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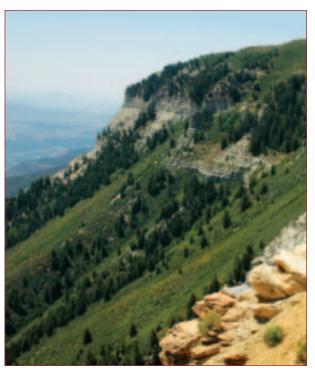
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INTRODUCTION

ROCKIES TO THE RESCUE

bservers and oil and gas operators alike continue to place a lot of faith in the U.S. Rocky Mountain region, one of the few places in the Lower 48 that will sustain its upward climb in natural gas production in coming years. Many new and revived oil plays are also attracting new players to the region.

But it is gas that takes center stage at the moment, as production is flat elsewhere in the U.S. even as demand increases. Because of high gas prices and better frac techniques, the number of Rockies' gas wells is on the rise, unlocking new supplies. Completions increased 61% during the past four years, from 5,390 gas wells in 2002 to 8,700 wells in 2006, according to data Photo courtesy of The U.S. Bureau of Land Management from IHS Inc.



This drilling activity helped boost Rockies gas production from 11.2 billion cubic feet (Bcf) per day in 2002, to 12.6 Bcf per day in 2006.

According to projections in a study Ziff Energy Group recently released, Rockies gas production will increase significantly in the years ahead.

"Higher new gas well productivity due to improvements in tight-gas completion technology has more than offset reductions due to maturity of some gas basins," says Dana Bozbiciu, senior gas analyst.

Ziff Energy's outlook indicates that between 2007 and 2015, Rockies gas output will grow to almost 16 Bcf a day, up 3 Bcf daily from current levels, principally from new tight-gas wells.

As evidenced by our article here on rookies in the Rockies, there is still a high level of interest in this region. A host of established companies such as ConocoPhillips, EnCana and Anadarko Petroleum, and E&P start-ups such as Denver-based Cirque Resources LP, are targeting the region for its rich natural gas potential, which all agree is in the multiple trillions of cubic feet.

The potential is staggering, so it's no wonder many companies think the Rockies is the place to be. In Wyoming alone, the prolific Pinedale Anticline Field could hold 27 trillion cubic feet (Tcf) of recoverable gas reserves and the nearby Jonah Field is estimated to hold 8.5 Tcf.

The region is not without its challenges, from environmental and community activists who oppose drilling and development, to well permitting backlogs at the various Bureau of Land Management offices peppered throughout these states.

But producers are rising to the occasion, with many new tricks up their sleeve to access land, drill wells and protect the environment, leaving as small a footprint as possible. Cooperation with communities and local government agencies has been growing steadily—just as oil and gas production has.

> —Leslie Haines, Editor-in-chief Oil and Gas Investor



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About the cover: True Rig No. 9 drills a deep gas well for EOG resources in the Uinta Basin. (Photo by Lowell Georgia)

Previous Rockies Articles

For more details on various plays and companies active in the Rocky Mountain region, see these articles that have appeared in Oil and Gas Investor since last year's Investor's Guide:

Rangely Field - Operator Chevron U.S.A. is driving its carbon dioxide flood to the field's boundaries as it approaches the field's 1 billionth barrel of oil production. December 2006.

Bakken Billions - The U.S. Geological Survey estimates this oil play, spreading from Montana to North Dakota, could hold at least 270 million barrels recoverable. February 2007.

Year-Round Drilling - Questar's award-winning operations allow more drilling on the gas-rich Pinedale Anticline. March 2007.

Shallow D-J Gas - Shallow gas wells are sprouting on the eastern flank of the Denver-Julesberg Basin. March 2007.

Pump up the Volume - Operators such as award-winning Williams Cos. are maximizing the gas-rich San Juan Basin. May 2007.

Green River Oil Shale - Five companies were awarded demonstration leases in western Colorado's Green River oil shale formation. July 2007.

Rockies Gas - A tour of several basins reveals progress in drilling and production from gas and coalbed-methane plays. August 2007.

Rockies Waiting Game - When it comes to the price gas producers receive at the wellhead, there is good news and bad news, but a new pipeline could improve that in 2008. August 2007.

Prospering in the Paradox - Delta Petroleum Corp. is finding success in southeastern Utah and southwestern Colorado. August 2007.



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ROCKIES OVERVIEW

Perspectives on Natural Gas

Tighter well spacing and better frac techniques are combating land-access restrictions and fewer per-well reserves in certain Rockies gas plays.

BY PETE STARK, VICE PRESIDENT, INDUSTRY RELATIONS, IHS INC.

S. natural gas productivity has reached a crossroads. Lower 48 gas production essentially reached a plateau by 1996 and decreased from 2002 through 2006, even though annual gas-well completions increased by 64% to 27,400 wells during this same period.

Operators in North America are drilling almost three times as many wells as they typically did in the 1990s just to maintain flat productive capacity.

At issue is the fact that the substantial increases in well completions in low- to moderate-volume unconventional gas reservoirs—tight sands, shales and coal seams—have not been able to offset production declines in high-volume conventional gas wells in the Gulf Coast region.

Nevertheless, unconventional reservoirs—including those found throughout the Rockies—are expected to deliver an increasing share of future domestic U.S. gas supplies, even though there are substantial challenges to transform these unconventional resources to supplies.

The challenges to producible supplies are epitomized by the U.S. Rocky Mountain region, which has the potential to supply a large part of future U.S. gas needs.

It is blessed with an estimated 186.9 trillion cubic feet (Tcf) of most likely probable, possible and speculative gas resources, according to the Potential Gas Agency's April 2003 report, *Potential Supply of Natural Gas in the U.S.*

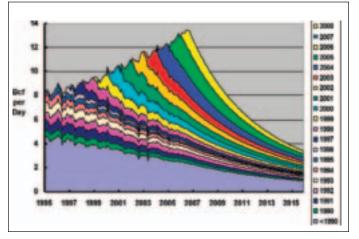
However, most of the Rockies' gas resource is attributed to unconventional tight sands and coalbed-methane (CBM) reservoirs, which tend to yield low to moderate volumes of production. What's more, these require a large number of wells to recover the gas in place.

Driven by high gas prices, Rockies' gas completions increased by 61% from 5,390 wells in 2002 to 8,700 wells in 2006.

This drilling activity helped boost Rockies gas production from 11.2 billion cubic feet (Bcf) per day in 2002 to 12.6 Bcf per day in 2006. This is an average annual increase of almost 500 million cubic feet (MMcf) per day.

This increase is critical to help sustain U.S. gas supplies. In perspective, though, the Rockies' gas production increase has only offset one-third of the corresponding annual production decrease of almost 1.5 Bcf a day in the Gulf Coast region.

In addition to development and technical recovery issues, Rockies operators must deal with significant



Color bands show the historic gas volumes generated by gas wells completed during each calendar year. The decline in the 2006 production (yellow) represents future production volumes that would result if no more gas wells were completed.

above-ground complications. These are well known and include uncertainties about gas prices, rising capital costs and transportation bottlenecks, as well as local community concerns, environmental regulations and growing anti-hydrocarbon sentiment associated with climate change policies.

ROCKY MOUNTAIN PRODUCTIVITY

The Rockies' regional gas production, including the San Juan Basin, has increased from about 8 Bcf per day during 1995 to almost 13 Bcf a day during 2006.

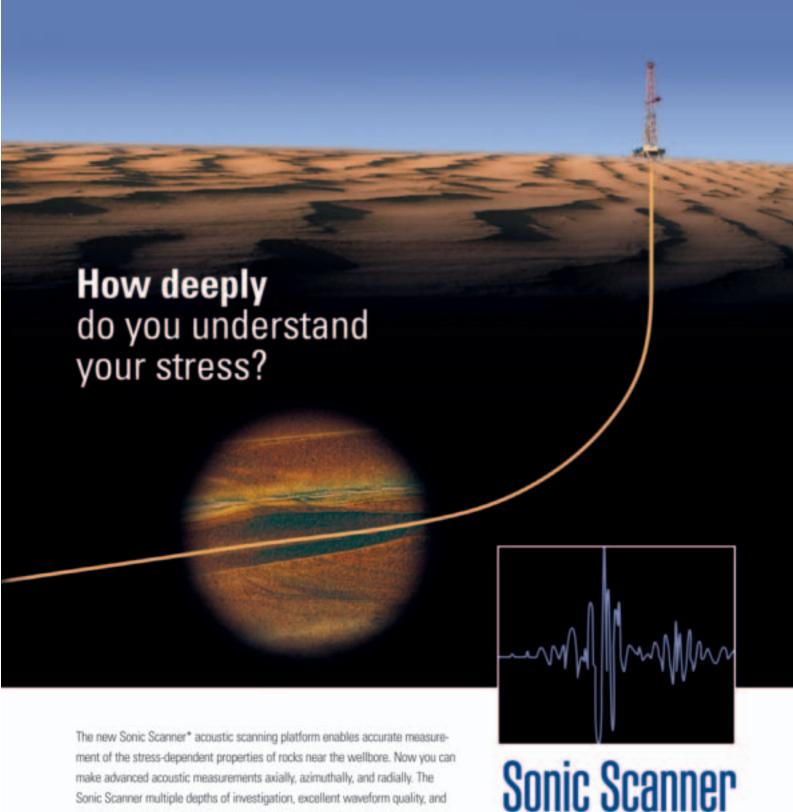
The average annual increase of about 500 MMcf per day has been accompanied by important changes in the production profiles. For example, the increase in slope of the vintage curves from the 1990 base to 2006 reflects the increase in production decline rates.

Moreover, since 1995, average reserves per well have decreased dramatically, from about 2.5 Bcf per well to a little more than 500 MMcf per well. Average peak-well production has decreased by 25% or more in most of the key unconventional gas plays. As a consequence, more gas wells must be completed each year to sustain the production growth rate.

Another implication of the increase in drilling intensity is higher production costs as demand for rigs and completion services grows.

JONAH'S CHALLENGES

The famed 36-square-mile Jonah Field in the northwest



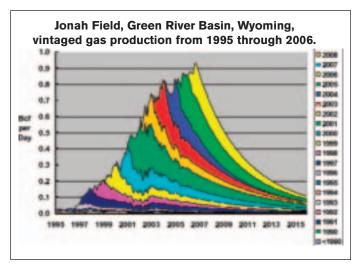
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Gas recoveries per well are declining despite the use of better frac techniques in Jonah Field.

part of the Green River Basin in Wyoming can be used to frame the challenges operators must address in developing major unconventional gas resources. The primary Upper Cretaceous Lance reservoir at Jonah is expected to yield 8.5 Tcf of gas from the estimated 13 Tcf of original gas in place, from a 2,500-foot gas column in tight, discontinuous channel sands with 8% to 2% porosity and 3-to 20 microDarcy of permeability.

Jonah gas production increased from about 25 MMcf per day in 1996 to an impressive 820 MMcf in 2003—an average annual increase of about 114 MMcf a day. But, the growth rate slowed from 2003 to 2006, when production grew by another 100 MMcf, and reached about 920 MMcf per day during 2006, from about 1,000 wells.

Nevertheless, Jonah Field has contributed 20% of the Rockies' gas production growth since 1996.

IHS' vintaged gas analysis shows that average peak-well production in Jonah increased from about 3 MMcf a day during 1998 to a high of about 4 MMcf a day during 2004, before dropping again to about 3 MMcf a day during 2005 and 2006.

Gas recoveries averaged about 4 Bcf per well from 1999 through 2002, but decreased on average to about 2.5 Bcf per well from wells completed in 2003 through 2006.

Multi-staged fracs (fracture stimulations) proved to be the key to unlock gas from the tight Lance reservoirs. Tuning the frac treatments allowed operators to boost the observed peak-well productivities and also allowed them to gradually reduce well spacing from 40 acres to 10 acres, while achieving the lower, but still substantial, peak production rates and recoveries recorded since 2003.

It is thought that 10-acre spacing will yield 65% recovery of the gas in place at Jonah. Increasing well density is a key factor in growing gas production from leading Rockies unconventional plays including the Pinedale Anticline, Piceance Basin, Natural Buttes in Utah, Wattenberg in Colorado and San Juan Basin coalbed methane.

ABOVE-GROUND CONSIDERATIONS

Multiple so-called "above-ground" business, community and environmental considerations also have impacted operations and gas production trends at Jonah and other Rockies unconventional gas plays.

Costs and prices The IHS-CERA Diminishing Returns study showed that 2005 drilling yielded positive incremental margins in 70% of the prime Rockies gas plays. This assessment was based on an average 2005 North American gas price of \$8.80 per thousand cubic feet (Mcf) and full-cycle costs of \$6.82 per MMbtu.

Rockies operators, though, are increasingly concerned about a cost–price squeeze. As an indicator of cost trends, CERA's Upstream Capital Cost Index increased by 31% from first-quarter 2006 through first-quarter 2007.

There are two key concerns about gas prices: first, chronic pipeline constraints in the Rockies yielded gas prices that averaged about \$3 per Mcf less than Henry Hub during the summer of 2007. The combination of soaring costs and the gas-price differential crimped 2006 and 2007 margins for many operators.

The Rockies' gas price differential is expected to decrease substantially with onset of flows during the coming winter via the newly built Rockies Express Pipeline (Rex) to the Midwest.

Second, high levels of U.S. gas storage (2,926 Bcf or almost 13% above the five-year average for August 17), and easing fears of a severe hurricane season, combined to drop spot gas prices and Nymex near-month (September) futures prices below \$6 per Mcf. Even though temporary, this could signal a period of softer gas prices that would squeeze profits for all but the most efficient gas plays.

Environmental and community concerns have impacted Jonah and other unconventional gas developments throughout the Rockies, but operators have forged innovative solutions to overcome many of the concerns.

At Jonah, leading operators like Questar Corp. and EnCana Oil & Gas (USA) have leveraged collaborative stakeholder groups to identify and address broad community and environmental concerns. Operators have studied impacts of development activity on wildlife migration and habitat, and they have established baselines for air and water pollution, with resulting changes in rules and practices to minimize or mitigate damages.

Drilling from pads and using wooden pallets on roads and drill sites have reduced surface damage. Operators also are restoring appropriate surface disturbances before development activities are completed.

Delivering water by pipelines, rather than by trucks, and using natural-gas-powered vehicles and rigs have reduced traffic hazards and air pollution while reducing costs. Produced water is being recycled as a means to reduce water usage.

Operators also are boosting efficiencies, reducing surface impacts and costs by implementing innovative

manufacturing-like processes in field operations. Newgeneration rigs on wheels and hydraulic skid mechanisms minimize time and cost to move rigs between wells on pads. Some operators minimize overall drilling and completion times by drilling and completing all wells on a pad in stages—such as setting surface casing in all wells before moving to the next stage.

Another innovation is central frac hubs that have been established to service wells on multiple pads from a common site.

Climate change policies still pose challenges. At the extreme, some environmentalists and policy makers simply oppose oil and gas developments and champion investments in renewable resources as a means to achieve sustainable energy independence.

Anti-hydrocarbon actions have evolved, from those of environmental advocates that filed thousands of injunctions and law suits to delay or deny oil and gas developments, to those of newly elected officials who implement policies and laws that hinder gas developments. Policymakers invoke concerns about climate change to limit access to government lands, delay or overturn approvals for hydrocarbon developments, reduce research and development funding for oil and gas, and boost hydro-

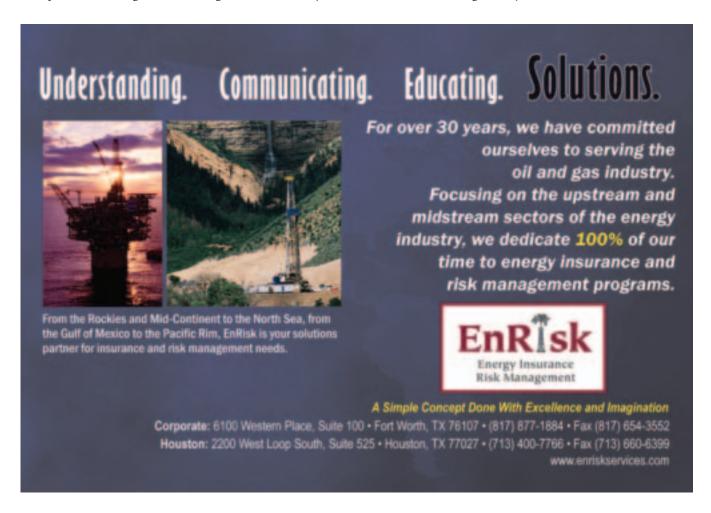
carbon taxes. These efforts often fail to recognize that natural gas is the "cleanest" hydrocarbon fuel and cleaner alternatives are probably a decade or more away from making sizeable contributions to energy supply.

CONCLUDING COMMENTS

The shift to unconventional gas resources is in the process of reshaping the industry and nowhere is this more evident than in the Rockies. As important as the Rockies are in supplying increased volumes of gas, tensions between various stakeholders in the region tend to slow down the pace of development.

In addition, lack of takeaway pipeline capacity will limit production growth in 2007. Land access and environmental mitigation remain important issues in the Rockies. Water and air quality, wildlife habitat and surface owner disputes are present in nearly every play in the region.

Most producers have responded by proactively engaging communities, deploying technology to minimize impacts and aggressively reclaiming impacted areas. To the extent these challenges can be overcome, the Rockies region will become the primary growth region in North American natural gas for years to come.



Rockies Gas Offers Climate Help

Clean-burning natural gas from the Rocky Mountain region can be a valuable tool in lowering greenhouse gas emissions.

BY PEGGY WILLIAMS, SENIOR EXPLORATION EDITOR

Climate change is a hot issue in the industry, its high profile driven by surging public interest. For Rocky Mountain producers, the growing movement to find solutions to greenhouse gas emissions can be beneficial. That's because the Rockies are home to abundant supplies of natural gas, and gas is a clean-burning fuel that's easy on the environment.

The recent Colorado Oil & Gas Association annual meeting in Denver featured several panels on climate change and how natural gas from the Rockies fits into the national and global picture.

"Natural gas can help solve climate change because there's less CO₂ [carbon dioxide] in its emissions," said Fred Julander, conference chairman and president of Denverbased Julander Energy Co.

Indeed, natural gas combustion emits about half the CO₂ of coal and 25% the CO₂ of oil combustion. Fuel switching from coal to gas is a key mitigation technology. Additionally, Rockies operators lead the nation in developing gas reserves in environmentally friendly ways.

"We are much more part of the solution than part of the problem," he said.

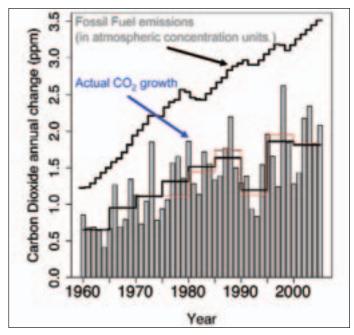
PREPONDERANCE OF EVIDENCE

The impact humans have on climate has been debated for years. Today, the scientific community agrees the climate system has been warming, which can be observed on continental, regional and ocean-basin scales, said Caspar Amman, scientist at the National Center for Atmospheric Research in Boulder, Colorado.

The data points are many: the earth's temperature has risen about 1.3°F (0.74°C) during the past 100 years, and satellite measurements of the mid-troposphere show warming consistent with that at the surface.

Widespread losses of mass occurred in glaciers and ice caps during the 20th century, and increases in ocean temperatures have been measured to depths of at least 9,843 feet. Atmospheric water vapor content has been rising. Mid-latitude wind patterns and storm tracks have been shifting poleward, and droughts have been longer and more intense.

At the same time, amounts of greenhouse gases in the atmosphere have been rising. Atmospheric CO₂ concentrations jumped from pre-industrial levels of 280 parts per million (ppm) to 380 ppm in 2005. Methane in the



Carbon dioxide emissions from oil, gas and coal combustion have risen sharply in the past four decades.

atmosphere has increased from pre-industrial levels of 715 parts per billion (ppb) to 1,774 ppb in 2005. And, atmospheric nitrous oxide rose from 270 ppb to 319 ppb across the same period.

During the past few years, many scientists who had withheld judgment on the human factors affecting climate change were convinced of its validity. Indeed, there's now a consensus among climate researchers that the climate changes of the past several decades are manmade and are because of the net effect of human activities since 1750.

"Global warming is real, and greenhouse gases are causing this warming," Amman said. "Since the 1950s, without anthropogenic forcing, climates would have been cooler."

ROLE OF NATURAL GAS

Now that most people have acknowledged man's impact on the earth's environment, plans for the future are being formulated. Since it appears that burning of fossil fuels has contributed to rising greenhouse-gas concentrations in the atmosphere, what's the next step?

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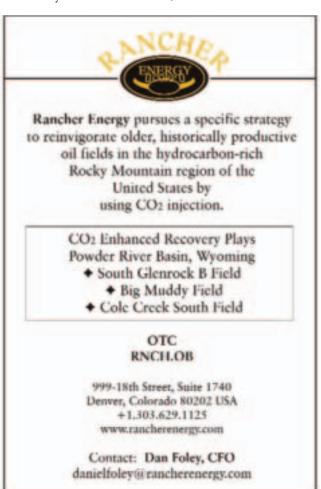
First World lifestyles are built around massive uses of energy, and economic growth requires energy consumption. Even with aggressive government support, alternative energy sources such as solar, wind and biomass will not achieve a scale large enough to displace the traditional workhorses of coal, oil and natural gas. Fossil fuels will supply 85% of total energy use by 2030, and no matter what programs and initiatives are put in place, CO₂ emissions will continue to grow during the coming decades.

These emissions are the main concern. It's a political reality that carbon regulation is on the way. Its focus will be on how to begin to stabilize the amount of CO_2 in the atmosphere.

"There are at least six global warming bills in the U.S. Congress right now," said James B. Martin, executive director, Colorado Department of Public Health and Environment. "A national strategy is coming, and all of the bills have a cap-and-trade mechanism."

The push to regulate carbon emissions is likely to result in a switch to gas from coal and oil, as natural gas is the least carbon-intensive fossil fuel.

To secure a solid place in the new carbon-adverse economy, however, natural gas producers need to concentrate on growing supply. Recent concerns about high prices and scarcities of the commodity have hurt demand, and these concerns must be



allayed. Politicians and the public should be assured gas supplies are plentiful.

LESSONS FROM THE ROCKIES

Furthermore, the gas industry has to foster wider knowledge and acceptance of the environmentally friendly aspects of natural gas drilling and development. That requires outreach to environmental groups blocking development, and communities impacted by exploration and production activities.

Rockies producers are already firmly on this path and can help the industry thrive in the new reality of a world worried about climate change. That's because Western operators have a long history of working in and protecting fragile environments. Companies active in the Rockies have learned to proactively embrace such environmental concerns as protection of fish and wildlife, fragmentation of habitat and the impact of development on wilderness and roadless areas.

Environmental stewardship is a key strategy for today's natural gas operator. J. Paul Matheny, vice president, Questar Exploration & Production Co., spoke about how environmental values are incorporated into the company's development program at Pinedale Anticline in Wyoming.

"We develop responsibly, and we avoid impacts to habitat and mitigate those impacts that can't be avoided," he said.

Some of Questar's methods include directional drilling from pads, use of clean-burning compressors, installation of liquid gathering systems and effective reclamation. For instance, interim reclamation can begin for long-lived producing wells early in the cycle, rather than waiting for full-scale reclamation at well abandonment.

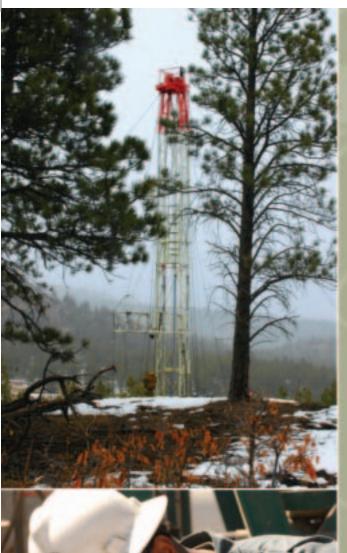
Strong community relations are another aspect of successful operations. If local residents and communities appreciate the support and involvement of natural gas producers, many problems and roadblocks to development can be avoided.

Jay Still, executive vice president, Pioneer Natural Resources, said Pioneer becomes actively involved in giving. In its operating areas, it performs community-minded acts of assistance such as snow removal, road maintenance, emergency response and weed control.

Pioneer has launched a groundbreaking landowner education program and has produced a video that takes a landowner through all the steps of drilling. The company also sponsors junior college programs to provide training to people in skilled work needed in the oilfield.

"We foster a working relationship with the communities," he said. "It's been tremendously effective."

The upshot? Rocky Mountain natural gas producers can seize the day. They offer a clean, efficient fuel that can be developed in a manner harmonious with fragile environments and supported by local communities. And, the knowledge of how to do this is a best-practices skill that can be exported to other producing areas in the country and beyond.



Across North America, Pioneer is finding and developing new oil and gas resources to help provide for the nation's growing energy needs. Our long-lived Rocky Mountain natural gas operations are an important component of our growth and offer significant opportunities to add further value.

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TOP OIL PRODUCERS

ConocoPhillips 2006 Top Oil Producer In Rocky Mountain Region

Oil production rose 6.5%, mostly from horizontal wells, versus a 10% rise in 2005.

Last year, oil production in the Rocky Mountain region increased about 6.5% compared with 2005 levels. Total output reached 176.2 million barrels, up 10.7 million barrels compared with 2005 totals of 165.5 million and some 152 million in 2004.

A good chunk of this increase can be attributed to the horizontal drillbit. Montana and North Dakota reported increases of about 10% and 12% respectively, primarily because of activity in the horizontal Bakken and Red River plays. These two states account for about 43% of the Rocky Mountain region's total oil output for 2006.

As it has for many years, Wyoming led the region, producing 53 million barrels of oil; up 1.8 million barrels compared with the 51.1 million it produced a year earlier, and ahead of 2004 output of 50.8 million barrels.

North Dakota's production has gone up since 2004 by 9.1 million barrels. In 2006, it was the second-highest producing state, contributing 39.4 million barrels, up 4.5 million barrels as opposed to the 35 million it produced in 2005 and the 30.3 million produced in 2004.

Montana has shown the most growth in oil production, up 11.4 million barrels since 2004. In 2006, it was the third-largest producer in the Rockies, extracting 36.2 million barrels, an increase of 3.3 million from 2005. In 2004, that number was 24.8 million.

In looking at the top oil producers in the region, assets of the former Burlington Resources, now owned by ConocoPhillips, maintained the No. 1 ranking, having produced 17.4 million barrels of oil, up 3.7 million barrels, as opposed to the 13.7 million the company produced in 2005. This increase is largely thanks to the company's aggressive horizontal drilling in the Williston Basin where it is chasing the Bakken and Red River.

Replacing Marathon Oil Corp. for second place was Enid, Oklahoma-based Continental Resources Inc., which produced 9.3 million barrels of oil, an upsurge of 2.1 million compared with the 7.2 million produced a year earlier. Continental's increase, like Burlington's, is primarily because of its horizontal drilling activity in the Bakken and Red River plays, both in Montana and North Dakota.

Dropping to third place in 2006, Marathon Oil produced mostly from the Big Horn Basin in Wyoming. Its output was 9.2 million barrels, a slight increase from the 9 million barrels produced the prior year. The majority of Marathon's production growth is in North Dakota, where the company has begun a large drilling program targeting the horizontal Bakken.

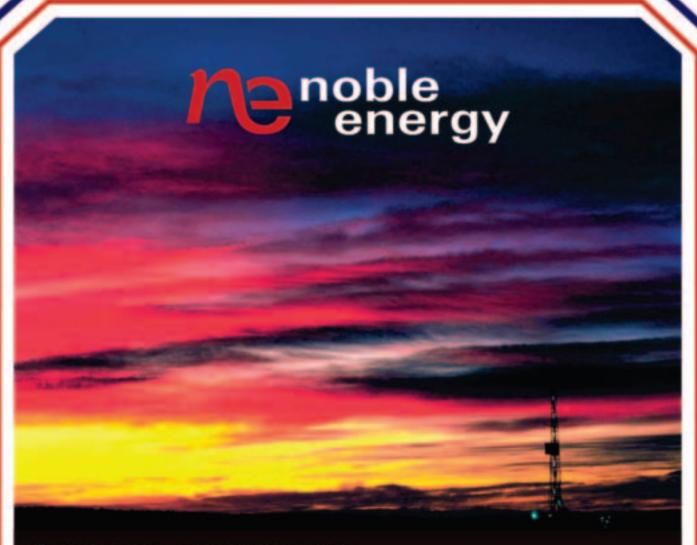
The fourth top oil producer in the region is EnCore Operating. With its high-pressure, air-injection program under way on the Cedar Creek Anticline, plus recent purchases in Wyoming, the company increased its production to 7.4 million barrels of oil compared with the 7 million extracted in 2005.

Rounding out the top-five oil producers in 2006 was Kerr-McGee Corp., due chiefly to its purchase of Westport Oil and Gas. Now owned by Anadarko Petroleum Corp., these assets produced 7.2 million barrels, up almost 4.33 million barrels. The name of record will change next year when 2007 production is totaled, as the amalgamated assets will be under Anadarko's name.

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TOP-10 OIL PRODUCERS IN 2006

Rank	Operator	YTD Million Barrels
1	ConocoPhillips*	17.4
2	Continental Resources Inc.	9.3
3	Marathon Oil Co.	9.2
4	Encore Operating LP	7.4
5	Anadarko Petroleum**	7.2
6	Chevron U.S.A. Inc.	7.0
7	Merit Energy Co.	6.2
8	St. Mary Land (Nance Petroleum Corp.)	5.6
9	Enerplus Resources (USA) Corp.	5.2
10	Citation Oil & Gas Corp.	4.4
	* Includes assets of Burlington * * Includes assets of Kerr-Mc Source: <i>Rocky Mountain Oil Journal</i> and Reprinted with persussion of <i>Rocky Mountain O</i>	Gee Corp. I IHS Inc.



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TOP GAS PRODUCERS

ConocoPhillips 2006 Top Gas Producer In Rocky Mountain Region

Regional gas production hits 4.9 trillion cubic feet, a new record.

ast year, natural gas production in the Rocky Mountain states exceeded 4.91 trillion cubic feet (Tcf), a new record for the region. Growth of 264 billion cubic feet (Bcf) represents about a 5.6% increase, compared with the 4.65 Tcf produced in the Rockies in 2005. Some 4.5 Tcf were produced in 2004.

Rocky Mountain gas represented about 21% of all the gas consumed in the U.S. for 2006, according to the U.S. Energy Information Administration.

Although gas prices in the Rockies have remained lower than in other parts of the country, operators appear to remain bullish on this resource. More outlets are being constructed, new areas of coalbed-methane (CBM) exploration are planned and new gas prospects continue to be generated and drilled. Providing the politicians don't interfere too much, look for this trend to continue.

As in years past, Wyoming led the Rockies in gas production, accounting for about 43% of the gas produced. The state generated 2.11 Tcf, up 142 Bcf compared with the 1.97 Tcf produced in 2005 and 1.92 Tcf in 2004. A good portion of this increase is thanks to exploitation of Jonah Field and nearby Pinedale Anticline in Sublette County. More than half the gas produced in Wyoming comes from federal lands.

Maintaining its second-place standing, Colorado produced 1.3 Tcf, up about 65.2 Bcf compared with the 1.14 Tcf produced a year earlier. The increase is mainly because of the aggressive drilling and completion activity under way in the Piceance Basin and increased CBM gas coming out of the Raton Basin.

In third place for the Rockies was New Mexico. Comprising only those counties in the northwestern sector of the state,* New Mexico contributed 1.046 Tcf in 2006, down slightly compared with the 1.041 Tcf produced in 2005. The majority of New Mexico's production is from the prolific San Juan Basin. Of all the major gas-producing states in the Rockies, New Mexico was the only one that did not show a substantial increase in production.

Of the 852 companies that reported gas production in the Rocky Mountain region, ConocoPhillips (incorporating Burlington Resources) again was the largest producer. On the old BR assets alone, the company produced 533.7 Bcf, down about 15 Bcf compared with the 549 Bcf produced in 2005. About 65% of this production came from the San Juan Basin of northwest New Mexico with the remaining gas produced primarily in Wyoming.

If the two companies' production for the year is added up,

in the Rockies they produced about 814 Bcf or 17% of the region's total gas ouput, dwarfing their nearest competitors. (BR was purchased by ConocoPhillips for \$35.6 billion in 2006.)

BP America Production, which had perennially been the top gas producer in the Rockies in the past, continued in second place, generating sales of 501.5 Bcf compared with the 496.4 Bcf extracted in 2005. This represents an increase of 5.1 Bcf, with the majority of the gas coming from the San Juan Basin in Colorado and New Mexico. Another major source of gas was the Overthrust and Greater Green River Basin in Wyoming.

EnCana Oil & Gas (USA) was the third-largest gas producer in the Rockies for 2006. It produced 477.2 Bcf, up 24.3 Bcf from the 442.9 Bcf it extracted in 2005. Almost two-thirds of EnCana's production is from the Jonah Field and Pinedale Anticline area of the Greater Green River Basin in Wyoming, with the remaining third produced in the Piceance Basin and Paradox Basin of Colorado.

* New Mexico includes San Juan, Rio Arriba, McKinley and Sandoval counties only.

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TOP-10 GAS PRODUCERS IN 2006 Rank Operator YTD Billion cubic feet ConocoPhillips (incorporating BR) 814.3 533.7 Burlington Resources Oil & Gas Co.* 2 BP America Production Co. 501.5 3 EnCana Oil & Gas (USA) Inc. 477.2 4 ConocoPhillips Co. 280.6 5 ExxonMobil Production Co. 268.6 6 Williams Production RMT Co. 265.6 7 Kerr-McGee Oil & Gas** 168.8 8 Chevron USA Inc. 168.4 Ultra Resources Inc. 9 104.2 10 XTO Energy Inc. 104.0 Reprinted with permission of Rocky Mountain Oil Jour



EnCap Energy Capital Fund VI

Citi Private Equity
Lehman Brothers Private Equity
Liberty Energy Holdings
Howard Hughes Medical Institute
Bank of Scotland
Fortis Capital Corp
Hexagon Investments
The Lincoln National Life Insurance Company
Mansefeldt Investment Company
Tejon Exploration Company
Koelbel and Company
Priam Energy Corporation
Cordillera Holdings II, LLC

have committed

\$500,000,000

of equity capital in conjunction with the formation of



Cordillera Energy Partners III, A Colorado Limited Liability Company

Actively acquiring oil and gas properties or companies in the following areas:

Anadarko Basin East Texas Basin Permian Basin Rocky Mountain Region

Rocky Mountain Well Watch

- 1. North Dakota's horizontal Bakken play is going hot and heavy in the vicinity of EOG Resources' Parshall Field, discovered in 2006 in Mountrail County. Whiting Petroleum Co., Denver, has drilled two producers and plans 18 additional wells in its Robinson Lake area, west of Parshall. The company's No. 11-25H Peery State well, a trilateral Middle Bakken discovery in Section 25-153n-92w, was completed in May 2007 for an initial rate of 1,061 bbl of oil and 1.037 million cu ft of gas per day. Whiting has 81,000 net acres in the Robinson Lake area. In Parshall Field, EOG has 13 producing single-lateral wells, three wells in progress and 22 permitted locations. Whiting owns 13,000 net acres in Parshall, which gives it an average 20% interest in the EOG field.
- 2. A large, four-way closure in Montana's Overthrust Belt is being tested by Denver-based **Bill Barrett Corp**. The No. 10-15 Draco, in Section 15-4n-8e, northwestern Park County, is drilling ahead toward a projected depth of 14,000 ft. The company defined its Circus prospect, near Ringling, with close to 150 sq. miles of 3-D seismic data. Objectives are in the Cretaceous, Mississippian and Devonian intervals. Barrett owns a 50% working interest in 296,000 net undeveloped acres in the region. Closest production is some 60 miles away. After the rig has finished drilling the Draco well, the company plans to test another even larger feature called Leviathan. The No. 4-6 Leviathan has been staked in Section 6 in the same township.
- **3**. Major drilling is under way in the Hanging Woman Basin, in the greater Powder River Basin on the Wyoming/Montana border. Denver-based **St. Mary Land & Exploration Co.** plans to drill 258 coalbed-methane (CBM) wells on its 220,000-acre position this year, primarily in Sheridan County. The compa-

ny is continuing to develop and test shallow, medium and deep coal intervals. Completed wells cost \$235,000 each and can ultimately recover 260 million cu ft of gas. The company operates as **Nance Petroleum Corp.** in the Rockies.

Separately, Sheridan, Wyoming-based **Pinnacle Gas Resources Inc.** plans to drill between 200 and 230 multi-seam CBM wells this year, mainly east of St. Mary's activity. Pinnacle will focus its 2007 efforts on 42,000 gross acres in its Cabin Creek project in Sheridan and Campbell counties, Wyo.

- 4. Talisman Energy, Calgary, has staked a 15,400-ft Overthrust test in Lincoln County, Wyo. The No. 8-12 Bear Canyon will be drilled in Section 12-23n-118w. Objectives are Mission Canyon and Bighorn. The company says that the Western U.S. Overthrust Belt is under explored. It has a fourwell program planned in the area, including the Lincoln County well. Another operated test and two nonoperated tests in Utah will round out the program. Talisman, which operates in the U.S. as Fortuna Energy, has acquired 630,000 net acres in the play and has an additional 53,000 net acres under option. Each well has the potential to encounter up to 25 billion cu ft of original gas in place. All of the ventures are expected to spud prior to year-end 2007.
- **5**. In the Green River Basin of southwestern Wyoming, a 19,500-ft test is being drilled by **Ultra Petroleum Corp.** The No. 10D-33 Mesa, Section 33-32n-109w, Sublette County, is targeting deep zones below the prolific Lance pool on the Pinedale Anticline. Primary objective is the Blair interval.
- **6.** After a seven-year delay for regulatory approvals, development has kicked off in the Atlantic Rim CBM project on the eastern flank of Wyoming's Washakie Basin. **Double Eagle Petroleum Co.**,

Casper, has begun development drilling in its Catalina Unit, in 16n and 17n, 91w and 92w. The company says it will drill 33 wells at Catalina, and the wells will cost \$1 million each and should encounter reserves of 1- to 1.2 billion cu ft apiece. At the end of 2006, Catalina had 14 wells that were cumulatively producing 5.1 million cu ft per day. Double Eagle also has interests in development programs planned by operators **Warren Resources Co.** and **Anadarko Petroleum Corp.** in additional Atlantic Rim units.

- 7. American Oil & Gas Inc., Denver; North Finn LLC and Red Technology Alliance LLC have gauged the Sims No. 15-26H horizontal well at an initial potential of 10 million cu ft of gas per day. The 14,615-ft well, in Converse County, Wyo., has a 1,165-ft lateral in the over-pressured Frontier formation. Testing continues at the Sims, which is in American's Douglas project on the southern flank of the Powder River Basin. Meanwhile, the partners have reentered the Hageman No. 16-34H, in Section 34 of the same township. Current plans are to drill a horizontal lateral into the Frontier at this location.
- **8**. Remote wildcats are occupying **Plains Exploration & Production Co.**, Houston, in a campaign in White Pine County, Nev. The company's No. 21-1 Pancake Summit has been drilled to 6,000 ft in Section 21-18n-56e about 43 miles west-northwest of Ely and about 60 miles south-southeast of Blackburn Field, reported IHS Inc. A second well, the No. 27-1 Pluto-Federal, is about 30 miles east in Section 27-18n-61e in east-central White Pine County. That well, about 80 miles southeast of Blackburn Field, is drilling toward projected depth of 12,000 ft.
- **9.** Piute County in south-central Utah will host a wildcat in a 10-well, two-year Utah Hingeline drilling program designed by **Royalite Petroleum Co.**,

Blaine, Wash. The No. 27-1 Royalite-Federal in Section 27-27s-3w is an 8,500-ft Lower Jurassic Navajo test, according to IHS Inc. The wellsite is 2 miles east of Maryville. The company owns 100% working interest in its lease-hold but plans to carry out the program with industry partners during the next several years. Navajo oil production is some 30 miles north-northeast of the projected wildcat in Sevier County's Covenant Field.

Denver-based **Delta Petroleum Co.** is also moving ahead on its Utah Hingeline properties. The company has 118,000 net acres in the province. It plans to permit its Parawan prospect in fall 2007. The test is about 35 miles south and west of Covenant Field, and will probe a large structural feature. Primary target is Navajo.

10. Deep gas activity is robust in Utah's Uinta Basin. **Questar Corp.** has an active drilling campaign in the Mancos and Dakota intervals in the Natural Buttes and Wonsits Valley

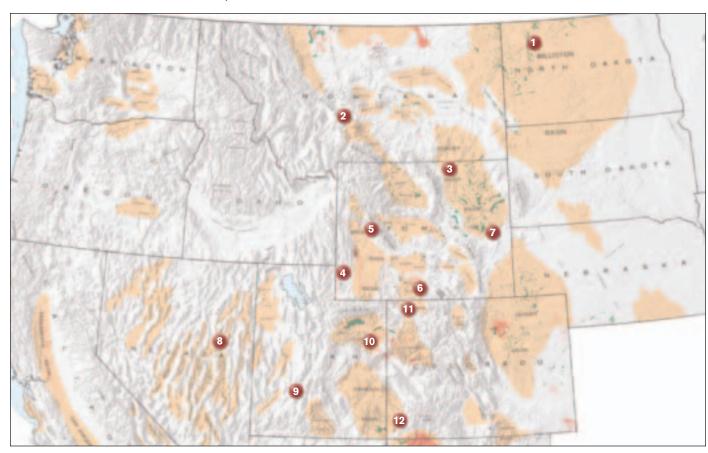
areas in Uintah County. The Salt Lake City firm has completed 11 Mancos/ Dakota wells to date, has two working on completion and four drilling. According to Questar, recoverable reserves appear to be 3- to 5 billion cuft per well. The company is focused on lowering well costs.

Denver-based independent **Gasco Energy** is also active in the play farther to the west in the Pariette Bench area. The company's initial 16,763-ft well found extreme over-pressuring and a high level of natural fracturing in the Mancos shale. The Federal No. 14-31, Section 31-9s-19e, was fractured in five sand packages in the Mancos interval and completed at an initial potential of 4.7 million cu ft per day.

11. An 11,000-ft wildcat will be drilled by **Julander Energy Co.**, Denver, Colo., in the western Sand Wash Basin in northwestern Colorado. The No. 32-4 Yellow Cat, in Section 4-10n-98w, is 50 miles northwest of

Craig in northwestern Moffat County. Targets are Lance, Lower Lance and Fox Hills. The proposed site is in a non-producing township 6 miles southwest of Powder Wash Field, a Wasatch/Fort Union gas pool above 8,000 ft.

12. A Gothic shale discovery in the Paradox Basin tested at sustained rates of more than 500,000 cu ft of gas per day during two separate seven-day test periods. Bill Barrett Corp. drilled the No. 1 Koskie-Brumley Draw on its Yellow Jacket prospect in Section 27-38n-16w in northwestern Montezuma County, Colo., about 6 miles northwest of Dolores in a non-producing township. Barrett's second and third wells on the prospect are testing. The shale is between 100 and 150 ft thick, thermally mature and overpressured. Wells depths range from 5,500 to 7,500 ft. A horizontal pilot is also planned for this year. Barrett holds a 55% working interest in 150,000 net acres at Yellow Jacket.



The Denver-Julesburg Basin Delights

Producers enjoy gas-manufacturing traits in the D-J Basin's Wattenberg Field, a jewel in the crown for many companies.

BY GARY CLOUSER, CONTRIBUTING EDITOR

he venerable Denver-Julesberg Basin in Colorado and parts of western Nebraska is one of the key gas plays in the Rocky Mountain region, and it is important to a number of significant independents. Anadarko Petroleum Corp.'s production from its Wattenberg Field asset in the D-J of northeastern Colorado ranks among the company's top-producing assets. Noble Energy Co.'s Wattenberg assets are its largest in North America.



David Howell Anadarko Petroleum

Wattenberg, says David Howell, general manager of Anadarko's Wattenberg operations, is the "jewel" within the D-J.

"It is like a manufacturing plant operation, with predictable, repeatable, low-risk" drilling advantages, and its production has good margins, he says.

The entire D-J Basin has produced about 12.5 trillion cubic feet of gas equivalent (Tcfe) since its discovery in the early 1900s. Of that amount, the Wattenberg Field has produced about 3.5

Tcfe. Howell says recent downspacing provisions and advancements in fracturing technology will extend the life of the field for many more years. The D-J boasts about 20,000 active wells with about 11,000 of those in Wattenberg alone.

The top-five D-J producing companies for 2006, according to IHS Inc., a Houston-based data and services company, were all out of state: Houston's Noble Energy and the old Kerr-McGee assets (now part of Anadarko); Petroleum Development Corp. of Bridgeport, West Virginia; Calgary's EnCana Oil & Gas; and Berry Petroleum Co. of Bakersfield, California. U.S. Exploration, which ranked 10th, has since been acquired by Noble Energy. Each company has a large Denver office.

Since December 2006, Petroleum Development Corp. has spent \$170 million on acquisitions in the Wattenberg Field.

The largest producing county in the D-J Basin by far is Weld County northeast of Denver, says Brian Macke, director, Colorado Oil & Gas Conservation Commission. The number of approved applications for permits to drill in Weld County has been increasing during the past few years, spurred by higher gas prices and better frac techniques: in 2004, some 796 permits were issued; in 2005, there were 901; and in 2006, there were 1,418.

"The estimated number for 2007 is 1,550," says Macke. "Given that, it should be reasonable to assume that oil and gas production from the D-J Basin should remain at or above its current levels for the foreseeable future, if there is no change in the current strong oil and natural gas price environment."

Gas production in 2006 in Weld County alone was 180 billion cubic feet (Bcf).

Research and consulting firm Wood Mackenzie with its U.S. operations headquartered in Houston, projects gas production from the D-J for 2007 will be about 678 million cubic feet (MMcf) a day and top 705 million daily by 2011, compared with the 2006 volume of 654 million a day. Liquids production is a relatively flat 6,000 barrels a day.

While the volume of conventional gas from the D-J has declined sharply since 2000, the increase in production from tight gas has more than exceeded that decline, says David Haas, Wood Mackenzie analyst. Conventional gas volume from the D-J has decreased from 129 MMcf a day in 2000 to its current rate of about 30 million a day. But, tight-gas production has soared from 397 million a day in 2000 to current levels of more than 640 million a day, says Haas.

ANADARKO'S STORY

"The D-J is definitely an important part of our overall portfolio," Howell says. "It's one of the assets that we refer to as consistent and predictable. It is among other onshore properties that provide the balance for our higher-impact opportunities internationally and in the deepwater Gulf of Mexico.

"As far as production, the Wattenberg Field accounts for about a quarter of our overall production from the Rocky Mountain region."

The field has been producing for more than three decades and has a ready supply of complementary field services and midstream assets, adding to its desirability.

Anadarko's current daily production from its Wattenberg assets is about 255 MMcf equivalent. At year-end 2006, Anadarko's Wattenberg assets contained about 1.5 Tcfe of reserves and had an unbooked net resource potential of an additional 1.9 Tcfe, Howell says. For second-quarter 2007, the D-J was second only to Algeria, among Anadarko's main producing regions.

"Back in 2005, we were producing about 230 million cubic feet a day net," Howell says. "So, you can see this is a fairly stable production base, and we expect to





continue into the years ahead. We have a sizable inventory of economic projects—about 9,300 of them—including development activities, fracs and re-fracs."

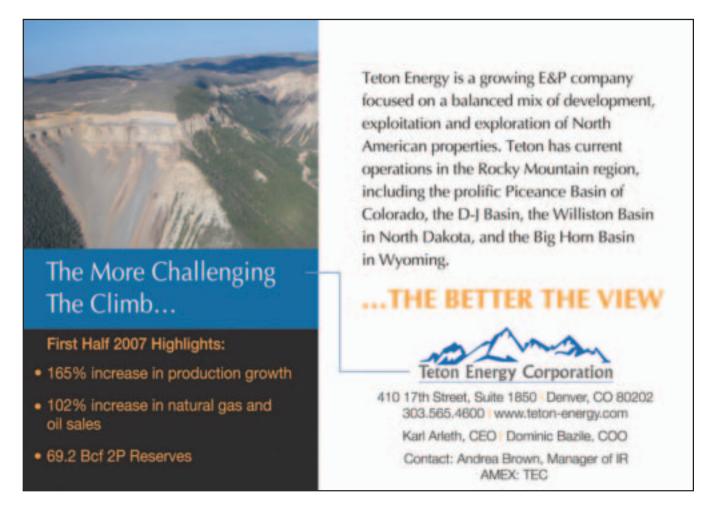
Advancements in technology also continue to support the productivity of the field, operators say.

"It's tight gas that we have extensive experience working with," Howell says. "This is a play type we understand very well, which is part of the reason we consider this field to be predictable, consistent and repeatable. These are also relatively inexpensive wells to drill, and they respond very well to fracing and re-fracing."

In second-quarter 2007, Anadarko spent about \$60 million on its Wattenberg assets, up about 15% from the previous year.

In 2007, the company plans to drill about 250 wells in the Wattenberg area and operate five drilling rigs, two of which are coiled tubing rigs. At any given time, the company has about 50 drilling permit applications in the Wattenberg pending before the Colorado Oil & Gas Conservation Commission.

About 90% of Anadarko's current Wattenberg production is coming from its Kerr-McGee acquisition, which was completed in August 2006. Anadarko already owned substantial mineral rights throughout the Wattenberg area, but gained the producing assets and complementary midstream position through the acquisition. That improved the operational margins of the play. Kerr-McGee was itself a top-three producer in the D-J Basin.



NEW FIELD RULES

Also making the play more attractive to Anadarko was the revision to Rule 318A of the Colorado Oil & Gas Conservation Commission. That rule increases the number of wells in each quarter section from five to eight per formation. The added downhole density is credited with allowing for additional gas recovery.

Kerr-McGee, Noble Energy and EnCana, as well as the Colorado Oil and Gas Association, a trade group, aggressively sought the rule, which

went into effect in December 2005. At the time, the three companies boasted that they accounted for about 75% of the natural gas produced in the Wattenberg Field.

Directional drilling is frequently used in the Wattenberg as a result of the new rule. It reduces the environmental footprint by enabling companies to drill multiple wells from a single pad, minimizing the need for new roads and pipelines, Howell says.

He says Anadarko expects coiled tubing drilling to further improve its margins. The company started using coiled tubing drilling in the field in November 2006.

"The technique is quieter, more efficient and costeffective than traditional drilling methods. As a result, there's less impact to nearby surface owners because the rigs are on location for a shorter amount of time and they make less noise," Howell says.

Completion operations using advanced fracturing techniques have enabled the company to greatly reduce its total water consumption. The low permeability of the Wattenberg tight gas lends itself well to re-fracing, Howell says.

Ted Brown, Noble Energy

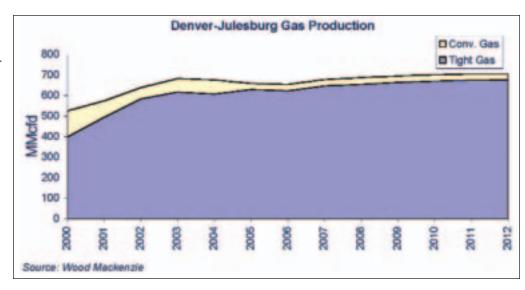
NOBLE'S NEW MUSCLE

Noble Energy says greater reliance on D-J Basin assets fits in well with its strategy announced in 2003 to acquire a larger inventory of high return/low-risk projects for near-term growth. That strategy included selling its Gulf of Mexico shelf assets and acquiring Patina Oil & Gas (completed in 2005), U.S.

Exploration Inc. (completed in 2006) and entering into a joint-venture drilling

program with Teton Energy.

Noble acquired Patina for \$3.4 billion and U.S. Exploration for \$411 million. Production from its Wattenberg assets has thus grown 20% from 2005, and



Noble Energy projects additional annual production growth of more than 5% in the next five years.

"We're a different company," Chuck Davidson, chairman and CEO, said at the company's senior management meeting May 17, 2007.

"There's no doubt in my mind. If you would have told me back in 2000 that we could wipe out 70% of the core production base and grow this company at 12% per year over the succeeding years, I would have just said you were nuts."

"We're currently producing about 250 million cubic feet equivalent in the Wattenberg Field, and we've had a pretty steady growth rate since 2005," says Ted Brown, vice president, northern region for Noble Energy.

The annual growth rate has been about 10%, despite a short-lived dip early in 2007 because of weather-related delays. Noble Energy is operating eight drilling rigs in the Wattenberg. It plans to conduct more than 1,200 projects in 2007, on which it will spend about \$430 million, Brown says.

"Resources continue to grow. We've almost doubled our proved and potential reserves since 2003," he says.

Brown also speaks optimistically about coiled-tubing drilling.

"Basically, our expectation is to reduce drilling time in half. The potential to drill a 7,000-foot well in about three days is tremendous," he says.

The joint venture with Teton Energy, a Denver-based E&P company, also confirms the potential of the Niobrara formation found in the basin. That 20-well drilling project, intended to develop Teton's assets in the eastern D-J Basin, has a success rate of about 88%, he says.

In all, Noble Energy's gross production for the Teton project is about 1 MMcf per day with additional wells to be delivered to sales throughout the remaining portion of 2007. Currently in the Niobrara, Noble Energy has increased its acreage position to more than 380,000 net acres and is producing 23 MMcf per day, net to Noble.

Overall, it expects to drill more than 150 Niobrara wells in the tri-state area of Colorado, Kansas and Nebraska in 2007.

Teton Energy has participated in the drilling of 42 wells on its 266,000 gross acre block, with a 25% working interest, the company said in a news release in August providing an operational update. Twenty of those wells are part of the initial pilot program, with Noble Energy as the operator. Plans for 2007 include the drilling of 90 gross wells, of which 22 have been drilled to date, and acquiring 50 square miles of 3-D seismic of which 12 square miles are in progress, says Dominic Bazile, chief operating officer and executive vice president of Teton.

In second-quarter 2007, the D-J contributed 6.4 MMcf, or 2.4%, of the total company net production. The company plans to spend \$8.1 million in the D-J in 2007.

PDC'S GROWTH

Petroleum Development Corp.'s president, Thomas Riley, credits the company's Wattenberg operations as being the "cornerstone" of the company's dramatic growth during the past five years.

"PDC is extremely pleased with our production and

reserve growth in the Wattenberg Field. Over 60% production growth is expected for this basin in 2007, and significant production and reserve growth is expected in 2008. This is a direct result of our ongoing drilling and re-frac programs, improved completion designs and our three acquisitions over the past 12 months," says Bart Brookman, vice president of operations.

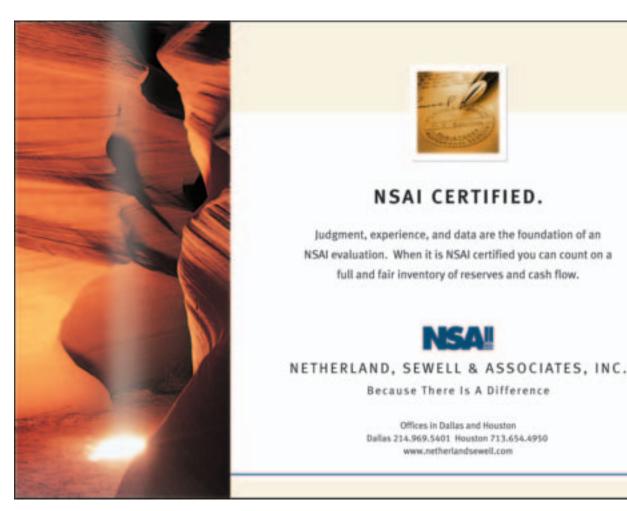
Most notable among those acquisitions was the \$132.5-million purchase of Exco Resources' Wattenberg assets.

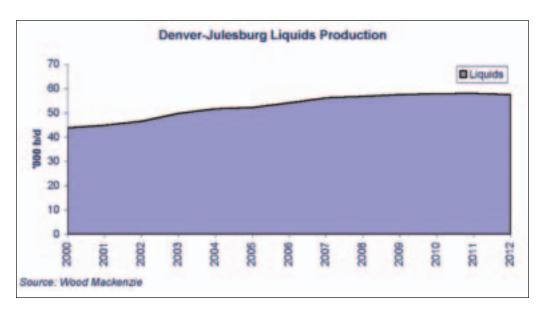
PDC's Wattenberg operations are its second largest, second only to the Piceance Basin in western Colorado. It has some 1,000 Wattenberg wells, 9,000 acres available for drilling and more than 450 undeveloped locations. The company has identified more than 1,200 projects for drilling, re-completions and re-fracs.

Its 2006 gross production rate was 40.6 MMcf a day. The company estimates its 2007 daily gross production rate will be 65 million.

Riley cites "predictable results" as a major benefit of its Wattenberg operations. PDC has a drilling success rate in the D-J Basin of 98%, and its average drilling time is five days per well.

PDC's 2007 plan includes drilling 150 gross wells and 164 re-completions and re-fracs. Its Wattenberg capital





expenditure of \$100 million represents about 37% of the company's total capital budget.

PDC also reports its eastern D-J Niobrara production in 2006 was 11 MMcf a day, and its estimated 2007 daily gross production will be 19 million. Its Niobrara capex for 2007 is \$33 million. It expects to drill 140 wells and has 29,000 acres for drilling.

PRB'S FAST GROWTH

PRB Energy Inc., headquartered in Denver, is another producer reporting positive results from the Niobrara formation. It has drilled and cased 11 of the initial 12 wells drilled in the D-J Basin. Initial production rates per well will be about 200,000 cubic feet daily.

"The first two wells are on production, with the remaining nine wells expected to be on production by the end of the third quarter," says Robert Wright, chairman and CEO.

"The Niobrara wells typically have a steep initial production decline and then will have stabilized production for a 20- to 30-year period. PRB is applying for 20 additional drilling permits.

"Plans calls for drilling approximately 50 to 60 shallow Niobrara wells in 2007 and approximately 140 wells in 2008. The total cost to drill and complete a well is in the range of \$175,000 to \$220,000, including the pumping units and flowlines," he says.

PRB has increased its daily production in the D-J Basin from about 0.250 MMcf at the beginning of the year to about 1 million at press time as a result of the completion of the first two wells and installation of pumps on nine older wells. These are part of the 385,000 gross acres in the D-J that PRB purchased from Anadarko at the end of 2006.

"It is our plan to expand the gathering system in order to transport gas from our next round of drilled wells," Wright says. If future wells continue to show similar production rates to those already hooked up, and if PRB maintains its expected drilling schedule, the company believes its D-J production could be in excess of 6 million per day by early 2008, and more than 10 million by late 2008.

PRB expects to invest \$10to \$12 million in capital drilling and completing wells in the D-J Basin in 2007 and \$20- to \$30 million in 2008.

"One of the benefits of the Niobrara play in the D-J is the ease and speed of drilling wells," Wright says.

"As a result, PRB currently is using only one rig in this area. That said, if we continue to experience the kind of success we've seen in the first several wells—and if the gas prices support ramping up production faster—we may add additional rigs."

PRB is a different company than when it was formed in 2004 to capitalize on the need for midstream gathering to move the large amounts of coalbed methane (CBM) produced in the Powder River Basin. PRB has evolved into an exploitation and production company that also operates its own midstream gathering and processing.

"The conventional Niobrara play in the D-J provides immediate production and therefore provides diversification and an excellent strategic complement to our CBM wells," Wright says.

Companies like PRB hope to benefit from better and less-volatile gas pricing in the future. Price improvement is critical if producers are to continue investing in the Rockies. The Rockies Express (Rex) pipeline is part of the solution for continued capital spending in the region. PRB, for example, is in the early stages of an aggressive drilling program in the D-J Basin in northeastern Colorado, the price risk of which should be reduced significantly as a result of the Rex line's added capacity. The decision to pursue that opportunity and spend significant capital was influenced by the improvement in price and stability it expects of Rex.

"The completion of the Rockies Express pipeline will be a very positive development for natural gas producers in Colorado and the region," Wright says. "As production has increased in the Rockies over the last couple years, lack of takeaway capacity has resulted in lower prices to producers in this region than those experienced elsewhere. The additional 1.8 billion cubic feet per day in takeaway capacity which Rex adds—a nearly 30% boost over current levels—will significantly increase access to nationwide demand for natural gas."



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Make it happen



Rockies Rookies

These four E&P companies traveled different paths to get to the same prize-owning assets with potential in the prolific Rocky Mountains.

BY JEANNIE STELL, FINANCIAL EDITOR

he vast reserves of oil, natural gas, coalbed methane and shale still to be tapped in the Rocky Mountain region are attracting E&P companies big and small in increasing numbers. Some of the companies have had an established base in the region for some time, while others are fairly new.

The challenges faced by the new players, as well as the old, are being met, driven by new technology, high oil prices and a continuing gas shortage in the U.S. New players have many decisions to make: where to invest, how much to spend, what type of business model to use and which type of technology is best suited for their focus and development strategy.

Here, we profile companies that entered the Rockies in different ways. Two were formed deliberately to focus in the region. Another, a Texas firm, accomplished a three-way merger with two Rockies players to gain Rockies assets and people with experience in the region. Yet another new player is evaluating the Rockies assets that came along with an acquisition made for other reasons.

Each of these firms represents a new partner in the region.



Mark Gustafson, president and chief executive of Triangle Petroleum, says the Rockies contain "high-risk, high-reward plays."

TRIANGLE PETROLEUM CORP.

Triangle is one of the newest Rocky Mountain rookies.

"We entered into the Rockies in the fall of 2005," says Mark Gustafson, president and chief executive of the Calgary-based company. "We looked at 20 to 25 different plays, and we chose two of them in the Rockies because they had near-term cash flow potential. That's why we jumped into those oil plays. They are high-risk, high-reward plays, but if they work, we can drill there for a long time."

Triangle has developed an oil exploration program as a 25%-owned joint venture with Denver-based Hunter Energy Inc. Their two conventional oil prospects total some 55,000 gross acres in Wyoming and Montana.

"The first area we went into is the Nugget sandstone play in southwest Wyoming. We have a 2,000- to 3,000-foot depth test well there," Gustafson says. "Some companies in the past were drilling there for deeper wells, so these are the by-passed zones. We looked at the various logs and studied some producing fields nearby. We think there might be a nice play there for us."

Gustafson estimates the wells have a probability for success in the 30% to 40% range, but at an expected 300 to 600 barrels of oil per day, they would be meaningful for Triangle. Wells in the area tend to produce for a long time, he says.

"There are three reasons why we like these plays. First, we have information from a geologist who used to work for Chevron in this area. He was involved in the development of some of the adjoining fields. He is now with our partner, Hunter Energy, and that's why we have insight in terms of the surrounding fields and the geological mapping of the whole area."

Secondly, he says, Triangle has 2-D seismic data on the area, which helps guide the company.

And third, Triangle has information on the wells already drilled and can see the by-passed zones from the logs.

Triangle also has a private partner for drilling its well in the Nugget play in Wyoming.

It is seeking another partner for its other program in Phat City, Montana. Triangle has 17,000 gross acres in the Nugget play and 38,000 gross acres in the Phat City play.

"We have a little bit of running room in both of those plays. If there is any success with these initial test wells, we should have a pretty strong development drilling program to follow up on after that," he says.

One of the plays is a sandstone formation and the other is a carbonate formation. The development wells will be standard wells, not tricky technology, he says.

"Initially before we lay some gathering systems, we will take the oil away by truck. There are pipelines out there, but, short-term, we would be trucking the oil. With the price of crude these days, we'll be still netting back a pretty good dollar there," Gustafson says.

The time frame from drilling, to completion, to trucking out the oil may be as short as 60 to 90 days, he says.

Triangle's two test wells and follow-ups are budgeted at \$3 million. Triangle sees the plays as a short-term cash flow potential that could lead to further developments.

"We are different from our peers in Calgary in that we don't have any exit strategy in mind. We want to grow the heck out of this thing. It's all about cash flow and production for us," says Gustafson.

The company hopes to be a strong player in the Rockies. With its partner, Hunter Energy, the joint venture has the potential for another 20 different prospects in the Rockies.

"It's kind of a step-by-step approach. We will drill the







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Nugget play, then we'll drill the Phat City play, then there are other prospects within the portfolio we would like to pursue," he says.

Triangle's Rockies inventory represents about 11% of its total acreage, and the company plans to spend some 10% to 20% of its 2008 drilling budget there, depending on drilling success.

Besides the Rockies, Triangle is focused on the Fayetteville shale in Arkansas, emerging Canadian shale gas projects and selected areas of the western U.S. The company has two operating subsidiaries; Triangle USA Petroleum Corp. and Elmworth Energy Corp. in Calgary.



Frank Lodzinski, president and chief executive of GeoResources, says he wants to get into the Rockies in a big way.

GEORESOURCES INC.

Another way to obtain Rockies assets is through mergers. Such is the case for Rockies rookie Southern Bay Oil & Gas LP, a private limited partnership in Houston that executed a three-way merger to boost its Rockies position.

"I had previously operated some production up in the Rockies, but I wanted to get in there in a bigger way, with people who are experienced and knowledgeable in the area. That's why I chose to merge Southern

Bay with GeoResources Inc. and Chandler Energy LLC," says Frank A. Lodzinski, president and chief executive of GeoResources Inc., name of the combined entity. The merger was completed April 18, 2007.

"We wanted to get into the Rockies because of the significant reserve potential and long-life production characteristics. But with the addition of Collis Chandler III, and our Denver and Williston personnel, we are not rookies any longer," says Lodzinski.

Southern Bay was formed in December 2004, and also has assets in South Texas and Louisiana. Its partners, which includes Lodzinski, other management members, Vlasic Investments LLC and Wachovia Capital Partners, now own about 57% of the common stock of the three merged companies.

Chandler Energy LLC, also a privately owned Denver company, brings to the deal assets in Colorado, Utah, Montana and Michigan. The Chandler group received about 16% of the outstanding common stock of the merged entities.

The public shareholders of GeoResources Inc., now a \$100-million market cap publicly traded company, hold the remaining 27% of the merged entities.

The combined entity has reserves of some 5 million barrels of oil and 19.5 billion cubic feet of gas, or more than 8 million barrels of oil equivalent (60% proved developed produc-

ing). Current production is about 1,000 barrels of oil and 3.5 million cubic feet (MMcf) of gas per day.

The company's acreage positions include 29,000 net developed acres and 62,000 net undeveloped acres. The projected capital budget for the next 18 to 24 months is about \$25 million, funded from cash flow.

"We haven't had assets in the Rockies for six or seven years before this, so this year we've gone in there in a big way. Altogether, we are in North Dakota, Colorado, Montana and Utah," Lodzinski says. "We are expanding our acreage position across both our northern and southern regions and undertaking both conventional and horizontal drilling in those areas."

Some 40% of GeoResources' hydrocarbon production comes from its Rocky Mountains holdings, while some 60% of its proved reserves, and more than 66% of its undeveloped acreage, are there. Accordingly, some 66% of the company's capital budget will be spent in the Rockies next year.

GeoResources is acquiring acreage in the Bakken shale play in Montana and North Dakota. In Roosevelt County, Montana, the company has a 50% interest in 2,200 gross acres. The play has similar geological characteristics to the recent Marathon Oil Co. discovery there, says Lodzinski. The company also has a 10% interest in 26,922 gross acres in Montrail County, North Dakota, and plans to drill its first well there early in 2008.

"EOG Resources Inc., based in Houston, has had recent success nearby in the Parshall Field area, and is currently offsetting some of GeoResources' leasehold," says Lodzinski.

GeoResources has begun development of existing acreage and producing fields in the Williston Basin. It will use waterflood, reservoir pressure maintenance, horizontal drilling and in-fill drilling technology to increase valuation of the holdings.

The company also has acreage in Yuma County, Colorado, where it is completing gathering lines to seven wells. Depending on favorable conditions, additional wells could be drilled at a later date.

"We've just started the program in the Rockies since we took over GeoResources, but so far our initial results are favorable," he says.

Lodzinski has previously built up and sold several E&P companies, and he plans to do so again.

"Generally, our strategy has been to build a reserve and production base, including both long-lived reserves and high-impact Gulf Coast plays. Then, with profitable growth, we have provided liquidity to our shareholders, via a merger or sale. Growth in per-share value and exit strategies are always foremost in our minds. We've accomplished that in the past with both public and private companies we've organized and managed.

"Our strategy with GeoResources is to, again, build the company over the next three or four years, then realize



profit through market liquidity or through a merger or sale. That strategy is consistent with what we've done in the past," he says.

In addition to its Rockies position, GeoResources also has acreage in the Austin Chalk trend in Texas and operates 60 wells. It expects to spud a new Chalk well every 60 days for the next two to three years. In Louisiana, it has a 28% operating working interest (46% after payout) in a recently drilled shallow gas discovery and plans to drill an additional

well there in 2008. Before year-end, the company will begin drilling three oil prospects in the prolific Raceland Field.

COMPASS RESOURCES CORP.

Start-up firm Compass Resources Corp., Houston, entered the Rockies with a bang, capturing funding of \$100 million from Natural Gas Partners, gathering more than 150,000 gross acres under lease or option in Wyoming, and building a dream team comprised of seven experienced professionals, some with prior Rockies experience.

"The Rocky Mountain basins are one of our main target areas for growth," says Douglas E. Brooks, president. "They have some of the highest untapped resource potential in the U.S., and it's possible to amass significant leasehold positions with relative ease and moderate cost."

Compass has entered the Powder River Basin.



Douglas Brooks, president of Compass Resources, says the Rockies "have some of the highest untapped resource potential in the U.S."

"In this play, we are targeting oil. While the project is oil-focused, it does represent an unconventional reservoir and trapping style," Brooks says. "Given the attributes of the Mowry shale in this and basin one other, we selected them for their lithology, thermal maturity and fracturability. From a commercial standpoint, the Mowry

shale is an emerging resource play, so while it has execution risk, the entry costs are still reasonable."

Still, there are challenges that Compass and other new players face when entering the region. Federal lands are predominant in most of the Rocky Mountain basins. One must learn to plan effectively and efficiently on federal lands because the process is time consuming and costly.

The Compass business model is to create value for its shareholders and employees, and each member of the management team is also a personal investor. As opposed to the current trend of business models that require a full sale within three to five years, the strategy of Compass is to



hold the equity for a longer period, to prove up more reserves and thereby maximize value.

Compass is actively seeking projects, primarily in resource plays, but it also is looking to acquire more conventional producing plays to make use of the team's operational, reservoir and geologic expertise. Brooks says Compass is looking for partnerships and is considering several other basins in the western U.S., Texas, New Mexico and the Midcontinent for large acreage in resource plays.

Although the company is fairly new, the business team consists of seasoned personnel. Before Compass, Brooks worked with Marathon Oil Co. for more than 24 years, most recently as director of business development, Americas.



than 24 years, most recently as BlueStone Natural Resources' Joe Dullea, senior vice president of exploration (left), John Redmond, president (center) and Doug director of business develop- Redmond, vice president of engineering (right) map out their Rockies strategy. (Photo courtesy of Bluestone Natural Resources)

John Morgan, vice president, production and operations, and Jay Knaebel, vice president, reservoir engineering and corporate development, are most recently from Burlington Resources Inc., Houston, prior to its sale to ConocoPhillips. Morgan also worked for Atlantic Richfield Co. and Vastar Resources Inc.

Knaebel's work for Burlington included experience with coalbed-methane plays in the San Juan Basin and in China, the Bossier gas play in East Texas, and the Canadian Rockies.

Jim Kendall, vice president, geoscience, worked for Marathon Oil Co.; Tom Brown Inc., Denver; Matador Petroleum Corp., Dallas; Encana, Calary; and most recently as team manager for the Midcontinent division at Samson Resources Co., Tulsa. He has explored five U.S. basins including East Texas, Permian, Midcontinent and the deepwater Gulf of Mexico, and several projects in Alberta.

Rex Henderson, manager, land and contracts, has worked as an independent landman and for Carrizo Oil and Gas Inc., Houston, and Southwestern Energy Co., Houston.

BLUESTONE NATURAL RESOURCES

Not all newcomers enter the Rockies with specific properties and long-term goals in mind. For example, BlueStone Natural Resources, a private company based in Tulsa, acquired Williston Basin properties through a recent acquisition.

"We ended up with the Rockies properties when we bought the stock of Columbus Energy. We were initially interested in Columbus' South Texas assets," says John Redmond, president.

BlueStone Natural Resources was formed in February 2006 utilizing funds from the management team and Natural Gas Partners, an affiliate of Irving, Texas-based NGP Energy Capital Management. In July 2007, BlueStone acquired Columbus Energy, which had existing assets in Montana and North Dakota. Columbus continues to operate as a subsidiary of BlueStone and also has assets in South Texas, in addition to the Rockies, comprising some 140 total wells with gross production of more than 17.8 MMcf of gas per day.

The Rockies represent about 10% of BlueStone's total holdings and the company will spend 5% to 10% of its total drilling budget there in 2008, barring divestiture.

"The Rockies, for us, is probably going to be a situation where we look the properties over, figure out what's there, and ultimately sell them to someone who is a little bit more focused in the Williston Basin," says Redmond.

Toward the end of this year or the beginning of next year, the company will begin a divestiture program of the Rockies assets, all in the Williston Basin.

"Because the assets were a part of the acquisition, we are going through the process now of determining what kind of assets they are and what kind of acreage goes with them. We're still trying to get our arms around that," he says.

Most of the wells produce from the Red River formation, and some of the acreage may be prospective in the Bakken as well.

"We've identified several areas where we are going to book

proved, undeveloped reserves. We've started a high-level study of all the properties we've got, and there is going to be some additional drilling potential on it. Chances are, we'll identify

"We have some members of our team that can get around up there. It's not completely foreign to us, which helps because as we start piecing this thing together, we can figure out what we like and what we don't like about the assets. It gives us a little bit of a leg up."

John Redmon
President of BlueStone Natural Resources

it and then let someone a little more accomplished and with more long-term vision take it and develop it."

Nonetheless, Redmond is pleased with what he saw

during an initial view of the properties and its drilling potential. The company also has some seismic on the properties but not a tremendous inventory, he says. The takeaway pipeline infrastructure is in place and fairly well developed, increasing the asset value for BlueStone.

Redmond is also comfortable working the properties because of the experience of some of his partners.

"We have some members of our team that can get around up there. It's not completely foreign to us, which helps because as we start piecing this thing together, we can figure out what we like and what we don't like about the assets. It gives us a little bit of a leg up," he says.

Joe Dullea, BlueStone's senior vice president of exploration, has former Rockies experience from working with Barrett Resources Corp., which was acquired by The Williams Cos. Inc. for \$2.8 billion in 2001.

Also, Doug Redmond, vice president of engineering, who worked the Rockies with Shell Oil, is on the team.

"He's my brother, and we always had designs on being in the same company, so this has been great. This has been our biggest deal to date, so we are trying to use it as a base. Really, our focus is on finding oil and gas in the Lobo play of South Texas, and we plan to make that a better asset," he says.



ABOVE-GROUND RISK

Roan Plateau Remains Political Flash Point

The struggle to add reserves in the Rockies is exemplified by the ongoing opposition to drilling on Colorado's Roan Plateau.

BY GARY CLOUSER, CONTRIBUTING EDITOR

he timetable and likelihood of drilling occurring on the natural gas-rich but environmentally sensitive Roan Plateau in northwest Colorado remain uncertain.

The scenic area is the epicenter of clashes between the oil and gas industry and environmentalists, Democrats versus Republicans on energy policy, state versus federal jurisdiction, internal Colorado politics and a likely talking point for next year's U.S. senate race in Colorado.

Bowing to pressure from Colorado Governor Bill Ritter and U.S. Senator Ken Salazar, the U.S. Bureau of Land Management (BLM) on August 8 agreed to Ritter's request to delay seeking drilling leases for another 120 days.

The delay is to allow time for Ritter, who became governor in January 2007, to review and comment on the BLM's plans. Ritter, a Democrat, has been critical of the Roan drilling plan supported by his predecessor, Republican Governor Bill Owens.

The U.S. House of Representatives, in its latesummer passage of its version of an energy bill, approved an amendment that would prohibit surface drilling on the federally owned portion of the plateau.

that federal land by horizontal drilling from the Colorado. (Photo courtesy of the U.S. Bureau of Land Management) base of the plateau, forcing energy companies to

drill up to three miles to reach gas fields. U.S. representatives Mark Udall and John Salazar, Democrats from Colorado, introduced the amendment. John Salazar is the brother of Senator Salazar. Udall, the son of former U.S. Senator Mo Udall of Arizona, is a 2008 candidate for the

Senator Salazar, a Democrat, further pressured the BLM by putting on hold the nomination of James Caswell as BLM director until the Interior Department agreed to grant Ritter his 120-day review. Once the BLM capitulated, Salazar lifted that hold.

The U.S. Senate had earlier approved its own version



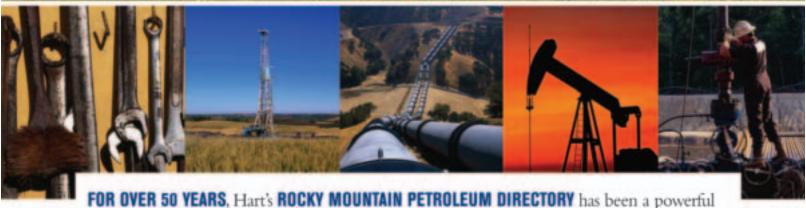
The amendment would only allow access to The U.S. Bureau of Land Management in August put a 120-day delay on leasing on the Roan Plateau in

of a 2007 energy bill, which did not include any prohibition against Roan Plateau drilling. When House-Senate conferees meet on their energy bills, they will have to decide whether to leave the Roan Plateau prohibition in any proposed settlement.

Meanwhile, House Republicans, noting the additional \$16-billion tax burden to the oil and gas industry, are urging Present George W. Bush to veto the energy bill—an action the Bush Administration says it is contemplating.

A total ban on surface drilling could cripple efforts to tap the gas in the plateau. Officials from the counties of Rio Blanco, Garfield and Mesa, where the surface drilling would

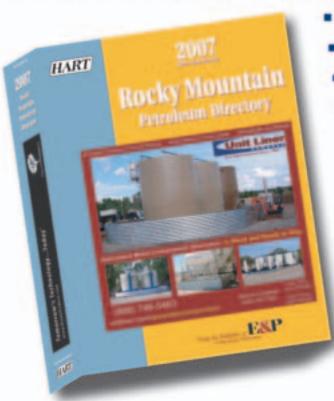
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occur, are on record as supporting the BLM's drilling plan. Also, the state's three largest newspapers, *Denver Post, Rocky Mountain News* and *Colorado Springs Gazette*, have editorialized in support of the BLM's drilling plan.

NEW ORGANIZATION

Greg Schnacke, a long-time advocate for responsible drilling on the Roan Plateau, is concerned about the possibility of additional drilling restrictions. The BLM plan already is the "most restrictive resource plan ever released by the BLM," he says.

Schnacke says he feels so strongly about the need for the Roan Plateau to be responsibly drilled that he has resigned his position as executive director of the Colorado Oil & Gas Association (COGA) to become the initial president of a lobbying organization called Americans for American Energy. That group has made drilling of Roan Plateau, drilling in the Arctic National Wildlife Refuge, and access to drilling on additional offshore U.S. sites major planks of its efforts. Americans for American Energy has offices in Golden Colorado, Colorado, and Washington, D.C.

Existing restrictions have already made the Roan Plateau a "difficult plan for the industry to embrace," Schnacke says, which has dampened enthusiasm, and likely the number of bidders and amounts of their bids for leasing. Some in the oil industry have said the restrictions may not be worth it.

Schnacke, who had been with COGA for 13 years, fears the additional comment period will result in still more proposed restrictions, even if the drilling prohibition approved by the U.S. House is eventually overturned. Oil and gas industry advocates are courting the support of oil-state Democrats.

Officially, Schnacke will be employed by Policy Communications Inc. (PCI), which has created the Americans for American Energy. PCI, with offices in Golden, Colorado, and Washington, D.C., is a communications and advisory firm headed by Jim Sims, the former White House director of communications for Bush's National Energy Policy Task Force.

Schnacke says there is a need to provide a "balanced voice" to those who oppose fossil fuels. Americans for American Energy will advocate environmentally responsible actions that recognize and balance economic concerns, he says.

BLM'S PLAN

The BLM earlier this year, after more than seven years of study, unveiled its plan and restrictions for the Roan Plateau. It would limit drilling operations to no more than 1% of the plateau's surface area at any given time. To allow the government to monitor and control disturbances, only one E&P company will be allowed to conduct all the work on behalf of the leaseholders, according to the BLM.

Leases will be available to any interested company, but leaseholders will have to agree on a single firm to do the drilling and establish a well.

Under the existing BLM plan, drilling up to 1,570 wells

would be permitted on portions of 73,602 acres of federal lands on the Roan. Companies could only disturb 350 acres at any one time and would have to drill directionally, clustering wells together to minimize well pads.

The BLM's plan protects 38,427 acres from any development and includes nearly 23,000 acres of wildlife security areas identified by the Colorado Division of Wildlife. In addition, drilling and related activities are limited from December through April in nearly 35,000 acres of critical big game winter range below the rim.

Estimates of the amount of recoverable gas contained in the Roan Plateau vary from as low as 4 Tcf to as much as 15 Tcf. The BLM's estimate is 15 Tcf for the entire planning area.

The Independent Petroleum Association of Mountain States (IPAMS) also is a strong advocate of drilling on the Roan Plateau, also known as the Naval Oil Shale Reserve (NOSR).

"Responsible development on the small section of the Roan that has been designated for energy extraction just makes sense," says Marc W Smith, executive director of IPAMS. "Our state is broke. We need money for schools, roads and health care. Tapping the natural resources under this tiny portion of the Roan will help fund these important needs while increasing domestic energy supplies and lowering energy costs.

"Responsible development on the small section of the Roan that has been designated for energy extraction just makes sense."

Marc W. Smith Executive Director of IPAMS

"Many anti-development environmentalist groups oppose all energy development. They would have people believe that we are faced with an either-or choice: develop natural gas or preserve it for other uses such as hunting and fishing. That is not the decision with which we are faced—we can manage the small and temporary impacts of development while maintaining the excellent recreation opportunities that this area offers."

Oil and natural gas development occurs on less than 1% of federal lands in the Intermountain West. IPAMS has long maintained that the NOSR, which is on a tiny portion of the Roan Plateau, should be made available for limited energy development in accordance with the Defense Authorization Act of 1997.

"The Salazar-Udall ban on developing the NOSR would cost the state of Colorado \$1 billion in lost revenues and prohibit the development of a vast natural resource—enough energy, in fact, to heat every home in Colorado for the next 20 years," says Andrew Bremner, IPAMS director of government affairs.

Oil Shale: The Future of U.S. Energy Security

Lobbyists make their case in Washington against pending energy bill provisions.

BY DARRELL A. HENRY, CONTRIBUTING EDITOR, WESTERN BUSINESS ROUNDTABLE



Darrell Henry

he Western Business Roundtable, a group of diverse business executives operating in the West from oil, gas and mining, to agriculture to engineering and utilities, recently hosted a briefing in Washington, D.C., for more than 60 representatives of Congressional offices on the tremendous potential of oil shale. The roundtable was also there to lobby

against provisions in the looming energy bill that could slow oil shale and other fossil energy development.

The roundtable works on a variety of issues, including economic development, environmental protection, regulatory reform, energy policy, public lands use, waste management, and air and water quality.

This article is a summary of the Western Business Roundtable's position on oil shale and its presentations by Darrell Henry of the Roundtable's Washington, D.C., office; Jim Bartis of the Rand Corp.; Scott Stewart of Shell Unconventional Resources; and Jim Bunger, an independent oil-shale consultant.

THE POTENTIAL

While oil shale occurs in much of the world, the western United States is home to the world's largest deposits. Most oil shales are fine-grained sedimentary rock containing high amounts of organic matter from which oil and gas may be extracted via a distillation (heating) process.

Oil shale was formed millions of years ago by the deposition of silt and organic debris on lake beds and sea bottoms. During time, heat and pressure transformed the materials into oil shale in a process similar to that which forms oil; however, the heat and pressure were not as great. Oil shale can contain enough oil to burn without additional processing, so it is also known as "the rock that burns."

Total world resources of oil shale are estimated at 2.6 trillion barrels of oil, with the Green River formation in Colorado, Utah and Wyoming containing an estimated 1.2 trillion to 1.8 trillion barrels—the largest deposits in the world.

Even by conservative estimates, there are 800 billion barrels of recoverable oil from oil shale in the area, an amount three times greater than the proven oil reserves of Saudi Arabia.

INCREASED DOMESTIC ENERGY SECURITY

Energy independence is essential to preserve America's economic strength and national security. A recent report by the U.S. Department of Energy is the latest reminder that reducing our dependence on foreign imports of oil and refined products is essential to achieving the energy security objective.

Import reductions can be achieved in two fundamental ways: by reducing demand for oil through conservation and efficiency, and increasing production of fuels from domestic resources, including alternatives, biofuels and unconventional fuels. Oil shale has the potential to increase domestic energy security and make the U.S. less reliant on foreign sources of energy.

"The disturbing irony is that the world epicenter of anti-American hatred and terror is also the epicenter of our number one source of energy," said former New York Governor George Pataki.

In public opinion poll after poll, an overwhelming majority of citizens—nearly 85%—express strong support for weaning the U.S. from increasing foreign energy addiction. They want America to be as energy independent as possible. Soon, new American technologies can help Western oil shale do just that.

21ST CENTURY TECHNOLOGY

The greatest challenge to realizing the vast potential of oil shale in Colorado, Utah and Wyoming has been technology, extracting the resource in an economically viable and environmentally responsible way. With U.S. demand for petroleum products topping 20 million barrels per day, oil shale could be used to meet a quarter of that demand—800 billion barrels of recoverable resources, which would last more than 400 years.

A new era has begun for Western oil shale. We are closer to finding viable techniques for extracting the resource in an economically feasible and environmentally responsible way, with cutting-edge research and development under way by private companies in the region.

Oil shale must be mined and processed to generate oil similar to that pumped from the ground, but extracting oil from oil shale is more complex than conventional oil recovery and historically, more expensive. There are several methods to extract oil from shale; some are advancements to traditional techniques while others are being tested for the first time in the Green River formation.

Some companies are using new technology to improve on the traditional method of accessing oil shale. Oil shale is first mined and then heated to a high temperature (retorting); the resulting liquid is then separated and collected.

An alternative experimental process is referred to as "in-situ retorting." This involves heating the oil shale while it is still underground and then pumping the resulting liquid to the surface.

Shell Oil Co. has U.S. Bureau of Land Management research and development leases and is moving stage-by-stage to prove up and resolve the issues around extraction of shale through a proprietary process known as "thermally conductive in-situ conversion." Shell has carried out a small field-test, the Mahogany Demonstration Project South, on its private property in Rio Blanco County, Colorado, using an in-ground heating process to recover oil and gas from the shale formation.

The process involves heating underground oil shale using electric heaters placed in deep vertical holes drilled through a section of oil shale. The volume of oil shale is heated during a period of two or three years until it reaches 650°F to 700°F, at which point oil is released from the shale. The released product is gathered in col-

lection wells positioned within the heated zone.

The field results have given confidence in Shell's insitu conversion process. A commercial decision on using this technology is anticipated early in the next decade, though possibly later depending on the sequence and outcome of research activities.

THE EFFECT OF EPACT 2005

Without the oil-shale provisions in the Energy Policy Act of 2005 (EPACT 2005), federal oil shale land would remain unavailable to the private sector, as it has since 1930 when President Herbert Hoover issued Executive Order No. 5327, withdrawing oil shale from leasing.

Even though President Harry S. Truman issued Executive Order No. 10355 in 1952, authorizing the Secretary of the Interior to rescind the Hoover order and lift the moratorium, to date it has not been lifted. (Limited leasing agreements in the 1970s were "prototypes" constructed so as not to have the effect of lifting the moratorium.)

With EPACT 2005, Congress provided clear direction in federal energy policy by instructing the Department of the Interior to develop a commercial leasing program and lift the leasing moratorium. With

OIL SHALE AND THE WEST

Development of this vast domestic resource could supply the U.S. energy needs for up to 400 years. This presents an opportunity to improve the national energy security position and reduce the instability caused by dependence on foreign sources of energy.

Oil shale's economic benefits would be substantial, not just to our impacted communities, but to American consumers at large. Based on a 3-million-barrel-per-day production rate, estimates are the industry would generate:

- •\$20 billion annually in revenues through lease bonus payments, royalties on production and corporate income taxes. Roughly half of those profits would likely go to federal, state and local governments;
- •several hundred thousand jobs in direct industry employment, plus the associated ripple effect; and
- •an estimated 3% to 5% decline in world oil prices, which would benefit consumers and business users in the U.S. by about \$15 billion to \$20 billion a year.

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WESTERN OIL SHALE

the exception of Shell, which is operating on private property, there has been no significant money put into oil-shale development on federal land since the prototype program in the 1970s.

EPACT 2005 was passed in August 2005, prior to the deadline for application of the leases in September 2005, and it is generally agreed among applicants and observers that it was the passage of EPACT 2005 and the prospect of obtaining additional contiguous acreage that generated enthusiasm for the experimental lease applications.

Some members of Congress wish to restore the barriers that have been in existence for nearly a century. If Congress succeeds in re-enacting barriers, we can expect the following:

- America's commercial oil-shale production will continue to be sidelined until the federal government provides clarity in its regulatory regime and leasing program;
- industry, and, more importantly, Wall Street, will perceive the proposed legislation as hostile to oil shale. This is a dangerous direction and could slow or halt any investment until favorable government policy is expressed;
- current lessees are likely to be discouraged from making large investments. In the case of the Utah lease, the 5,120-acre preference may not be sufficient to support a full-scale operation. Without a clear path to development, investors prudently will likely hold back from investing further in oil shale; and
- •loss of oil shale as one of our domestic resources will

exacerbate a future supply crisis. As we've seen from hurricanes Katrina and Rita in 2005 and the conflicts in the Middle East, the U.S. is highly vulnerable to supply disruptions, and with continued competition for the world's oil supply from China, India and other burgeoning economies, there is some urgency to begin the process.

Lawmakers should recognize the danger of removing this vast resource (richer and larger than the Alberta oil sands) from our domestic energy base.

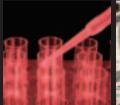
The lack of clear government policy has inhibited development of this domestic resource for nearly a century. The first serious attempt with the passage of EPACT 2005 to remove century-old, government-induced impediments to development of this resource is in jeopardy because of legislation pending in Congress.

Members of Congress must recognize that delaying, and even cutting off, the regulatory and leasing process effectively removes this resource from our domestic supply options, at least while our government policy is in limbo. Given the competition for investment in energy supply in other parts of the world and the pressures to develop the resource, it's only a matter of time before retreating on the oil-shale provisions in EPACT 2005 is seen as a colossal mistake.

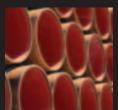
Author's note: Research content, credits and thanks go to the Rand Corp., Shell Unconventional Resources, the American Petroleum Institute and Jim Bunger, an independent oil shale consultant.

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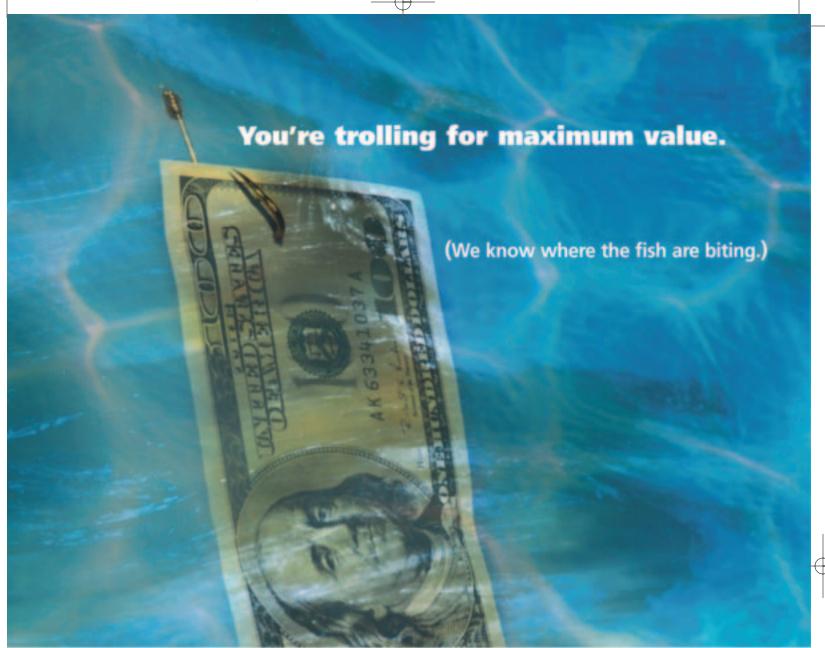










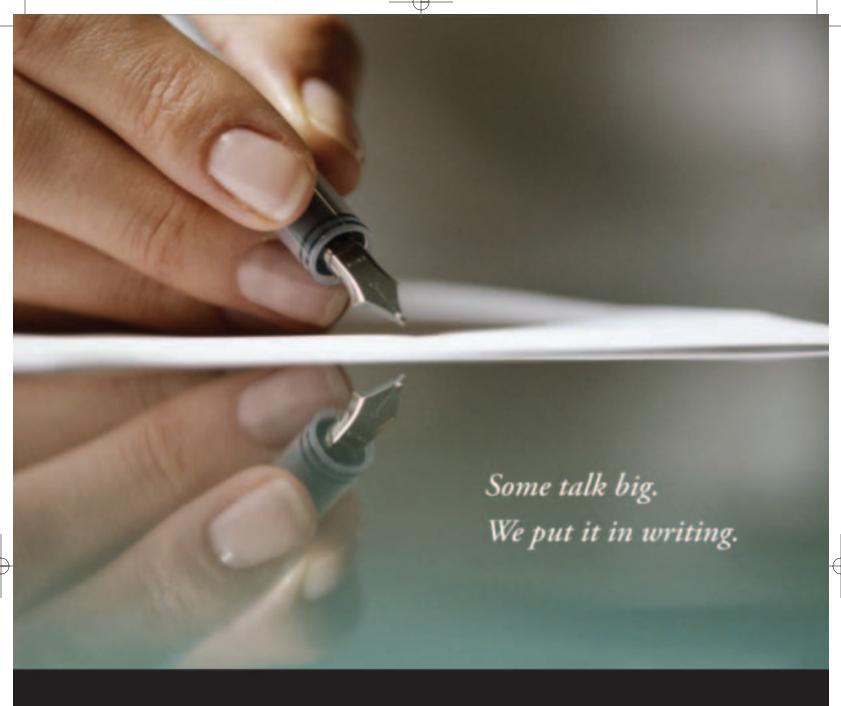


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