Dispelling the Alaska Fear Factor

A guide to Alaska's oil and gas basins and business environment

A special publication from Petroleum news

Introduction

Thank you for your interest in investing in Alaska. This is a state rich in opportunities and we look forward to working together to responsibly develop the state's oil and gas resources.

Highlighting Alaska's resource opportunities and the stable nature of our regulatory and tax regimes is an important goal of my administration. We recognize that your investment in this state is important to our future. We want you to know that your presence in Alaska is appreciated and your input is always welcome.

We hope that you will also find the development of Alaska resources to be in your best interests — from the North Slope south to the Alaska Peninsula. We are proud to have long-time companies continuing to invest in our state and profit from their exploration, and we are also excited to see new and returning companies willing to invest, such as Shell, Pioneer, ENI, Benchmark, Savant, Total and others. They recognize the exciting environment that exists in Alaska, and they are companies committed to forging new relationships in the Last Frontier and initiating investments in this rich environment.

"Whether it is the North Slope or Cook Inlet, Alaska is demanding greater access to facilities in order to enhance expansion opportunities for current investors and future investors."

—Alaska Gov. Sarah Palin

As Alaska's governor, one of my very first pledges during the first month in office was to ramp up responsible resource development. I know that's a goal under which we both can live. I promise to vigorously defend Alaska's rights, as resource owners, to develop and receive appropriate value for our resources. But I also know that the state should be trusted to keep its promises and I will expect the same of the industry. Oil and gas development remains the core of our state. We recognize that one thing we can do for you is to provide stability for our developers.

We have numerous resource development priorities. My administration's number one priority is ensuring the construction of the North Slope natural gas pipeline. We know that Alaska's gas can be developed profitably and begin to flow from the North Slope to commercial markets in this state and throughout the Lower 48. We are no longer going to accept the warehousing of Alaska's gas. We are moving forward aggressively to bring to market this valuable resource and provide a safe and secure domestic supply for our homes and businesses as well as those in the Lower 48.

We also recognize that while Alaska's gas pipeline will first flow our proven gas reserves, we must strongly encourage exploration and expansion. Whether it is the North Slope or Cook Inlet, Alaska is demanding greater access to facilities in order to enhance expansion opportunities for current investors and future investors.

We are excited about many great prospects, and naturally our focus is on energy supplies because we are blessed with them. Members of my administration and I look forward to answering your questions and partnering in a way which will respect our land and provide a promising future for the state and those who are willing to invest in the exploration and development of our resources.

Thank you, again, for your interest.

Sincerely,

Sarah Palin
Governor of Alaska

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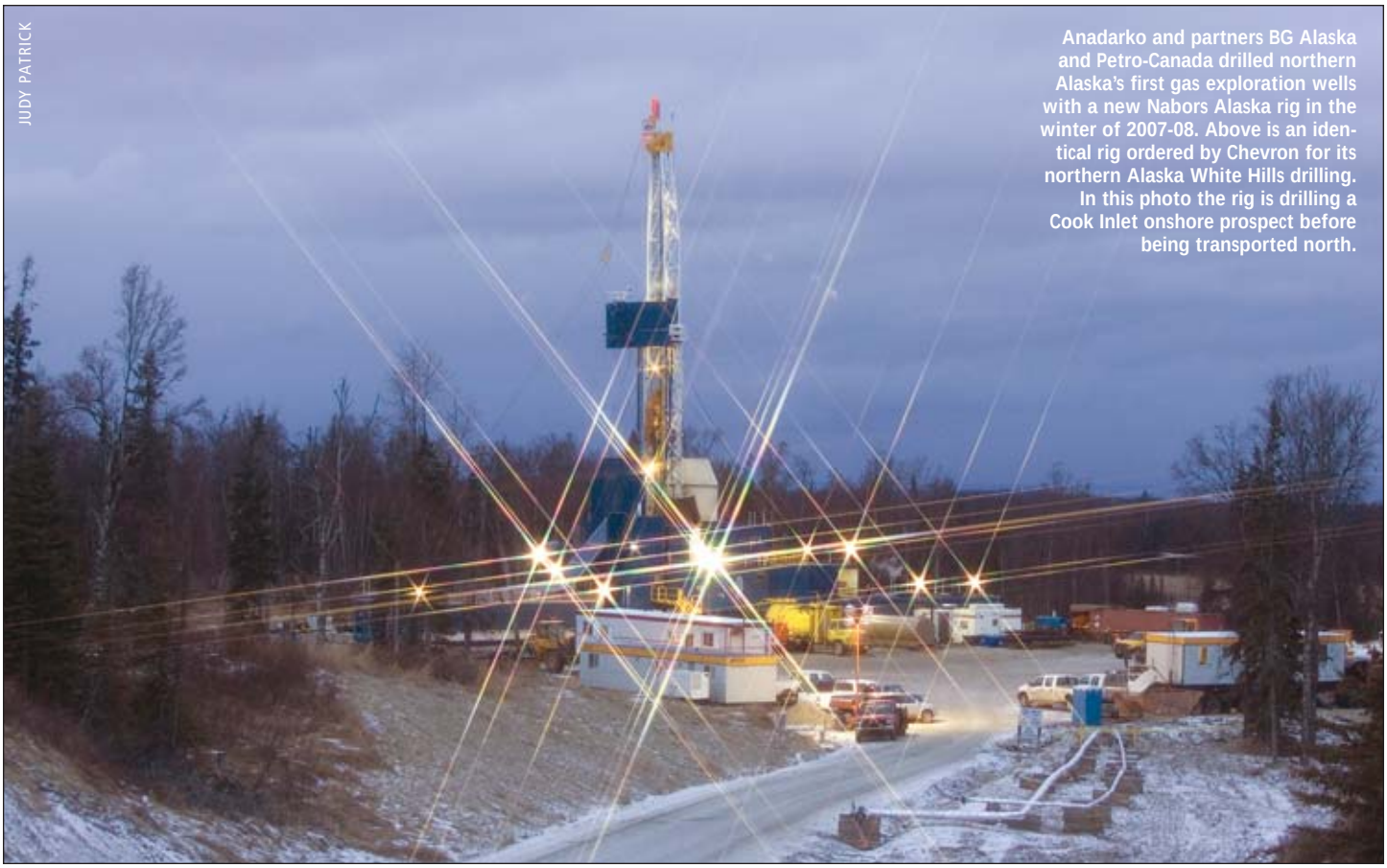

JUDY PATRICK

Anadarko and partners BG Alaska and Petro-Canada drilled northern Alaska's first gas exploration wells with a new Nabors Alaska rig in the winter of 2007-08. Above is an identical rig ordered by Chevron for its northern Alaska White Hills drilling. In this photo the rig is drilling a Cook Inlet onshore prospect before being transported north.

Message from the publisher

The first edition of "Dispelling the Alaska Fear Factor" was published in May 2005. The book was designed to report on government and industry efforts to dispel Alaska's 'fear factors' — fears that had discouraged many oil companies from doing business in the state.

The first and second editions (which you are reading) also provided what the second part of their titles promised: "a guide to Alaska's oil and gas basins and business environment."

First string of successes

Because of the success of newcomers such as Armstrong Oil & Gas, Pioneer Natural Resources and Kerr-McGee, the second edition of this guide, first published as a draft online in May 2007 and printed in June 2008, has less information about Alaska's fear factors because some have disappeared in the wake of those successes.

Armstrong proved that a tiny independent could purchase leases in Alaska (offshore the North Slope, no less), identify drillable prospects near existing infrastructure, find partners to help finance exploration, and discover and develop commercial quantities of oil and gas.

Pioneer and Kerr-McGee were two of Armstrong's partners.

Using the Alaska expertise Armstrong had under contract and adding some of its own, Pioneer took over as operator of the Armstrong-identified Oooguruk prospect, discovered by the partners in 2003 and expected to come online in the second half of 2008.

Kerr-McGee's story is similar. The company, which is now part of Anadarko Petroleum, came into the state as an Armstrong partner in late 2003 to drill the near-shore Nikaitchuq prospect in early 2004.

Nikaitchuq development was initially scheduled to match Oooguruk's, but a number of things interfered, including Armstrong's decision in 2005 to sell its interests in all its Alaska assets to yet another company new to Alaska — Houston-based Eni Petroleum, the U.S. E&P affiliate of Italy's Eni SpA. (Armstrong President Bill Armstrong said his small, Denver-based firm did not have deep enough pockets to be a good partner in developing the two discoveries.)

Eni proceeded to purchase Anadarko's interest in Nikaitchuq and expects to produce first oil from the field in 2009.

Armstrong returned to Alaska in 2007, this time picking up leases onshore in Southcentral Alaska's Cook Inlet Basin, and was due to drill a gas well in summer 2008.

Still, newcomers to the more remote National Petroleum Reserve-Alaska face major fear factors, such as absence of infrastructure, uncertain federal lease sale dates, short winter drilling season and high costs. Talisman subsidiary FEX LP conducted exploration drilling in NPR-A in the winters of 2005-06 and 2006-07 (off-road exploration generally takes place in the winter), but in 2007 said it was putting a two-year hold on drilling to shoot seismic and evaluate its discoveries.

The Calgary-based company made what former CEO Jim Buckee referred to as significant petroleum discoveries in this far-flung part of the North Slope, talk-

2006-07 winter exploration drilling by ConocoPhillips and partners at Noatak, which is south of Barrow in NPR-A.

ing in the hundreds of millions of barrels. But Talisman's new CEO, John Manzoni, was taking a more cautious, less enthusiastic approach to NPR-A, part of his more 'prudent' approach to all the company's exploration targets.

Elsewhere on the North Slope, companies such as Brooks Range Petroleum Corp., ConocoPhillips, Chevron and Anadarko were exploring for oil in the winter of 2007-08. Early 2008 results at more than one prospect looked good for Brooks Range and its partners.

But 2008 drilling results for Savant Alaska at its Kupcake oil prospect adjacent to BP's Liberty oil prospect did not look promising. Savant, another Denver-based newcomer, was drilling from an ice island in the near-shore waters of the Beaufort.

And Anadarko's results from two seasons of drilling one oil exploration well at its Jacob's Ladder prospect looked equally dire.

Going further offshore

In the federal waters of the Beaufort Sea, Shell's delineation drilling at its Sivulliq prospect (formerly called Hammerhead) was awaiting the results of a lawsuit filed with the U.S. Court of Appeals for the 9th Circuit.

But the company was still working with local stakeholders, sharing knowledge and developing consensus for its offshore plans in both the Beaufort and adjacent Chukchi seas. Even if Shell gets permission to drill for oil, it planned to drill only three top holes at Sivulliq in the summer of 2008 — holes that would not go deep enough to encounter hydrocarbons.

A cluster of mega-bids in the February 2008 federal Chukchi Sea lease sale confirmed strong interest by Shell and ConocoPhillips in two major geologic structures about 75 miles offshore, around the Klondike and Burger wells that were drilled in 1989 and 1990. The Burger structure holds a known gas field of perhaps 14 trillion cubic feet.

As this guide went to press, ConocoPhillips was taking its first steps toward a potential Chukchi drilling program, planning a site survey program in the summer of 2008.

Equally exciting was the fact that Anadarko drilled northern Alaska's first two natural gas exploration wells in the winter exploration season of 2007-08. The wells, drilled in conjunction with Anadarko's partners in the Brooks Range Foothills, BG Alaska and Petro-Canada, were drilled in anticipation of a gas pipeline being built from the North Slope to Outside markets. (North Slope gas discoveries to date have been an accident of oil exploration.)

Jack-up to Cook Inlet

This brings me to another subject: the rewards. The payoff in northern Alaska in terms of size of a discovery is large by any standard, especially anywhere else in North America. For example, Nikaitchuq is thought to hold between 100 million and 200 million recoverable barrels of oil; Oooguruk around 70 million barrels.

Exploration and development activity in the Cook Inlet Basin, which is expected to see its first jack-up rig in about 20 years in 2009, has also picked up in the last year.

And new basins have been opened to exploration — the North Aleutian Basin (also referred as Bristol Bay Basin), Nenana Basin and the Yukon Flats Basin.

This guide will tell you about all of the state's oil and gas basins, as well as other basics about Alaska's oil and gas industry, such as permitting, access and existing infrastructure. To keep up with industry news from this northernmost state, I suggest subscribing to our weekly newspaper, Petroleum News, and our news bulletin service. You can get information about both by emailing circulation@petroleumnews.com, visiting our Web page at www.petroleumnews.com or calling us at 907-522-9469.

Many thanks to all the individuals in government agencies, associations and private companies who contributed to this guide.

Kay Cashman, Petroleum News
publisher & executive editor

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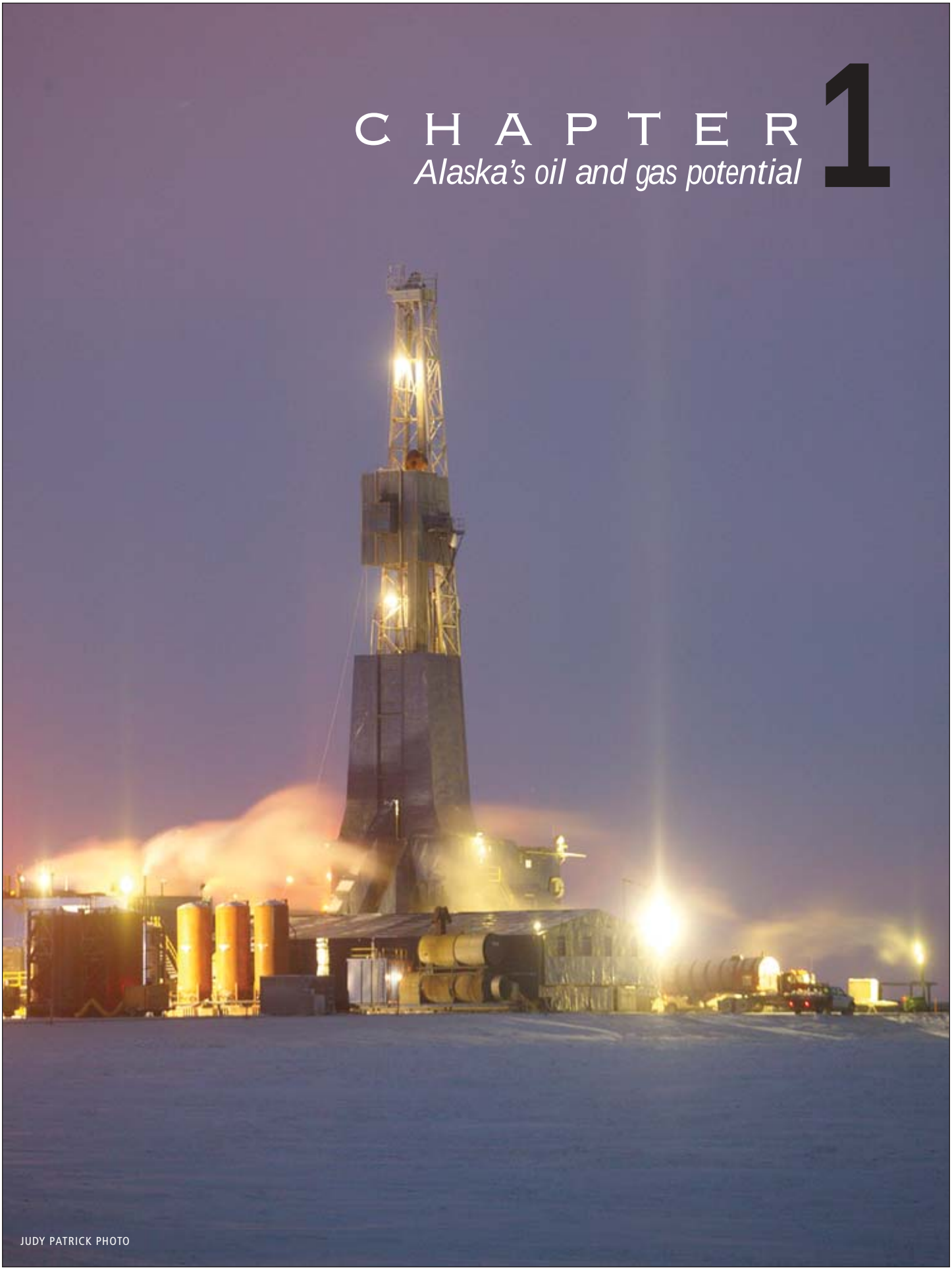
CHAPTER 1

Alaska's oil and gas potential



JUDY PATRICK PHOTO

Katalla, site of Alaska's first commercial oil production in 1902

THE BARRETT WILLOUGHBY COLLECTION, ACCESSION NUMBER 72-116-213, ARCHIVES, ALASKA AND POLAR REGIONS DEPARTMENT, UAF

CHAPTER 1

Alaska's oil and gas potential

The discovery of the giant Prudhoe Bay oil field on Alaska's North Slope in 1967 marked Alaska as a world-class oil and gas region. Two years later, the discovery of the nearby Kuparuk River field, still the second largest producing oil field in North America after Prudhoe Bay, confirmed Alaska's position as a premier place to explore for oil and gas. Since those discoveries were made, a cluster of major oil and gas fields have been developed on the central North Slope.

But with production declining in the Prudhoe Bay and Kuparuk fields and a general recognition that the central North Slope is reaching maturity as an oil and gas province, is there still potential for Alaska as an area for oil and gas development?

The answer has to be a resounding "yes."

Look at figure 1, a map of Alaska's oil and gas basins. The Prudhoe Bay area occupies just one relatively small part of a vast and largely underexplored oil and gas province extending across northern Alaska and out into the Beaufort and Chukchi seas.

In southern Alaska, substantial aspects of the Cook Inlet Basin remain unexplored. To the southwest of the Cook Inlet, the prospective Bristol Bay Basin, also known as the North Aleutian Basin, extends from Bristol Bay along the north side of the Alaska Peninsula and out into the Bering Sea.

The Gulf of Alaska Shelf along the northern perimeter of the Gulf of Alaska also presents some exploration opportunities.

The Interior of Alaska contains several sedimentary basins, such as the Nenana Basin near Fairbanks and the Yukon Flats Basin near the Canadian border. These Interior basins probably contain natural gas.

The North Slope

Since the startup of Prudhoe Bay following the completion of the trans-Alaska oil pipeline in 1977, the central North Slope has remained the fulcrum of the state's oil and gas industry. The fields on the Slope have cumulatively produced more than 15 billion barrels of oil and natural gas liquids and field operators continue to extend reserves through in-field development and the development of satellite fields. In addition to oil, some fields contain huge quantities of natural gas, which Alaskans hope to be able to eventually market to the Lower 48 via a gas pipeline yet to be built.

The U.S. Geological Survey's 1995 National Assessment of United States Oil and Gas Resources recognized 11 oil and gas plays in northern Alaska, in an area extending from the southern Brooks Range to the coasts of the Beaufort and Chukchi seas. Seven of these plays had already yielded confirmed oil and gas at the time of the USGS assessment.

The assessment estimated the following quantities of technically recoverable oil and gas in place: 2.34 billion to 15.43 billion barrels of oil, 23.27 trillion cubic feet to 124.33 tcf of natural gas and 0.44 billion to 2.08 billion barrels of NGL.

These 1995 estimates now seem much too low. A U.S. Department of Energy report in 2001, for example, estimated the ultimate recoverable oil reserves on the whole of the North Slope to be 22.2 billion barrels, including resources from existing fields and undiscovered resources.

A 1998 U.S. Geological Survey assessment of the 1002 area of the Arctic National Wildlife Refuge at the east end of the North Slope gave estimates of 5.7 billion to 15.9 billion barrels of technically recoverable oil, with a mean estimate of 10.4 billion barrels.

A 2002 U.S. Geological Survey assessment of the National Petroleum Reserve-Alaska, a 23 million-acre tract of land at the west end of the North Slope, resulted in estimates of 6.7 billion to 15.0 billion barrels of technically recoverable oil and 40.4 tcf to 85.3 tcf of natural gas. The mean estimates for technically recoverable oil and gas were 10.6 billion barrels and 61.4 tcf.

And a 2005 U.S. Geological Survey assessment of the central North Slope suggested technically recoverable, undiscovered oil in the range of 2.6 to 5.9 billion barrels, with a mean of 4.0 billion barrels. The equivalent estimates for nonassociated natural gas were 23.9 tcf to 44.9 tcf, with a mean of 33.3 tcf. In addition USGS estimated mean volumes of 4.2 tcf of gas associated with oil fields, 387 million barrels of NGL from gas fields and 91 millions of bar-

GENERALIZED OIL AND GAS BASINS/PROVINCES ALASKA

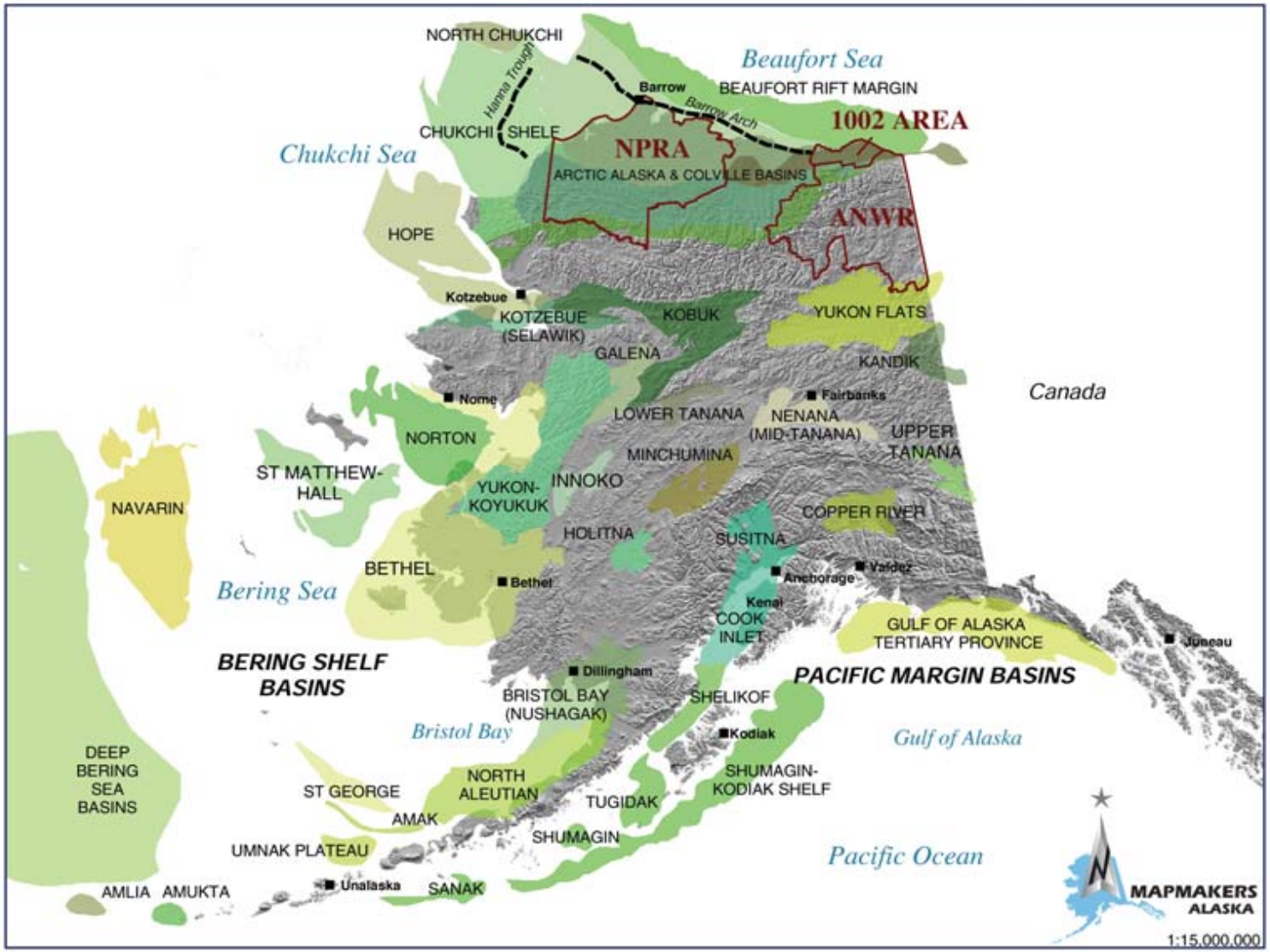


Figure 1.1

Compiled and combined by Mapmakers Alaska from:
1. U.S. Geological Survey (USGS) Open-File Report 02-438
2. State of Alaska Division of Geological and Geophysical Surveys (DGGS): Special Report 32- Oil and Gas Basins Map of Alaska 1983, by Arlen Ehm
3. File in Arc/Info e00 format, DGGS Special Report 32, digitized by DGGS in 1991, modified by Mapmakers Alaska to align with sedimentary basin boundaries and faults from USGS OF 02-438.
4. US Minerals Management Service: "Basins of Bering Shelf and Pacific Margin Offshore"
5. Annotations and Labels obtained from DGGS Special Report 32; US Minerals Management Service "Basins of Bering Shelf and Pacific Margin Offshore, The Mapmakers "Alaska Geological Provinces and Quadrangle Location Map," 1972.
6. Barrow Arch and Hanna Trough: Figs. 1 and 4, USGS OF 84-395, "Summary Geologic Report For Barrow Arch Outer Continental Shelf Planning Area, Chukchi Sea, Alaska," by Arthur Grantz and Steven D. May.
7. Conversations: Alan Bailey and Arlen Ehm, Alan Bailey and Mark Myers.

rels of NGL from oil fields. So, how much of these hydrocarbons could be produced profitably and what are the risks involved in finding and developing them?

Clearly the existence of an oil production infrastructure in and around Prudhoe Bay, coupled with an oil export route through the trans-Alaska oil pipeline, significantly helps the economics of new oil development in the central North Slope. However, development scenarios for sites that are distant from Prudhoe Bay must take into account the cost of new production facilities and transportation pipelines. This cost would drive a need to find substantial quantities of hydrocarbons in the more remote locations before viable development could commence there.

In NPR-A USGS sees the possibility of individual accumulations in the range from 16 million to 1,024 million barrels of technically recoverable oil. However, most accumulations would lie in the lower third of this range, perhaps between 32 million and 256 million barrels. Most accumulations in ANWR's 1002 area (coastal plain) would lie within a similar range, although an individual accumulation in ANWR could contain more than 2 billion barrels of oil.

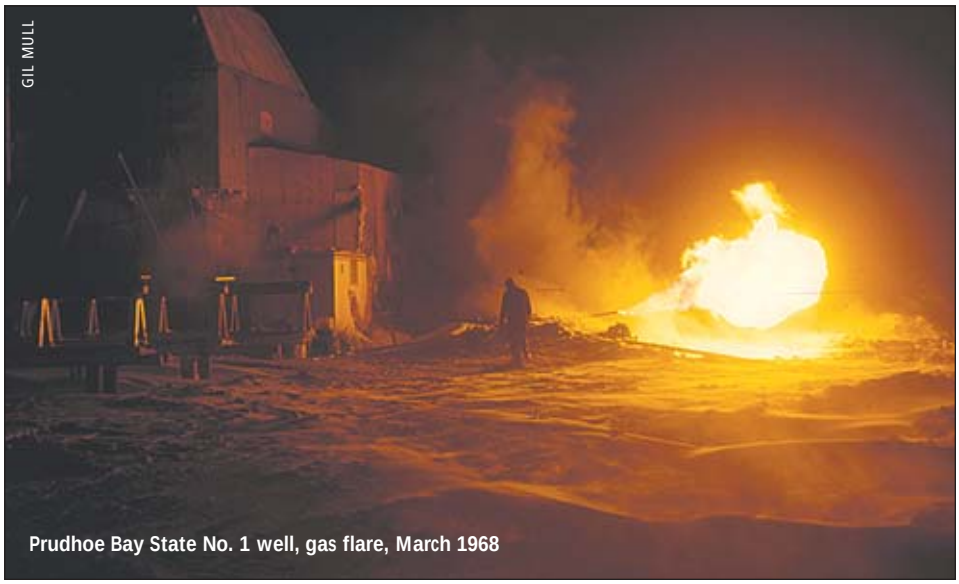
The USGS economic analysis for NPR-A assumed various pipeline scenarios for pumping oil into the existing transportation infrastructure. The USGS analysis for the federal lands within NPR-A suggests a threshold oil price of about $20 per barrel, with a very high probability of an economic find at around $23 per barrel.

Economically recoverable oil would probably top out at 6 billion to 7 billion barrels if the oil price was to exceed $30 per barrel, although there is an outside chance that more than 10 billion barrels could be recovered at a profit.

The corresponding figures for ANWR indicate a threshold oil price of around $13 per barrel for viable exploration and development. It is more likely that a price of $15 per barrel would be needed, with virtual certainty of an economic find at around $20 per barrel. With prices in excess of $30 per barrel, the potential economically recoverable oil in the area tops out at around 6.5 billion barrels. As in NPR-A, it is just possible that more than 10 billion barrels could be recovered economically.

Most people consider the Brooks Range Foothills belt along the south side of the North Slope to be largely a gas province, with the possibility of finding substantial gas reserves.

But the marketing of gas from the foothills and from the entire North Slope depends on the construction of a gas export pipeline to southern Alaska or through Canada to the Lower 48 states, an idea that has been debated for many years but that now seems likely to come to fruition (see chapter 12).


GIL MULL

Prudhoe Bay State No. 1 well, gas flare, March 1968

Offshore northern Alaska

With many of the geological characteristics of the prolific central North Slope, the Beaufort and Chukchi seas offer tantalizing possibilities for oil and gas exploration.

In the Beaufort Sea the 200 million barrel Northstar oil field began production in 2001. Three other fields, Liberty, Sivulliq (formerly Hammerhead), and Kuvlum, may each contain more than 100 million barrels of recoverable oil reserves.

The U.S. Minerals Management Service has identified 14 possible oil and gas plays in the Beaufort Sea. MMS estimates technically recoverable oil in the range from 0.41 billion to 23.24 billion barrels, with a mean estimate of 8.22 billion barrels. Technically recoverable gas estimates range from 0.65 tcf to 72.18 tcf, with a mean of 27.65 tcf.

The economics of developing these resources depends heavily on distances from onshore infrastructure. MMS thinks that just 0.47 billion barrels of oil and 0.59 tcf of gas could be recovered economically from the Beaufort offshore continental shelf at an oil price of $30 per barrel and a gas price of $4.54 per mcf. With an oil price of $80 per barrel and a gas price of $12.10 per mcf economically recoverable oil and natural gas increase to 6.92 billion barrels and 19.97 tcf. If exploration were to prove particularly successful, economically recoverable oil could be as high as 1.79 billion barrels at $30 per barrel and 21.17 billion barrels at $80 per barrel; the corresponding high-end figures for natural gas are 2.39 tcf and 59.38 tcf.

MMS estimates oil accumulations under the Beaufort Sea with mean volumes ranging from 0.7 million to 1.021 billion barrels of oil. There is a possibility of an accumulation as large as 3.831 billion barrels of oil. The corresponding figures for gas accumulations are 0.8 tcf to 6.9 tcf, with the possibility of a 22 tcf accumulation (note that these accumulation estimates come from an earlier resource assessment than do the total resource estimates).

With huge geologic structures and an abundance of potential source and reservoir rocks, the continental shelf under the Chukchi Sea offers great promise as a major oil and gas area. However, the daunting challenges of operating in this remote region have deterred extensive exploration. Only five exploration wells have been drilled in the area — one of these wells found a substantial gas reservoir in the Burger structure.

MMS estimates that there are somewhere between 2.32 billion and 40.08 billion barrels of technically recoverable oil under the Chukchi, with a mean estimate of 15.38 billion barrels. The corresponding figures for technically recoverable gas are 10.32 tcf to 209.53 tcf, with a mean of 76.77 tcf.

Economically recoverable oil ranges from 0 barrels at $30 per barrel to 12 billion barrels at $80 per barrel. But, given the issues of sea ice cover and huge distances from the existing oil and gas infrastructure, oil prices would need to be fairly high to justify development in the region. Note, however, that because there is known gas

under the Chukchi Sea the construction of a gas export pipeline from the North Slope would impact the economics of oil and gas development in the Chukchi. The MMS estimate for economically recoverable natural gas at $4.54 per mcf is 0 tcf. At $12.10 per mcf the estimate ranges from 6.01 tcf to 153.70 tcf, with a mean of 54.44 tcf.

Viable development in the Chukchi would require the discovery of large volumes of hydrocarbons within an area that could operate through an initial production infrastructure. Such a discovery would likely require major exploration expenditures.

MMS estimates for individual oil accumulations under the Chukchi range from less than 1 million barrels to more than 1 billion barrels of oil. There is a possibility of an accumulation with as much as 3.6 billion barrels of oil.

So, although there is a definite possibility of finding a giant oil field under the Chukchi Sea, the more likely scenario for viable development consists of several large accumulations that can share production and transportation facilities.

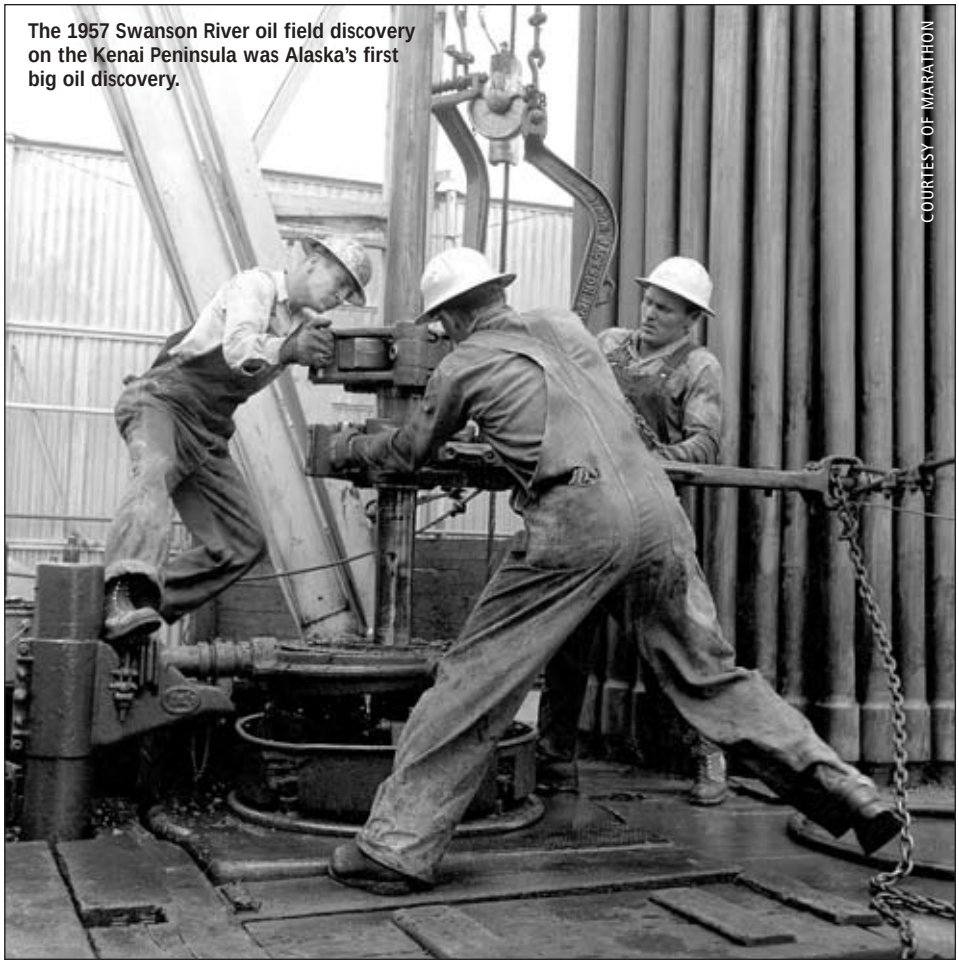
MMS views the Hope Basin to the south of the Chukchi Sea as primarily a gas province. Gas from this area could support mining operations and other local industrial activities. The mean expectation for technically recoverable gas is 3.77 tcf, but there could be as much as 14.98 tcf.

MMS expects no economically recoverable gas at a price of $4.54 per mcf and 1.53 tcf at $12.10 per mcf. The MMS economic analysis assumes local industrial uses for the gas — for example as fuel for the Red Dog Mine or for liquefied natural gas production and export. Local use would compete in price with other available fuels such as diesel and the potential development of shale gas deposits near Red Dog.

Southern Alaska

In southern Alaska, several major oil and gas basins extend around the Alaska Peninsula, the body of water named Cook Inlet and the Gulf of Alaska. The oil and gas fields of the upper Cook Inlet and Kenai Peninsula, part of the Cook Inlet Basin, have yielded more than 1.3 billion barrels of oil and 9 tcf of gas since the late 1950s.

The USGS 1995 assessment estimated undiscovered, technically recoverable oil resources of 0.19 billion to 0.97 billion barrels for the whole of southern Alaska. USGS also estimated 0.68 tcf to 2.14 tcf of natural gas. As in northern Alaska, these estimates now seem very conservative — a 2004 U.S. Department of Energy report on Southcentral Alaska natural gas stated that there might be as much as 10 tcf to 14 tcf of undiscovered, conventionally recoverable natural gas in the Cook Inlet Basin, and perhaps about 7 tcf of coalbed methane in the area of the basin.


COURTESY OF MARATHON

The 1957 Swanson River oil field discovery on the Kenai Peninsula was Alaska's first big oil discovery.

Substantial sections of the oil and gas basins of southern Alaska lie within U.S. federal offshore territory and did not come within the USGS assessment. Some of the Cook Inlet Basin, for example, lies under the federal waters of the lower Cook Inlet and Shelikof Strait. MMS estimates 0.06 billion to 2.85 billion barrels of technically recoverable oil under the lower Cook Inlet, with a mean of 1.01 billion barrels.

At an oil price of $30 per barrel MMS expects 0.51 billion barrels to be economically recoverable from this area, although as much as 1.78 billion barrels might be recoverable at a profit. The corresponding estimates for natural gas at $4.54 per mcf are a mean 0.64 tcf and an upper range at 2.25 tcf. At $80 per barrel for oil and $12.10 per mcf for gas the mean estimates go to 0.97 billion barrels of oil and 1.16 tcf of natural gas. Mean values for volumes of individual oil accumulations lie in a range from 6 million barrels to 166.5 million barrels, with the possibility of an individual 447 million barrel accumulation.

The existing oil and gas fields in the Cook Inlet Basin are mainly from discoveries made in the 1950s and 1960s, before the oil industry's attention switched to the North Slope with the giant Prudhoe Bay discovery. There is plenty of opportunity for new exploration for both oil and gas in the inlet.

The Susitna Basin, a northern extension of the Cook Inlet Basin, remains largely unexplored.

The existing oil refining and export facilities on the Kenai Peninsula provide markets for oil from the Cook Inlet area.

The gas industry in Southcentral Alaska is going through major transition, with gas prices increasing steadily and the future possibility of a pipeline link to a North Slope gas line. There is a ready market for natural gas as a fuel in the highly populated Alaska Rail Belt, although gas utilities tend to establish long-term supply contracts with Cook Inlet producers — there's no real spot market.

And although LNG and fertilizer plants on the Kenai Peninsula provide industrial

markets for gas, major question marks remain over the future of both of these plants because of gas supply and pricing issues.

The huge Bristol Bay Basin shares many of the geological features of the Cook Inlet Basin but remains substantially unexplored — all but one of the 26 wells in the area have been drilled onshore at the edge of the basin, and most were drilled without the benefit of modern drilling equipment and techniques from 1903 to 1985.

The Bristol Bay coast or the Aleutian Peninsula could site facilities for the export of oil or LNG.

MMS has estimated up to 2.50 billion barrels of technically recoverable oil, with a mean of 0.75 billion barrels in the federal offshore components of the Bristol Bay Basin. MMS estimated up to 23.28 tcf of natural gas, with a mean of 8.62 tcf.

MMS' assessment also contains estimates for the offshore areas of the Gulf of Alaska Shelf. MMS estimates 0 to 2.04 billion barrels of technically recoverable oil, with a mean of 0.630 billion barrels. Estimates for natural gas range from zero to 16.00 tcf, with a mean of 4.65 tcf.

The relatively small Copper River Basin, north of Valdez, contains similar geology to the Cook Inlet Basin and so offers some oil and gas potential. Sporadic and limited exploration since 1957 has so far failed to find economic quantities of oil or gas. The basin straddles part of the Alaska road system, but bringing gas to market would require the construction of a fairly long pipeline.

The Interior basins and Norton Sound

There are several sedimentary basins within Interior Alaska: the Holitna and Minchumina basins northwest of the Alaska Range; the Nenana Basin near Fairbanks; the Yukon Flats Basin, northeast of Fairbanks; and the Kandik Basin on the Canadian border.

With the exception of the Kandik Basin, all of these basins share broadly similar geological characteristics and they probably contain natural gas, either as conventional gas or as coalbed methane. The lower sections of the Yukon Flats Basin may be more oil prone. The thermal maturity of the Kandik Basin area would support both oil and gas generation, but this basin is structurally complex and may have limited potential.

For central Alaska, the USGS 1995 assessment estimates up to 0.06 billion barrels of technically recoverable oil, with a mean of 0.32 billion barrels. The assessment estimates 0.51 tcf to 7.31 tcf of conventional natural gas, with a mean of 2.76 tcf. However, a 2004 USGS assessment estimated up to 600 million barrels of oil and up to almost 15 tcf of gas in just the Yukon Flats Basin. Mean values for the Yukon Flats Basin in this assessment were 173 million barrels of oil and 5.5 tcf of gas.

Although the existence of coal beds in some of the basins points to the possible presence of coalbed methane, no published resource estimates exist for this type of gas in Interior Alaska.

Given the modest scale and isolated locations of the Interior basins, local usage may prove to be the only market for gas from these basins. With very low population densities, viable development of the gas probably requires industrial applications, especially mining.

However, the somewhat higher population density in the Fairbanks area might support some gas development from the Nenana Basin. An industrial consortium is currently exploring for gas in that basin, and the main Southcentral gas utility has proposed a gas line between Anchorage, the Nenana basin and Fairbanks — a line that could connect north to a future North Slope gas line.

The Yukon Flats Basin also sits close to the proposed North Slope gas pipeline route.

The Norton Sound Basin, offshore south of Nome, exhibits many of the geological characteristics of the Interior basins and is also viewed as gas prone. MMS has estimated that there may be up to 0.24 billion barrels of technically recoverable oil in this basin, with a mean quantity of 0.06 billion barrels. There may be up to 13.27 tcf of recoverable natural gas in the basin, with a mean quantity of 3.06 tcf. MMS thinks that gas pool sizes could range from about 7 billion cubic feet to approximately 1.6 tcf, with a mean size of around 12 bcf.

MMS views local usage centered on Nome as the most likely market for gas from this basin and places economically recoverable resources at a gas price of $12.10 in the range zero to 9.62 tcf, with a mean of 1.97 tcf. With a population of only around 9,000 on the entire Seward Peninsula, economic development of the gas would probably require local industrial applications.

Bering Sea Shelf Tertiary basins

The Navarin Basin, St. George Basin and St. Matthew-Hall Basin on the Bering Sea outer continental shelf contain substantial thicknesses of Tertiary sediments and are all thought to be gas prone. However, the development and marketing of gas from the very remote and harsh offshore locations of these basins would present some

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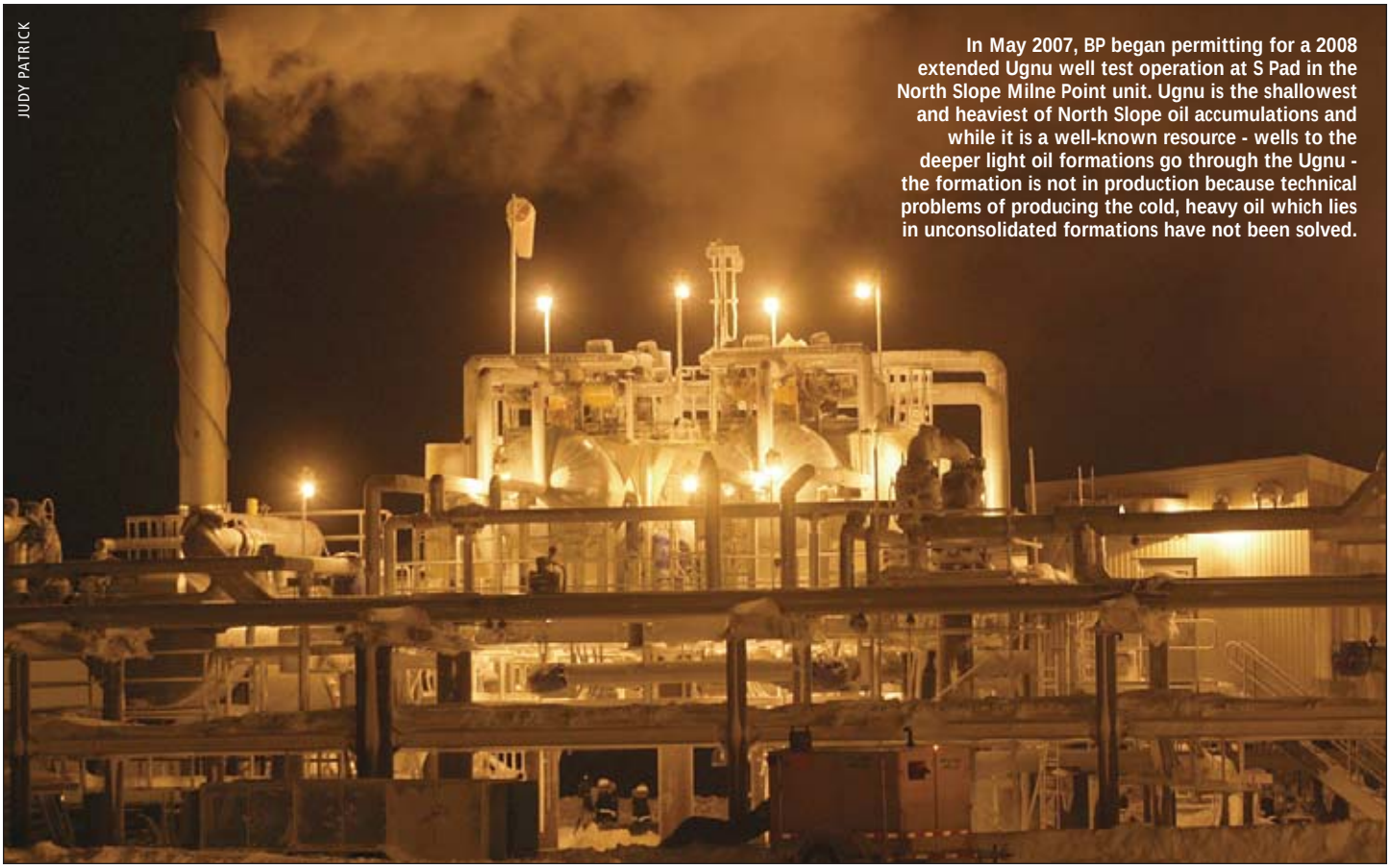


JUDY PATRICK

In May 2007, BP began permitting for a 2008 extended Ugnu well test operation at S Pad in the North Slope Milne Point unit. Ugnu is the shallowest and heaviest of North Slope oil accumulations and while it is a well-known resource - wells to the deeper light oil formations go through the Ugnu - the formation is not in production because technical problems of producing the cold, heavy oil which lies in unconsolidated formations have not been solved.

formidable challenges.

Heavy oil

Several shallow formations in the central North Slope above the Kuparuk River, Milne Point and Prudhoe Bay contain heavy oil. The total heavy oil in these formations amounts to about 23 billion barrels of proven reserves, a volume equivalent to the original oil in place in the Prudhoe Bay field. It is unclear how much heavy oil exists on the North Slope, other than in these proven resources.

Extracting heavy oil through permafrost in a region that's subject to severe Arctic winters is enormously challenging. But recent advances in technology, especially horizontal directional drilling, have rendered the production of some of the oil economic. Further technological advances ought to enable the development of more of this huge resource.

Gas hydrates

In addition to conventional natural gas and coal-bed methane, Alaska holds huge volumes of gas trapped in gas hydrates. Gas hydrates exist in large quantities under the permafrost of northern Alaska. There are gas hydrate plays under the Beaufort and Chukchi seas. Seismic evidence also points to the existence of gas hydrates under the Bering Sea and below the deep water south of the Gulf of Alaska continental shelf.

A 2001 report by Kirk Sherwood and James Craig of MMS suggested that there might be as much as 169,000 tcf of gas tied up in gas hydrates Alaskawide. And USGS has estimated that there may be 590 tcf of gas in gas hydrates beneath northern Alaska.

With the gas hydrates on the North Slope sitting under an existing oil and gas infrastructure, there is a strong possibility of extracting gas from the hydrates at sometime in the future. However, production depends on developing technologies for tapping gas from the hydrates and on the construction of a gas line for bringing the gas to market. An industry, university and government agency team is currently engaged in a multiyear investigation into the development of gas hydrate resources in the central North Slope.

What of the future?

So what are the prospects for future oil and gas exploration and development in Alaska? The oil and gas basins in this overview share a couple of characteristics:

1. The basins remain largely underexplored. Total exploration drilling in Alaska's vast area amounts to several hundred wells, compared with perhaps tens of thousands of wells elsewhere in the United States. Every basin in Alaska shows at least some potential for exploration and development.

2. There are several areas in and around Alaska that probably contain undiscovered, large oil and gas fields. The deep Gulf of Mexico may be the only other area in the United States with available acreage that still contains undiscovered fields of comparable size.

Even just in areas near existing oil and gas infrastructures on the North Slope and Cook Inlet substantial opportunities for new discoveries remain.

Of course, Alaska's remoteness and climate bring challenges when it comes to the exploration and development of oil and gas. But the history of the oil and gas industry in the state over the past half-century has demonstrated that ingenuity and perseverance can defeat the challenges.

With escalating fuel costs worldwide, maybe it's time to overcome the fear factor and look again at Alaska's potential. ■

The big birds fly safely year after year

Air Logistics maintains a stellar record of performance in Alaska

Air Logistics keeps its fleet busy providing its customer base with safe and cost efficient helicopter transportation services throughout the State of Alaska. Air Log's core contracts focus primarily in the Oil & Gas sector and include support to pipeline operations, offshore and onshore exploration & drilling, seismic work, environmental and permitting activities, and oil spill emergency response.

JUDY PATRICK PHOTO

Force of fleet

Established in 1977, Air Logistics of Alaska is a wholly-owned subsidiary of Bristow Group, (headquartered in Houston / NYSE: BRS) one of the world's leading providers of helicopter transportation services to the oil and gas industry. Given its background as the first civil helicopter company to work in support of the oil and gas industry, Bristow Group takes great pride in the fact that it now offers world class aviation services to customers in all of the world's major offshore and onshore oil and gas producing regions. In Alaska, Air Log's operations are headquartered in Fairbanks. Additional offices are located in Deadhorse, Valdez, and in Anchorage.

For the Fiscal Year ended March 31, 2006, and by way of operating over 400 aircraft in 21 countries, Bristow Group reported over 275,000 flight hours and operating revenues of $770,000,000.

Building business through performance

For more than 25 years, Air Log has provided contract helicopter service to Alyeska Pipeline Service Company (Trans Alaska Pipeline) to include surveillance, operations & maintenance, and oil spill contingency response. Each and every day Air Log operates multiple aircraft in support of the TAPS mission. Notably, during the last 15-year period Air Log has flown over 70,000 contract flight hours in support of TAPS with no aircraft accidents or incidents.

Air Log's overall success and expertise in Alaska has also attracted the attention of numerous Oil & Gas operators. In example, over the past several years Air Logistics has provided North Slope helicopter support to Anadarko, BPXA, Chevron, ConocoPhillips, EnCana, ENI, ExxonMobil, FEX, PetroCanada, Pioneer Natural Resources, TOTAL E&P, and Shell E&P.

Air Logistics
A Bristow Company

An enviable record of success

A string of aviation and industrial safety awards says that this company is doing something right. Air Log Alaska's five year accident rate (per 100,000 flight hours) compares very favorably (70% less) than the current five year helicopter industry average. In March 2001 OSHA awarded Air Log VPP Program status at the highest attainable level — the Star Level — making Air Log the first aviation company in the United States to achieve that standing.

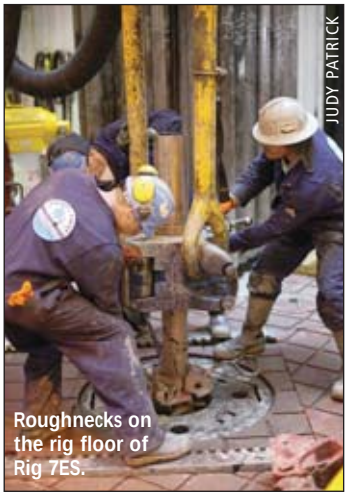
Looking forward

Air Logistics views itself as a highly responsive client service driven business and remains committed to maintaining industry leading standards while at the same time growing internal capacity in order to meet expected incremental demand in the Alaska market. Air Log looks forward to continuing to play a key role in the successful development of Oil & Gas operations in Alaska, through consistently providing real and measurable value to its customer's day to day field operations. ■

Nabors Alaska Drilling: A leader in the Last Frontier since 1963

Nabors Alaska Drilling has been the leading oil drilling contractor in Alaska since 1963. The company was the first to design and build highly mobile arctic rigs for the North Slope. Nabors Alaska is a division of Nabors Industries LTD, the largest land-based drilling contractor in the world. With over 600 land rigs, 950 workover and well service rigs, and 45 offshore platform rigs. Nabors operates in all of the major oil & gas regions around the globe.

Advancement, ingenuity, innovation, improvement. These are words that are not typically associated with an industry that can at times be reluctant to change, but Clyde Treybig, quality manager at Nabors Alaska, frequently uses the term "continual improvement" when talking about operations.


JUDY PATRICK

Roughnecks on the rig floor of Rig 7ES.

"We're not drilling wells the way we did five years ago," he says.

"And five years from now, we'll be drilling wells differently from the way we do today. We are the leader in the pursuit of safer, cleaner, more productive drilling operations," Treybig says.

As evidence, Treybig points to Nabors development of rig moving systems for specific applications which have greatly reduced the time and costs associated with rig moves. "Not only have we improved the efficiency of the moving systems, but we have enhanced safety by adding capacity, controls, and monitoring devices to the rig." Nabors is also leading the industry in terms of training and compentency of it's workforce. Nabors is big on systems, procedures, and audits to ensure personnel safety, equipment reliability, and the integrity of their operations.

"It's all a part of the whole," says Treybig. "Safety is directly tied to efficiency which is directly tied to productivity,"

he says. Trying to prioritize customer satisfaction and employee safety is academic, he says. "One cannot exist without the other."

Visit the company online
www.nabors.com

Safety for people is the top priority, but safety for the environment is not far behind in Nabors philosophy. The rigs themselves are always being modified to improve on environmental performance.

"We put a lot of money into our rigs to improve the environmental aspect of the drilling," says Randy Bovy, Nabors camp manager, "We have one main goal," he says, "No spills." After that is waste management. "In our business, we're always going to have some waste," he says, "but we want to eliminate it or manage it in the best possible manner and in accordance to all regulatory requirements"

Dave Hebert, Nabors Alaska General Manager, points out that offering a wide range of services is the result of operating a wide range of equipment. "We have something that the other guys really don't — we have the kind of variety of equipment and experience that allows us to run anything from workover rigs to exploration rigs. It used to be, 'a rig is a rig is a rig' — you tell us where to be and we'll drill a hole for you. But that's not the way it is anymore," says Hebert.


Nabors Rig 33E drilling at BP's Northstar Island

JUDY PATRICK

"Now we're looking at better equipment, better technology, better systems and, most importantly, more professional rig hands. We're looking at ways to do things safer, cleaner, and more efficient. We offer a broad range of subsidiary products & services including equipment systems, drilling IT, engineering, transportation, construction, well logging, and others."

Today, says Hebert, Nabors delivers the right rig, along with the appropriate integrated services and technology to drill better, more efficient, lower cost wells. Currently we are looking at the next generation of arctic drilling rigs. Rigs that will be more mobile, more versatile, with enhanced safety and environmental protections. We are constantly looking for ways to provide added value to our customers. We have a legacy of providing innovative service in Alaska and we aim to continue that" says Hebert. ■

Innovation saves NSTI customers time, money

Telecommunications engineering, construction services for remote oil, mining projects

North Slope Telecom was founded in 1980 by William 'Bill' Laxson, who recognized the need for a telecommunications company in Alaska that specialized in supporting remote oil exploration drilling projects.

The company's first office was Bill's garage at his East Anchorage home. Today, NSTI has 53 employees and is headquartered at 2020 East Dowling in Anchorage.

Although NSTI's main client base comes from the petroleum industry, the firm has recently taken on mining and government clients.

At the request of several customers, NSTI is offering its services outside Alaska, in the United States and internationally. But, NSTI is sticking to what it knows—telecommunications engineering and construction services for remote projects. The company is a complete "one stop shop" and plans to remain one.

NSTI's leadership team

Bill Laxson remains NSTI's sole proprietor, president and primary engineer.

His management executives are Dave Smith and Sharon Kazem.

Dave is vice president and manager of operations. His primary responsibilities are coordination of the company's work efforts in the field and Anchorage, marketing, and customer development.

Sharon is administration and finance manager, which includes human resources and IT support.

Latest and best equipment

In addition to a hard working, dedicated staff, NSTI has the latest in electronics test equipment, communications tower safety equipment, and an onsite electronics laboratory for systems design, configuration and testing.

The company's radio repair shop can handle most models from major manufacturers.

Custom designs require NSTI to have a complete fabrication shop for metals, plastics and other common materials. The company continues to expand its custom fabrication and equipment repair capabilities.


Helicopter taking off from a mountaintop radio site.

It is also in the process of purchasing new radio, fiber optic and communications circuit testing equipment.

NSTI's strength, competitive edge

According to Bill Laxson, NSTI's "primary strength" is its "well-rounded" technical staff.

"For instance, most companies have one guy that does only telephones, another that does only radio and still another that does only cable or tower work. We have a training program that uses both in-house and formal training to expand our technicians' capabilities. This allows us to shift an onsite technician 'on the fly' to perform just-in-time work for our customers, maximizing the customer's dollar and our flexibility," Bill said.


Installing a microwave radio antenna at Alpine

NSTI's procurement and shipping departments," he said, "can get almost anything to almost any place in Alaska or the world with little notice."

Welcomes newcomers, independents

Although NSTI's customers include Alaska's long-time oil producers, it welcomes newcomers, such as NSTI customer Pioneer Natural Resources. It is the first independent to develop and produce an oil field on Alaska's North Slope. The field, Oooguruk is scheduled to go online in late 2008.

When asked to name NSTI's most challenging job, Bill said, "construction of ConocoPhillips roadless Alpine field on the western North Slope."

"It was the first project of this size and complexity that NSTI had attempted since its support of the Exxon Valdez oil spill cleanup effort," Bill said. "To compound the situation an oil field this large had not been built in the state since the Kuparuk field in the 1980s. There were very few people with an institutional memory of that project available for hire."

At the time NSTI had only 15 or 16 employees and the amount of work required was "incredible," he said. "We made up for limited qualified technical manpower by hiring the best we could find and using them to train highly intelligent and highly motivated people."

"We also used an innovative approach of pre-building and configuring systems into packages in our Anchorage shops and shipping them to crews on the project for final assembly and testing. This ability to maximize the use of our technical staff and adjust to very fluid situations gave us the edge we needed to complete the project on time," Bill said.

Given the challenging environment in which NSTI works, it has "an excellent safety record," Bill said. "Our last lost time accident was six years and 400,000 hours ago. We credit this to having a high awareness of the need to work both smart and safe."

For more information visit NSTI's website at www.nstiak.com. ■

Vital support services

Doyon Universal Services' human support, security services underpin business operations

Doyon Universal Services started in Alaska in 1946 under the name of Universal Services. Originally founded to support the burgeoning military presence in Alaska after World War II, the company grew to become an international provider of human support services for a variety of industries. With its international expansion and following the sale of the company to a new owner, the company headquarters moved to Seattle in the late 1980's.

In 1992 Universal Services formed a joint venture with Doyon Ltd., one of the 13 Alaska regional Native corporations, to provide services in Alaska. On Sept. 1 of this year, the joint venture company became Doyon Universal Services, LLC. Previously DUS was limited geographically to the state of Alaska by the joint venture agreement. Under the new LLC agreement, that geographic restriction has been removed.

The company employs some 700 people, providing catering, security and maintenance support services to industries that include oil and gas, construction and mining. Many of the company's employees are Alaska Natives.

Food for remote sites

Supporting work sites that lie off the road system and perhaps hundreds of miles from the nearest store, has remained a core business for the company over the years.

And food is probably the most obvious morale booster in these remote places - Doyon Universal Services serves about 6,000 meals each day in Alaska. The company takes pride in the variety of meals that it prepares and its ability to serve almost any dish at any location. With people becoming increasingly health conscious, menus accommodate a variety of dietary needs and requests. The company employs a full-time nutritionist who works with the chefs to develop menus and deal with dietary issues. Menus now include entrees that support the Atkins and South Beach diets and the company promotes a heart healthy program.

Doyon Universal Services has become a top-tier provider of professional security services.

Visit the company online
www.doyonuniversal.com

Logistics

In the almost 60 years that DUS has been operating in Alaska they have become experts in how to bring sensitive product…to remote environments. This is a huge benefit to customers – companies who specialize in engineering, for example, don't have to deal with buying supplies or worry about how to move fresh meat to a site.

Doyon Universal Services carries out a wide range of maintenance and upkeep duties ranging from maintaining HVAC systems to keeping the plumbing working and making beds.

Doyon Universal Services takes pride in the variety of meals that it prepares and its ability to serve almost any dish at any location.

The company places strong emphasis on sanitation and trains staff appropriately. Simple actions like cleaning door handles when maintaining shared living areas help ensure a hygienic living environment. Recent problems with virus outbreaks on cruise ships have highlighted this problem.

In recognition of its safety and sanitation programs and results, Doyon Universal Services has received the Alaska Department of Environmental Conservation's Gold Star certificate for all of the company's work sites. The Gold Star certification recognizes the achievement of the highest standard of sanitation and food safety.

Security Services

Security has become a major service line for Doyon Universal Services, which specializes in the high caliber security required for critical infrastructure, including oil and gas facilities, power plants, water supplies and transportation infrastructure. For example the company provides protections for the trans-Alaska pipeline, the Valdez Marine terminal and the Port of Anchorage.

New Coast Guard and homeland security regulations for all forms of transportation have placed a plethora of new security requirements on port operators. Doyon Universal Services maintains a high level of expertise in the regulations and can help operators perform security assessments and formulate security plans.

The company can also provide professional fire fighting services and operates the fire brigade at the Valdez Marine Terminal.

Depth of expertise

Doyon Universal Services' expertise in protecting critical infrastructure depends on a cadre of highly experienced and well-trained security experts. The company's security director, for example, has 25 years of experience that includes service in law enforcement, the FBI and the military.

Each of the company's security officers comes with some level of medical qualifications, ranging from emergency trauma technician to full qualifications as a paramedic. These qualifications enable the officers to provide first response in a medical emergency.

Safety

In whatever services it provides, Doyon Universal Services makes safety a top priority. The company instills safety awareness in all of its employees through safety programs, safety meetings, safety audits and safety analysis. ■

Baker Hughes is continuing to invest in its global infrastructure, with new facilities planned in every region. A new multidivisional Super Center is under construction on the North Slope.

Baker Hughes advances exploration & production in Alaska

Baker Hughes is a top-tier oilfield services company, providing the worldwide oil and natural gas industry products and services for drilling, formation evaluation, completion, production and reservoir analysis. In Alaska, Baker Hughes has been active since the earliest days of exploration and production activity on the North Slope and Cook Inlet.

Baker Hughes provides extensive coiled tubing drilling, completion and production services in Alaska to improve recovery from existing fields.

Drilling and production to reservoir analysis

Baker Hughes divisions are organized into two segments – Drilling and Evaluation and Completion and Production. Our Drilling and Evaluation group includes four divisions:

Baker Atlas provides wireline-conveyed well logging, data analysis and perforating services for formation evaluation, production and reservoir management.

Baker Hughes Drilling Fluids provides fluids systems and services that help optimize the drilling and completion processes.

Hughes Christensen offers Tricone® and PDC drill bits, ream-while-drilling tools and drilling optimization services.

INTEQ offers directional drilling, measurement-while drilling (MWD), logging while-drilling (LWD) and wellsite information services.

Our Completion and Production group includes three divisions and a new business unit:

• Baker Oil Tools provides completion and intervention solutions that help manage cost and risk while optimizing production.

• Baker Petrolite provides chemical technology solutions for hydrocarbon production, transportation and processing, and also delivers pipeline integrity services.

• Centrilift provides artificial lift systems, including electric submersible pumps (ESP) and progressive cavity pump systems.

• ProductionQuest services are centered on the wellbore, including permanent monitoring, chemical automation, intelligent production systems and consulting.

Baker Hughes recently acquired two reservoir consulting firms — Gaffney, Cline & Associates (GCA) and GeoMechanics International (GMI) — strengthening the company's capabilities in reservoir engineering, technical and managerial advisory services and reservoir geomechanics.

Visit the company online
www.bakerhughes.com

Investing in the future

Baker Hughes is continuing to invest in its global infrastructure, with new facilities planned in every region. In Anchorage, a new multi divisional facility is under construction, and a new multidivisional Super Center is under construction on the North Slope. Both of these facilities are scheduled to open during 2008.

Health, safety & environmental compliance

Baker Hughes conducts business in a manner that does not harm people or the environment. We facilitate this commitment through a comprehensive Health, Safety and Environmental (HS&E) management system. Our Alaska operations have surpassed several HS&E milestones recently. For example, our INTEQ Alaska shop has not had a recordable incident since February 27, 2002.

Improving recovery in Alaska

Baker Hughes operations in Alaska have been in the forefront of applying advanced technologies to increase oil recovery from existing fields. Our INTEQ division is using its CoilTrak™ coiled tubing drilling system to drill laterals from existing wells for accessing bypassed reserves. Prototypes of our Microhole Drilling System were tested in Alaska with successful results in well path steering and high-rate real-time data transfer. Our Baker Oil Tools division achieved the first successful installation of a new rotating, self-aligning multilateral (RAM) system on Alaska's North Slope. The RAM system is the industry's first tool that can continuously rotate liners and screens into extended-reach lateral bores while simultaneously landing multilateral junctions. The RAM System enables operators to efficiently construct long, horizontal multilaterals to ensure maximum contact with trapped oil pools.

Want to know more?

Our website has detailed information on Baker Hughes capabilities and contact information. Please visit www.bakerhughes.com ■

Epoch: The leader in wellsite information services

Epoch Well Services is the fastest growing supplier of Drilling Instrumentation Systems, Digital Mudlogging Services and Web Based Live Well Site Data delivery in the world.

Epoch was founded in 1979 in Bakersfield, Calif. The corporate office is located in Houston, Texas, with field offices in Anchorage, Alaska, Bakersfield, Calif., New Iberia, La., Grand Junction, Colo., Rifle, Colo., Williston, N.D., Rock Springs, Wyo.; Oklahoma City, Hartshorne and Weatherford, Okla.; and Alice and Odessa, Texas.

Our RIGWATCH™ Drilling Instrumentation Systems are now used throughout North America, South America and the Middle East to aid the wellsite managers and rig crews in their efforts to drill safely and efficiently. Our wellsite reporting software packages, RIGREPORT™ and PERC™, are present on many of these same locations and have been adopted as the primary reporting tools by both drilling contractors and operators. With the implementation of these tools, downtime situations are averted and cost savings are maximized on each and every well.

Jim Carson, Alaska division manager

Epoch continues to be the leader in mudlogging services in California and Alaska, while maintaining a significant presence in the Gulf of Mexico, Gulf Coast and Rocky Mountains. Our DML (Digital Mudlog) Mudlogging Software is simply the best wellsite log-generating package available, creating clear and concise well logs. Our RIGWATCH Explorer™ Software is a powerful log analysis tool, developed for use on the office desktop. When these tools are used in tandem, operators can monitor the drilling progress of their wells and the geologic evaluation of these wells as never before.

Epoch's myWells.com is a web-based data delivery product that allows users to access all their well information from one convenient location. myWells.com can be utilized to access real time drilling data, reports, IADC sheets, petrophysical data, mudlog data and any other information the customer chooses. This array of information can be accessed anywhere an internet connection is available.

The company has had a continuous 19-year presence in Alaska with highly experienced, competent employees. Jim Carson is Alaska's division manager and has been with the company for 15 years, and assures that "These employees have a significant understanding of Alaska geology, local management well-versed in the logistical challenges and a top-down management dedicated to the growth of the Alaskan market."

The greatest opportunity for Epoch in Alaska would be the construction of the Alaska Gas Pipeline. More immediate opportunities exist for the company with the entrance of new operators into Alaska, and Epoch warmly welcomes all the new entrants into the exciting market. ■

Visit the company online
www.mywells.com