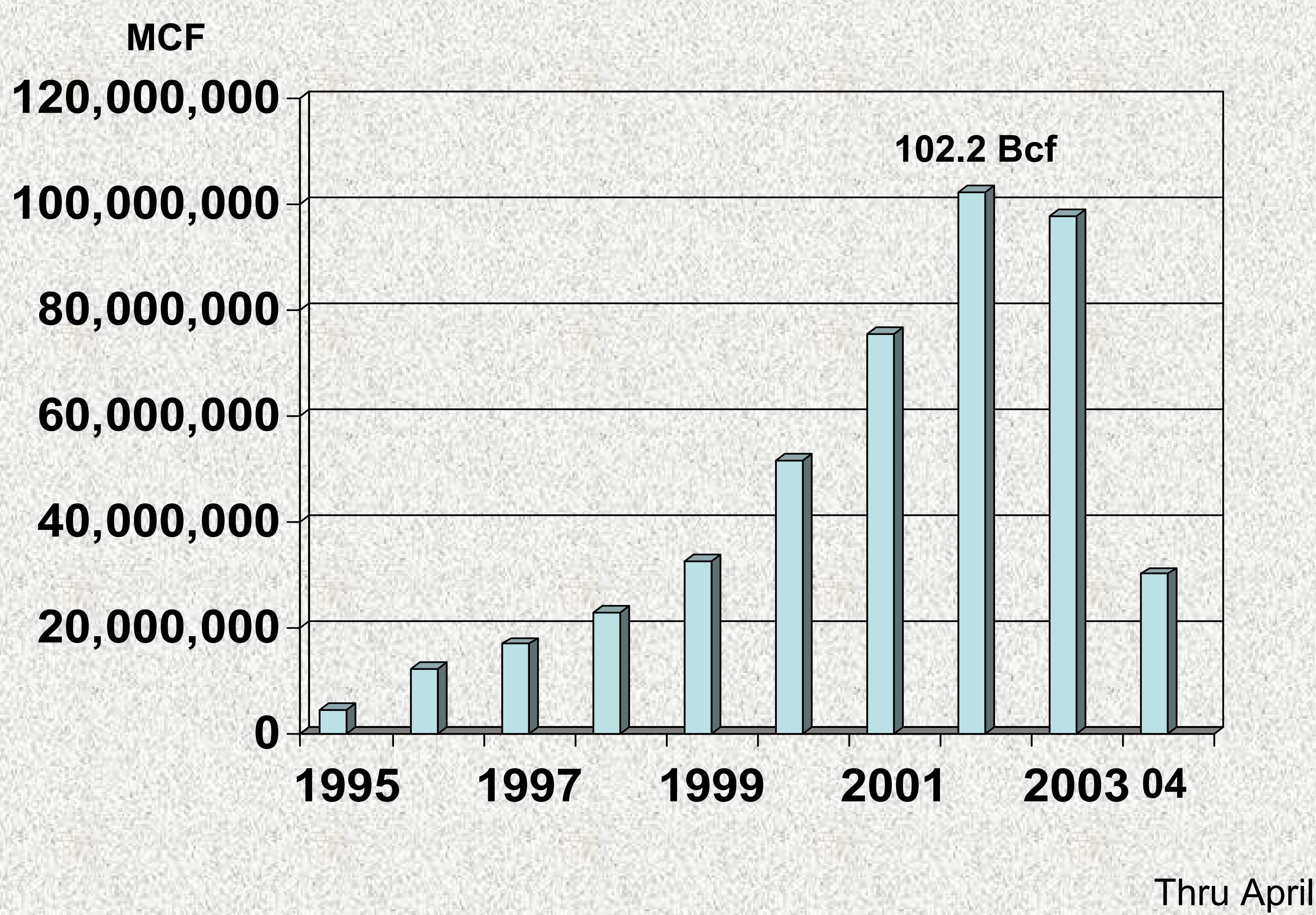


No. of Wells vs Time

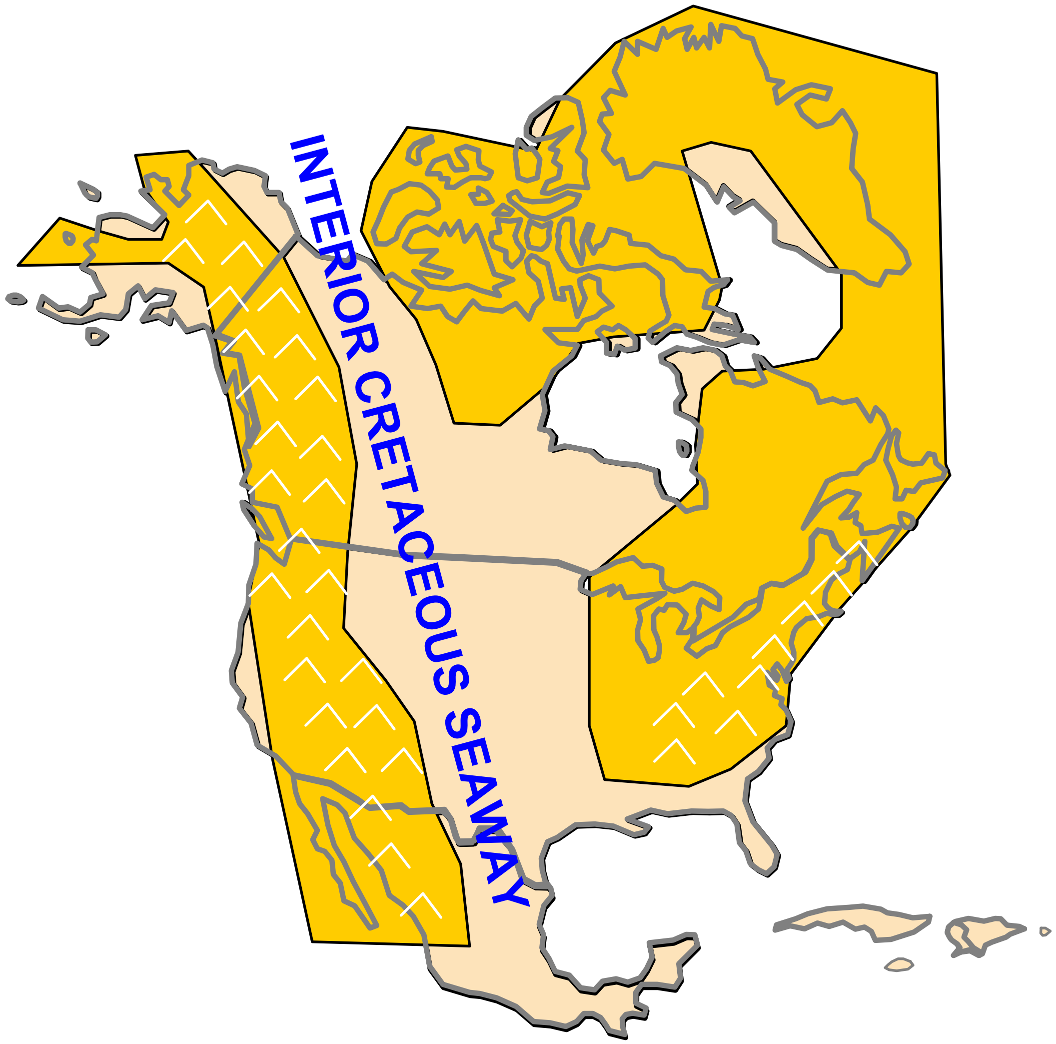
MMcfd vs Time

www.eia.doe.gov/

CBM PRODUCTION IN UTAH

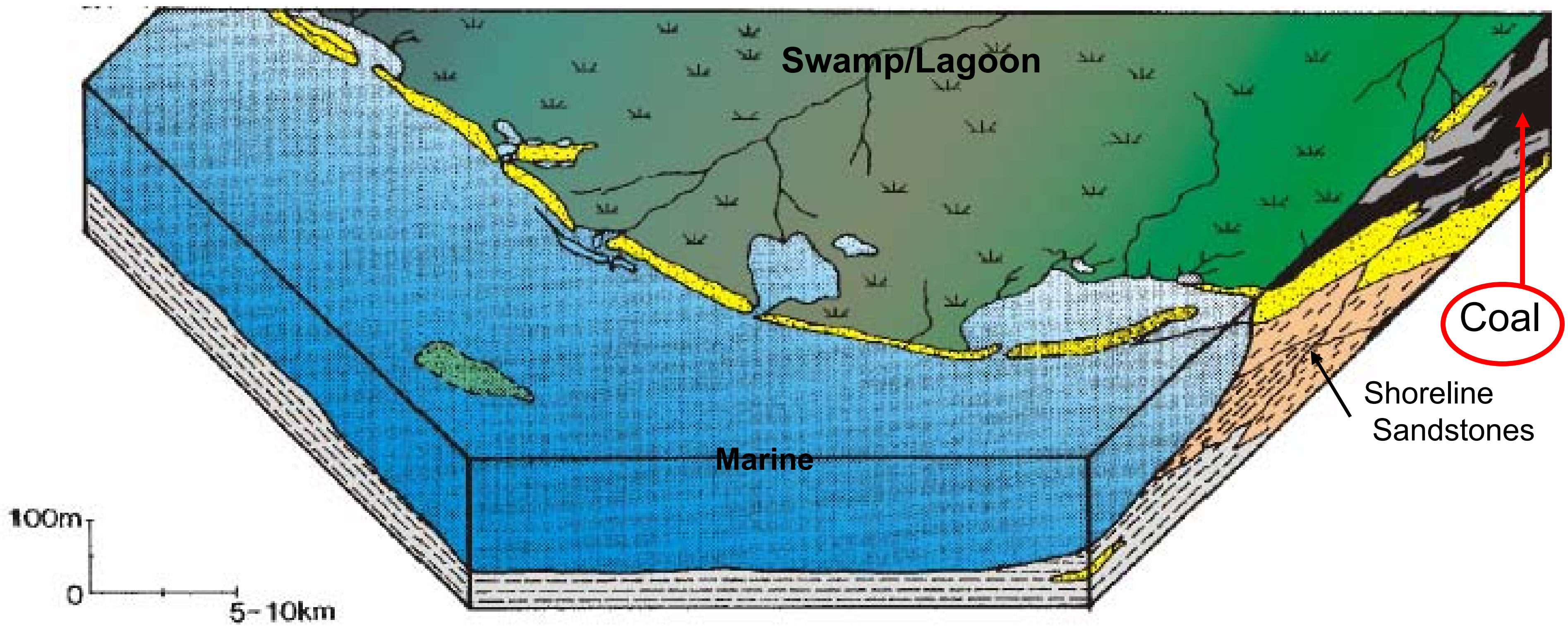


THE CRETACEOUS SEAWAY CONTAINS THE CBM PROJECTS IN THE ROCKIES



RYER, 1988

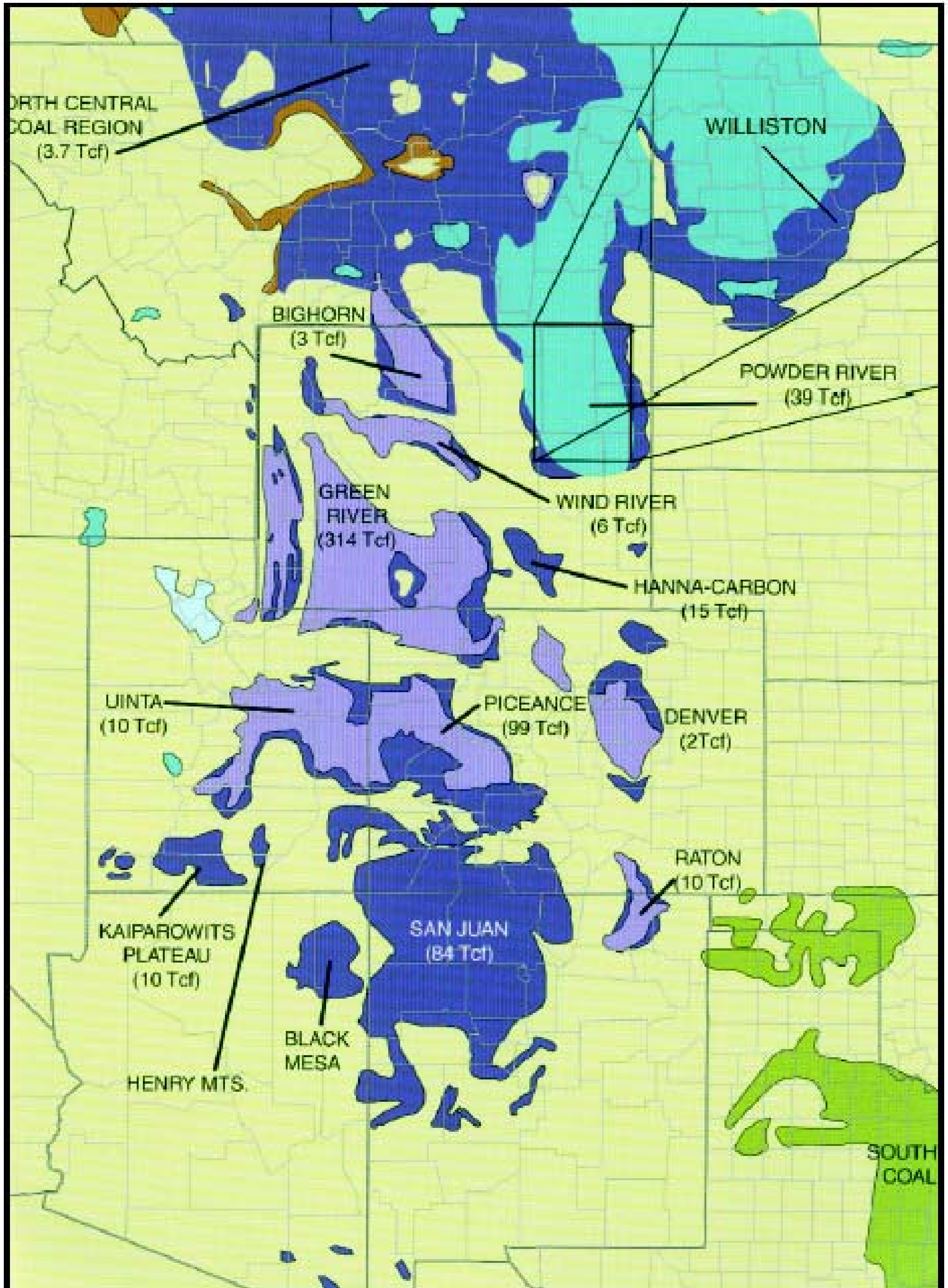
TYPICAL COAL DEPOSITIONAL ENVIRONMENT FOR CRETACEOUS ROCKS IN THE ROCKIES



Horne, RMAG 2003

POTENTIAL FUTURE COAL BEDS AND CBM

Picture 13
Cyprus trees within the Okefenokee Swamp, Georgia. Note stumps of older trees and succession by younger trees. (Picture courtesy of John Balsley, Consultant, Indian Hills, Colorado.)



MAJOR COAL-BEARING BASINS IN THE ROCKIES

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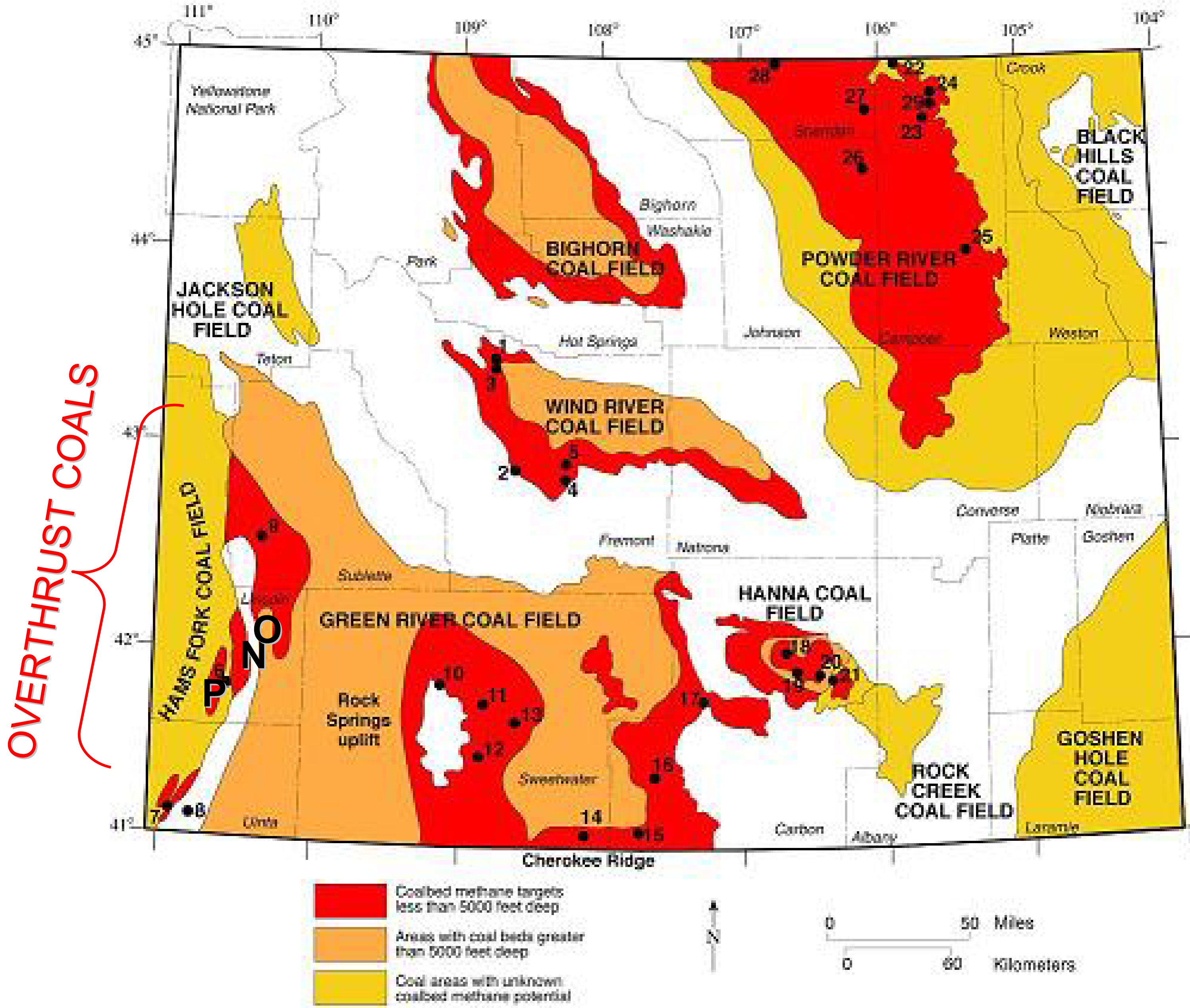
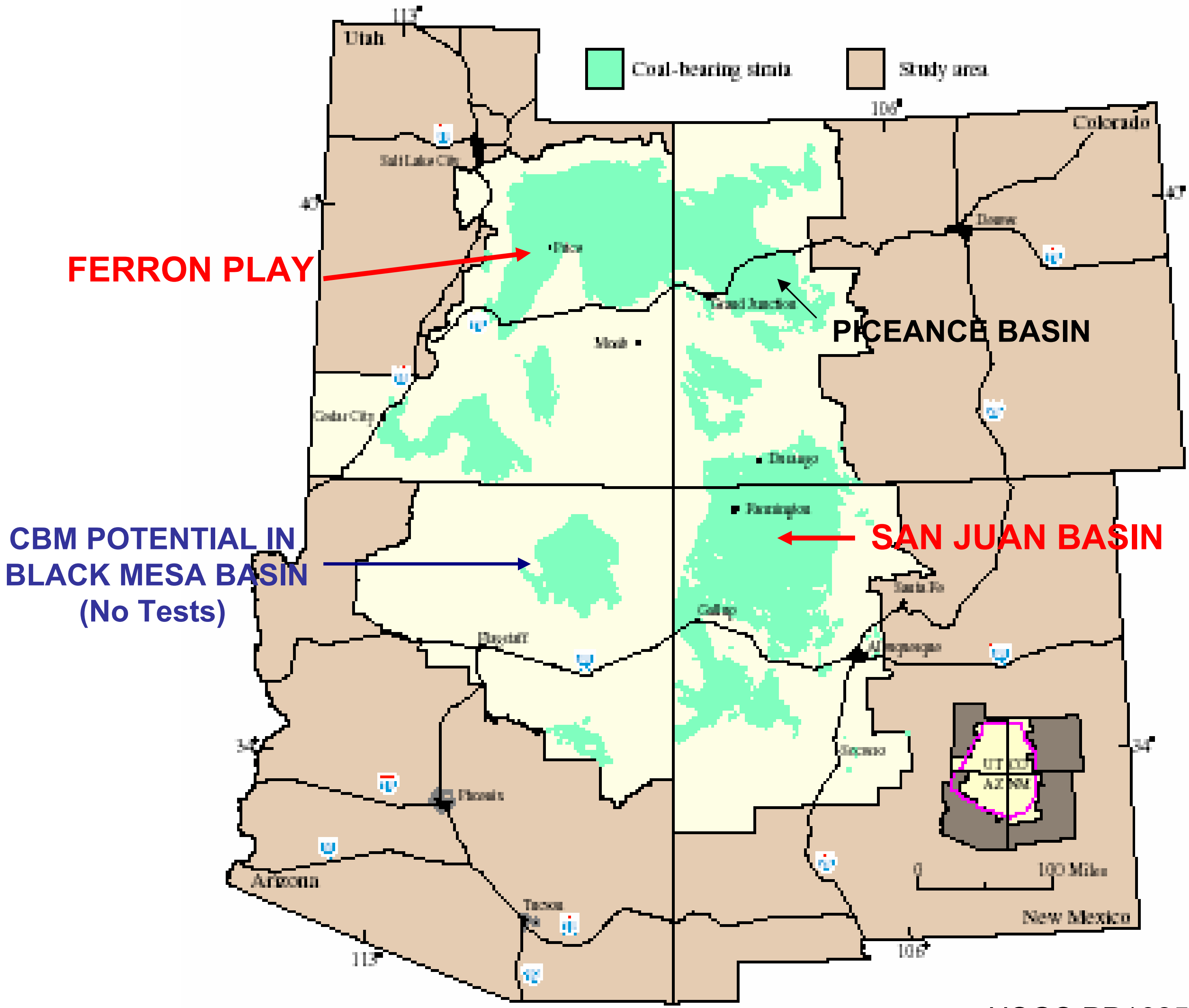


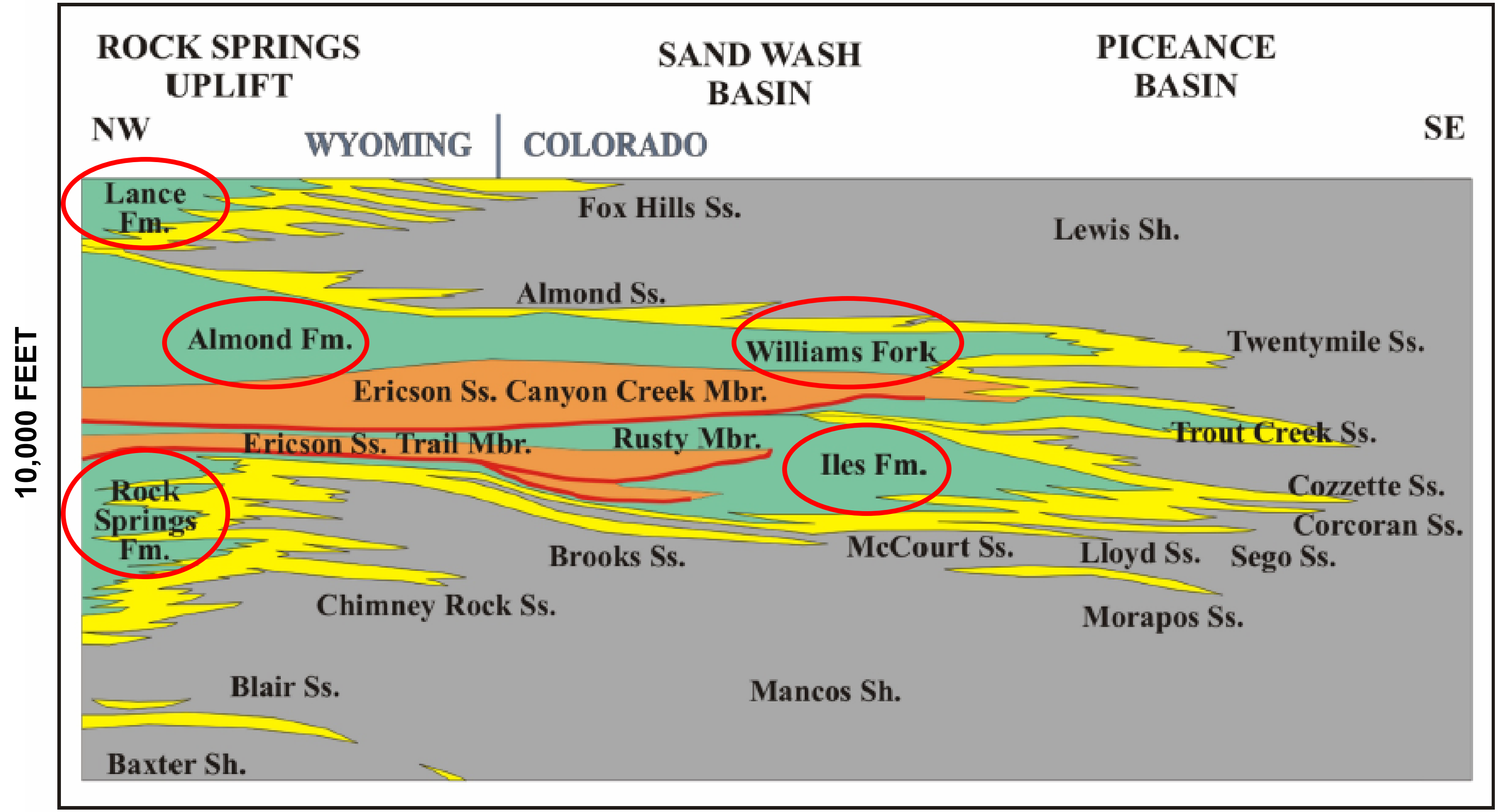
www.wsgsweb.uwyo.edu/

COAL-BEARING AREAS IN THE FOUR CORNERS REGION

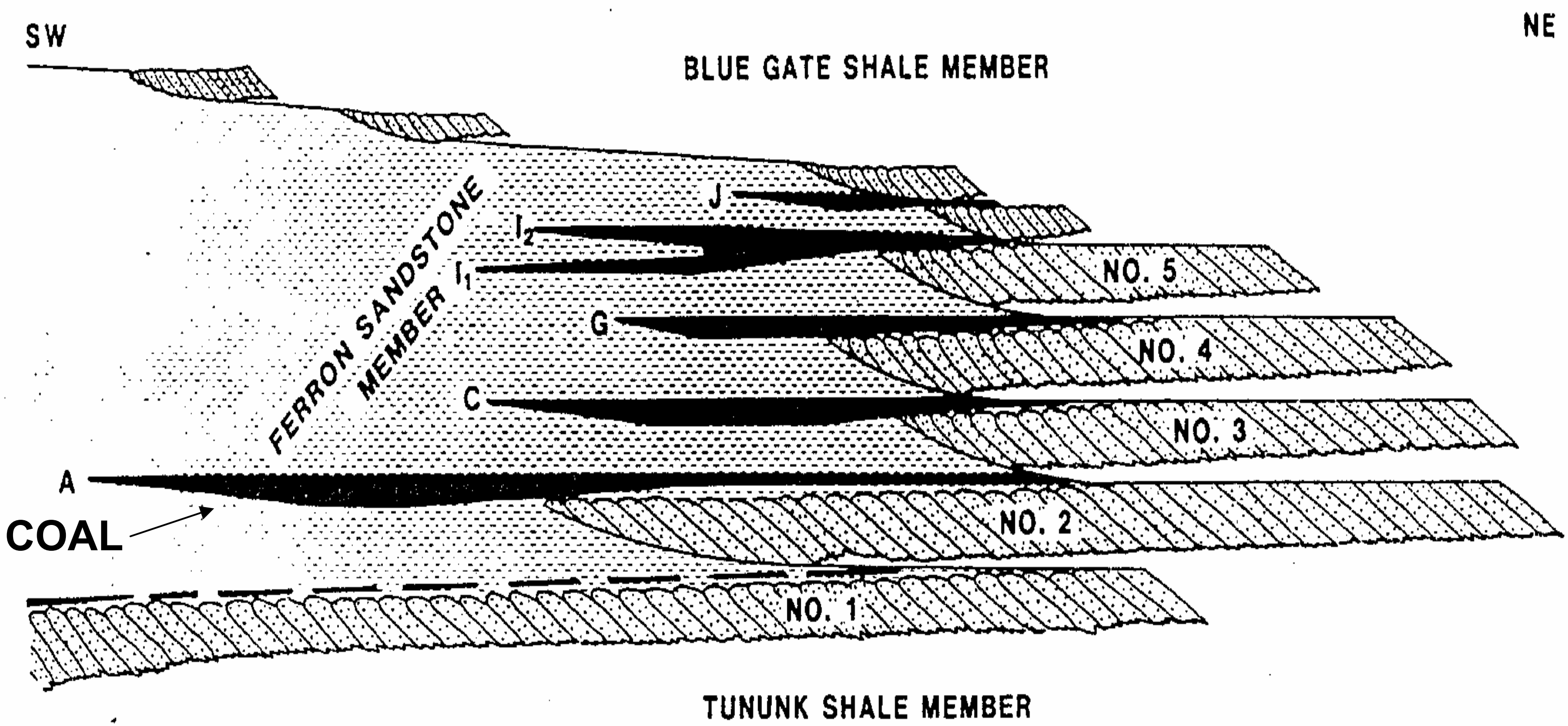


USGS PP1625B, 1999 Kirschbaum et al

COAL-BEARING CRETACEOUS FORMATIONS



Horne, RMAG 2003

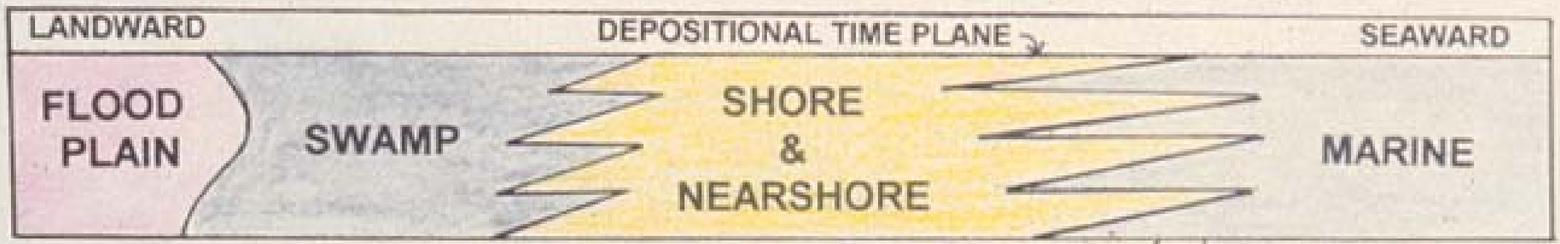


PRODUCTIVE COAL SEAMS IN THE VERY SUCCESSFUL FERRON CBM PLAY OF EAST-CENTRAL UTAH

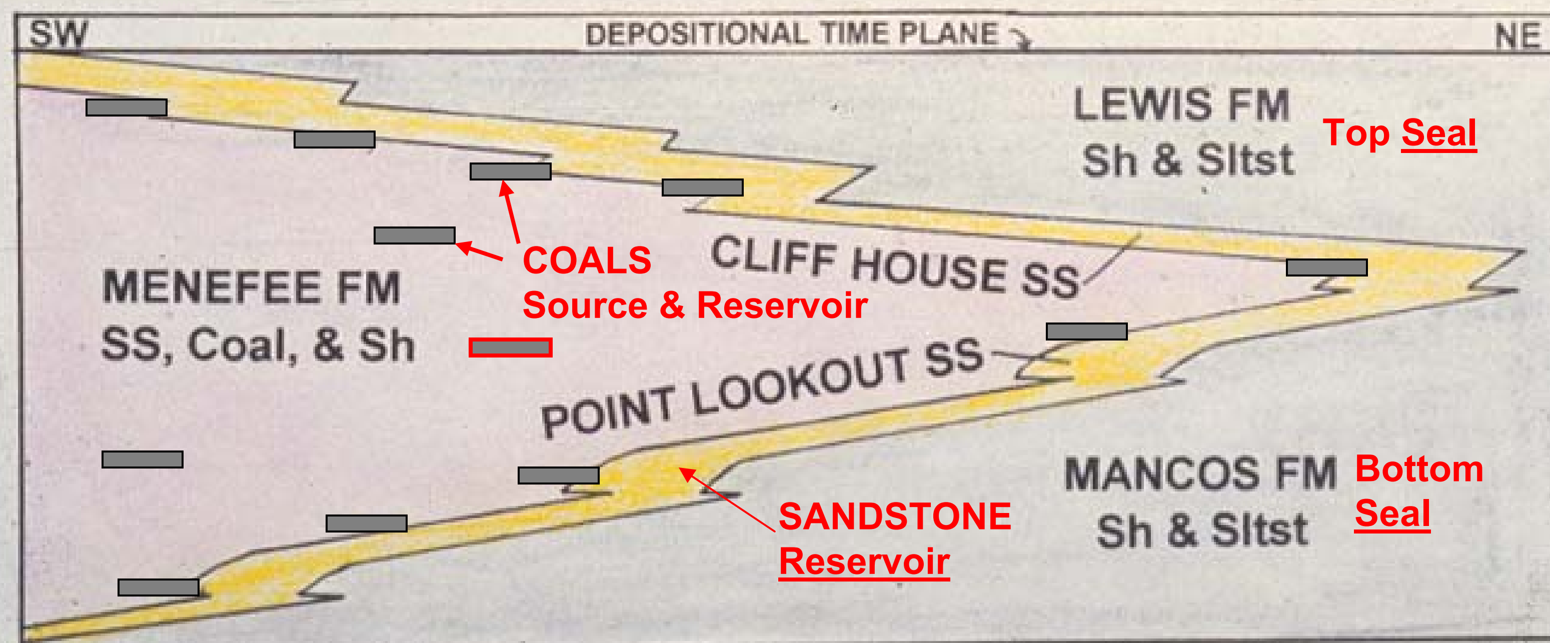
SCHEMATIC CROSS SECTION
MESAVERDE DEPOSITIONAL SEQUENCE

AN IDEAL "GAS MACHINE"

After Jackson in Hollenshead and Pritchard



Zones of deposition at any given time



Meissner

THE FUTURE LOOKS BRIGHT FOR CBM

ANCIENT SWAMPS

COAL

COALBED METHANE

ENERGY SUPPLY AND