Approved: 3-16-04
Date

MINUTES OF THE SENATE UTILITIES COMMITTEE

The meeting was called to order by Chairman Stan Clark at 9:30 a.m. on March 4, 2004 in Room 526-S of the Capitol.

All members were present except:
Senator Jim Barone- excused

Committee staff present:
Bruce Kinzie, Revisor of Statutes
Raney Gilliland, Legislative Research
Ann McMorris, Secretary

Conferees appearing before the committee:
Tim Carr, Kansas Geological Survey
Jack Ekstrom, Evergreen Resources

Others attending:
See Attached List.

Ed Cross of KIOGA introduced Dr. Timothy R. Carr, chief of the Energy Research Section of the Kansas Geological Survey and co-director of the Energy Research Center at the University of Kansas.

Dr. Timothy Carr provided background on a segment of the Kansas energy industry, coalbed methane, that has the potential to be an important energy source for Kansas, and contribute to our state's economy and tax base. He explained the technical, environmental and economic aspects of coalbed methane within a national, state and local perspective. (Attachment 1)

His power point presentation detailed background on the natural gas markets and coalbed methane, and overview of Kansas CBM activity and the role of the Geological Survey, the impact on the Kansas economy and potential issues such as supply problems, severed minerals vs. surface, enhanced coalbed methane recovery and carbon sequestration. Coalbed production from U.S. Basins has increased steadily since 1990 from 200 billion cubic feet to 1400 billion cubic feet in 2002. The total number of coal bed methane wells in Kansas is 1300+ and the greatest activity is currently in southeast Kansas. Production increase is expected to continue. (Attachment 2)

Ed Cross then introduced Jack R. Ekstrom, director of Government and Public Affairs for Evergreen Resources, Inc of Golden Colorado.

Mr. Ekstrom explained his company is engaged in exploration for and production of unconventional natural gas, including natural gas produced from coal seams. They custom build their own equipment for drilling, cementing and sand-fracturing the subsurface gas-bearing formations and he explained their operations on site. (Attachment 3)

Much discussion on cost, characteristics required in coal beds, technology and future possibilities in this and other fields to obtain natural gas. A question was asked about original lease agreements which are sold to other companies and how they are being handled.

The next meeting of the Senate Utilities Committee is scheduled for March 8, 2004.

Adjournment.

Respectfully submitted,

Ann McMorris, Secretary

Attachments - 3

SENATE UTILITIES COMMITTEE GUEST LIST

DATE: **MARCH 4, 2004**

Name	Representing
Jesse McCurry	Commerce
Scott Schneider	GIBBA
Jack Glaves	Duke - P-N x KM
Jim Carr	Kansas Geological Survey
K. David Newell	Kansas Geological Survey
Doug Schmucker	KIOGA
Jack Ekstrom	Evergreen Res.
Ed Cross	KIOGA
Tom Day	KCC
Tom Bruno	EKOGA
Steve Johnson	Kansas Gas Service ONEOK

Tim Carr
March 4, 2004

Testimony before the Senate Utilities Committee 3/4/04

Written Testimony – Images attached as separate file.
All material available as Kansas Geological Survey Open-File Report 2004-9
Online at http://www.kgs.ku.edu/PRS/publication/ofr2004-9/Testimony.pdf

Chairman Clark and Members of the Committee:

My name is Timothy R. Carr. I am Chief of the Energy Research Section of the Kansas Geological Survey, and Co-Director of the Energy Research Center at the University of Kansas. I do not come as an advocate of any legislation before the committee, but to provide background on a segment of the Kansas energy industry, coalbed methane, that has the potential to be an important energy source for Kansas, and contribute to our state's economy and tax base. I will attempt to place the technical, environmental and economic aspects of coalbed methane within a national, state and local perspective

Coal is the most abundant energy source in the world, and it is a major source of hydrocarbons, particularly gas. The coalification process, whereby plant material is progressively converted to coal, generates large quantities of methane-rich gas, which are stored within the coal. The presence of this gas has been long recognized due to explosions and outbursts associated with underground coal mining. Only recently has coal been recognized as a reservoir rock as well as a source rock, thus representing an enormous undeveloped "unconventional" energy resource. But production of coalbed methane (CBM) is accompanied by significant technical and environmental challenges, including disposal of large quantities of water produced with the gas. CBM production was initially spurred by a tax incentive. Internal Revenue Code Section 29 provided a non-refundable tax credit for sale of CBM (as well as other qualified alternative fuels) from wells drilled between 1980 and 1992 inclusive, for sales of fuel between 1980 and 2002 inclusive.

In 2002, natural gas produced from coalbeds totaled 1,614 billion cubic feet (Bcf), representing 8.3 percent of total U.S. dry gas production (19,353 Bcf). In 2002, proved reserves of coalbed methane increased to 18,491 Bcf, a 5 percent increase from the 2001 level (17,531 Bcf). Coalbed methane accounts for 10 percent of all 2002 dry natural gas reserves. EIA estimates that the 2002 proved gas reserves of fields identified as having coalbed methane are now more than quadruple the volume reported in 1989.

Kansas is a major gas producing state. We produce almost twice as much natural gas as we consume. In 2002, Kansas produced more than 450 billion cubic feet, which is down significantly from peak production. However, with increased wellhead prices, the decline in Kansas gas production appears to have slowed significantly. The increased contribution of Kansas coalbed methane production appears to be contributing to stabilizing Kansas natural gas production. While coalbed methane production extends back to wells drilled for the Section 29 tax credits during the late 1980's and 1990's and even to the "shale gas" wells of the early part of the twentieth century, more than ½ of the more than 1,300 coalbed methane wells in eastern Kansas have been drilled during the

last 3 years. This is a remarkable drilling boom that ranges throughout eastern Kansas from Oklahoma to Nebraska. While a small component of total gas production, CBM production in Kansas has doubled from 2002 to 2003, and will increase significantly in 2004.

Coalbed methane is a growing and significant worldwide energy source that is expected to increase for the next several decades. This additional source of methane coupled with additional infrastructure is significant component to address our present natural gas supply challenges. If we are to move within a decade from a 20 trillion cubic foot to a 28 trillion cubic foot natural gas economy (forecast by the Energy Information Agency), we will require significant new unconventional gas supply sources. As we work to address short-term North American natural gas supply challenges and worldwide oil production constraints, we can expect natural gas prices to remain subject to chronic high prices and periodic price spikes.

CBM production is attractive due to several geological factors. Coal stores six or seven times as much gas as a conventional natural gas reservoir of equal rock volume due to the large internal surface area of coal. Much coal is accessible at shallow depths especially in Kansas, making well drilling and completion inexpensive. Finding costs are also low since methane occurs in coal deposits, and the location of coal resources is well known. Gas content generally increases with coal rank, with depth of burial of the coalbed, and with reservoir pressure. Fractures, or cleats, that permeate coalbeds are usually filled with water; the deeper the coalbed, the less water is present, but the more saline it becomes. In order for gas to be released from the coal, its partial pressure must be reduced, so that the methane will desorb from the coal and then flow to the well bore. This is accomplished by removing water from the coalbed. Large amounts of water are produced from coalbed methane wells, especially in the early stages of production. In Kansas, we are fortunate to have a low-cost disposal option in the deep saline aquifer of the Arbuckle Group. Another method to enhance methane production from coals is to inject gases that preferentially replace methane molecules on the coal surfaces (e.g., carbon dioxide).

In a CBM well, after hydraulic fracturing to increase permeability, methane production rises during the dewatering stage of production as water production decreases. In contrast to a conventional gas well, methane production rates increase for a period of time and water production decreases (6 months to 2 years). A significant period of stable gas production and relatively low water production is followed by a slow decline in production rates that can last for decades.

The four-county area of Labette, Montgomery, Neosho and Wilson in southeast Kansas is the center of coalbed methane exploration and production. While there is CBM production as far north as Miami and Johnson counties and to the west in Chautauqua County, the bulk of current CBM production is from these four counties. Also, in the four-county area, conventional gas production was relatively insignificant and the effects of new CBM gas production can be recognized. In the four-county area, gas production has doubled from 2002 to 2003 (4.2 billion cubic feet to 9.06 billion cubic feet. This increase is the result of new CBM production and we should expect continued increases

in the next few years. In 2003, the value at the wellhead of the CBM gas produced in the four counties increased to $45 million from the approximately $12.5 million in 2002.

What will be the impact of this increased revenue to the four-county area? First, a one-eighth royalty to the mineral owner (usually the surface owner in agricultural areas) will amount to $2.25 million pumped directly into the agricultural sector. In addition, the employment impact can be estimated using final demand multipliers as reported in "Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II): US Department of Commerce's Bureau of Economic Analysis, 1992", and the " The Economic Impact of Stripper Wells in the United States: Interstate Oil and Gas Compact Commission, 1998".

The increase in revenue from 2002 to 2003 for gas production is approximately $30 million. Using final demand multipliers, the increased economic activity to the economy of the four-county area is estimated at $45 million with increased earnings of $5.8 million (Table 1a). Using the multipliers, increased employment in the four-county area is estimated at 426 new jobs (Table 1a). Direct effect multipliers can be used to estimate the impact of increased in revenue from coalbed methane production on the local petroleum industry (Table 1b). The local petroleum industry is estimated to have had an increase of almost $3 million in earnings and a potential increase of 273 employees. In an area encompassed by Labette, Montgomery, Neosho and Wilson counties, these indirect and direct effects are very significant numbers.

Change in Value at Wellhead (Million$)	Final Demand Multiplier Output	Final Demand Multiplier Earnings	Final Demand Multiplier Employment	Change in Output (Million$)	Change in Earnings (Million$)	Change in Employment
$30	1.4982	0.1925	14.2	$45	$5.8	426

Table 1a - Estimated indirect effects on the local economy of increased coalbed methane production in the four-county area of southeast Kansas (Labette, Montgomery, Neosho and Wilson).

Direct Effect Multiplier Earnings	Direct Effect Multiplier Employment	Change in Earnings (Million $)	Change in Employment
0.0984	9.1014	$2.95	273

Table 1b - Estimated direct effects on the Kansas oil and gas industry of increased coalbed methane production in the four-county area of southeast Kansas (Labette, Montgomery, Neosho and Wilson).

The four-county area of southeast Kansas has seen a significant increase from 2001 to 2002 in property tax evaluations attributed to coalbed methane activity (Table 2). In 2001, mineral leasehold was assessed at $2.4 million. In 2002, mineral leasehold was

assessed at $4.1 million and actual tax dollars from mineral leasehold taxes increased 76%. These increased assessments and tax dollars do not include the impact of surface facilities and pipelines (e.g. compression stations). I do not have 2003 valuations, but based on the doubling in production and more than tripling in wellhead value, I would expect a very significant increase in tax assessments and revenue (I would think that significant would almost be an understatement).

Southeast Kansas Mineral Leasehold Property Taxes				
	2001		2002	
County	Assessed Value	Tax Dollars	Assessed Value	Tax Dollars
Labette	$118,879	$12,931	$354,821	$38,692
Montgomery	$1,086,517	$137,963	$1,447,388	$189,594
Neosho	$255,075	$34,174	$878,596	$123,342
Wilson	$932,101	$105,450	$1,381,048	$159,449
Total	$2,392,572	$290,517	$4,061,853	$511,077

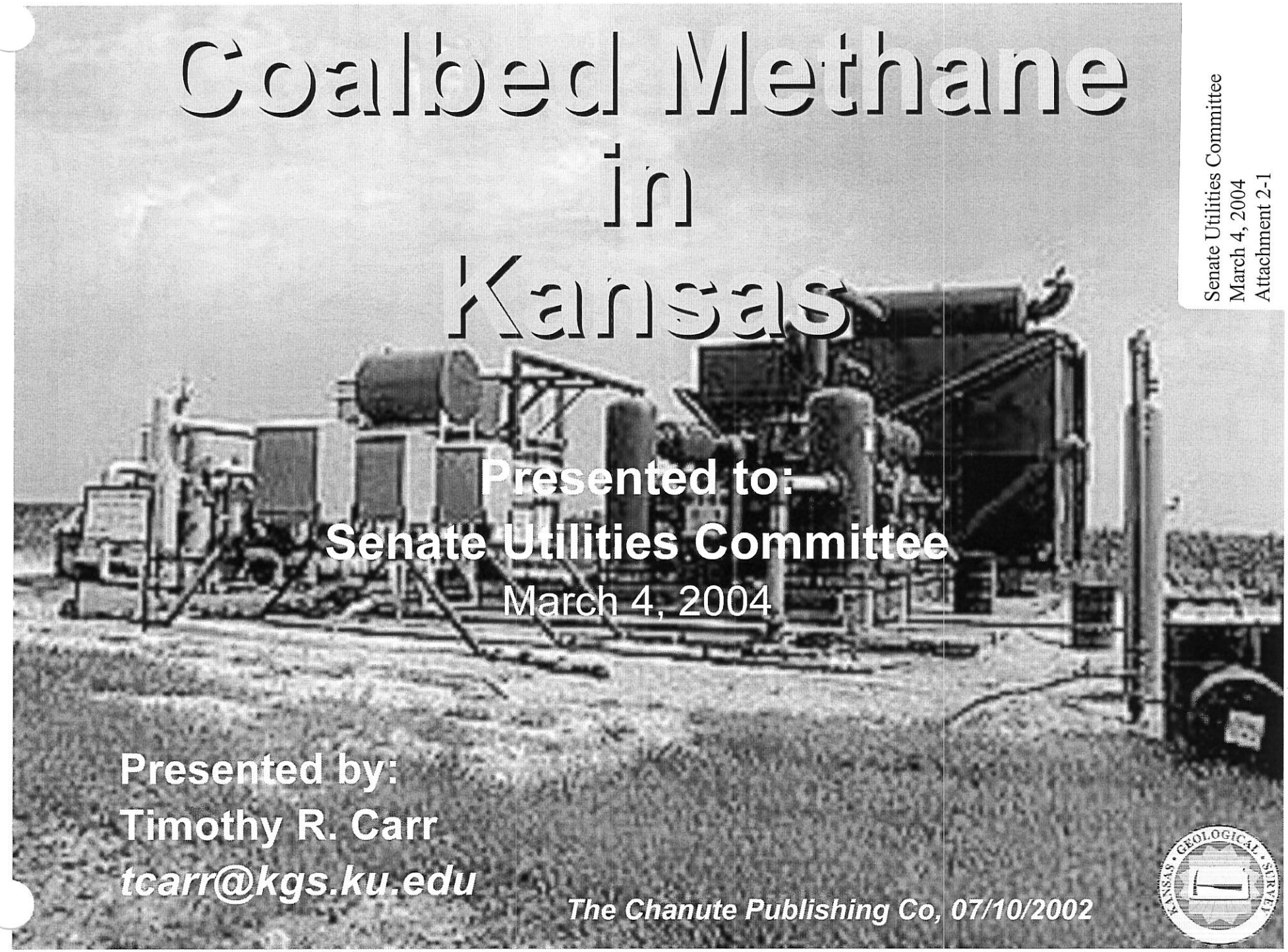
Table 2 – Assessed value and tax dollars in 2001 and 2002 from mineral leasehold in Labette, Montgomery, Neosho and Wilson counties.

The Kansas Geological Survey is out in the field and in the lab working to better understand the distribution reservoir characteristics and gas quality of coal beds. We are working to provide real-time access to data and research products to all interested private and pubic sector organizations and citizens. This information is required for well-informed decision-making and the wise conservation of our coalbed methane resources. Coalbed methane exploration and development is at a critical stage with numerous pilots are underway across the entire extent of eastern Kansas. The exact quantity and quality of our CBM resources is only now becoming understood. The Survey is also looking to the future of Kansas coalbed methane. We are working to better understand the technical challenges for the next stages of CBM production. Enhanced coalbed methane recovery and the potential of value-added sequestration of greenhouse gases may be as valuable as primary production in a possible carbon constrained world.

Energy production has been a foundation of our Kansas economy for more than 100 years. Based on published forecasts from the International Energy Agency and the Energy Information Administration, hydrocarbons (oil, gas and coal) will remain the primary source of energy through the middle of the 21st century. Kansas has a bright energy future, and unconventional gas resources such as coalbed methane will be major contributors.

1-4

Coalbed Methane in Kansas



Presented to:
Senate Utilities Committee
March 4, 2004

Presented by:
Timothy R. Carr
tcarr@kgs.ku.edu

The Chanute Publishing Co, 07/10/2002

Outline

- Background on the Natural Gas Markets
- Background on Coalbed Methane (CBM)
- Overview of Kansas CBM Activity
  - Role of Geological Survey
- Impact on Kansas
  - Economy
- Potential Issues
  - Supply Problems
  - Severed Minerals vs. Surface
  - Enhanced Coalbed Methane Recovery
  - Carbon Sequestration

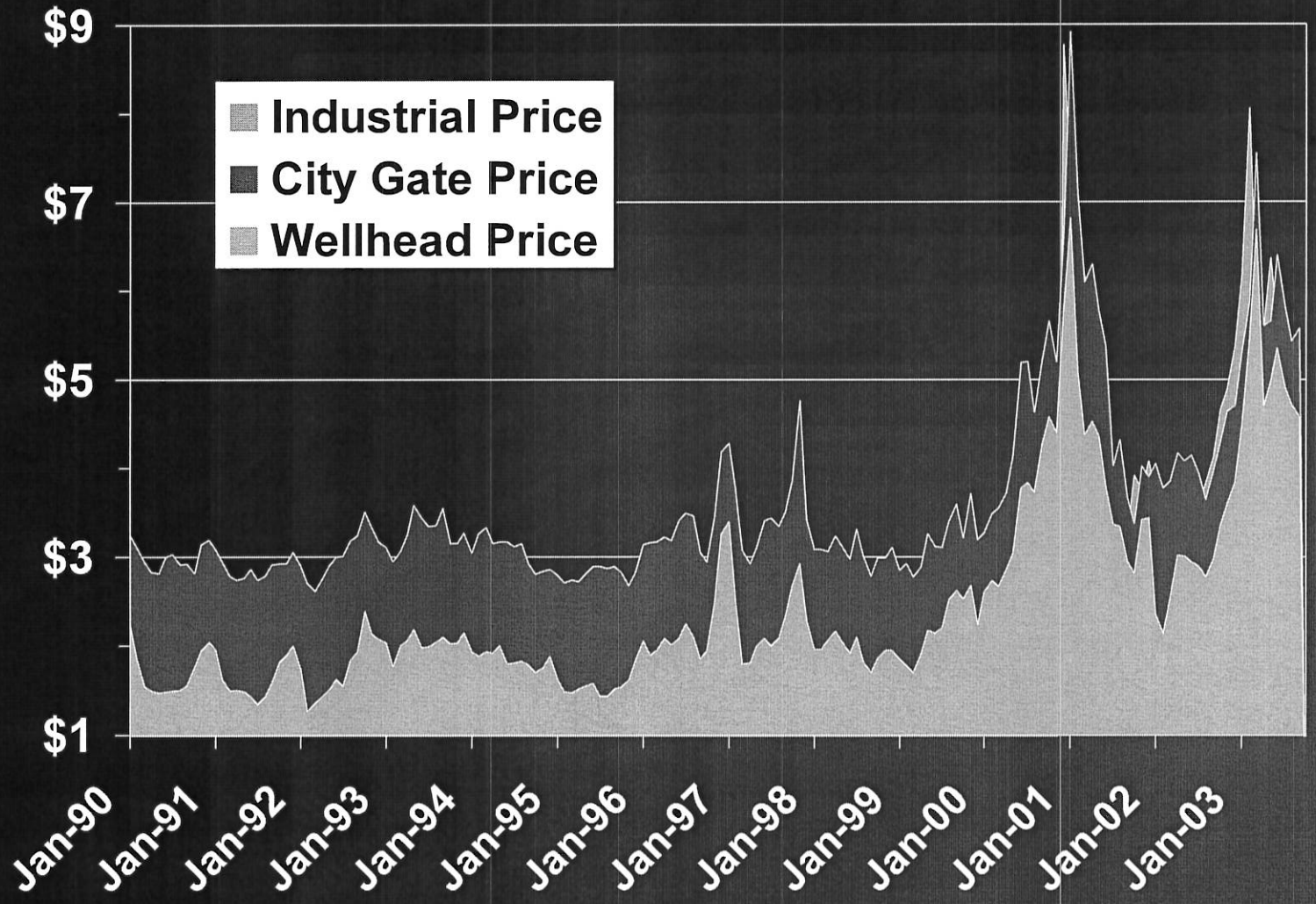
Kansas Profile

Kansas national population and energy use rankings:

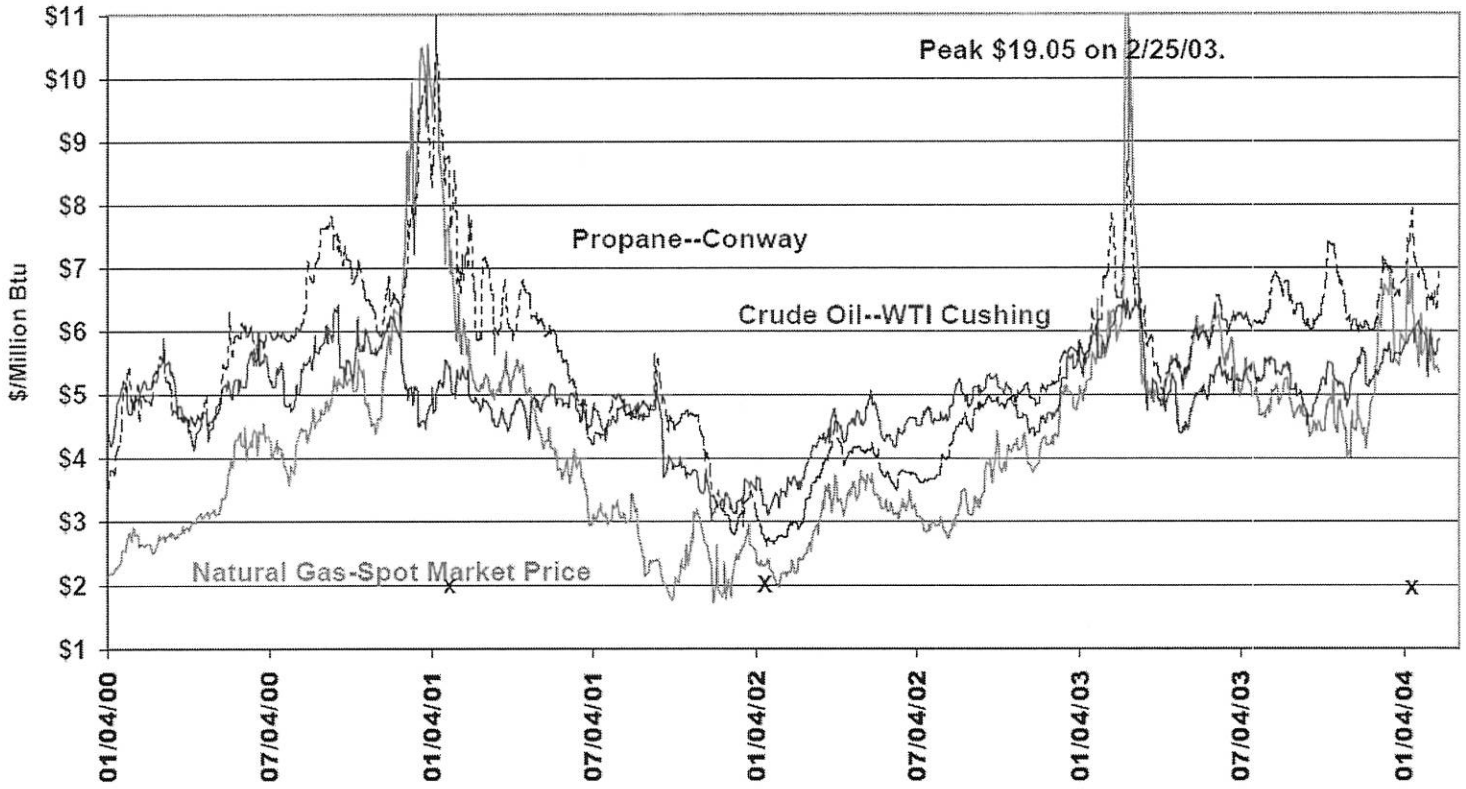
- *Population – 32th (2002)*
- *Total per capita energy – 18th (2000)*
- *Natural Gas Consumption (2002)*
  - *Residential – 71,002 MMcf*
  - *Commercial – 38,812 MMcf*
  - *Industrial – 105,400**
  - *Electric Power – 23,126 MMcf*
- *Natural Gas Production (2002) – 453,417 MMcf*

*Estimated.

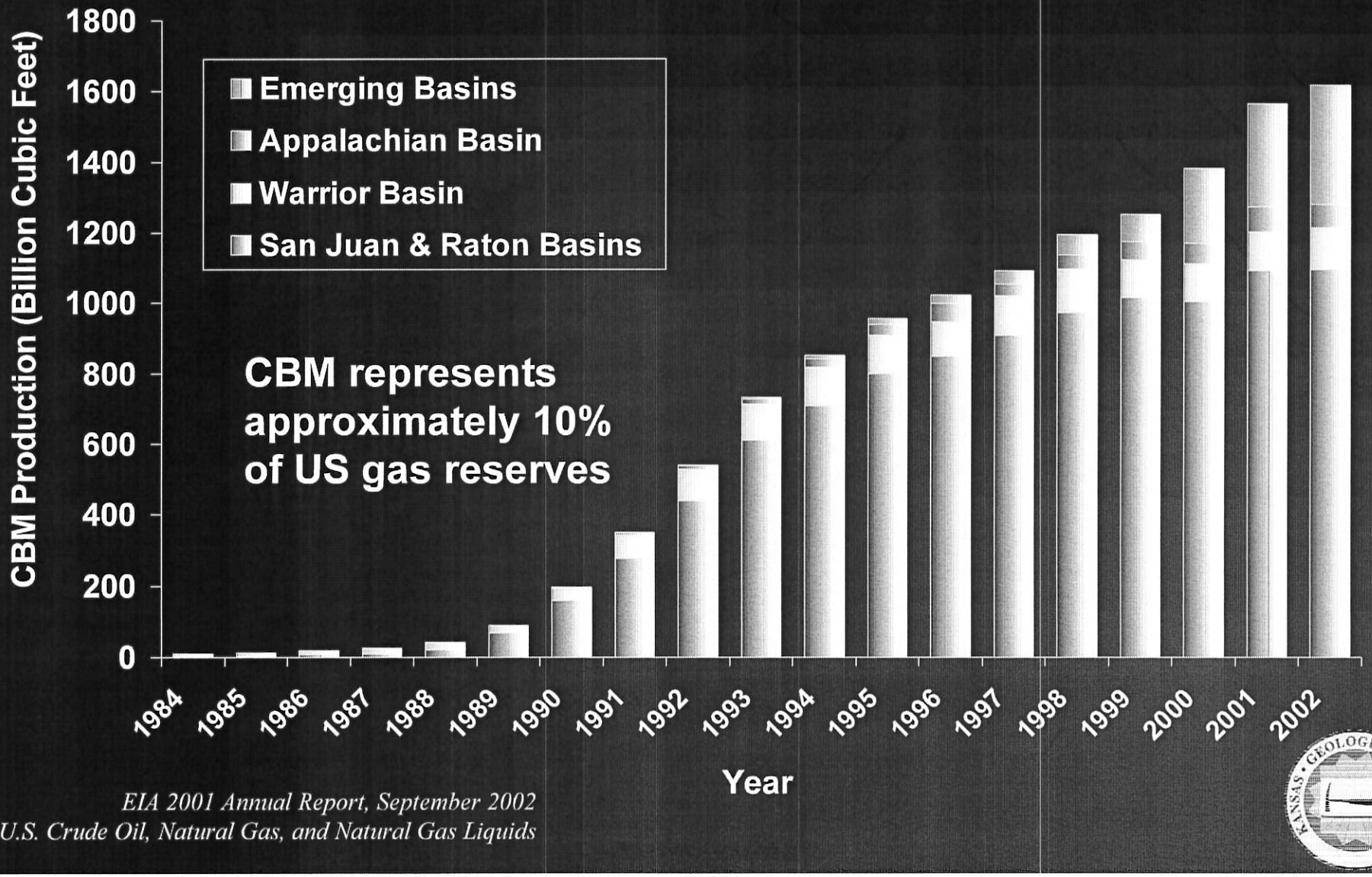
Natural Gas Prices Continue to Be Volatile



Recent Energy Prices



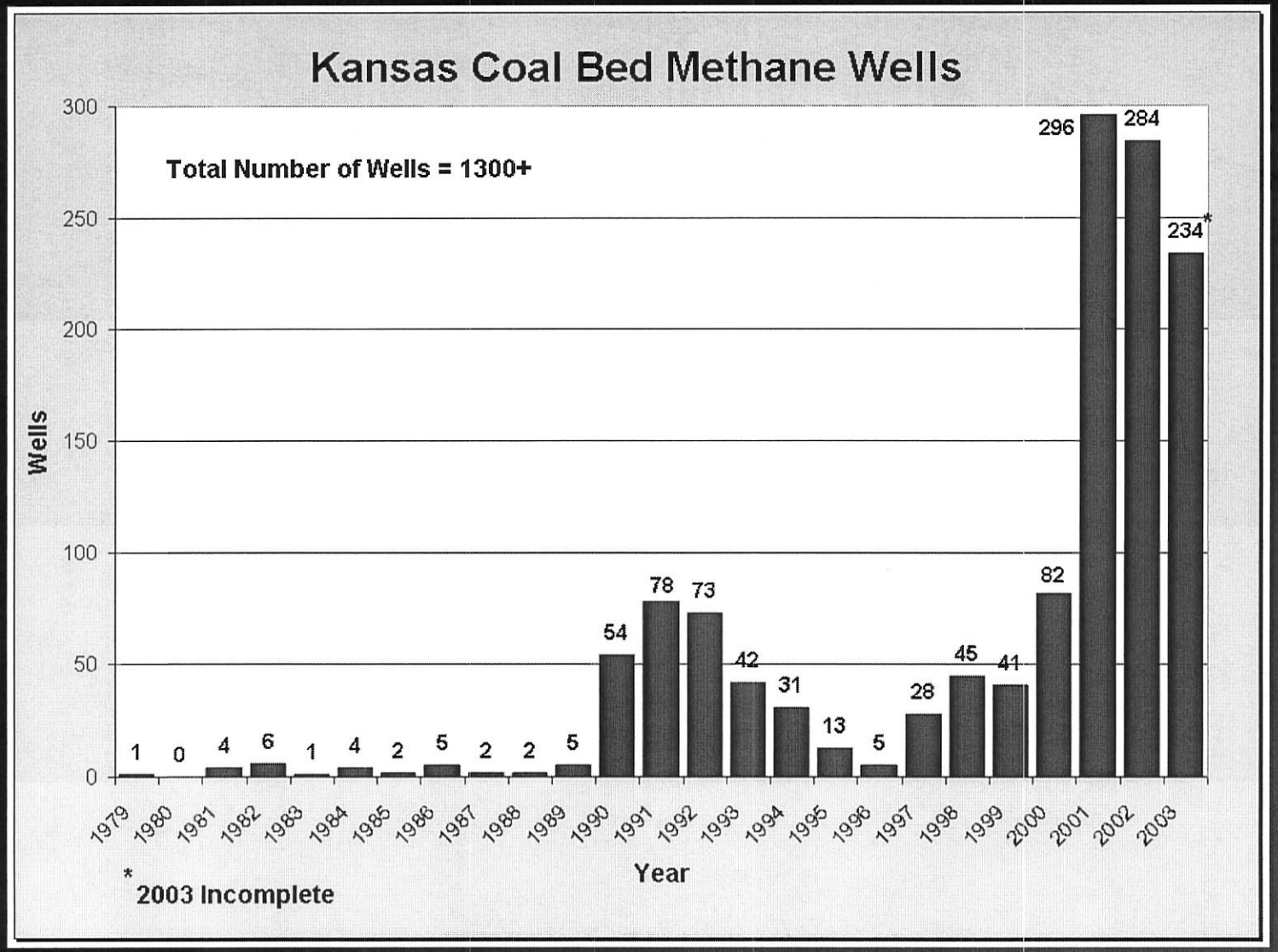
Coalbed Methane Production from U.S. Basins



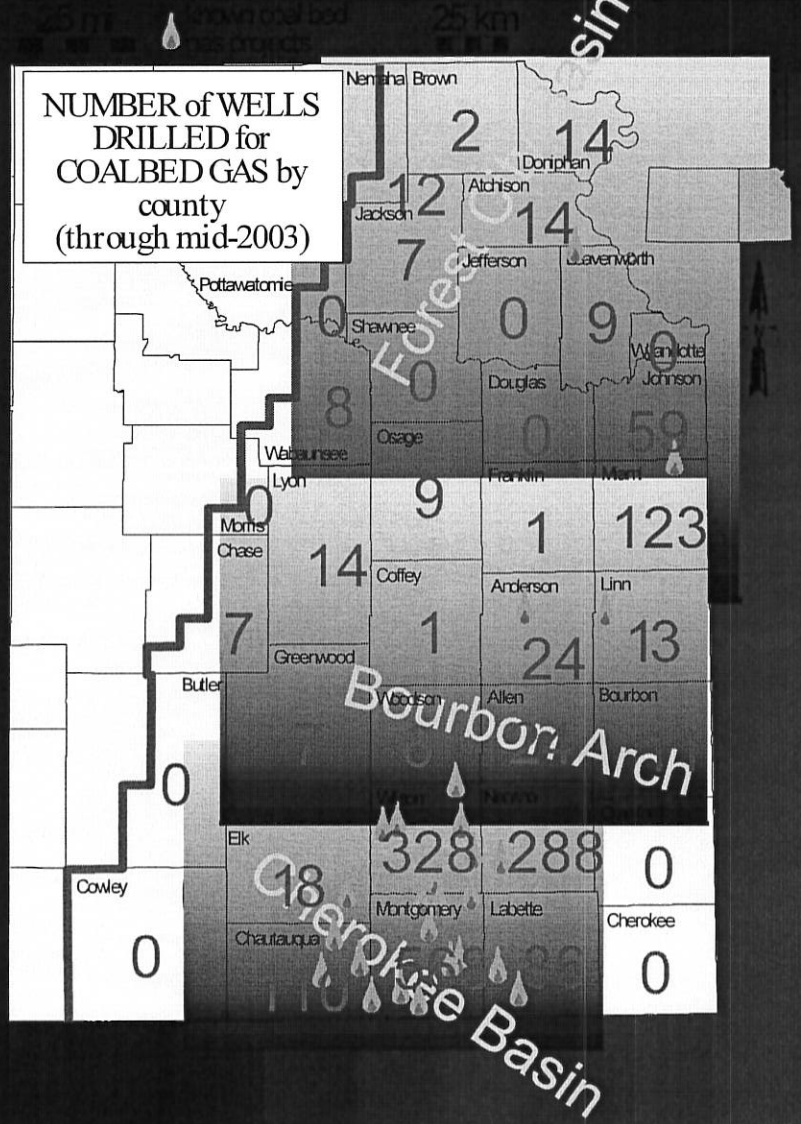
EIA 2001 Annual Report, September 2002
U.S. Crude Oil, Natural Gas, and Natural Gas Liquids

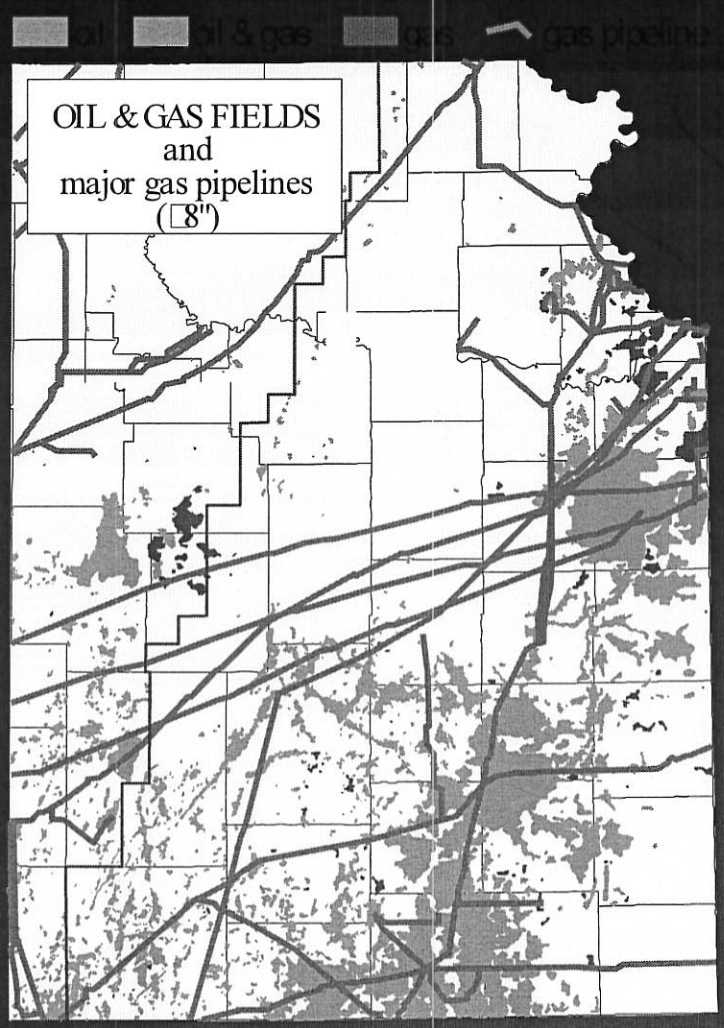
KANSAS GEOLOGICAL SURVEY

Coalbed Methane Activity



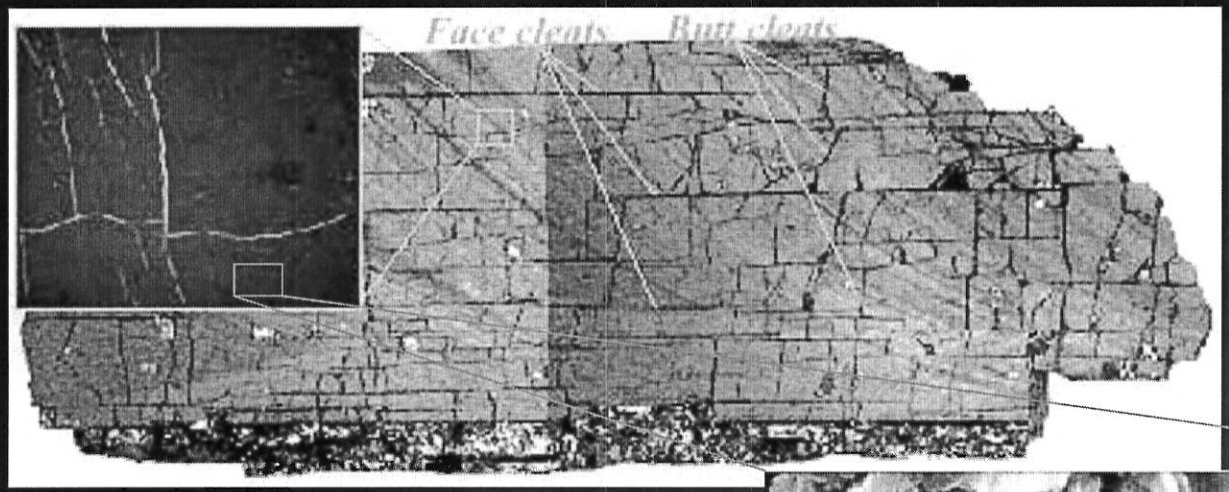
Kansas Coalbed Methane Activity





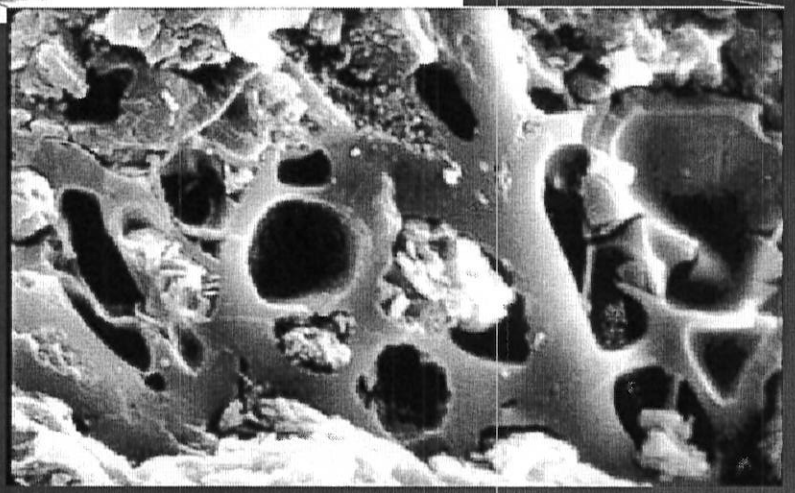
KANSAS GEOLOGICAL SURVEY

Unconventional Reservoir

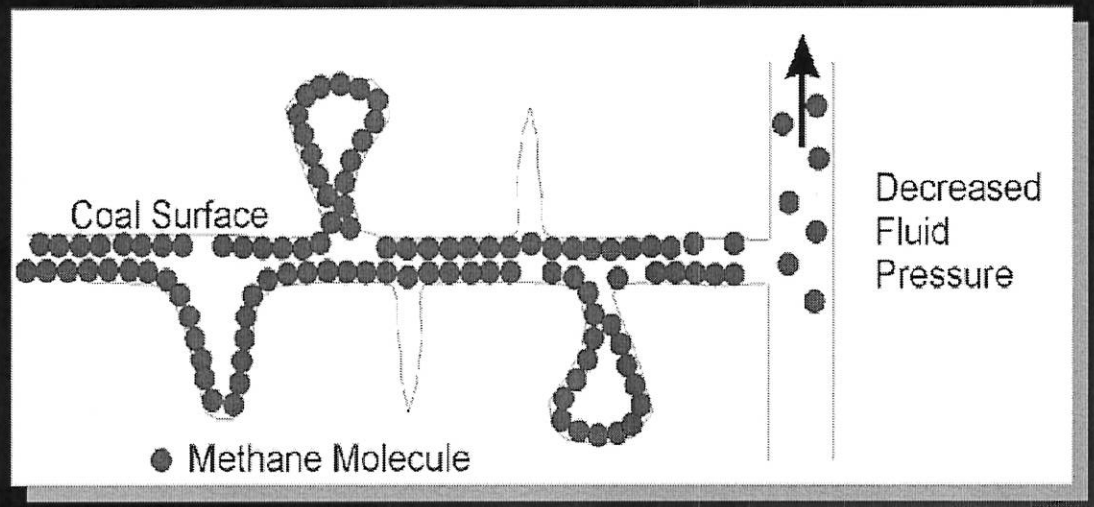


Fractured Reservoir

Micropores

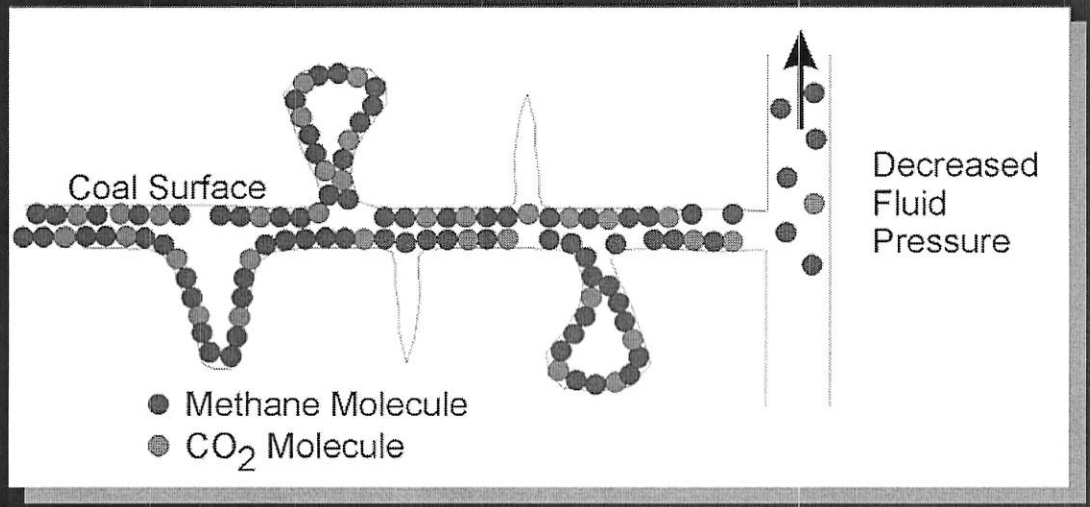


Methane Production from Micropores

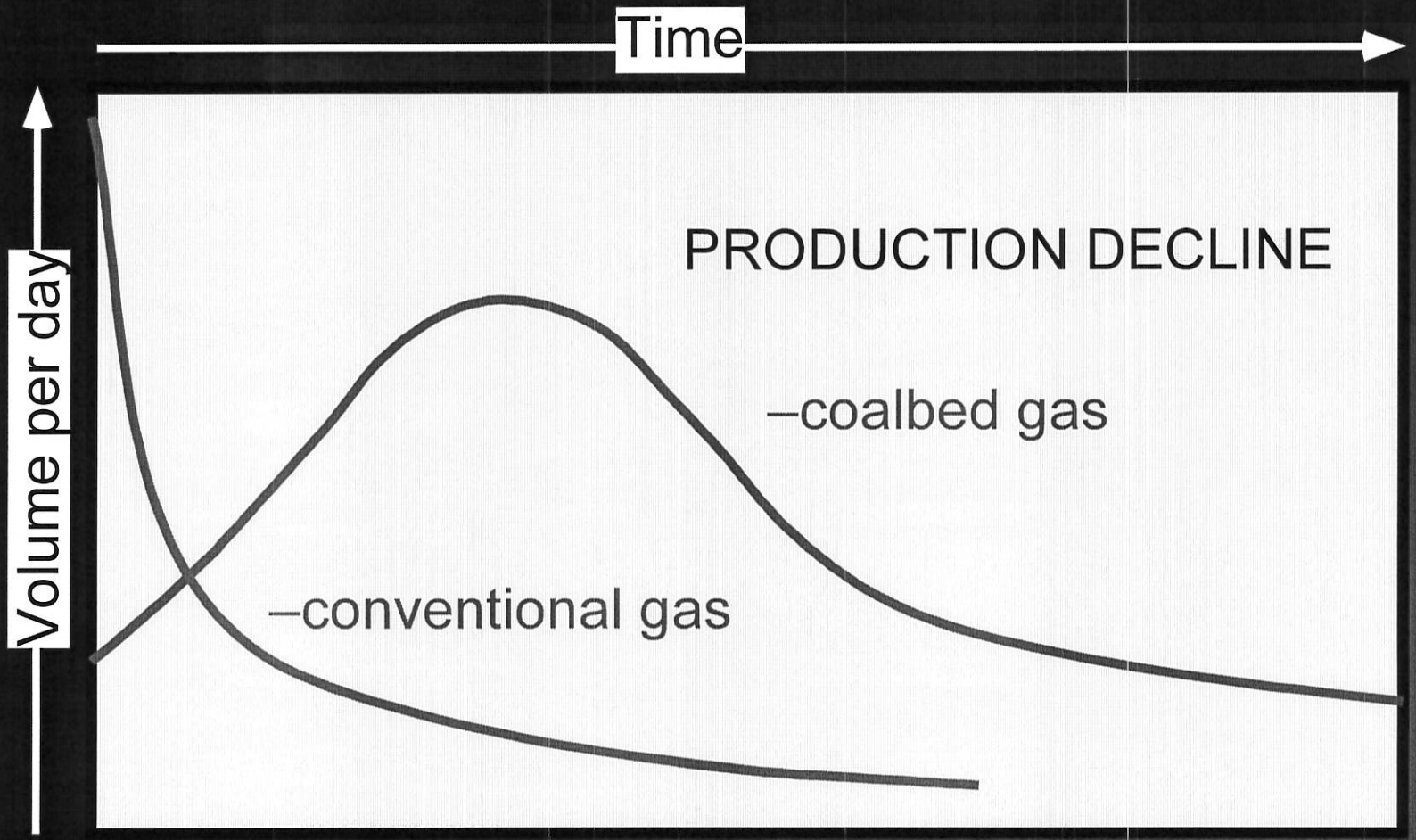


Desorption

Replacement

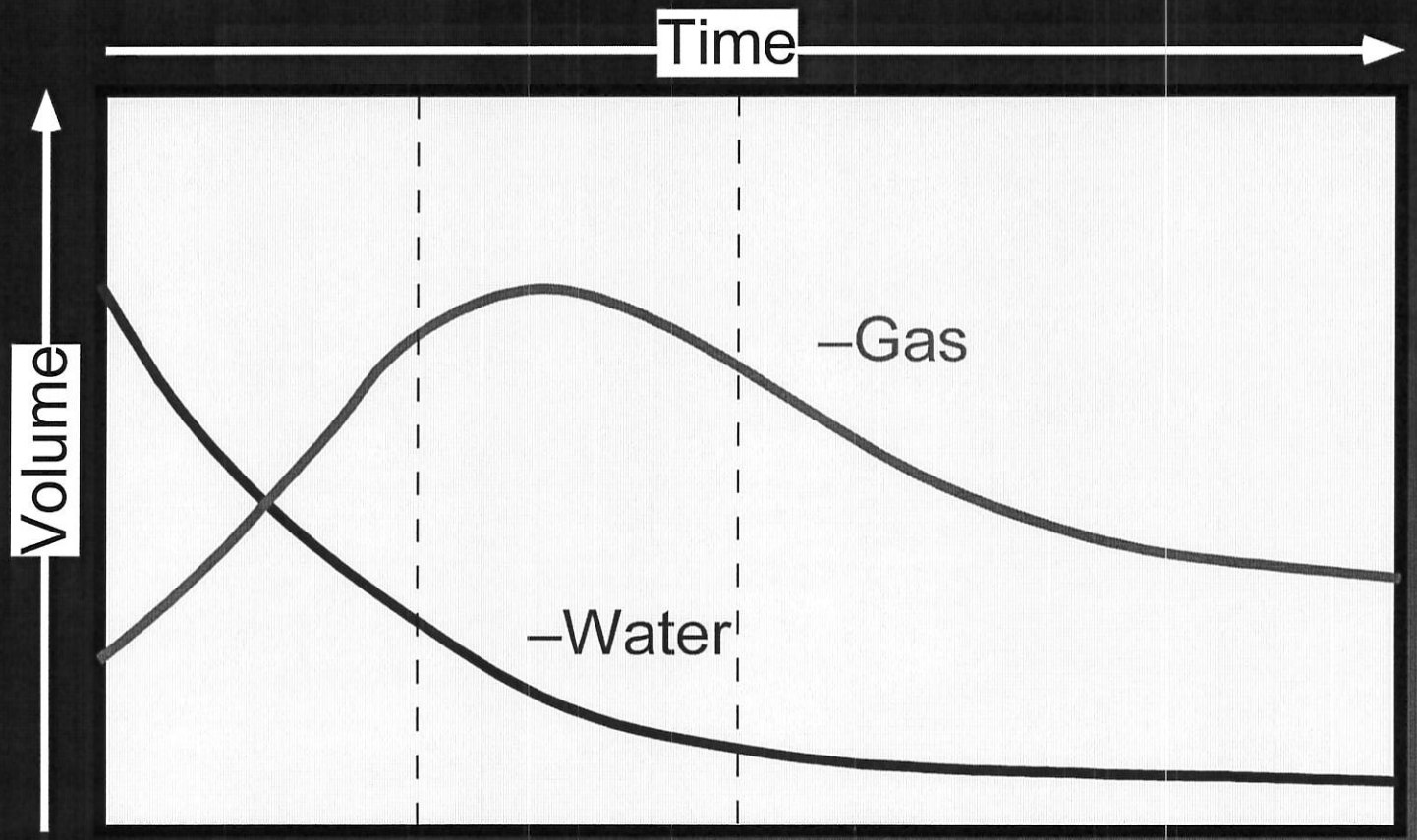


Conventional Gas and Coal Bed Gas



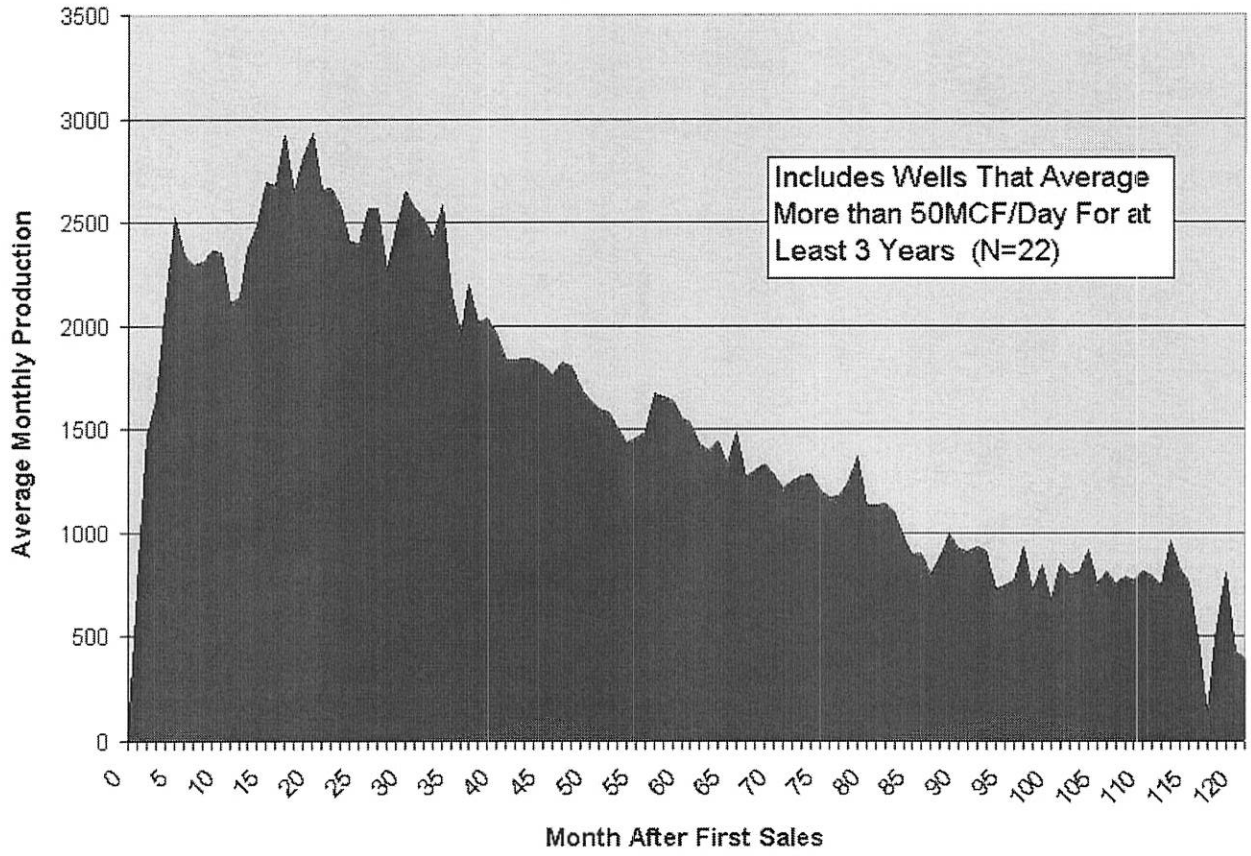
Adapted from Rice, 1997

Production Stages of a Coalbed Gas Well



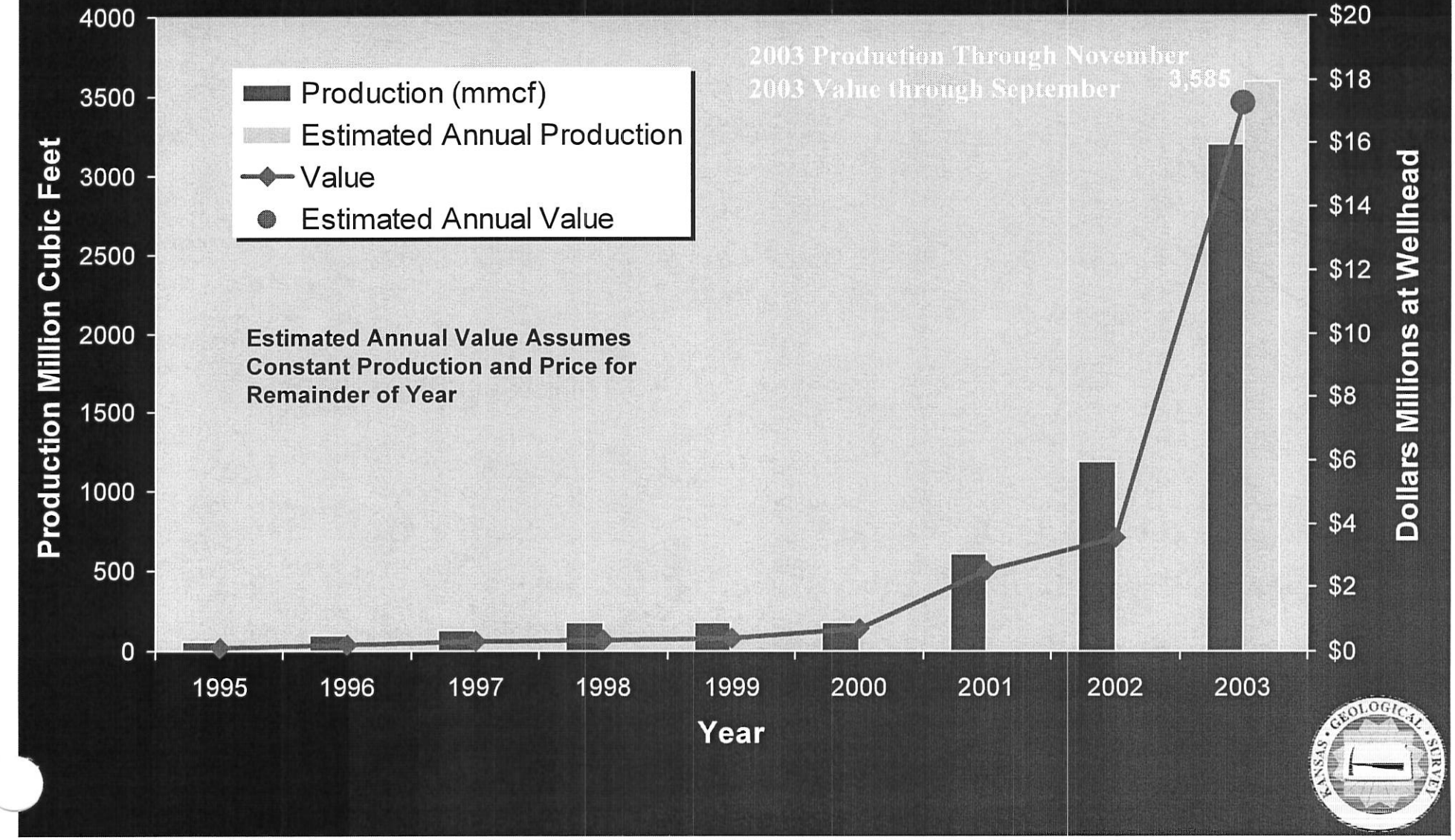
Adapted from Rice, 1997

Kansas Coalbed Methane Monthly Production



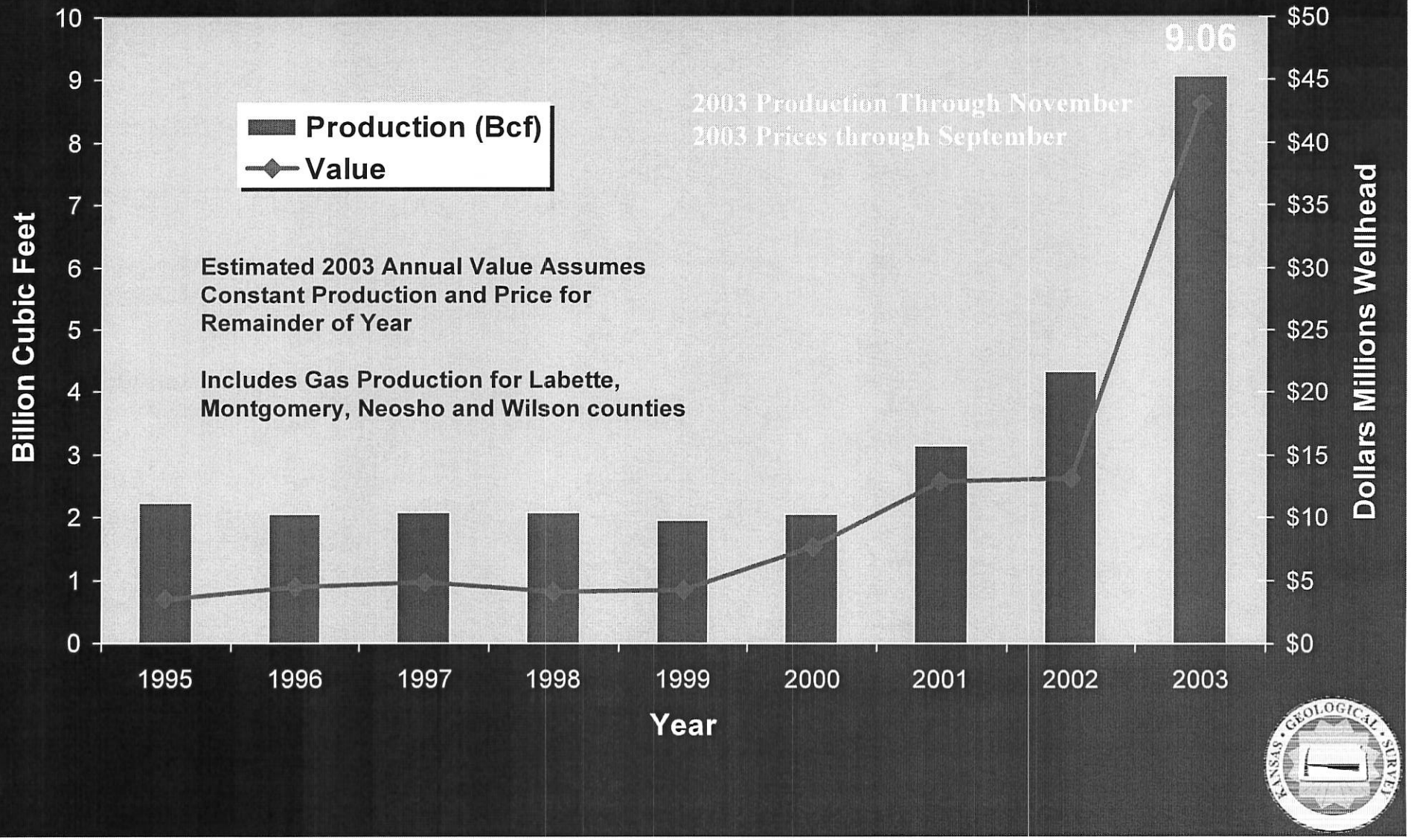
KANSAS GEOLOGICAL SURVEY

Neosho County CBM Production

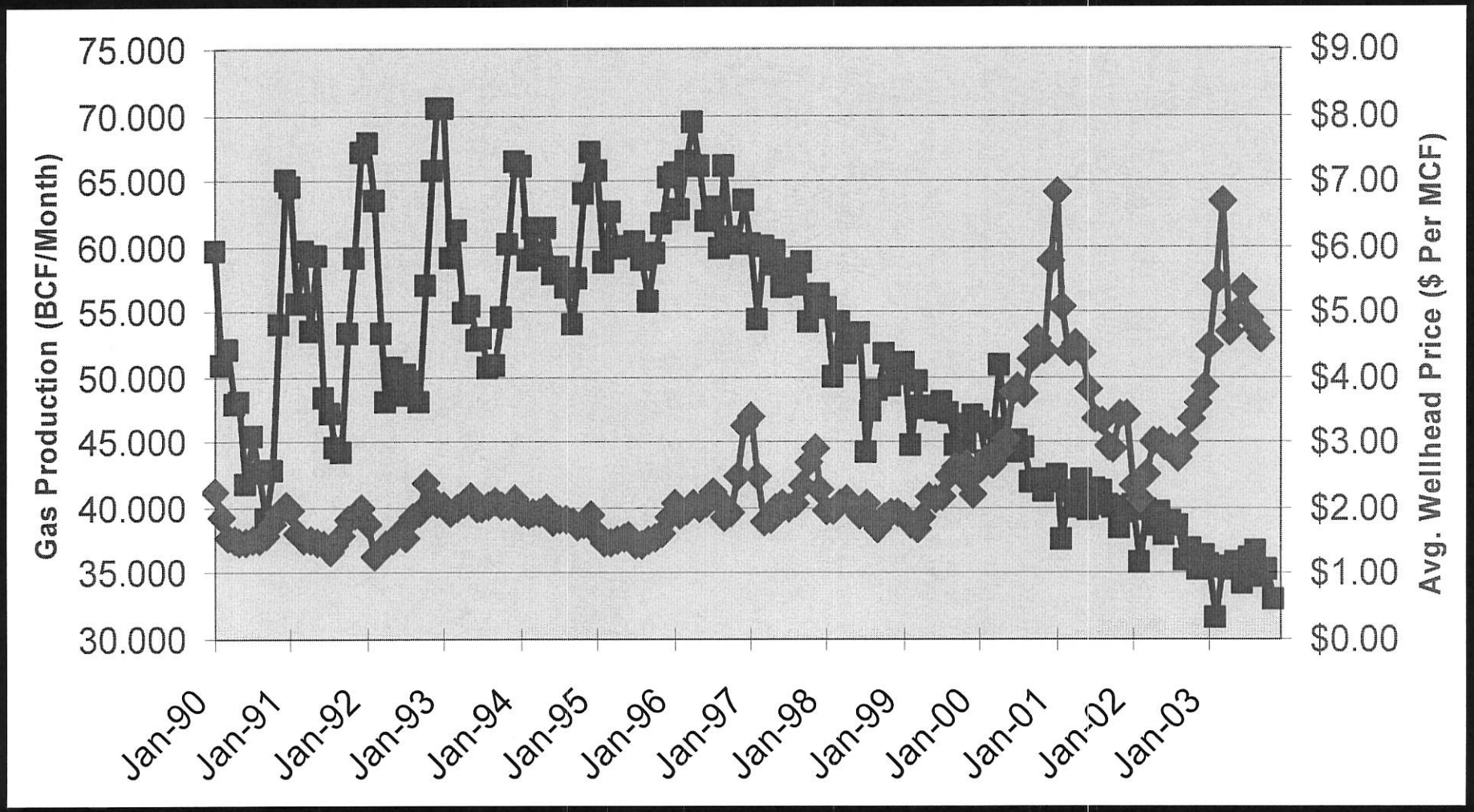


2-15

SE Kansas CBM Production



Kansas Gas Production



Production Through November 2003
Wellhead Prices through September 2003

KANSAS GEOLOGICAL SURVEY

2-17

Coalbed Methane Program

KANSAS • GEOLOGICAL • SURVEY

Coalbed Methane Program

Coalbed Methane Program

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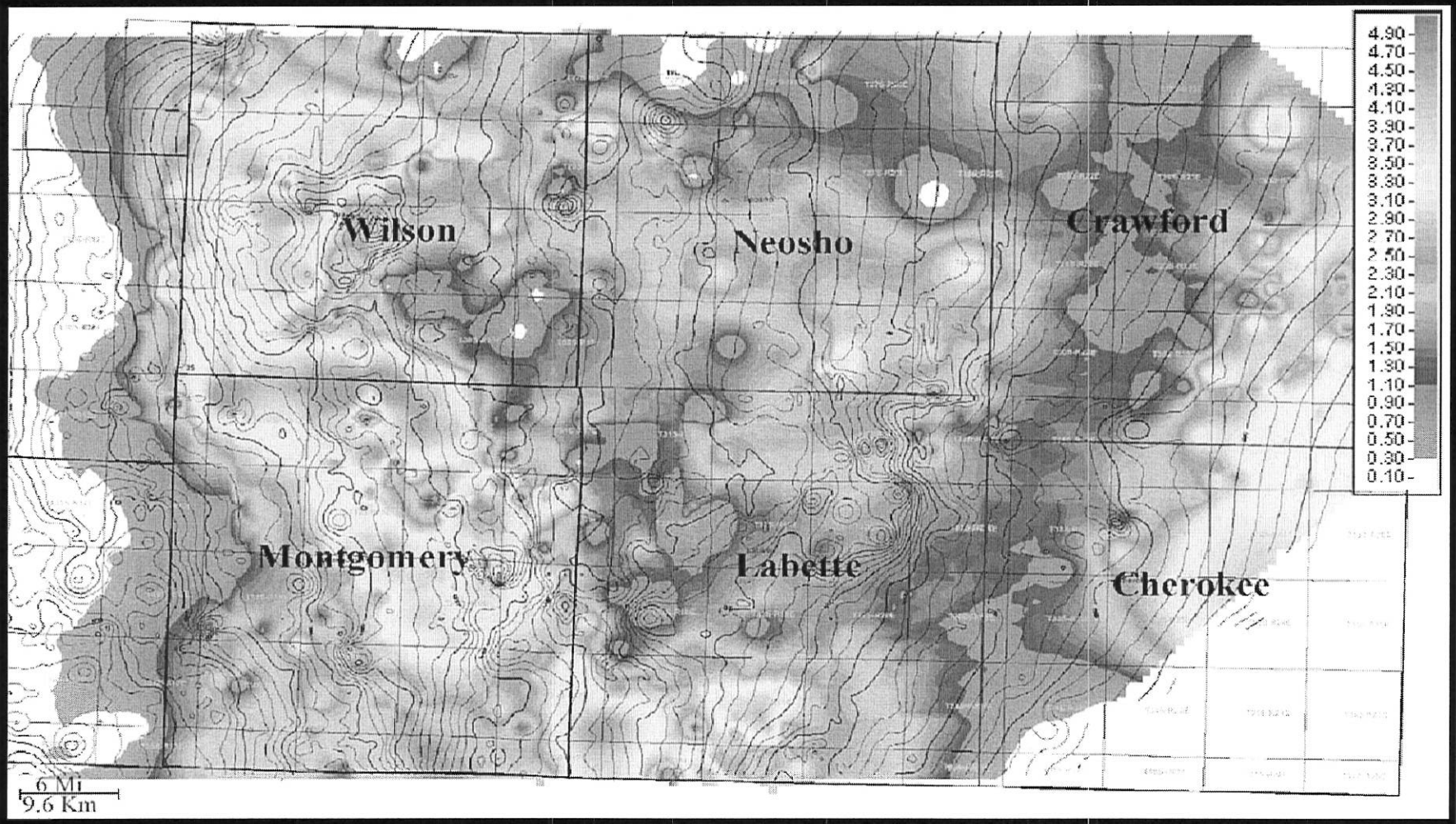
2-20

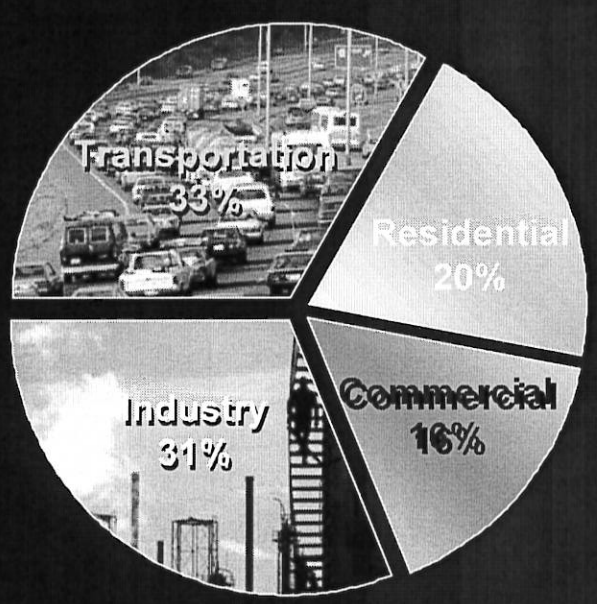
Weir-Pitt Coal

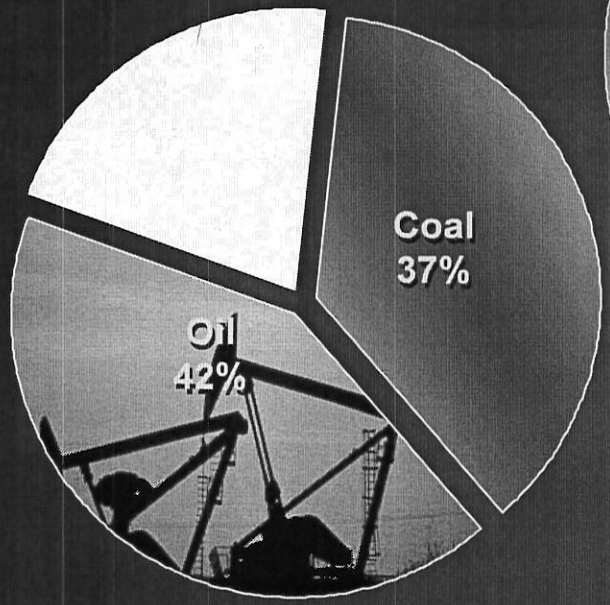


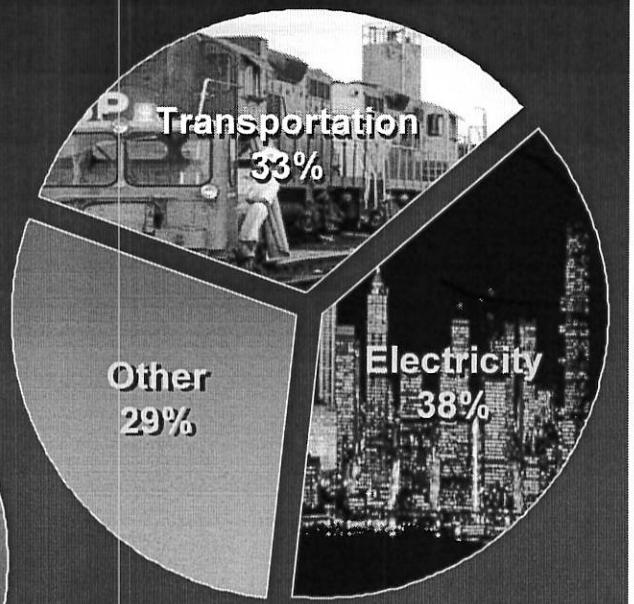
KANSAS GEOLOGICAL SURVEY

United States Carbon Dioxide Emissions

By Source & Sector)







EIA AEO2002

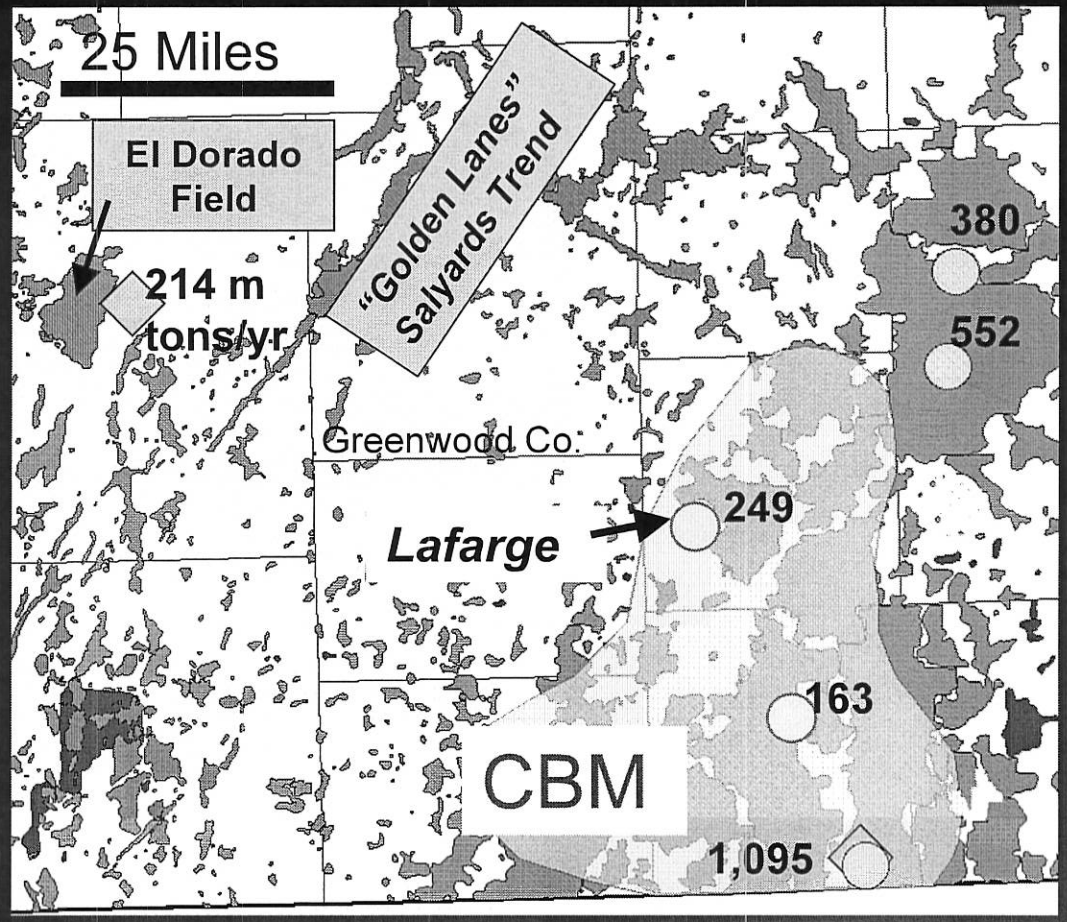
Southeast Kansas

Partially miscible and immiscible CO_2 EOR

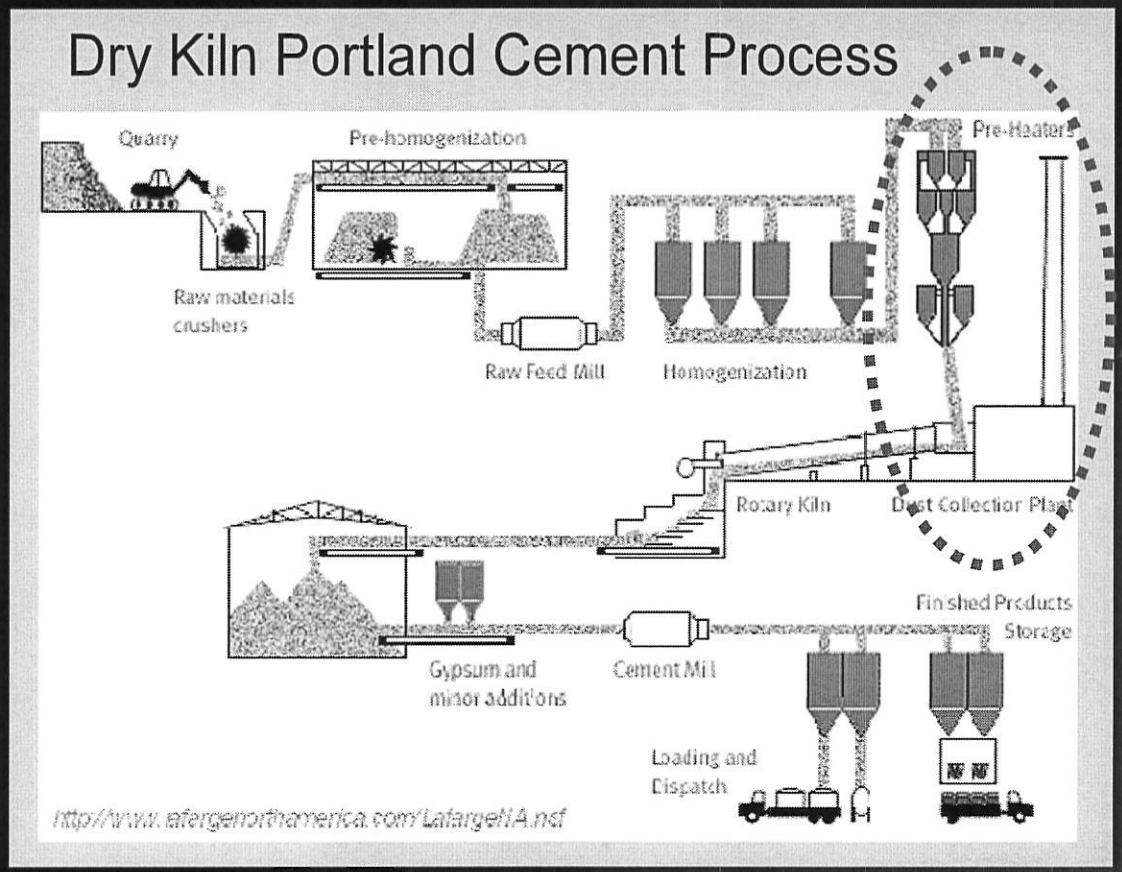
- **El Dorado**
- **Salyards Trend,**

Enhanced Coalbed Methane (N_2 and CO_2)

Cement plant gas stream may be best suited for ECBM



Cement Production



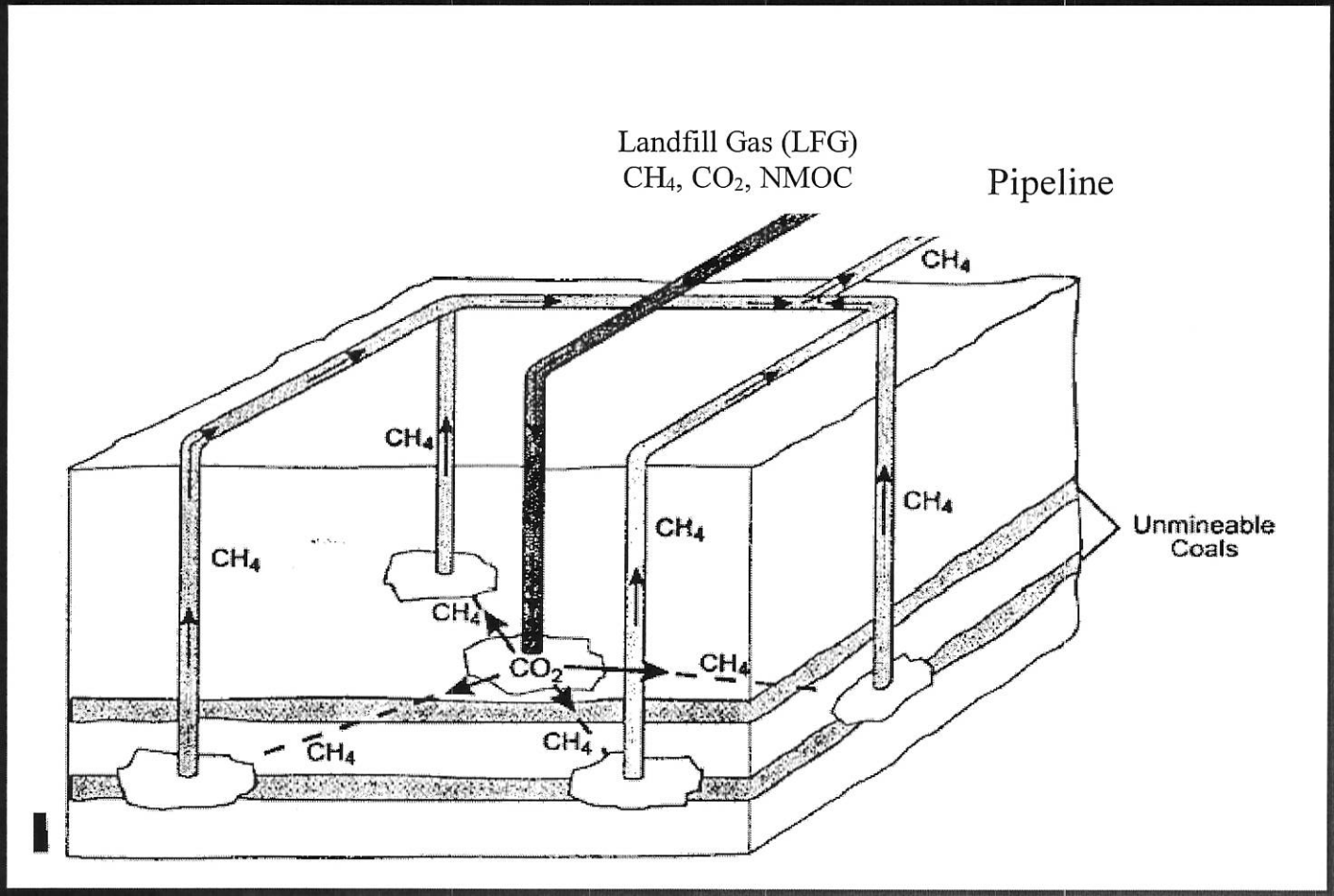
Calcination Process

$CaCO_3 > CaO + CO_2$

0.51 tons CO2 / ton cement

CO_2 and N_2 kiln gas mix may be suitable for ECBM with little processing

Landfill Gas



2-25

Kansas CBM Summary

- **Expect CBM Production Increase to Continue**
- **Continued Exploration Expected**
  - **Extent Dependent on Outcome of Pilots**
    - › Geological Survey Working to Provide Information
  - **Northward Spread**
  - **Significant Impact on SE Kansas Economy**
  - **Potential Significant Impact on Kansas Economy**
- **A Substantial Boost in US Supplies will take Time**
  - **US Market Controls Kansas Gas Price**
  - **Kansas is Vulnerable to Energy Price Spikes**

Testimony by Jack R. Ekstrom,
Evergreen Resources, Inc.
Senate Utilities Committee
Topeka, Kansas
March 4, 2004

Good morning Mr. Chairman and distinguished members of the committee. It is an honor to testify before you today. Thank you for inviting me.

I am Jack Ekstrom, director of Government and Public Affairs for Evergreen Resources, Inc. Evergreen is NYSE company engaged in exploration for and production of unconventional natural gas, including natural gas produced from coal seams. The company has proven natural gas reserves of nearly 1.5 trillion cubic feet, primarily in he Raton Basin of southern Colorado. The company has a market capitalization of approximately $1.3 billion. In addition to Colorado and Kansas, Evergreen operates in Alberta, Canada, eastern Utah and Alaska.

Evergreen owns leases of approximately 750,000 acres in the Forest City Basin, a geologic province encompassing all or parts of Miami, Linn, Franklin, Anderson, Doniphan, Atchison and Jackson counties. We are presently exploring this acreage and our plans for the remainder of this year are to drill a total of 90 wells and by year's end have 100 producing gas wells, including a number of purchased wells, in Kansas.

Our Kansas headquarters are in Ottawa, and by the end of this year we expect to have a professional staff of 15-25 with an average annual salary of approximately $60,000. We recently hired a husband and wife team, as well as a young lady in Denver who wished to return to Ottawa. If full-scale development is attained, we expect our project to employ at least 90 professionals and to make capital expenditures of more than $70 million annually. At full-scale development, Evergreen would drill in the range of 150-200 wells per year. This year our capital expenditure budget for Kansas is $33 million. We hope that our ultimate recoverable reserves approach one trillion cubic feet of gas.

We are presently custom building our own equipment for drilling, cementing and sand-fracturing the subsurface gas-bearing formations. We hope to have this equipment on site and operating in the second half of this year. We typically drill four to five wells per section and our expectation is for reserves of .25 to .33 trillion cubic feet per well. These wells, drilled to depths between 1,000 and 3,000 feet, appear to produce small amounts of water. This water is disposed of in state-permitted injection wells in the Arbuckle formation, well below drinking water aquifers.

We are enthusiastic about our prospects in eastern Kansas and look forward to providing growth in your tax base, a sound and secure supply of clean-burning natural gas and to being a positive force in the communities in which we operate. Again, thank you for the invitation. I will answer any questions you have to the best of my ability.