

# Unlocking The Natural Gas Riddle

---

Governors Comprehensive Energy Policy  
Advisory Commission  
Baton Rouge, Louisiana  
April 29, 2002

By: Matthew R. Simmons

**SIMMONS & COMPANY**  
**INTERNATIONAL**

# The Profound Questions Facing Natural Gas

---

- Demand needs to grow at least 30 Tcf.
- Foreign imports are a restricted supply.
- Only way to reach these demand levels is through major increase in U.S. gas supply.
- Whether gas production can stay flat is becoming a serious issue.

# The Natural Gas Riddle

---

- Why did a drilling boom not increase natural gas supply?
- What will be the supply impact of the recent drilling collapse?
- Many theories, few hard facts.
- TRRC's new oil and gas database sheds light on this riddle.

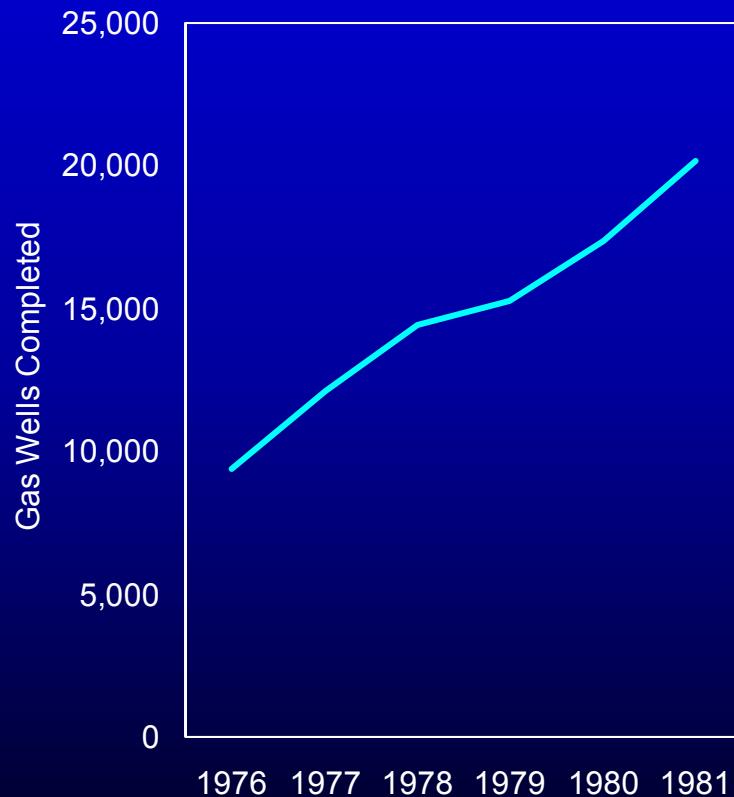
# A Drilling Boom That Fizzled - A Collapse With Questions

---

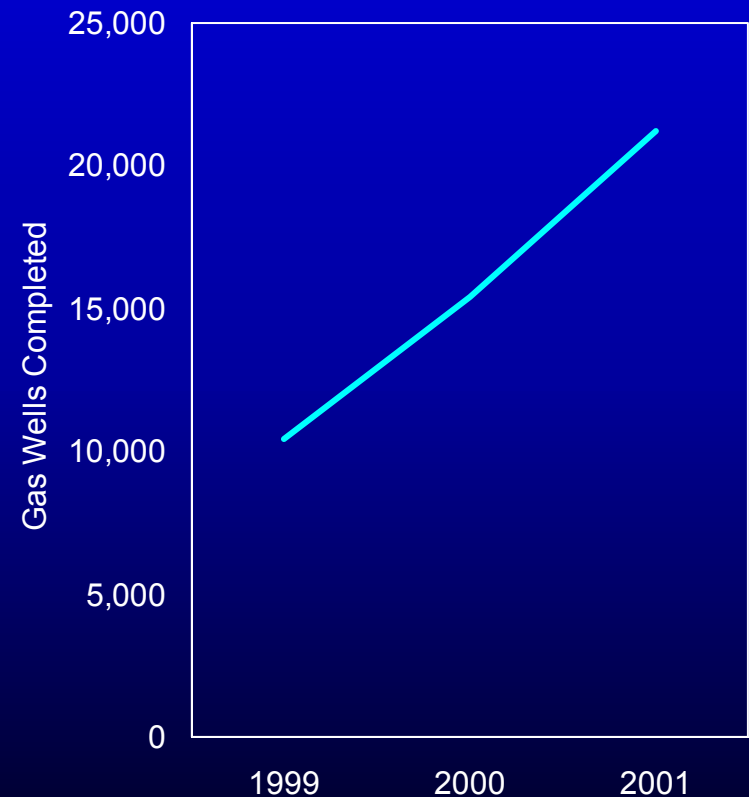
- In 2000 – 2001, a gas rig drilling boom occurred that exceeded the 1976 - 1981 boom.
- Yet, daily natural gas supply stayed mired at the same level for the past eight years.
- Gas drilling peaked in July. It is now off by 45%.

# The Drilling Boom Of 2000/2001 Was Unprecedented

Five-Year  
The 1970s Gas Boom



Two-Year  
The 2000-2001 Gas Boom



Source: EIA Monthly Energy Review, March 2002.

**SIMMONS & COMPANY**  
**INTERNATIONAL**

# Wells Completed Are Off

## Gas Wells Completed

1 <sup>st</sup> Q 00	3,275
2 <sup>nd</sup> Q 00	3,535
3 <sup>rd</sup> Q 00	4,321
4 <sup>th</sup> Q 00	4,467
1 <sup>st</sup> Q 01	4,755
2 <sup>nd</sup> Q 01	5,609
3 <sup>rd</sup> Q 01	5,748 ← Peak
4 <sup>th</sup> Q 01	5,112
1 <sup>st</sup> Q 02	4,700 (Est.)

↑  
Down 18%

## Gas Rig Count

July 2001	1,070
April 2002	591

↗  
Down 45%

# The Record 2000/2001 Drilling Boom

---

Old Record: 20,166 Gas Wells Completed (1981)

New Record: 21,224 Gas Wells  
(+ 5% Over Old Record)

2<sup>nd</sup>/3<sup>rd</sup> Q 01 Annualized Rate: 22,714 Gas Wells Completed

Peak 2001 Versus 1981 Record: + 13% More Wells

# The Supply “Response” Was Puzzling

---

- Most gas observers were sure supply would grow.
- Its failure to respond was blamed on a lag effect or false data.
- As time lag thesis waned, a "marginal well thesis" took its place.
- If "marginal thesis" is true, a 45% drop in gas wells drilled might have a negligible impact on gas supply.
- But no data was developed to support this "marginal well" theory.



# Smell Test Questions The Marginal Well Thesis

---

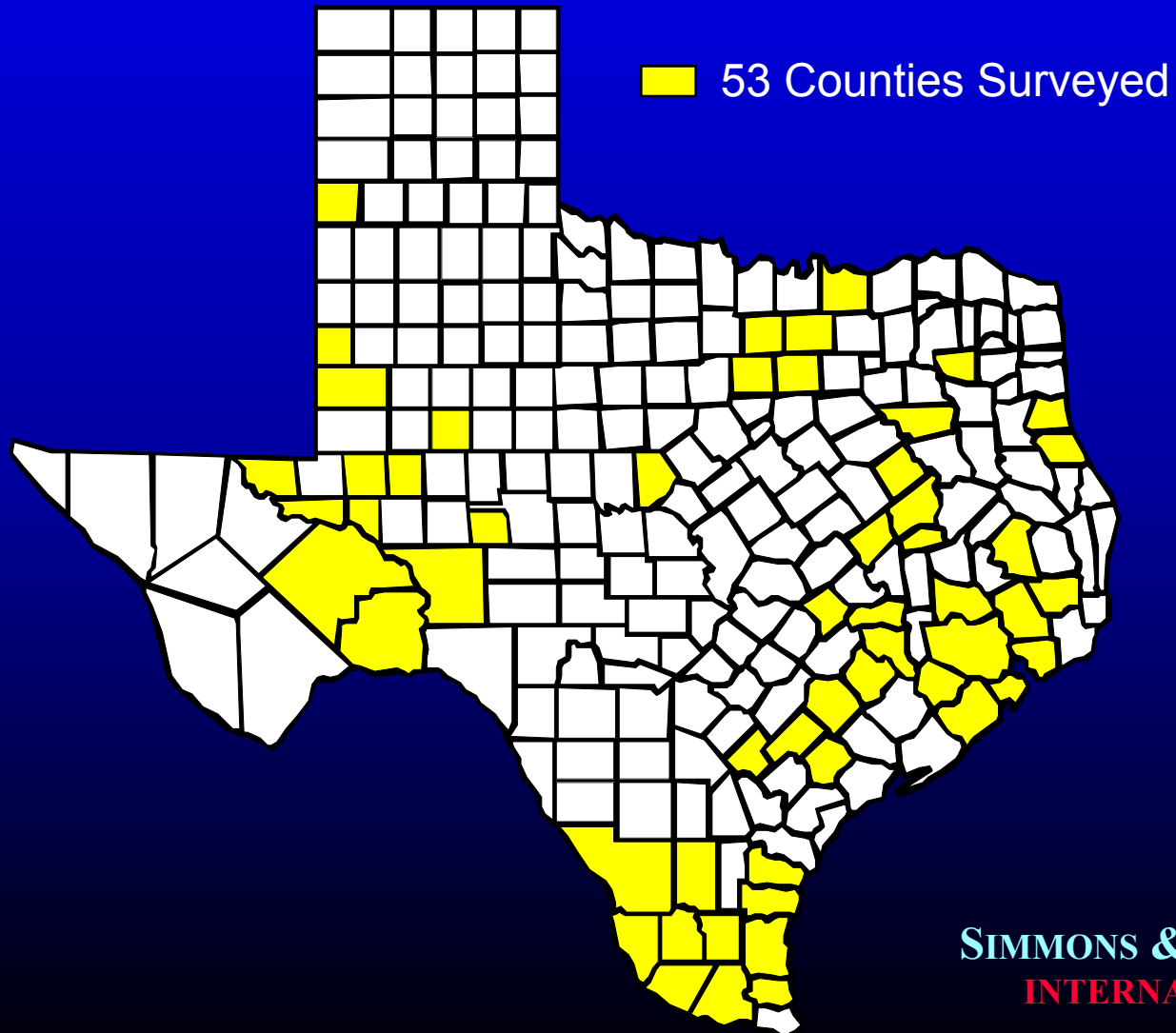
- There were various reasons why the marginal well thesis might not be correct:
  - Drilling boom happened too fast to create new marginal well sites.
  - Some extra wells completed in boom were likely wells planned to drill in 2002 and beyond.
  - High gas prices allowed operators to spend maximum dollars to enhance peak production.
- If the marginal well thesis is not correct, natural gas supply will drop by some material degree.
- Questions are: 1) How much?; and 2) How fast?

# Simmons' TRRC Data Study

---

- Made extensive use of ACTI.
- Sampled 53 Texas counties (which produced 66% of the state's gas well gas).
  - The counties covered a wide range of gas well productivity.
  - The range should be a reasonable proxy for the U.S.
  - January 2002 gas production from this sample totals 8.3 bcf/day.
    - ☐ This represents 16% of U.S. production.
    - ☐ It is same amount as Colorado, Wyoming, Alabama and California combined.
  - We “examined” two types of wells:
    - ☐ All wells completed in 2001, 2000, 1999 and 1998.
    - ☐ Giant gas wells: any wells producing daily supply equivalent of 1 billion cf/year.

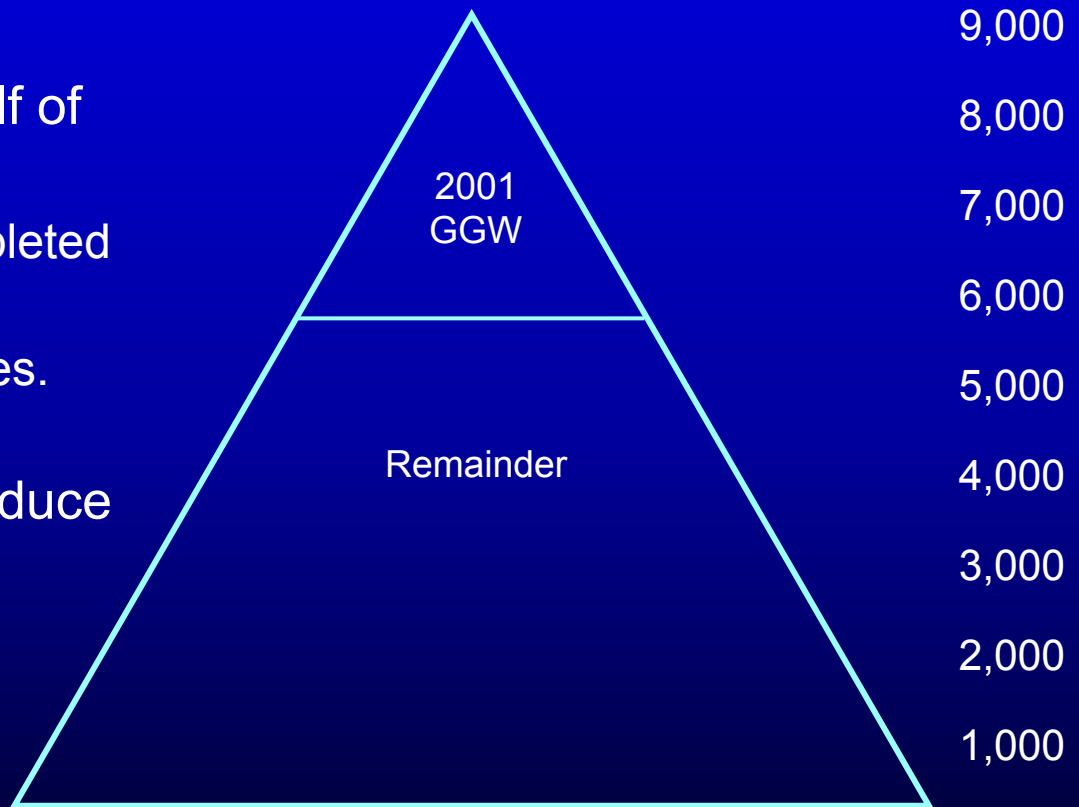
# Details Of The Texas Gas Study



**SIMMONS & COMPANY**  
**INTERNATIONAL**

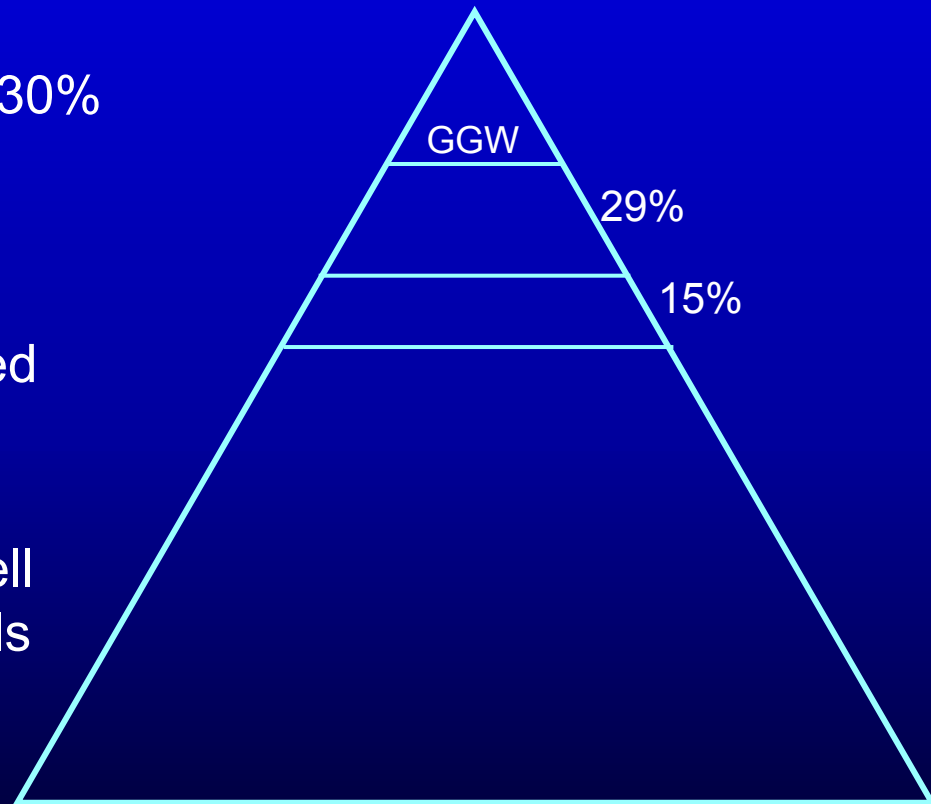
# 2001 Vintage Wells Made Up 29% Of Total Production

- 172 GGWs made up  $\approx$  half of total supply.
  - 60% of these wells completed in last half of year.
  - All have high decline rates.
- Another  $\approx$  2,300 wells produce another 1,227 Mmcf/d of total supply.



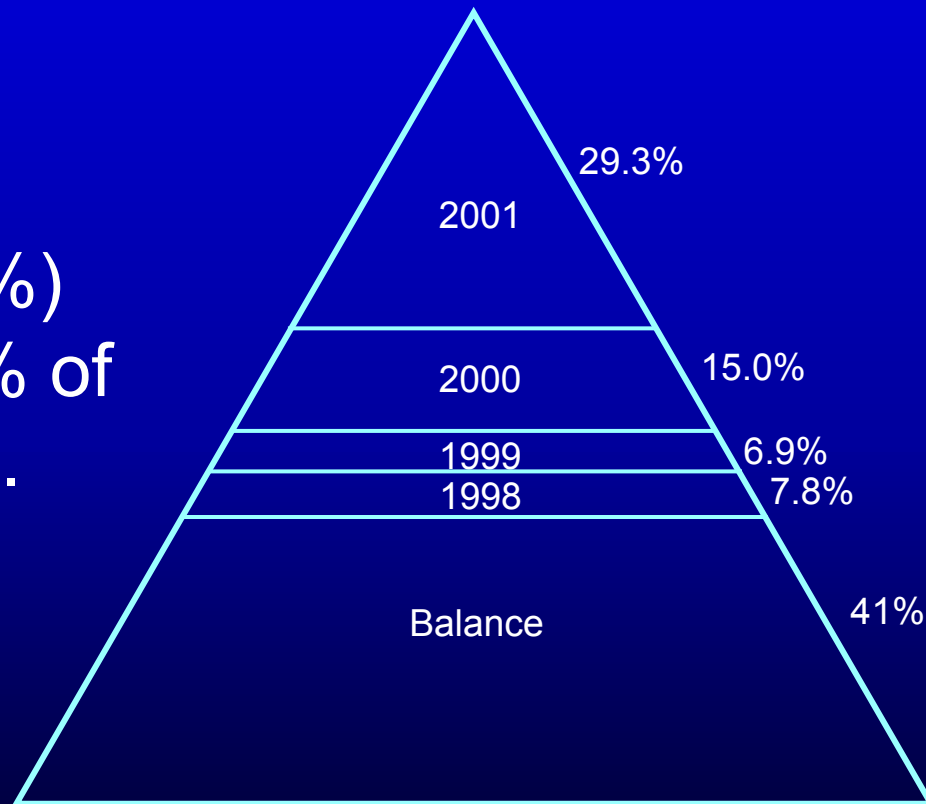
# Another 15% Comes From 2000 Vintage Wells

- 74 GGWs contributed only 30% of what the 2002 GGWs supplied.
- Another 1,942 wells supplied 11% of January 2002 total.
- In total, 44% of total gas well production comes from wells completed in the last 24 months.



# 53 County Gas Pyramid

- 7,682 1998 to 2001 wells (20%) account for 59% of total production.



# TRRC Analysis Highlights Exposure To Drilling Drop

---

- Regardless of whether the 53 county survey is a sound proxy for all of Texas (or U.S.), it highlights how sensitive current supplies are to steadily increased drilling.
- Conversely, it underscores how fast gas supplies might drop once the brunt of gas drilling decline arrives.

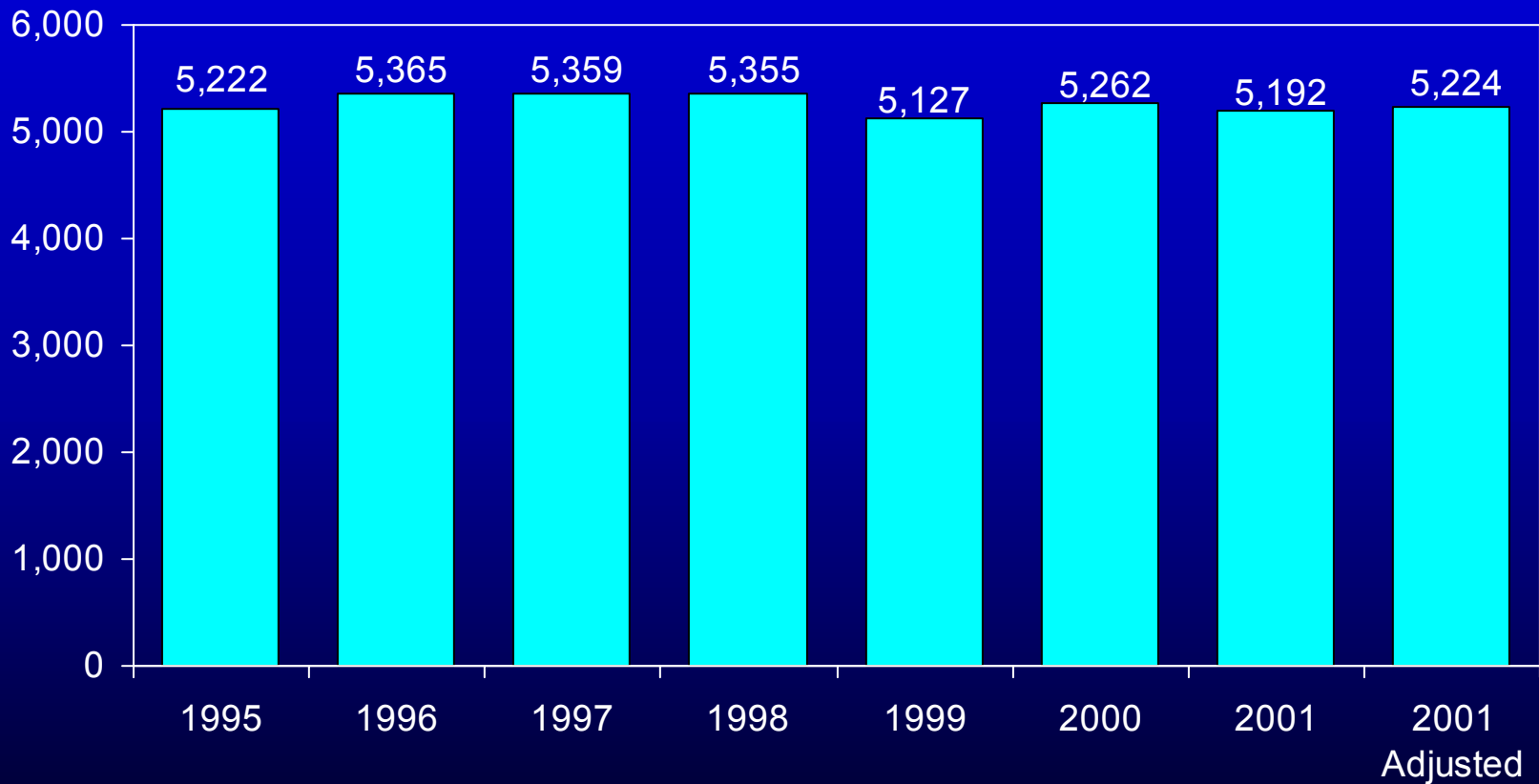
# Texas Study Proves That Gas Supplies Can Quickly Decline

---

- Texas analysis highlights how easily supply can drop, unless steady or rising drilling continues.
- Counties with robust well productivity in 1999 or 2000, but declining in 2001, highlight how fast “new elephant finds” come and go.
- The high productivity wells of 2001 are also declining fast.
- When lag effect of drilling downturn finally felt, supply drop could be very large.



# Total Natural Gas Production First 11 Months Total By Year



Source: TRRC.

**SIMMONS & COMPANY**  
**INTERNATIONAL**

# How Texas Maintained Flat Gas Supply

	Mmcf/Day		
	January 1999	January 2002	
Top Quartile (34 Counties)	2,020	3,502	+ 73%
2nd Quartile (31 Counties)	3,502	3,863	+ 10%
3rd Quartile (33 Counties)	3,376	2,968	(12%)
4th Quartile (94 Counties)	5,590	3,711	(33%)

- 65 Counties Grew By 1,843
- 127 Counties Fell By 2, 287

# This Two-Tiered State Supply Worsened In 2001

	<u>January 1999</u>	<u>January 2002</u>	
Top Quartile (38 Counties)	2,601	3,538	+ 36%
2nd Quartile (38 Counties)	3,455	3,489	+ 1%
3rd Quartile (25 Counties)	3,567	3,390	(5%)
4th Quartile (91 Counties)	4,916	3,627	(26%)

- Almost half of Texas gas producing counties had annual decline of 26% during historic drilling boom.
- Steady growth by small number of counties "masked" by declines.

# Could These Results Be Similar Around U.S.?

---

- Two states produce high percent of U.S. gas.

	<u>Nov 2001</u>
Texas	31%
Louisiana	<u>26%</u>
Total	57%
Oklahoma	8%
Wyoming	7%
Colorado	4%
Rest Of U.S.	<u>24%</u>
Total	<u><u>100%</u></u>

# The Drilling Boom/Decline

	2001				2002	Boom	Bust
	January	April	July	December	February	1/01 To Peak	Peak To 2/02
U.S. Total	1,118	1,206	1,278	901	825	+ 14%	(35%)
<b><u>State Totals</u></b>							
Texas	429	481	509	384	349	+ 19%	(31%)
Louisiana	221	226	230	172	164	+ 4%	(29%)
Oklahoma	135	144	156	74	72	+ 16%	(54%)
Wyoming	51	52	64	44	45	+ 25%	(30%)
New Mexico	72	79	81	39	39	+ 13%	(52%)
Other	210	254	238	188	156	+ 13%	(34%)

# Louisiana And Texas Have Similar Gas Profiles

---

- Like Texas, Louisiana's gas production (excluding Federal offshore waters) has been effectively stable over the last few years.
- Parishes with growing production have offset most Louisiana parishes with declining production.
  - 53% of 2000 production grew by 12%.
  - 47% of 2000 production fell by 24%.
- This happened despite a drilling boom.

# Louisiana Parishes Also Have Gains And Declines

Parish	MMcf/d				
	1998	2000	2001	98/01	00/01
Vermilion	638	557	521	(18%)	(6%)
Terrebonne	468	400	483	+ 3%	+ 21%
Plaquemines	388	339	391	+ 1%	+ 15%
Bienville	250	244	252	+ 1%	+ 3%
St. Mary	264	239	251	(5%)	+ 5%
Pointe Coupee	134	212	229	+ 71%	+ 8%
Cameron	206	216	209	+ 1%	(3%)
Bossier	80	137	157	+ 96%	+ 15%
Jefferson Davis	224	151	151	(33%)	--
Desoto	150	128	138	(8%)	+ 8%
Webster	224	168	151	(36%)	(10%)
Lafayette	111	129	111	--	(14%)
Iberia	155	106	104	(33%)	(2%)
Lafourche	122	119	97	(20%)	(18%)
Clairborne	152	100	94	(38%)	(6%)
Others (48)	746	757	784	+ 5%	+ 4%
Total	<u>4,312</u>	<u>4,002</u>	<u>4,123</u>	<u>(4%)</u>	<u>+ 3%</u>

# Why Is A Serious Decline Not Yet Appearing?

---

- Many skeptics of a serious supply risk point to the steady supply (or slight declines) of current supply.
- Drops in the first quarter of 2002 reflect high supplies of the first quarter of 2001 (liquids not stripped).
- Gas price rebound could quickly correct drilling downturn.
- This ignores "lag effect."



# Lag Effect Of Declining Rig Count Masks Potential Supply Drop

---

- Texas rig count peaked in 7/01 at 509 rigs. Rig count is now 293, a decline of 42%.
- Daily gas supply through January 2002 is flat.
- In March 2002, many key TRRC Districts were still close to peak gas completion rates.
- TRRC District 4 had nearly 100 rigs drilling at peak. This work is now down to 69 rigs.
- Giant gas wells take approximately 10 to 12 months from spud date to peak production.
- If a big supply collapse occurs, it should begin in third quarter of 2002.

# Texas Gas Wells Completed

## Highlight This Lag Effect

- Texas rig count decline:

- Peak (July 2001) 509
- March 2002 301
- April 2002 293

- Texas new gas well data:

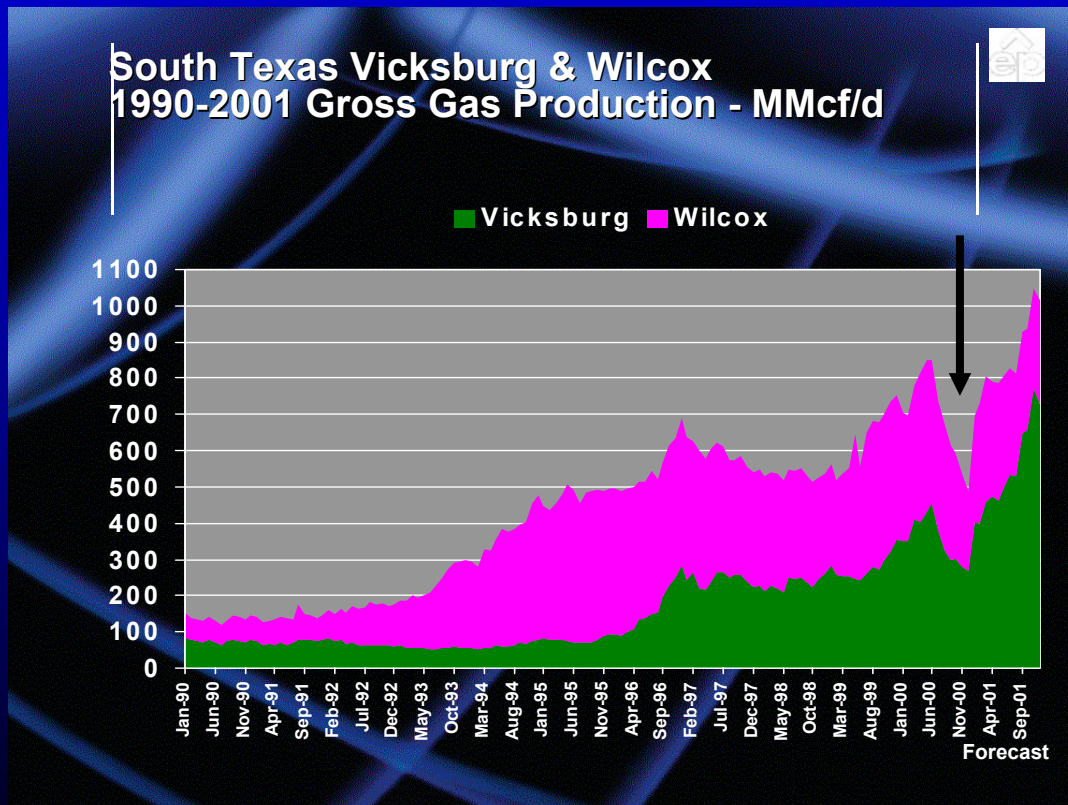
New Gas Well Completions	
Month	Wells
January 2000	297
January 2001	329
April 2001	377
July 2001	351
October 2001	427
January 2002	351
February 2002	377
March 2002	469

Record Month

- Gas well completions will finally drop but lag effect imprecise.

# Once Lag Effect Appears, Drop Can Be Large

El Paso's remarkable success in deep South Texas wells shows impact of a brief "drilling pause".



## Impact

- 830 MMcf/d in June.
- 500 MMcf/d in November.
- 40% drop in six months.

# Summary Of Texas Analysis

---

- There was no evidence of major decline in 2001 well productivity.
- Instead, impact of high volume wells seemed to grow.
- High percent of Texas supply will soon need to be replaced.
- Drilling collapse makes this a challenging task.
- Supply will drop. Big question is how fast and when.

# Important Questions Raised By This Study

---

- While the analysis of data from the 53 county survey is as detailed as ever done, key questions remain.
- Whether the survey is representative for U.S. production is not certain.
- The data highlights the impact of new technology in permitting extremely high initial well production.
- Other data highlights the impact of well re-drills/workover.
- The sustainability of these events is questionable.
- Sketchy data indicates that some of the drilling boom was “pre-drilling” sites that would otherwise have been drilled in 2002/2003 .
- “Gas well completions” that become dry holes were numerous.

# The Profound Issues This Study Raises

---

- All estimates predicting only a small gas supply drop were anchored on the “increasingly marginal well” thesis.
- This study uncovered no evidence to support this concept.
- Instead, it highlighted the possibility that most new wells have high peak production/day, but steep declines.
- If this is true in Texas, it is probably true throughout the U.S.
- If so, daily gas production is likely to begin a serious decline.
- This decline could be steep by the time it bottoms.
- Whether this drop is reversible through a new drilling boom is not clear.

# How Serious Could Supply Drop Become?

---

- The big impact of a 45% drop in gas drilling should appear in the third and fourth quarters of 2002.
- Some of drop could be offset by increased drilling of small number of giant wells (and deepwater gas).
- The rate of drilling these wells has also slowed.
- The lag effect of increased drilling also takes 9 to 12 months.

# Conclusions: Gas Supply Is At Risk

---

- TRRC study does not guarantee a supply collapse.
- Risk is serious enough to warrant contingency planning.
- U.S. has few alternate actions if supply does drop by meaningful degree.
- Lead times for all alternate actions are long and expensive.



# There Are "Action Plans"

---

- Growth In GGW Drilling (Onshore And Offshore)
- Coal Bed Methane
- "Cleaning Up Bad Gas?"
- Imported LNG
- Arctic Gas
- Nuclear And Clean Coal

SIMMONS & COMPANY  
INTERNATIONAL