

# Dispelling the ALASKA FEAR FACTOR



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

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# Introduction

**T**hank 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.

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 over the next few years of my administration. The 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



"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



# Message from the publisher

The first biennial 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 the "Alaska fear factor," which had discouraged many oil companies from doing business in the state.

The first edition also provided what the second part of its title promised: "A guide to Alaska's oil and gas basins and business environment."

Because of the success of newcomers such as Armstrong Oil & Gas, Pioneer Natural Resources and Kerr-McGee, the second edition of the book, published in May 2007 (which you are reading), has much less information about the "Alaska fear factor."

Armstrong proved a tiny independent from "Outside" 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 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 Ooguruk prospect, discovered by the partners in 2003 and expected to come online in 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 where it discovered commercial quantities of oil.

Development was initially scheduled to match Ooguruk's, but a number of things interfered with that, 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



Nabors 14E drilling a successful exploration well in NPR-A during the 2006-07 drilling season for Talisman Energy's Alaska subsidiary, FEX.

Eni SpA. Armstrong President Bill Armstrong said his firm did not have deep enough pockets to be a good partner in developing the two discoveries.

Eni soon made a reportedly generous, and successful, offer to Anadarko for Nikaitchuq. In April 2007, Eni said it was targeting the end of 2007 for project sanctioning, with first oil to flow by the end of 2009.

Newcomers to the more remote National Petroleum Reserve-Alaska face the stuff the Alaska fear factor is made of — absence of infrastructure, short winter drilling season and high costs. Talisman subsidiary FEX L.P. is on its second winter drilling season as an operator in NPR-A.

The Calgary-based company has made a significant petroleum discovery in this far-flung part of the North Slope, and is talking in the hundreds of millions of barrels.

A tiny independent, BRPC Group, also discovered oil at one of its two North Slope exploration wells in the winter of 2006-07. The North Shore No. 1 encountered approximately 70 feet of oil-charged Ivishak sandstone formation north of the Prudhoe Bay oil field.

Which brings me to another subject: the rewards. The payoff in Alaska in terms of size of a discovery is large by any standard, especially anywhere else in Canada and the United States.

Nikaitchuq is thought to hold between 100 million and 200 million recoverable

barrels of oil; Ooguruk around 70 million barrels.

Enough said. The next step is to subscribe to Petroleum News and get a weekly news update and access to our extensive story archives.

Many thanks to all the individuals in government agencies and private companies who contributed to "Dispelling the Alaska Fear Factor: A guide to Alaska's oil and gas basins and business environment."

Kay Cashman  
Petroleum News publisher  
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# CHAPTER 1

*Alaska's oil and gas potential*

# 1





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

**T**he 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 bil-

lion 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 reserves from existing fields and undiscovered resources.

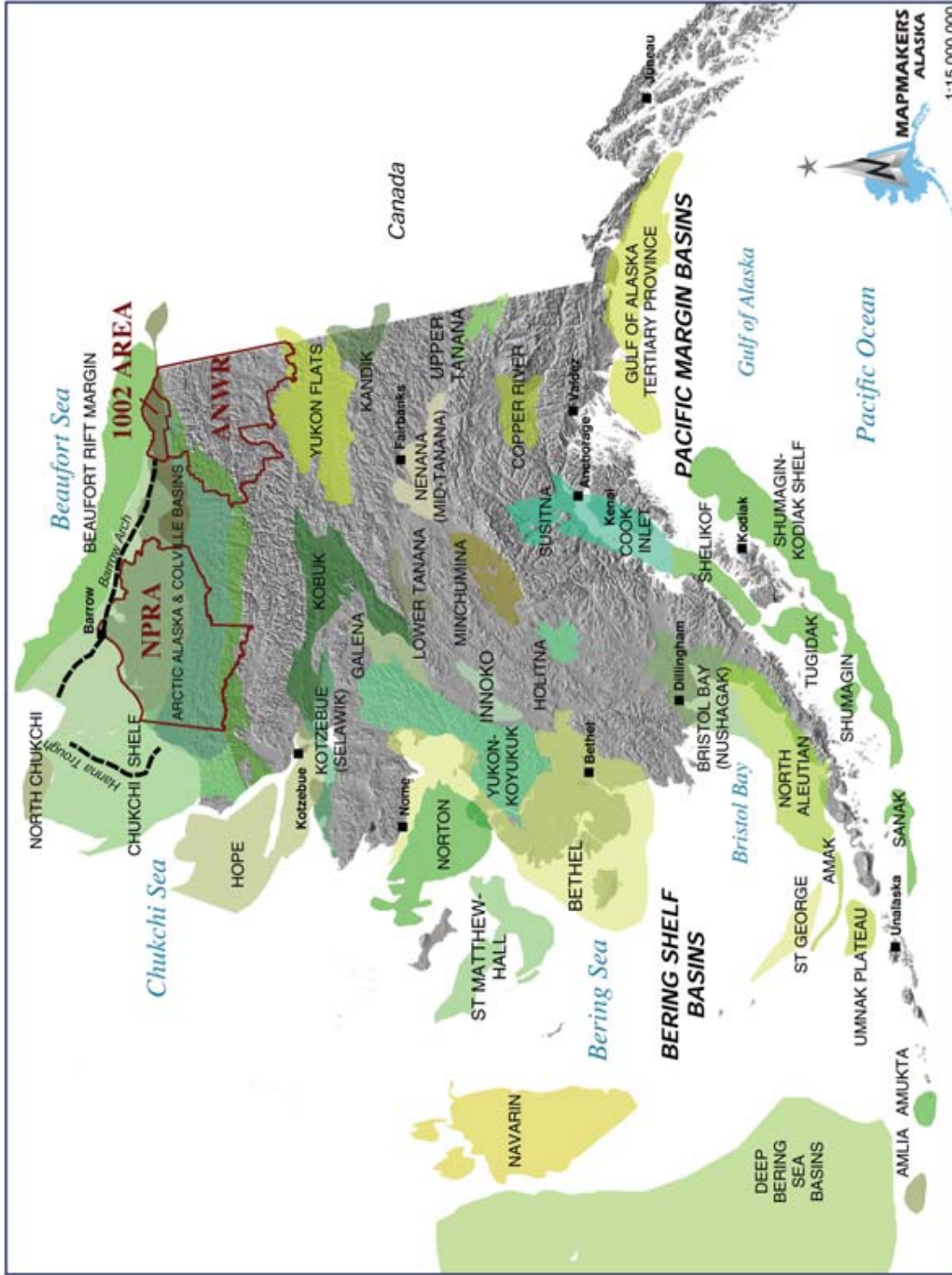
A 1998 U.S. Geological Survey assessment of the 1002 area of the Arctic National Wildlife Refuge at the east end of the North Slope gave estimates of 5.7 billion to 15.9 billion barrels of technically recoverable oil, with a mean estimate of 10.4 billion barrels.

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 ArcInfo 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 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



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

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).

### 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 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 bil-

lion 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 the total resource estimates came from).

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.

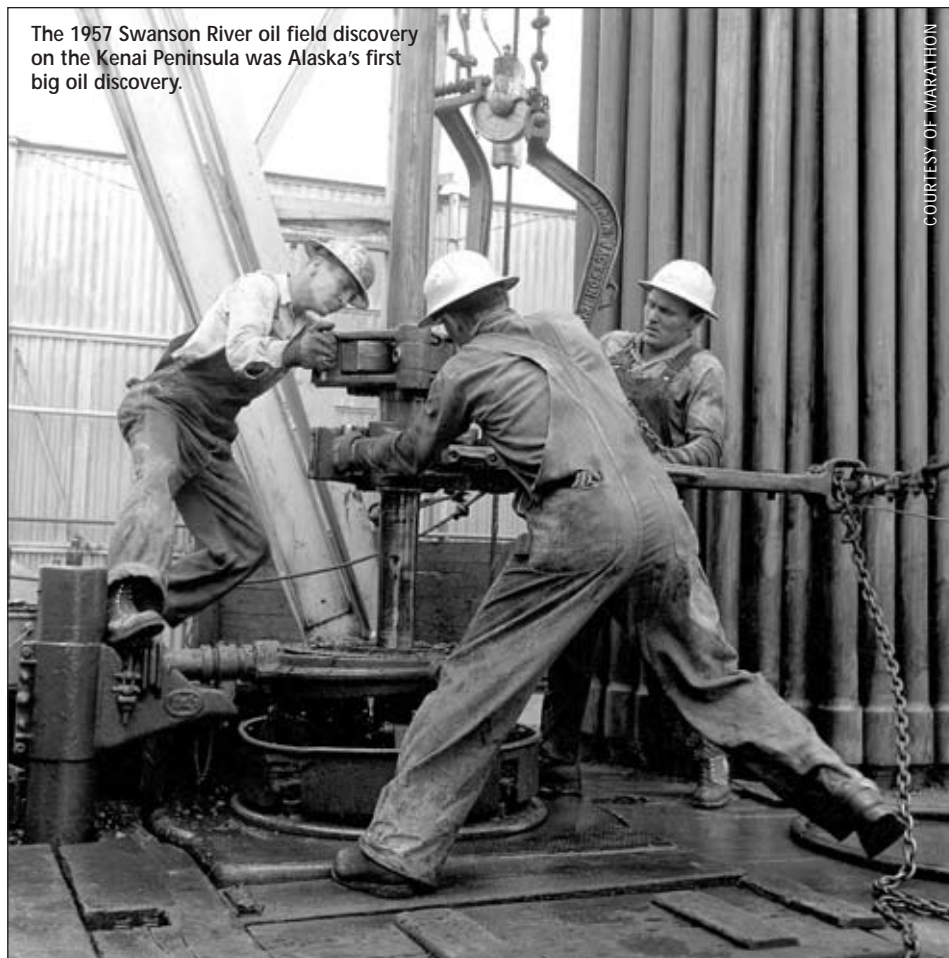
MMS expects no economically recoverable gas at a price of \$4.54 per mcf and 1.53 tcf at \$12.10 per mcf. The MMS economic analysis assumes local industrial uses for the gas — for example as fuel for the Red Dog Mine or for liquefied natural gas production and export. Local use would compete in price 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

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



COURTESY OF MARATHON

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.

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's 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 0 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 assess-

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ment 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.

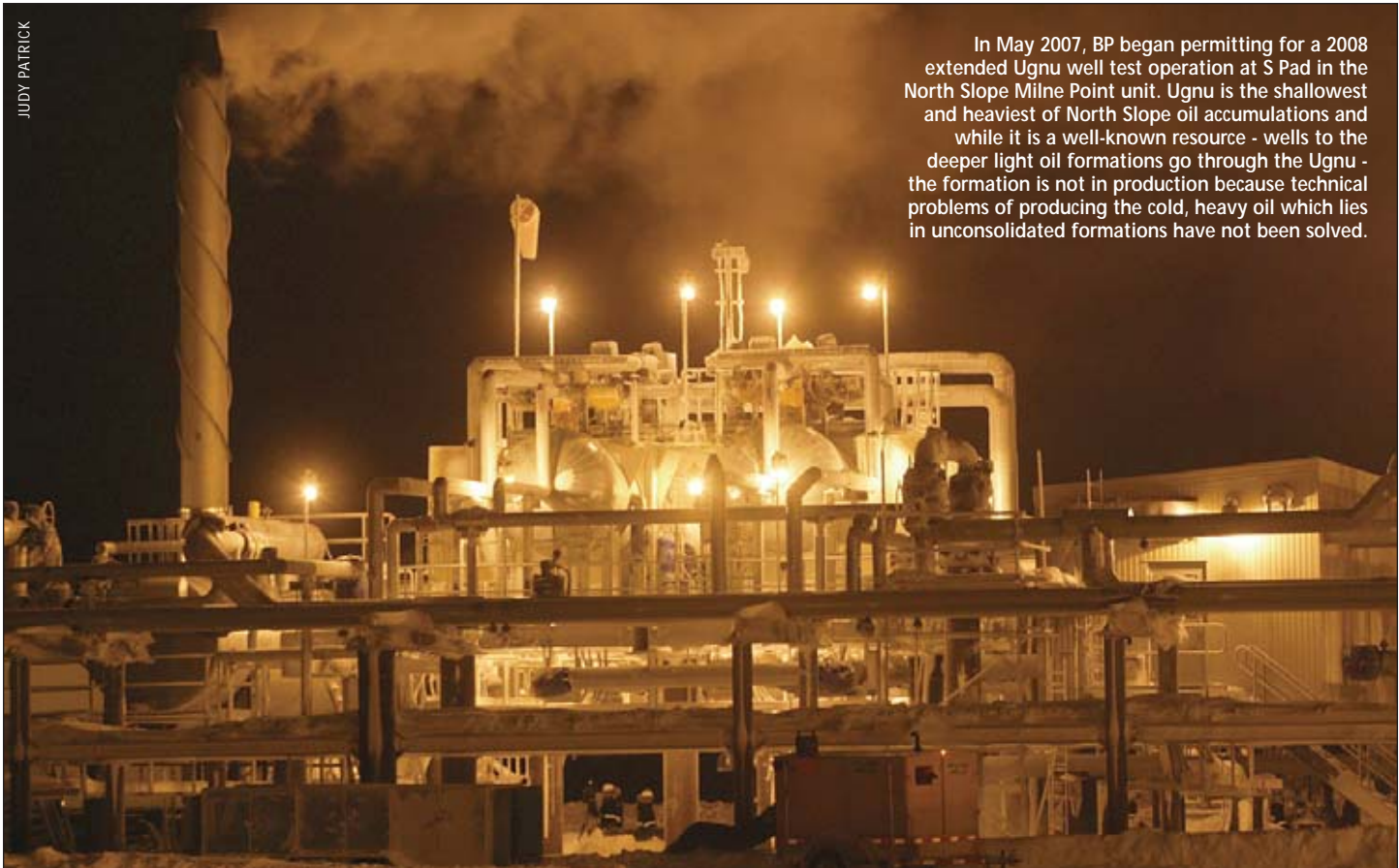
The Norton Sound Basin, offshore south of Nome, exhibits many of the geological characteristics of the Interior basins and is also viewed as gas prone. MMS has estimated that there may be up to 0.24 billion barrels of technically recoverable oil in this basin, with a mean quantity of 0.06 billion barrels. 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 0 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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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 multi-year 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 characteris-

tics:

1. The basins remain largely under-explored. 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*

**A**ir 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.

## 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



JUDY PATRICK PHOTO

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.

## 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



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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. ■



**Air Logistics**

A Bristow Company

# Vital support services

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

**D**oyon 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



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



heart healthy program.

## 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.

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. ■



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



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

**N**abors 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.

“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 competency of its 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.”

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



Roughnecks on the rig floor of Rig 7ES.

JUDY PATRICK



Nabors Rig 33E drilling at BP's Northstar Island

JUDY PATRICK

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.

“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. ■



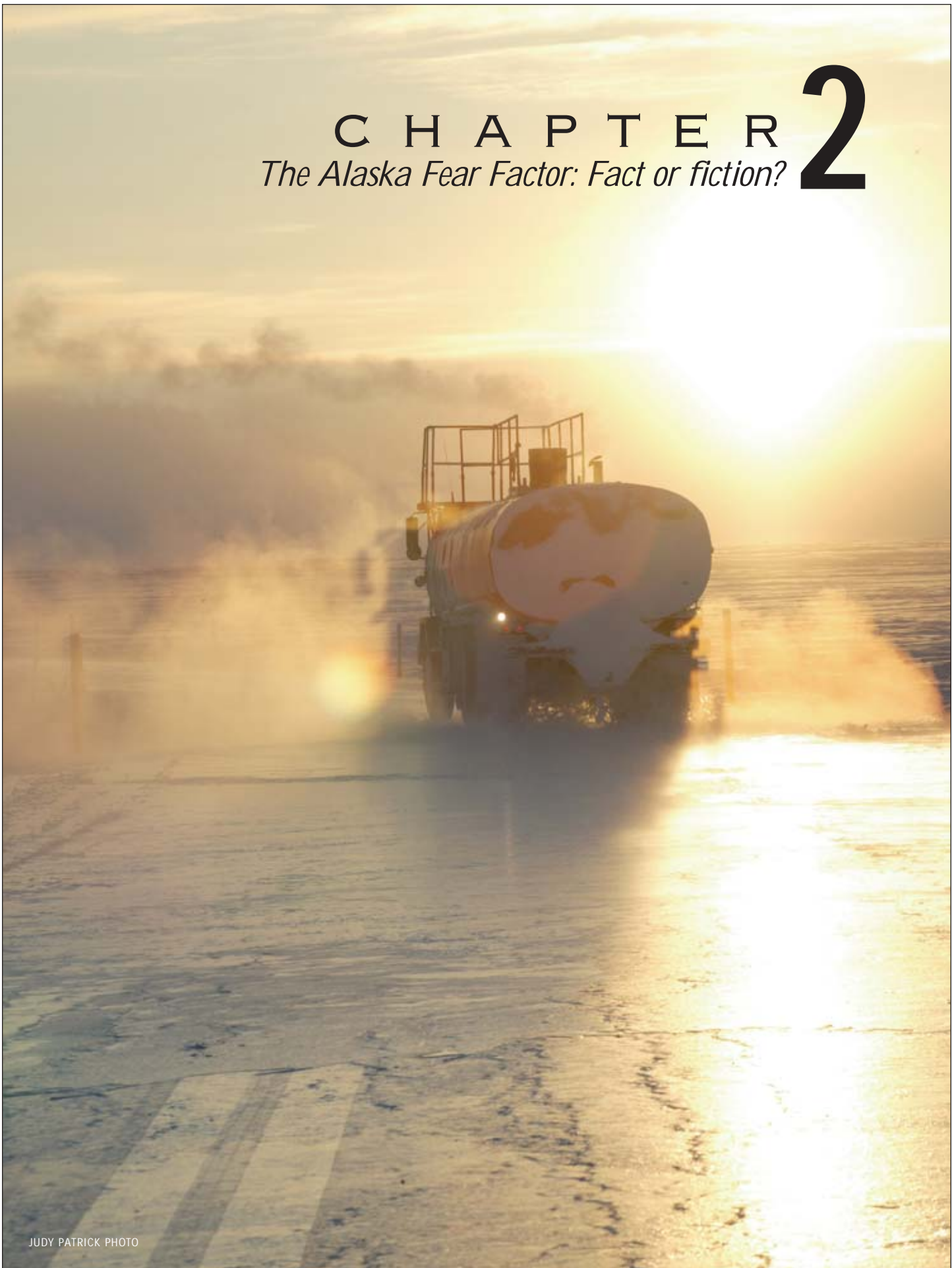
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# CHAPTER 2

*The Alaska Fear Factor: Fact or fiction?*



## CHAPTER 2

# The Alaska Fear Factor: Fact or fiction?

**P**etroleum News asked Bill Van Dyke to identify and talk about the most common “fear factors” faced by oil and gas companies looking at investing in Alaska. Van Dyke is a petroleum engineer who retired in April 2007 from 29 years with the State of Alaska’s Division of Oil and Gas where he served in a number of positions, including state petroleum manager and acting director of the division.

Before going to work for the State of Alaska, he worked as a petroleum engineer for Chevron Oil Co. and Gulf Oil Co. He’s currently an oil and gas consultant working in Alaska.

“The continuity and consistency Bill provided through different administrations had a stabilizing influence on many DNR decisions,” Kevin Tabler told Petroleum News following Van Dyke’s retirement. Tabler is manager of land and government affairs for Chevron in Alaska. He held the same position with Unocal before Chevron acquired it.

“Certainty and reliability are tremendously important to any business deciding to invest. Bill’s longevity and extensive knowledge of the inter-relational workings of DNR provided invaluable counsel to new administrations and the oil and gas industry. His personal and professional demeanor had a calming effect on many confrontational matters that fostered an atmosphere for resolution and compromise. Bill has played an important influential role in the history and development of the oil and gas industry in Alaska. His talents and skills will be difficult to replace,” Tabler said.

Stu Gustafson agreed with Tabler. Gustafson worked for ExxonMobil in Alaska for 19 years before leaving the state in 1996 and returning in 2001 as one of the driving forces behind Armstrong



Bill Van Dyke, former petroleum manager for the State of Alaska

Oil & Gas’ entry into Alaska. The small Denver independent was instrumental in bringing three new oil companies to Alaska in less than three years — Pioneer Natural Resources, Kerr-McGee and Eni. Although Armstrong has since sold out to the bigger companies it brought into Alaska, Gustafson continues to assist some of those firms through his consulting firm, Coordinators Management.

Van Dyke, he said, served as a “guiding light” for new companies entering Alaska. “For decades Bill was the calm, straightforward force that moved and centered the Division of Oil and Gas. He was the constant that kept it business not politics. He created cooperation instead of confrontation with his knowledge and style for every new administration and was the guiding light for all the new players,” Gustafson said.

Following is an April 2007 interview with Van Dyke conducted by Kay Cashman, Petroleum News publisher and executive editor.

*Q. What is a real Alaska “fear factor;” one that has some validity?*

A. One hurdle that is still in play is the **higher cost of doing business** on the North Slope, as compared to drilling wells in Canada or Texas or Kansas. ... The reality is that the costs are so much higher that to some extent it scares folks off. It’s the difference between raising money for a \$500,000 wildcat onshore in the Lower 48 as compared to a \$5 million well onshore on the North Slope. Potential explorers don’t always balance the higher cost against the potential higher rewards. The size of discoveries can be several orders of magnitude larger on the North Slope and in Cook Inlet, too, compared to the Lower 48.

*Q. How much does it cost to drill an exploration well close to infrastructure on the North Slope?*

A. This is a very rough estimate, but an **exploratory well** that is relatively close

to infrastructure — not too far from Prudhoe or Kuparuk — will run you somewhere in the range of \$5 to \$10 million. ... There are ways to reduce the per-well cost, for instance by using the same set of ice roads and the same rig to drill two or, if you’re lucky, three or four wells in a winter. ... Otherwise all the costs get booked against just one well. So it makes a difference if you have a couple prospects close to one another and can drill two or three wells in a season, but even then you’re still looking in the range of \$5 million per well.

*Q. How much does it cost to drill a remote well on the North Slope?*

A. **Remote wells** can get very expensive depending on how far away from infrastructure they are. They can run \$25 million to \$50 million for a single well that is very remote where you are building 40 to 50 miles of ice road, and you only get to drill one well because of the limited winter drilling season, which is often the case on these remote wells. But again, potentially the reward is a lot bigger.

*Q. Wildcatter and geologist Alfred James III thinks the North Slope “is all oil country. Rare is the hole that’s been drilled that doesn’t have a showing of oil.” Do you agree?*

A. A geologist would be a better person to ask about this, but I don’t think anyone will disagree that there was a tremendous amount of oil and gas generated on the North Slope, and not all at the same time. There are different age source rocks; some that generated more oil than gas, others that generated more gas than oil. ... And there are multiple source rocks in the North Slope petroleum systems. It is rare to drill a well on the North Slope and not find any shows of oil or gas, but in a rare instance it does happen. A lot of the wells drilled — you can look at most of them in public records — had at least oil and gas shows, and that

might be what Alfred James was talking about.

*EDITOR'S NOTE: Alfred "Fred" James was interviewed by Petroleum News in 2002. He thinks the North Slope holds a great deal of promise for small oil companies. James said the mega-majors must look to find mammoth reservoirs, holding billions of barrels of oil reserves, while smaller firms can deal profitably with pools that hold millions of barrels. "There are probably a whole lot of Alpines, Fiords and Tarns (left on the North Slope); together they may hold more oil than Prudhoe," James was quoted as saying in the article which can be found in Petroleum News archives at <http://www.petroleumnews.com/pnads/194940219.shtml>.*

*Q. Are there plugged and abandoned wells on the North Slope that had oil and/or gas shows but which were not tested?*

A. A number of the minor shows, whether they were oil or gas, were probably not tested certainly in the early days. Immediately after the discovery of Prudhoe Bay everybody was looking for the next Prudhoe Bay. So if there wasn't a nice, big, thick, clean sandstone, at least a hundred feet thick or so, charged with oil they just moved on. There also could have been thin laminated sands, viscous oil zones or a thicker sand with just a little bit of oil at the top of it. Those wells just weren't tested because people assumed back then they wouldn't be economic.

*Q. Is the uncertainty of affordable access to facilities on the North Slope (mainly owned by BP, ConocoPhillips and ExxonMobil) still a fear factor?*

A. A few years ago **facilities sharing** was a big concern for companies exploring close to existing infrastructure, say within 20 miles of existing facilities. Their concern was being able to use existing facilities (mainly owned by the three majors that dominate existing North Slope facilities — BP, ConocoPhillips and ExxonMobil) for a reasonable price if they found a few million barrels of oil that did not justify standalone production facilities. Over the last three or four years that's shown itself to be a lesser concern because you can get a win-win solution at the end of the day. For example, it looks like the folks at Pioneer (Natural

## Bob Britch: Ten steps to smooth, successful permitting

The Sept. 26, 2004, edition of Petroleum News featured Bob Britch's 10 steps to permitting oil and gas projects in Alaska. Britch, an Anchorage-based engineering and environmental consultant, has amassed more than 30 years of experience in dealing with environmental issues and has coordinated drilling permitting for several companies, including Kerr-McGee, Armstrong Alaska and Forest Oil. Britch's experience includes permitting wells offshore and onshore throughout Alaska.

Typically, he is involved in permitting two to six oil and gas projects each year, as well as doing other environmental work. Following is an abbreviated version of his recommendations:



BOB BRITCH

### **RULE NO. 1:** Gather preliminary information

It is essential to start out by assembling and assessing the critical information about what you're going to do, Britch said. Information such as where you are going to drill and what kind of rig you are going to use will have a major impact on the permit requirements.

Assembling some of this information will prove fairly straightforward — drilling contractors have standard ways of doing things, he said.

"For just about any oil and gas project there are givens that they will have to do," Britch said. "Most of the steps are really limited, primarily because of logistics or standard practices."

But the operator does have considerable control over some parameters, especially the location of the drill site. For example, a drill site that requires the construction of an access road is likely to require more complex permitting than a site next to an existing road, he said.

### **RULE NO. 2:** Ask the regulator

Once you know what you're going to be doing it is generally a good idea to

review your plans with the regulators, especially to find out how an agency would interpret the ever-changing regulatory requirements, Britch said. In particular, you don't want to get to the end of the permitting process and then find that you have to apply for an additional permit.

"If there are any gray areas, it's best to ask the agencies up front," Britch said.

People normally hold a meeting with the agencies prior to preparing the permit applications.

"One mechanism that the agencies typically use to help facilitate is something they call the pre-application meeting, where you sit down with all the agencies prior to submitting the applications and you ... ask some of these questions," he said.

### **RULE NO. 3:** Start early

It is best to start the permitting process as early as possible, Britch said. As well as enabling you to complete the permitting in a timely manner, starting early allows you to adjust project plans to accommodate permitting issues.

### **RULE NO. 4:** Err on the side of overstating your requirements

For example, if you are not certain what kind of rig you will use, specify a larger rig than you're likely to need, Britch said.

"Ask for something bigger and it's much easier to back off than to ask for more."

However, don't fall into the trap of providing more information than the agency needs for a particular type of permit. The agency will be uncertain about what to do with the additional information.

"On several occasions I've seen them require a new permit, because they're not sure and they're trying to be safe," Britch said.

### **RULE NO. 5:** Involve the regulators, know the regulators

You can also avoid misunderstandings by involving the regulators in discus-

*see BRITCH next page*



Resources Alaska) are going to have a facility sharing agreement with the (ConocoPhillips-operated) Kuparuk River unit to handle oil from Pioneer's Oooguruk discovery (offshore within the barrier islands). I think Pioneer's agreement will serve as sort of a model agreement down the road for other companies and for other units. The same companies that own the facilities at Kuparuk for the most part own the facilities at the other producing fields, although in different ownership percentages. ... I think the tide has turned with respect to facilities sharing. Those deals aren't going to be automatic or get negotiated in a day... but Pioneer and Jim Weeks of Winstar and UltraStar have made a lot of progress in that area.

*Q. What's another fear factor?*

A. I think explorers were, and still are to some extent, concerned about **rig availability**. A number of the old legacy rigs have been retired or sent overseas. Rig availability is always an issue for

explorers. I think the new, lighter-weight rigs that are coming over, primarily from Canada, have helped alleviate that concern — in a number of ways. Obviously, the number of rigs on the North Slope has gone up, and with the newer rigs the cost to drill a well has to be going down. You can mobilize those new rigs a lot quicker and there are fewer loads to move, and you don't need as hefty of an ice road to move them; another cost-saver. The rig situation is certainly better than it was a couple of years ago, especially for the explorers. But finding just the right rig for your specific well still can be a challenge.

*Q. What's another fear factor?*

A. For the **companies that don't own their own oil tankers**, I think there is always some concern about how you're going to market your oil once you make a discovery and do the development. The common carrier pipelines are open, so those aren't a problem once you get your oil into the existing infrastruc-

ture network. You just have to pay the tariff, which is regulated. So, the question is, are you going to sell your oil in-state to one of the refiners or sell it to one of the companies that owns a tanker, or are you going to charter your own tanker. As far as I know, access on the tankers hauling Alaska crude is not regulated, so a producer that did not own a tanker would have to make private arrangements with the companies that own the tankers — BP, ConocoPhillips and Exxon. Chevron may also bring in a tanker once in a while although I am not sure of that. ... I think most of the companies with smaller amounts of production on the North Slope just sell their oil to in-state refiners or to one of the oil companies with the tankers. (As of April 2007 the only companies operating production facilities on the North Slope were BP and ConocoPhillips.) ... In the Lower 48, there are a lot more options to market your oil and gas. You can haul the oil out with a truck and there usually are multiple gas gathering lines. There are fewer choices up here. There still are options

*continued from previous page*

## BRITCH

sions about your project, especially when problems arise.

"If you run into a problem, make sure that you involve them in it — they don't want to be surprised," Britch said. Deferring a problem to the end of the permitting process can cause major problems.

**RULE NO. 6:** Good communication depends on getting to know the regulators

Different regulators do things in different ways, Britch said. A personality clash between a regulator and the person who interfaces with him or her can become especially damaging. Britch emphasized the importance of recognizing this type of problem and taking prompt action.

**RULE NO. 7:** Educate the regulators

By educating the regulators about your project you can help identify any areas that might give rise to litigation and where additional information might be needed to defend the permit.

"The regulators are in a position of public trust and they also have to be able to defend their position with other non-government organizations," Britch said.

Pilot programs can prove especially valuable in fleshing out regulatory issues without landing companies in a legal and regulatory quagmire. For example, one pilot program tested the effectiveness of new techniques for solidifying drilling waste. In addition to developing improved techniques for waste disposal, data from the program helped the agencies understand the processes involved.

"It's a win-win situation for everybody," Britch said.

**RULE NO. 8:** Avoid unnecessary permits

Make sure that you design your project in a way that minimizes the number of permits that you need. For example, moving a drill site from federal to private land can dramatically reduce the number of permits required.

"Literally you can move your project 200 feet and be in a totally different permitting arena," Britch said.

Avoiding wetlands and obtaining water from an established commercial source can also simplify the permitting.

**RULE NO. 9:** Limit regulatory access

Limiting regulatory access by establishing a single point of contact between the project and the regulators avoids the possibility of expensive and time-consuming confusion. Different people talking to the regulators may convey different messages about what is planned, Britch said.

**RULE NO. 10:** Do not lie or mislead regulators

It may seem obvious that lying to the regulators is a really bad idea, but a number of people have come badly unstuck by trying to 'stretch the truth,' Britch said. Chances are that lying will lead to fines and other punitive actions. Lying will also cause you great difficulty in regaining credibility with the regulators.

"The regulators know what they're doing ... they've been in the game a long time and they can tell a lie and they can tell when something's really questionable," Britch said.

And always remember that the regulators have a duty to issue permits for any work that can proceed in a legally compliant manner, he said. ■

available, but it's not quite as open of a market as in, say, West Texas.

*Q. What happens to the oil produced from exploration wells? I've heard BP and ConocoPhillips, the only companies that operate production facilities on the North Slope (as of April 2007), will take that oil but not pay for it.*

A. Yes, that's been the general practice on the North Slope. One of the units such as Prudhoe, Kuparuk or Milne will take your oil, but they won't pay for it. Your other option is to inject what you've produced back down the same well. ... Where that becomes a problem is if you want to run any kind of long-term test, in the meantime you have to store all that oil on your drill site and generally you just don't have that volume of tank capacity out there, especially at an exploration drill site. If it's just a short-term test you can have a couple of tanks out there to store what you produce in terms of oil and water. Giving the oil away for free may not be the best option, but at least it is an option that is available.

*Q. What about companies without a lot of North Slope experience?*

A. It's a challenge for companies without the **big archives of North Slope data and experienced North Slope staff** to develop prospects. It's really all about access to modern seismic data, which again is getting better because in the last four or five years some of the legacy companies have been more willing to sell data. ... It's not going to kill the deal to have to buy seismic from the legacy companies or the seismic companies, but it's not cheap either. As I indicated, on the North Slope it's more expensive to collect data, so companies charge more for it than they might in the Lower 48. Developing prospects is, at the end of the day, what you need to do before you go out and drill any wells, so access to modern seismic is important, as is having a staff that understands the North Slope, that has the expertise on the North Slope ... so they know what they're looking at. Luckily there are third-party contractors with that experience; companies like PRA and ASRC Energy Services offer that kind of expertise. They will help oil and gas companies less familiar with the geology and geophysics collect the data, interpret the data and develop prospects.

*EDITOR'S NOTE: In a November 2006*

## Barnes: Alaska needs to fix permitting, regs

While Alaska is to be complimented on providing access with its areawide leasing program, the state has "a difficult, a complex permitting, regulatory (and) political environment," says John Barnes, Marathon Oil's Alaska production operations manager.

The result, Barnes told The Alliance's Meet Alaska conference in Anchorage Jan. 19, is "longer lead times, fiscal uncertainty (and) project uncertainty."

"Doing it the Alaska way isn't really positive," he said. "We need to turn the Alaska way into doing it quicker."

For a starter, he said, "lots of efficiencies" could be gained in the regulatory process.

Marathon operates in Cook Inlet, producing some 160 million net cubic feet a day of natural gas, Barnes said, selling "to basically every potential customer out there," including supplying about 50 percent of the natural gas used by local utilities. Recent Marathon investments have brought on a new field, Ninilchik, increased production from older fields and brought new gas pipelines into regulated service.

While the company has a staff of only about 40, three-quarters on the Kenai Peninsula, it uses the equivalent of about 250 full time employees through its contractors. The industry's aging workforce is a concern, he said, "and trying to get young, talented individuals to get the education and come into the workforce is something that we all have to worry about."

"And ... as an industry ... we don't have the reputation we should as technology leaders."

"The world needs Alaska resources, but Alaska needs world markets," he said and "... we have to compete for investment," since capital flows to areas with the best returns.

Operating costs are higher in Alaska, which puts Alaska projects at a competitive disadvantage, he said. "To overcome that we have to be quicker, we have to be more efficient in how we spend our money and the projects we bring on." This is where Alaska's permitting and regulatory processes hurt, he said.

Forging cooperation, streamlining the regulatory process and letting the market work will help meet the Alaska challenges, he said.



John Barnes, Marathon Oil's Alaska production operations manager.

JUDY PATRICK

—KRISTEN NELSON

*This is a reprint from the Jan. 28, 2007, issue of Petroleum News*

*email to Petroleum News, Eni Petroleum, the U.S. E&P affiliate of Italy's Eni SpA, said the greatest obstacle to exploring for, and developing, oil and gas in northern Alaska was the "lack of 3-D seismic and/or access rights."*

*Q. If a company wants its own staff, are there a lot of people available with North Slope experience to help develop prospects?*

A. I wouldn't say so. Most folks with 10 or more years of **Alaska experience** that are still in Alaska today are working for companies already active in Alaska or for one of the existing consulting companies like PRA or ASRC Energy Services. A fair number of the people with Alaska explo-

ration experience working for the major companies have transferred out over the years and are now working in other areas of the world, on other projects. And for better or for worse, not many people who retire from the legacy companies retire here in Alaska, but a few of them do and at least some of them are available to consult. ... Having said that, newcomers like Armstrong, Pioneer, Kerr-McGee, Brooks Range, Savant and Eni have shown that you can go search out the folks worldwide that have Alaska experience, or hire it locally. And those strategies work. Luckily I think that there is enough competition among the contracting companies and the solo consultants that the price for consulting is reasonable. Whatever service you need, there is more than one contractor available



The North Slope Borough is headquartered in Barrow, the largest community on the North Slope, with the exception of Deadhorse, whose residents are primarily oilfield workers.



to provide that service, or that equipment.

*Q. What about the fiscal regime in Alaska? I know it's a fear factor; but is it a valid one?*

A. The royalty rates are what they are. They're set in the lease. So neither the legislature, the administration, nor the lessee can unilaterally come back and change the royalty rate in an existing lease. .... But obviously the **oil and gas taxes** are subject to possible change over time by the Alaska Legislature. The new PPT was in my opinion the first significant change we had in the Alaska oil and gas tax structure in many, many years. With respect to the PPT (the State of Alaska's new petroleum profits tax), the verdict's still out. I think it's going to take a few years just to see what parts work well and what parts don't work.

*Q. FEX complained about PPT. Is there any validity to its complaints?*

A. I think an individual company's view on the state's new petroleum profits tax (PPT) relative to the old ELF system is going to depend on the assumptions it used in its analysis. Because clearly under the old ELF system if you have, for instance, a relatively small oil field, you wouldn't pay any production tax because the ELF would zero it out. ... Under the

PPT as I understand it today after you make some oil price assumptions and some development and production cost assumptions it's possible that some of the smaller fields will pay some production tax — certainly not on day one, but maybe in year eight or 10 of their life. So if that's your only view of the world then maybe the new tax isn't as favorable as the old ELF. But under the new tax system you get a lot of investment tax credits up front, and I believe that the smaller new investors can actually get some cash payments up front from the state that you certainly wouldn't have gotten under the old ELF. At the end of the day your view on the new PPT is strongly colored by the assumptions used in the analysis. I recommend that companies talk directly with representatives from the Department of Revenue to better understand the PPT details.

*Q. Are there any other valid fear factors?*

A. The one thing that is still out there is the possibility to get delayed in the permitting process or with supply train logistics, because **so much exploration and construction/development is seasonal** on the North Slope, and even in Cook Inlet to some extent. Even without unexpected delays things do seem to take a little longer to accomplish here in Alaska. The timeline is stretched out to some

extent due to the seasonal nature of operations. Certainly the smaller companies almost by nature are looking for a quick payout. They want to invest their money today and start making a return tomorrow. Because of the seasonality of both North Slope and Cook Inlet operations, that's not always going to be possible. ... Unless you are already on the existing gravel road system, for the most part you are limited to wintertime operations onshore on the North Slope. Offshore up North, certainly in the deeper water depths you can use barges, marine vessels and drillships only for summertime operations. Even in Cook Inlet much of the onshore seismic has to be shot in the winter because of the rivers, swamps and bogs. Likewise, for the same reasons many of the onshore exploration wells in Cook Inlet are drilled in the winter. ... Commercial fishing considerations restrict some offshore summertime activities, especially seismic in the Inlet. For smaller companies — companies without deep pockets — having that money tied up over multiple seasons is always a concern. But again, I think you just have to recognize that the rewards, hopefully, will be bigger — a lot bigger. Statistically I think they have been. The seasonality of Alaska operations is something you can try to some extent to engineer around, but really at the end of the day have to accept as a fact of nature. ■





## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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PETROLEUM NEWS, WEEK OF SEPT. 17, 2006

# Gustafson knocks Alaska fear factor

*Former Exxon executive tells story behind breakthrough successes attained by Armstrong Oil & Gas in 'difficult' Alaska oil patch*

By ROSE RAGSDALE  
For Petroleum News

**S**tu Gustafson says he knows what kind of consultant he isn't.

That's one whose motto is: "There is a whole lot of money to be made working on the problem if you are not part of the solution."

Certainly, Gustafson's performance during the past five years as vice president of operations for Armstrong Alaska, an affiliate of Denver-based Armstrong Oil & Gas, suggests that he's definitely a part of the solution.

Gustafson, who worked for Exxon Exploration in Alaska for 19 years before leaving the state to work in Russia in 1996, returned to Alaska as a consultant with Armstrong to bid at a state oil and gas lease sale in 2001.

Gustafson shared his story with oil industry geologists in Anchorage last spring. Armstrong, the small independent sold all of its Alaska oil and gas assets in August 2005 to Eni Petroleum Exploration Co., the last of three new companies the independent is credited with attracting to the state. Gustafson continues to assist partners through his company Coordinators Management.

When Armstrong contracted him, Gustafson said company officials sent him 84 questions on why they couldn't do business in Alaska and why they shouldn't invest in the state.

"Their perception was the environment was difficult, and permitting would be very complex," he said.

### Setting a record

Reality turned out to be very different for Armstrong. The permitting process was surprisingly smooth.

Armstrong's plan of operation and all of its engineering going forward for processing 40,000 barrels per day of oil and roads,



STU GUSTAFSON

JUDY PATRICK

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*"You take your questions to the agencies and they will give you the right answers. It's when you have (company) people who have the attitude that they have the answers and are going to educate the agencies that you get into trouble."*

—Stu Gustafson

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pipelines, tanks, generators and the pipeline system was approved in 91 days, Gustafson said. "The entire process for exploration operations — permitting and drilling — took 180 days."

"If you want to make the system complicated you can," said Gustafson. "There is nowhere that I have found, whether it's Louisiana, or Texas or Russia, that you will find a more receptive regulatory environment to work with."

"You take your questions to the agencies and they will give you the right answers," he explained. "It's when you have (company) people who have the attitude that they have the answers and are going to educate the agencies that you get into trouble."

Before Armstrong came to Alaska, company officials were told that they would need three years to learn to drill their first wildcat well here, according to Gustafson.

"We got our first leases in six months, and we drilled three offshore wells that year, taking on Pioneer (Natural Resources) as a partner."

Armstrong's speed was astonishing.

During the next two years, Armstrong drilled eight more wells, six offshore and two onshore.

"So, in what was supposed to take us the timeframe to learn how to drill one well, we drilled 11 wells without any ... snags in the process at all," Gustafson observed.

Armstrong also debunked myths about Alaska's high operating costs and big companies making life miserable for small independents.

"Operational costs are high in Alaska because it costs more to drill here," said Gustafson. But as a small independent, the risk

of sitting on prospects for three years while building a new rig to save money didn't make sense to Armstrong.

As for the majors making life miserable for Armstrong, Gustafson says the opposite is true. "The problem is getting through some of the layers down the food chain. ... That first year, we had that problem."

With the help of supportive media and regulators who seemed empowered and proactive under the Murkowski administration, Armstrong overcame early obstacles, Gustafson said.

Then Armstrong convinced Texas-based Pioneer that independents could do business in Alaska, and together they bought 22,000 acres and drilled three wells. The next year, the companies tripled their acreage and brought in Oklahoma-based Kerr McGee.

Sharing risks with bigger companies like Pioneer and Kerr McGee was critical for a small firm like Armstrong, Gustafson said.

"Alaska's offshore bonding requirement, alone, was \$200 million unless you were a publicly held company that clearly had a net value of \$200 million and you were willing to expose everything for it. ... We had to bring in somebody with public funding who could drill those wells because we could not," he said.

Alaska regulators also helped out by urging the producers to give the independents access to their exploration acreage.

"The state put pressure on some of the operators that held acreage for a long time, and they farmed it into us," Gustafson said.

But some of Armstrong's success resulted from the company's own practical approach. For example, Armstrong sought regulatory permits as they were needed rather than all at one time.

Why? "Because time is money," Gustafson said. "In four years, we went from zero to more than 340,000 acres gross, and we drilled 11 wells. Does this sound like a difficult environment for an independent company to operate in?"



Alaskans are very concerned about the protection of the state's pristine environment, including its wildlife. Pictured here is a swan.

### Good news

Thanks to Armstrong Alaska, two projects, Oooguruk, at 20,000 bpd, and Nikaitchuq, at 60,000 bpd, are moving forward in development with Pioneer and Kerr McGee. Both are offshore in the Beaufort Sea near the ConocoPhillips-operated Kuparuk River oil field.

Armstrong also sold the rest of its assets to ENI, which took over the independent's operations in the state.

Gustafson says he expects ENI will follow the same strategy in operating on the North Slope as those of the earlier independents.

"I think you will see the same thing when you work with them. That they will move along in a rapid fashion," he said.

So how did Armstrong succeed where others have failed?

"Go to the (agencies') offices and find out who got what approved the fastest with the least amount of paper," he advises. "Change the location, and by golly, it'll work. You don't have to reinvent a model

every time. ..."

Armstrong also embraced innovation when it led to significantly lower costs.

As an example, Gustafson cited Armstrong's production-in-a-box technology for developing modular production facilities.

"Basically these are truckable modules about 55 feet long, 14-feet-by-15-feet. You could have six wells in each one," Gustafson explained. "You can build these any place and truck them up there, and when the time expired and you don't need them, you could take them off somewhere else.

"The big thing about these is that without these production modules, and without being able to prove to the (Alaska Department of Environmental Conservation), North Slope Borough and the whalers that any spill from any wellhead would be in the tank with controls built into the design of the system, we would not be talking about oil production right now on these properties. The project would not have moved forward."

Gustafson also said the North Slope Borough proved to be easy to deal with. "They want someone standing there to explain what you want to do," he said. "Go early and talk straight. You're not going to get everything you want, and it's going to cost you something, but there is a way to work it."

### What's next?

With the trans-Alaska oil pipeline still half empty and the legal, business and technological environment changing, there will be new plays and new technologies in Alaska, predicts Gustafson.

"Trust the contractors up here. Give them your goals, your objectives and communicate with them early, and you will get it done," Gustafson said.

And how do you survive?

"Not the biggest, not the strongest and not the smartest will survive. It is the one who figures out how to change," he added. ■

—Alan Bailey contributed to this article

PETROLEUM NEWS, WEEK OF MAY 27, 2007

# TAPS rates too high

*FERC judge says Alaska pipeline owners double-dipped to justify tariffs*

By ROSE RAGSDALE  
For Petroleum News

A federal judge May 17 ordered owners of the trans-Alaska oil pipeline to slash nearly in half tariffs they propose to charge for crude shipments, a move likely to generate substantially higher revenues for the State of Alaska and spur oil and gas activity on the North Slope.

The ruling by Administrative Law Judge Carmen Cintron of the Federal Energy Regulatory Commission affects tariffs proposed by the five owners of the 800-mile pipeline from 2005 forward. FERC's five commissioners are expected to review the case and render a final opinion by year's end or in early 2008.

The state, Anadarko Petroleum Corp. and Tesoro Alaska Co. asked FERC to require the pipeline owners, referred to in the FERC proceedings as the "carriers," to reduce rates for oil shipments to about \$2 a barrel from rates of about \$3.71 in 2005 and \$3.97 in 2006.

The major owners of the pipeline also own the three North Slope oil producers, BP Exploration (Alaska) Inc., ConocoPhillips Alaska and ExxonMobil Production Co. Unocal Pipeline Co. and Koch Alaska Pipeline Co. LLC also control minority interests in the line, which supplies about 17 percent of the nation's crude supplies.

During the past two and a half years, both sides have argued the case with the help of a small army of lawyers.

Initially, the shippers challenged the carriers' 2005 interstate tariffs, but every conceivable aspect of the issue was soon drawn into the proceedings.

The State of Alaska protested the 2005 interstate tariffs, charging discrimination based on provisions of the Interstate Commerce Act, after the Regulatory Commission of Alaska reduced in-state tariffs for the pipeline by more than 50 percent.

The carriers countered with a defense that relied on the strength of a settlement agreement reached with the State of Alaska in 1985 that established a method for calculating tariffs for the pipeline. They also asked FERC to overturn the RCA ruling, claiming the lower in-state rates and subse-

## Shippers, state praise 'first step'

Alaska officials and shippers Anadarko Petroleum Corp. and Tesoro Alaska Co. have hailed a federal judge's decision to lower tariffs for the trans-Alaska oil pipeline as "important" and beneficial.

But the ruling by Administrative Law Judge Carmen Cintron of the Federal Energy Regulatory Commission "is nonbinding and reflects her opinion only," said Daren Beaudou, a spokesman for BP Exploration (Alaska) Inc., which owns slightly more than 50 percent of the pipeline.

"The commission has yet to decide the case. This is still in the early stages, and the decision when it comes likely will be appealed by one or more of the parties," Beaudou said May 23.

"It is an important issue, and we are confident that we've complied with our agreement with the state and that we've followed the law," he added.

FERC's five commissioners are expected to review the case and render a final opinion by year's end or in early 2008.

Gov. Sarah Palin immediately praised the ruling May 17, saying that it "reaffirms the need to ensure low tariffs on oil and gas lines."

"This is why we spent a great deal of time working on structuring the Alaska Gasline Inducement Act to maximize value for the state and ensure low tariffs. We're pleased with the FERC decision, and we look forward to continued progress on this issue," Palin said.

### State could collect \$600 million

"It's certainly a good thing, both in terms of moving forward with AGIA and oil revenues for the state," said John Iverson, director of the Division of Tax at the Alaska Department of Revenue.

If Cintron's ruling prevails, state auditors estimate Alaska will collect millions.

"We're looking at the assumption that the case will be resolved in 2010," Iverson said. "The refund amount, itself, to the state would be around \$500 million, with about \$100 million more in interest."

see STEP page 2.10

quent attempts to block increases in interstate tariffs contradicted terms of the 1985 pact and violated provisions of the ICA.

As time passed, proposed 2006 and 2007 tariffs have been added to the case.

### Cintron agrees tariffs 'excessive'

In a detailed, 116-page decision, Cintron concluded that Anadarko, Tesoro and the state essentially got it right when they argued the tariffs were "excessive."

The judge outlined her reasoning in more than 250 separate points, starting with which side must prove their case and ending with whether RCA's lower rates violated the ICA.

"The crux of the matter," wrote Cintron, "is that the carriers must recognize the pre-

vious recoveries of their investment, otherwise there will be an unjust and unreasonable double recovery," she wrote. "The carriers have presented no fact in the case that calls for an opposite conclusion."

She noted that there was considerable difference between the pipeline owners' \$1,751.18 million revenue requirement for computing the tariffs and Anadarko-Tesoro's revenue requirement of \$647.32 million.

Cintron said the carriers' contention that they have to start from the beginning of the trans-Alaska oil pipeline and that revenues they have already recovered don't count in calculating future tariffs "is not given any weight."

The judge further endorsed the argu-

see RATES page 2.9



continued from page 2.8

## RATES

ment of FERC's trial staff that "just and reasonable rates cannot result where any double recovery is allowed," calling the reasoning "commonsensical" and impossible to ignore.

Cintron found the actual amounts collected by the carriers must be used to calculate the tariffs, saying the approach is consistent with a FERC precedent that disallows double recovery of investment.

She said Anadarko and Tesoro's calculations would be the basis for her ruling, with minor variations in return on equity and tax.

### Judge finds carriers haven't proved line 'riskier'

A key difference was Cintron's rejection of the carriers' argument that a risk premium of 2 percent, or 200 basis points, should be added to their return on equity because the trans-Alaska pipeline is "riskier than any Lower-48 oil pipeline."

"The Carriers have failed to prove that operating TAPS is riskier than the operations of other oil pipelines," Cintron wrote.

The Carriers also asserted that the risks the pipeline faced during construction merits a 2 percent risk premium since the challenges and risks that TAPS faced in the past are relevant in the present.

Cintron rejected this argument, noting that case law indicates a "risk premium inquiry is forward-looking."

Cintron also said the carriers gave no reasonable explanation as to why their rates should vary significantly when their costs are virtually identical. She agreed with FERC's staff that a uniform rate is more reflective of the cost to ship a barrel of oil on the pipeline, and is in line with the RCA's single rates for shipments on the line. The staff also argued that a uniform tariff would help alleviate frequent problems with over and under recoveries by the carriers.

Cintron ordered the carriers to adopt a single, uniform tariff.

### DR&R: weighted average nominal after-tax cost of capital most reasonable

The judge differed with Anadarko and Tesoro's calculation of funds, plus earnings, that the carriers have collected to pay for dismantling and removing the pipeline when it is no longer operational. The useful life of the pipeline recently was

Comparison of revenue* estimates		
Total 2006 Revenue Requirements and Rates		
(Millions)		
Description	Revised A/T 154-B	TAPS Carriers 154-B
1. Operating Expenses*	\$559.65	\$559.65
2. Depreciation Expense	\$13.48	\$335.43
3. Amortization of Deferred Earnings	\$7.13	\$223.84
4. Amortization of AFUDC	\$0.86	\$11.63
5. DR&R Allowance	\$0.00	\$0.00
6. Return Allowance		
7. Return on Equity	\$30.58	\$281.62
8. Interest	<u>\$13.77</u>	<u>\$9.59</u>
9. Total Return Allowance	\$44.34	\$291.21
10. Income Tax Allowance	\$22.13	\$329.04
11. Non-Transportation Revenues	<u>(\$0.27)</u>	<u>\$0.38</u>
12. Total Revenue Requirement	<u>\$647.32</u>	<u>\$1,751.18</u>
13. Composite System Barrels (Millions)	326.795	326.795
14. Composite Rate (\$/Bbl)	\$1.98	\$5.36
15. Valdez Interstate Rate (\$/Bbl)	\$2.04	\$5.53

\* Includes amortization of FERC rate case litigation costs and RCA rate case litigation costs.

*\*Anadarko Petroleum Corp. and Tesoro Alaska Petroleum contended in their complaint to the Federal Energy Regulatory Commission that tariffs on trans-Alaska oil pipeline were excessive. They said the pipeline's owners invested \$647.32 million to operate the pipeline in 2005 and 2006, an amount that should be used to determine interstate tariffs for crude oil transportation from the North Slope. The pipeline owners told FERC that an investment of slightly more than \$1.75 billion should be applicable for determining the tariffs.*

*In a May 17 ruling, FERC Administrative Law Judge Carmen Cintron sided with Anadarko and Tesoro saying she used their calculations as the basis for the conclusions she reached in the TAPS tariffs case, though the final numbers might vary slightly based on findings elsewhere in her initial decision.*

*Source: Initial Decision re BP Pipelines (Alaska) Inc, ConocoPhillips Transportation Alaska Inc, ExxonMobil Pipeline Co etc under IS05-82 et al., pg 40.*

extended by the owners from 2011 to 2034.

Cintron noted that the owners commingled the so-called "DR&R" monies with other corporate funds and freely invested them as they saw fit. The shippers said the DR&R funds, plus interest totaled about \$17.2 billion, based on their parent companies' ROE rates. However, the owners argued the total is closer to \$2.5 billion, based on earnings from U.S. securities. A State of Alaska witness also presented an estimate of \$5.64 billion, based on a

weighted cost of capital.

Cintron said the federal rate wasn't credible since the owners did not invest the DR&R funds in government securities and the evidence showed the weighted average nominal after-tax cost of capital was the most reasonable rate for reflecting future earnings on DR&R monies already collected.

She also ordered the carriers to give a full accounting of the DR&R funds, plus their past earnings and to keep that accounting up to date going forward. ■



JUDY PATRICK

The trans-Alaska oil pipeline

*continued from page 2.8*

## STEP

The figures are based on state auditors' estimates of tariff overcharges from 2005 through 2008.

For non-owner oil shippers on the pipeline, the judge's decision will significantly improve the economics of doing business in Alaska, and in turn, significantly improve the state's oil and gas investment climate," said Antony Scott of the Alaska Department of Natural Resources Division of Oil and Gas.

"The difference is on the order of \$3 a

barrel. It's the equivalent of raising a company's stress price for making investment decisions. If a company decides to do business based on a stress price of \$30, then \$3 would be 10 percent. And that's a big deal!" he said. Scott recalled Conoco Inc.'s chairman and CEO complaining in the mid-1990s about the TAPS tariffs before that company pulled out of Alaska after developing the Milne Point field.

Conoco sued the pipeline owners over the tariffs, and did not return to Alaska until it merged with Phillips Petroleum Co. and became one of the pipeline's owners.

Scott said industry executives often question him "intensely" about the tariffs and their future direction.

Shippers make their point

"Judge Cintron's ruling supported our contention that the TAPS rates were excessive," said Mark Hanley, a spokesman for Anadarko. "Compared to this year's (tariff), which on average is \$5.11 a barrel, that's a considerable difference. It's a big first step."

The ruling also reinforces the Regulatory Commission of Alaska's decision several years ago to lower in-state tariffs to the \$2 a barrel range, Hanley said May 22.

The five pipeline owners appealed the RCA decision, which was upheld in a lower court and now awaits a decision by the Alaska Supreme Court.

—ROSE RAGSDALE



# From the perspective of a consultant, any company can operate in Alaska

By ARLEN EHM  
Geological Consultant

I have been involved in Alaskan exploration for forty-two years beginning with the first well drilled from the first platform in Cook Inlet in 1965. I have worked for entities of all sizes in nearly all of the basins in Alaska. An industry publication once questioned whether I was a Veteran geologist or an Alaskan institution. My peers refer to me simply as The Aged Flatulent. My point is that I have been around Alaska for quite a while and might have worked with your father.

I firmly believe that any company can operate in Alaska and I will tell you why I believe that.

In order for you to understand where I am coming from I will provide a bit of background information. I hold both Bachelor's and Master's degrees in geology from Wichita State University. After nine years of employment as a geologist I became a consultant and for the past thirty-one years have been an Anchorage-based geological consultant. I have provided consulting services to various departments within state government and to the Internal Revenue Service, the Federal Trade Commission, the Federal Bureau of Investigation and the Securities and Exchange Commission. Consulting services have been provided to more than eighty domestic and foreign clients including oil and gas companies, other consulting firms and individuals.

I have also provided evaluations of more than twenty oil and gas properties. I have served as an expert witness in six court cases including one where I served as a special master to the Superior Court of the State of Alaska.

In addition to my own sole proprietorship, I am a co-founder and a principle of Alaska Research Associates, Incorporated. This firm has prepared an analysis of some of the basins in Alaska including an extensive field investigation



in ANWR in 1984. I have recently been the Vice President/Alaska for a small independent company based in the lower-48 and have provided geological input for another small independent that recently entered the Alaskan exploratory scene.

To conclude that I was involved in Alaskan exploration only as a geologist would be incorrect. I have been involved in many aspects of exploration although not always by choice. I simply performed as the projects required. However, that exposure allowed for me to develop experience in areas far a field from simple geology.

In my role as a consultant I am constantly in contact with independents and mid-sized companies in the lower-48 who wish to review the prospective nature of the Alaskan exploratory scene. Although I made no effort to enumerate, I would estimate that I have communicated with at least twenty-five such companies and I have encouraged them to come to Alaska.

What are the primary concerns of those companies looking to come to Alaska and become involved in exploration? There are many, but it should be noted that space does not permit them to be addressed here.

The most commonly given concerns are as follows:

- High entry costs
- High operating costs
- High risk

- Permitting problems
- Excessive bureaucracy
- Excessive environmental constraints
- Long lead time
- Remote exploration targets
- Seasonal operational restrictions
- Lack of infrastructure
- Seasonal access

While many of these are common with operations in the lower-48, several are unique to Alaska or are exacerbated by Alaskan operations. It should be

noted that becoming involved in Alaskan exploration might not be the correct move for a lot of companies. Those companies that are comfortable with exploring in the lower-48 and are profitable doing so may well wish to remain where they are and thereby avoid the risks and expenses inherent in Alaskan exploration. High potential alone is insufficient cause for a company to come to Alaska.

I would like to point out that I was sixty-eight years old before I ever attempted to obtain permits for geophysical work or oil and gas wells. I learned the system quickly and have been able to obtain permits that, on the surface, have appeared difficult.

However, there is no question but that a review needs to be made of the regulations, rules and methods of obtaining permits and the conducting of operations based on those permits. The system needs to be revised and streamlined and a stand-alone system needs to be developed solely for oil and gas regulations and permitting separate and apart from all other permitting in Alaska.

In conclusion, any operator can come to Alaska and operate. However, they must plan well and far in advance. Failure to plan adequately blunts the picks of more operators than any other single factor. Adequate planning will reduce the stress level and, perhaps, eliminate the fear factor totally. ■



# Decades of experience providing essential services and supplies on the North Slope

*Colville plays a critical role in keeping industry and communities operating*

Colville, Inc. is the oldest company in the Prudhoe region, with continuous operations back to 1953. Started as a family business, Colville has now built a staff of some 87 seasoned and experienced people able to professionally and safely manage operations in this challenging part of the world.

According to Mark Helmericks, President and CEO of Colville, Inc., "Our people, with their years of experience and their enthusiasm for good customer service, are our best asset.

Colville has grown prudently in a way that offers its staff a long-term job with good prospects for future growth. In return, both the company and our customers get rewarded with some of the best talents in the business."

Colville is comprised of four full-service companies that provide a broad range of support to the oil and support industries, the trucking and aviation industries, North Slope communities, locals and visitors:

- Fuel and industrial gas – Colville, Inc.
- Solid waste – Colville Solid Waste Services



Mark Helmericks,  
President and CEO  
of Colville, Inc.



Colville hook truck unloading bins.

- Industrial supply – Brooks Range Supply
- Community, general store, retail – Prudhoe Bay General Store

Colville has two locations in Deadhorse, near the airport. Fuel and solid waste services are based at the Colville pad. Brooks Range Supply's pad contains the business complex of the Napa franchise, industrial supplies, a post office and the Prudhoe Bay General Store.

Colville has essential equipment customized for each business unit, including:

- Fleet of fuel trucks and special ramp-fueling rigs for quick and safe airport refueling.
- Tractor and tanker trucks for fuel support services.
- A bulk fuel tank farm and gas station onsite.

- Solid waste compactor trucks, hook-truck loaders, 150 large roll-on/roll-off "bear proof" industrial dumpsters, and the flatbeds to haul them, ice road capable.
- Fleet of expeditor sized trucks for quick response on a more immediate basis.
- Yard Equipment, e.g. loaders and graders.
- Fork lifts and other warehouse equipments in both locations.

Colville's future looks bright. Its business units are investing in expanding e-commerce and electronic sales and improving customer purchase capabilities. Upgrades in the use of biofuels, waste reduction options and recycling capabilities are ongoing.

Colville has expanded on-site fuel storage capacity and its fleet of tankers and tractors. Offshore developments in the Chukchi and Beaufort Seas are extremely promising, so Colville will be operating offshore this coming summer with a boat specifically designed for Arctic waters, the "White Night," another name for the midnight sun.

Colville looks forward to another half-century of service in Alaska. ■

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Brooks Range Supply and Prudhoe Bay General Store facility.



# FMC Technologies

**F**ounded in 1884 on the principles of technology and innovation, what is now FMC Technologies has grown into a \$3 billion corporation, located in 17 countries and ranked 1 & 2 in the global sub sea and surface wellhead industries.

By designing wellheads that range from conventional to cutting edge thru-bore, delivering equipment that meets your bottom line, and providing reliable service you can count on, FMC truly provides the total package. We look at your priorities

before we determine our own - that's how we perform. FMC's goal of excellent customer service in Alaska can be contributed to a dynamic, devoted management team. Alan McArthur, Kevin Hite, and Ted Brown total 55 years of service with FMC Technologies, focusing their experience on surface wellheads in the Alaskan market.

Their efforts, combined with a dedicated engineering and project team in Houston, TX, have led all major customers in Alaska to use our equipment for drilling successful wells - including the first High Pressure Horizontal

Wellhead System in the region. Our customers trust us to deliver, and we are available 24 hours a day to do just that. With nearly 80 years' experience, full API and ISO certification, and extensively trained technicians, not only are our products reliable - our people are, too. ■



Visit the company online

[www.fmctechnologies.com](http://www.fmctechnologies.com)

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**FMC Technologies**



# Kuukpik Corporation

## *Big River balancing act requires vigilance and flexibility*

**F**inding balance is a decision-by-decision process. For health seekers it consists of finding the right blend of exercise, relaxation, diet and productive pursuit. For the graphic designer it means even distribution of text and graphic elements on a page. For the gymnast it is maintaining bodily equilibrium and poise.

For Kuukpik Corporation seeking equilibrium between tradition and vision, between honoring the past and embracing the new, between recognizing the wants and needs of the oil companies and the cultural considerations of Nuiqsut's local people — finding that place where unity of purpose and collective goals reside.

Kuukpik Corporation is an Alaska Native Village Corporation established in 1973 under the Alaska Native Claims Settlement Act of 1971 (ANCSA). Located on the Colville River Delta about 35 miles from the Beaufort Sea coast, the corporation's home village, Nuiqsut, is also eight miles from the Alpine oil field, the first North Slope oil discovery on Native-owned lands since ANCSA.

Kuukpik Corporation successfully negotiated a comprehensive Surface Use Agreement, including provisions for education, training, and consideration in contracting, employment and the environment. The corporation owns surface rights to portions of the oilfields, and receives a small royalty for the production of oil and gas.

Prior to the Alpine discovery, Nuiqsut was primarily a subsistence-based economy. "Subsistence remains the integral way of life for the people of Nuiqsut," says Lanston Chinn, Kuukpik Corporation CEO. "So, as part of the agreement, the Kuukpik Subsistence Oversight Panel was created to provide ongoing local input and oversight in protecting and promoting the health of subsistence area resources. Working with the local community on issues has enhanced the acceptance of and respect for local traditional knowledge. This year, the elders are predicting a late breakup, which can be worthwhile information to the oil companies. Now they are coming out to take boat and plane trips with the elders ... and, they're listening, because these elders know the land and conditions better than anyone."

### Community concerns

Thanks to oil and gas revenues, better community infrastructure and

Kuukpik Corporation's home village, Nuiqsut, is also eight miles from the Alpine oil field.



JUDY PATRICK

training/employment opportunities exist in Nuiqsut. Although the people recognize the inherent advantages and opportunities resulting from development, they still harbor concerns about maintaining their strong subsistence heritage. Kuukpik means "Big River" in Inupiaq, referring to the Colville River and the Kuukpikmuit or "People of the Big River" are protective of the area's resources.

"The experience of working with the outside oil companies is of great value to the people," says Chinn. "They are learning how to be successful as a service provider in the competitive marketplace of the oil and gas industry."

### Business partners

"In consultation with Kuukpik's board of directors we thought about and asked ourselves, "What would be the quickest way this little village on the Colville River on the North Slope could participate? We decided to joint venture with strategic support service partners and it's working," he says. "Since 1992, Kuukpik has enjoyed a level of success with its partner companies."

Local Kuukpik Corporation businesses include retail merchandising, hardware, fuel services and a contract post office, and major business partners include ConocoPhillips Alaska, Inc., British Petroleum Exploration Alaska and Anadarko Petroleum, as well as some independent oil companies new to Alaska. The corporation also contracts to the local area government, the North Slope Borough. Kuukpik joint ventures include:

NANUQ Inc. — ice road, ice pad, and ice bridge construction and maintenance, gravel mining, hauling and placement, piling and gravel pad construction and maintenance, camp construction and other civil construction and maintenance.

Kuukpik Drilling, LLC — contract oil and gas drilling, exploration and development, drilling equipment rental, and personnel services.

Kuukpik/Arctic Catering, LLC — consolidated camp catering and maintenance operations, environmental /security monitoring services and operation and facilities maintenance management, including helipads and airstrips.

Kuukpik/Carlile Transportation, LLC — full-service truck transportation and logistical services (over-the-road and over-the-water, full or partial loads), to Alaska, lower 48, and Canada.

Kuukpik/Northern Air Cargo LLC — scheduled and chartered jet and propeller aircraft serving Alaska, the continental US, worldwide air express cargo links and logistic services.

Kuukpik/Veritas, LLC — seismic data acquisition, processing and interpretation.

Kuukpik/NANA Management Services — oilfield security, environmental monitoring and reporting services.

Kuukpik/LCMF — full service architectural, civil and structural engineering, surveying, permitting, project management, design/construct, CAD and mapping services.

The corporation is working closely with its joint venture partners in pursuing contracting opportunities and welcoming the Independents that want to do business. "Our companies are familiar with what the community seeks in any relationship with a company looking to explore and develop. Our emphasis will always be balancing the vital interests of the resources and subsistence culture with exploration and development as we allow and encourage the oil and gas industry to go forward. Balance has always been the theme," reflects Chinn, "but it takes vigilance." ■



# Nordic-Calista

*Drawing on the knowledge, enthusiasm and experience of employees to meet future challenges*

**N**ordic-Calista is a joint venture between Nordic Well Serving Inc. and Calista Corporation formed in 1985. Nordic Well Serving Inc. is fully owned by Roll'n Oilfield Industries. The Roll'n Corporate Group was formed in 1977 by its owner and president, Ron Rowbotham. With over 37 years industry experience, Ron is committed to provide the benefit of his extensive knowledge and experience to each customer.

Founded in 1972, Calista Corporation is the second largest of the 13 regional corporations formed under the Alaska Native Claims Settlement Act (ANCSA) in 1971. It is a business corporation formed under state and federal laws, including the Settlement Act and its amendments. In the Yup'ik Eskimo language the name "Calista" translates to "Cali" which means work and "ista" which means someone or something which does.

## Health, Safety and Environment

"That's what it is all about, doing the right thing". Nordic-Calista is committed to creating a work environment for our personnel, clients and subcontractors that is safe so everyone can return home to their family and friends healthy.

Besides having the right work environment, equipment, procedures and policies, it is imperative to have a safety culture. "Today I will do everything in my power to prevent myself, or any of my co-workers from getting hurt." We utilize the Dupont STOP program to document observations, unsafe and safe behaviors.

## Current Operation

Currently we are operating three rigs on the North Slope, two of which are modified to coiled tubing drilling rigs. We employ approximately 100 people

## Management

Our management is a efficient focused group, able to be very adaptable and react quickly. Noel Therrien, Operations Manager, has over 25 years of experience in the oil-



field. Udo Cassee, Operations Superintendent, has over 15 years experience in the oilfield. He started with Nordic in 2003 after an 11 year career with a major international oilfield service provider. Doug Yessak, Field Superintendent, has close to 30 years experience in workover, completion and drilling. Steve Laporte is responsible for our safety, environmental and training aspects.

## Equipment

All our equipment is custom designed and built. Early in the history of the company, it was recognized that a rig for Arctic operations is not a off the shelf item. Being able to manage the design and construction ourselves allows us to integrate best practices from past experience and therefore ensure that the end product is safe, efficient and cost effective. It also helps us to manage quality control and meet dead lines. While in operation we continue to improve our rigs with greater efficiencies.

Rig#1 and Rig#2 are operated as a platform for coiled tubing drilling. More than 400 sidetracks have been drilled with these units. Rig#1 has been operating in these configurations since 1996, Rig#2 started in 2002. Rig#2 is used in a hybrid mode

where we conduct both jointed pipe and coiled tubing operation. Right now the jointed pipe mode is only used for work over applications but our vision is to utilize jointed pipe to drill surface hole, and coiled tubing to drill the reservoir.

Rig#3 is a drilling & work over rig. In the last couple of years it has been "the rig of choice" by several majors and independents for drilling exploration wells. It is a single modular package like Rig#1 and Rig#2. This concept allows for short rig up times, low exposure to weather, low risk for spills caused by connections between modules and a small overall footprint.

## The future

We are constantly looking at new concepts to improve existing equipment or for new drilling rigs. Nordic-Calista is here to stay and will draw on the knowledge, enthusiasm and experience from its employees to meet the challenges of the future. ■

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# Alaska Anvil: Forging long relationships

*Engineering firm has delivered comprehensive service to Alaska businesses for more than two decades*

**L**ike the solid blacksmith's tool of old, Alaska Anvil Inc. provides a stable platform for clients' projects to take form.

The organization has been serving that function for businesses across Alaska for more than two decades.

"We have all the disciplines necessary to deliver complete engineering/design packages," says Alaska Anvil President and General Manager Frank Weiss, and the company goes out of its way to forge long-term relationships.

"We really appreciate what Alaska Anvil does for us," says Jim Boltz, chief operating officer of Petro Star Inc. "They do a tremendous amount of engineering and piping design work for us at both our refineries in North Pole and Valdez. They are cost competitive and extremely responsive to our needs. We've been a customer for over 10 years."

## Deep Alaska roots

Founder L.K. Leverson's roots in Alaska go back a long way. In the 1960s, he was superintendent of construction for Bechtel Inc. as the LNG plant in Nikiski was being built.

Anvil Corp. was founded in 1971 in Ferndale, Wash. It soon began working in Alaska, with a 1974 job to install a power plant and distribution system at a gold dredge in Nome. Formation of Alaska Anvil, as a wholly-owned subsidiary of Anvil, came in 1984. Today, Alaska Anvil's staff is growing again as they expand to meet clients workload and project requirements with the support of Anvil Corporation. Early projects for Alaska Anvil include work in Nome with WestGold on Bima, a 558-foot long bucket line dredge — the world's largest ocean-going gold dredge at the time. Alaska Anvil also assisted WestGold with a sled-mounted drilling unit that went onto the ice pack to drill and test ore quality during the winter months when the dredge was idle.

## Employee owners

The Anchorage-based Alaska Anvil draws on the strength and traditions of its parent.



The Petro Star Inc. refinery in Valdez is a client of Alaska Anvil Inc.



From two people at the first office, Anvil Corp. has grown to more than 650 employees. And those employees are also the owners. In 1996, the company completed a transition from a privately held firm to an employee-owned ESOP company, with workers holding more than half of the stock.

The company still carries on the founder's traditions.

Levorsen comments: "Our work, not our words, speaks for us. When a project meets the client's expectations, is completed on time and at a reasonable cost, clients reward us with ongoing work, along with building recognition and reputation in the industry."

## Cutting costs

"At Alaska Anvil, employee owners welcome a challenge, and cost-cutting is a big

one. Our clients have come to rely on us for innovative and cost-effective solutions. At Anvil we recognize that our role is to provide engineering and design services to accomplish the goals and objectives of our client in a cost effective manner."

"We do what we need to do to maintain profitable investment, so we are constantly working on cutting costs while retaining quality," adds Weiss.

## Oil industry a focus

Alaska Anvil worked on projects for all of Alaska's major refineries, as well as with Alyeska Pipeline Service Co. and the old Sohio.

At Kuparuk, Alaska Anvil has played a significant role in satellite field developments including Tarn, Tabasco, Meltwater and Westsak. They have engineered and designed facilities for enhanced oil recovery programs using miscible injectant including the Small Scale Enhanced Oil Recovery Expansion and Large Scale Enhance Oil

Recovery Expansion projects. Other facilities engineered and designed by Anvil include the Gas Handling Expansion, Power Generation and Transmission Upgrade, Pipelines, New Well Additions and Existing Well Conversions (i.e. producer to injector, etc.) and numerous other smaller projects.

The company has developed unique solutions for some of the formidable challenges Arctic oil development has faced. At the first seawater treatment plant at Prudhoe Bay, for example, a method was needed to level the sea floor to set the water plant. The job required a tolerance of plus or minus two inches. Anvil responded by fabricating a custom undersea grader. It was an odd-looking piece of equipment, but it got the job done.

Alaska Anvil's office in North Kenai allows the company to support Cook Inlet producers and the platforms there. Clients include Tesoro Petroleum Corp., XTO Energy Inc., Forest Oil Corp., Unocal and Marathon Oil Co. ■

# CHAPTER 3

*Northern Alaska's oil and gas province*



Pipeline and drill site construction at  
Alpine satellite Fiord CD3, winter 2006

JUDY PATRICK PHOTO



## CHAPTER 3

# Northern Alaska's oil and gas province

## Geological setting

**N**orthern Alaska consists of five distinct geologic regions: the Brooks Range, the Brooks Range Foothills (also known as the North Slope Foothills or Arctic Foothills), the North Slope (also known as the Arctic coastal plain), the Beaufort Sea and the Chukchi Sea. For the purposes of discussing oil and gas exploration and development, it's also convenient to divide the North Slope into the central North Slope, the western North Slope and the eastern North Slope.

The central North Slope and the near shore area of the Beaufort Sea contain all of the current operational oil fields in northern Alaska. The western North Slope includes part of the National Petroleum Reserve-Alaska.

NPR-A extends south across the western Brooks Range Foothills and into the north side of the Brooks Range. The eastern North Slope includes the 1002 area of the Alaska National Wildlife Refuge. ANWR extends south into the Brooks Range.

The Brooks Range consists of east-west trending mountain groups that reach heights in excess of 6,000 feet. Uplift, folding and faulting have exposed rocks of pre-Mississippian to Tertiary age. There is little to no oil or gas potential in much of the Brooks Range proper because of the extensive deformation and uplift. However, rocks exposed at the surface provide valuable insights into many of the petroleum source rocks and reservoir units that occur in the subsurface to the north.

The folded and thrust faulted zone that marks the northern front of the Brooks Range runs generally eastward from the shores of the Chukchi Sea north of Cape Lisburne to a point near the trans-Alaska oil pipeline south of Prudhoe Bay, before turning northeast through the northern part of ANWR.

The Brooks Range Foothills between the Brooks Range front and the North Slope consists of a series of rolling hills,

mesas and east-west trending ridges with elevations from 900 to 1,500 feet. The rocks in the foothills are younger and less deformed than those in the Brooks Range to the south. Rock exposures in the foothills provide useful information about the subsurface geology to the north.

### Four major sedimentary sequences

The geological history of northern Alaska has resulted in four distinct rock sequences. From oldest to youngest, these sequences are known as the Franklinian, Ellesmerian, Beaufortian and Brookian sequences. People also refer to the Franklinian as the pre-Mississippian sequence and the Beaufortian as the rift sequence. Different sediment source areas, depositional environments and structural settings characterize the sequences. However, relatively small-scale events, such as changes in sea level, altered the depositional environment and created internal complexities within the sequences.

Figure 3.2 depicts the structural evolution associated with the Ellesmerian, Beaufortian and Brookian sequences.

### Franklinian oldest

The oldest rock sequence, the Franklinian, formed on a stable continental platform before middle Devonian time (about 400 million years ago). The sequence contains a wide range of rock types that include metamorphosed argillites, graywackes, quartzite, carbonates, and some local volcanics and granites. Some of the sequence may have formed on a passive margin sloping under a sea that deepened to the south. The Franklinian sequence is often considered non-prospective "basement" due to its high thermal maturity and generally poor reservoir quality. However, shows of migrated oil are common in basement penetrations along the Barrow Arch, and wells in the Point Thomson area have penetrated zones of permeable, vuggy and fractured dolomites — economic production from pools in the Franklinian

remains a possibility at some point in the future.

Franklinian sequence deposition ended across most of northern Alaska with a cycle of middle to late Devonian mountain building and metamorphism known as the Ellesmerian orogeny. Franklinian rocks became somewhat metamorphosed and highly deformed throughout the mountain belt. The continental uplands rapidly wore down to a low-lying, south-facing coastal plain that began to subside below sea level, accelerated in places by the formation of failed rift sub-basins such as the Meade and Ikpikpuk-Umiat sub-basins of NPR-A. The widespread eroded surface of Franklinian rocks formed a pre-Mississippian unconformity.

### Ellesmerian deposited from a landmass to the north

Ellesmerian clastic sediments, eroded from uplifted Franklinian rocks in the landmass that lay mostly to the north of the modern Beaufort Sea coast, spread southward and accumulated in coastal and marine settings of an ancient basin known as the Arctic Alaska Basin. This south-facing passive margin deposition characterized the Ellesmerian sequence and continued into early or middle Jurassic time.

Deposited in highly varied marine to non-marine settings over at least 150 million years, Ellesmerian strata constitute a diverse suite of clastic and carbonate formations. These formations include prolific petroleum source rocks, excellent reservoirs and strong seal units that collectively define a self-contained, world-class petroleum system.

From the center of the Colville Basin (see figure 3.1) the Ellesmerian thins southward because of the increasing distance from the source of the sediments; depositional onlap against the terrestrial landmass to the north combined with later uplift and erosion has also caused northward thinning of the Ellesmerian sequence.

# General Geologic Structure of Northern Alaska



**Figure 3.1** Alaska Department of Natural Resources, Division of Oil and Gas. "Oil and Gas Opportunities in Alaska, 2003"



**Table 3.1: The oil fields of the central North Slope**

Main field	Satellite field	Discovered	First production	Oil and gas play	Oil produced to Dec. 2004 (mmbbl)	Gas produced to Dec. 2004 (tcf) (1)	Estimate of ultimate recoverable oil (mmbbl) (2)
Prudhoe Bay		1967	1977	Barrow Arch Ellesmerian	10,698	48,187	13,281
	Aurora	1969	2000	Barrow Arch Beaufortian	11	47	-
	Borealis	1969	2001	Barrow Arch Beaufortian	30	27	-
	Orion	1969	2002	Topset Brookian	2.3	1.9	-
	Midnight Sun	1997	1998	Barrow Arch Beaufortian	11	40	-
	Polaris	1969	1999	Topset Brookian	3.5	4.0	-
West Beach		1976	1993	Barrow Arch Beaufortian	3.3	20	-
Niakuk		1985	1994	Barrow Arch Beaufortian	80	67	118.3
Kuparuk River		1969	1981	Barrow Arch Beaufortian	1,971	2,385	2,878
	Meltwater	2000	2001	Turbidite Brookian	7.6	17	44
	Tabasco	1986	1998	Topset Brookian	9.7	1.3	23
	Tarn	1991	1998	Turbidite Brookian	64	91	126
	West Sak	1969	1997	Topset Brookian	15	5.2	541
Milne Point		1969	1989	Barrow Arch Beaufortian	181	93	682 (3)
	Schrader Bluff	1969	1991	Topset Brookian	38	23	
Endicott (including Eider and Ivishak)		1978	1987	Barrow Arch Ellesmerian	437	1,854	582
Lisburne		1967	1982	Barrow Arch Ellesmerian	139	1,445	178
Alpine		1994	2000	Alpine	137	162	665 (4)
Badami		1990	1998	Turbidite Brookian	4.3	22	-
Point McIntyre		1988	1993	Barrow Arch Beaufortian	376	638	575

Table 3.1: The oil fields of the central North Slope: Cumulative production data from Alaska Oil and Gas Conservation Commission monthly reports.

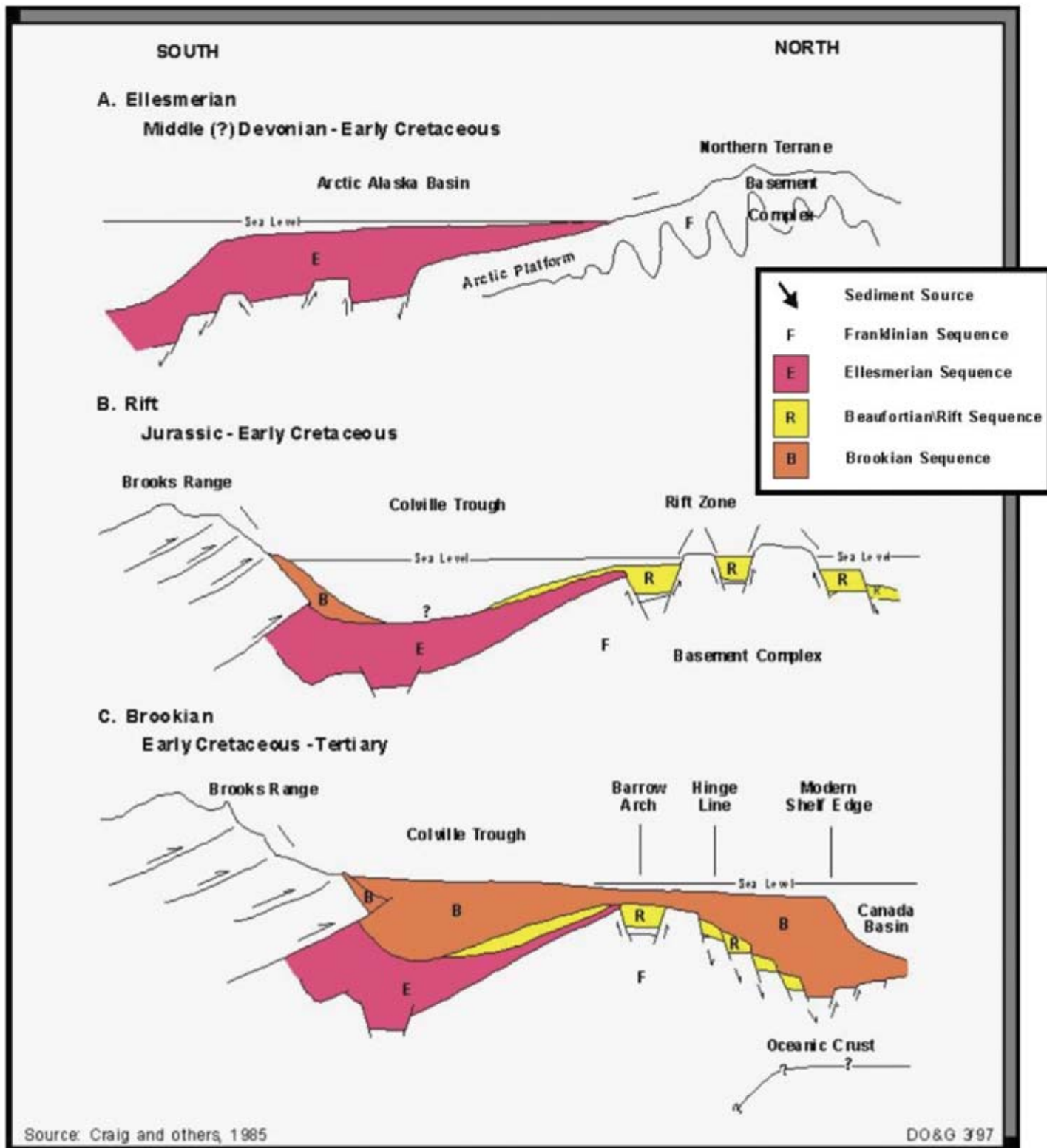
(1) Most of this gas is reinjected back into the reservoirs

(2) Cumulative production to December 2003 plus estimated reserves at December 2003 from Alaska Division of Oil and Gas 2004 annual report

(3) Includes Schrader Bluff estimated reserves

(4) Includes Colville River Unit satellites

## Structural Evolution Associated with the Ellesmerian, Beaufortian and Brookian Sequences

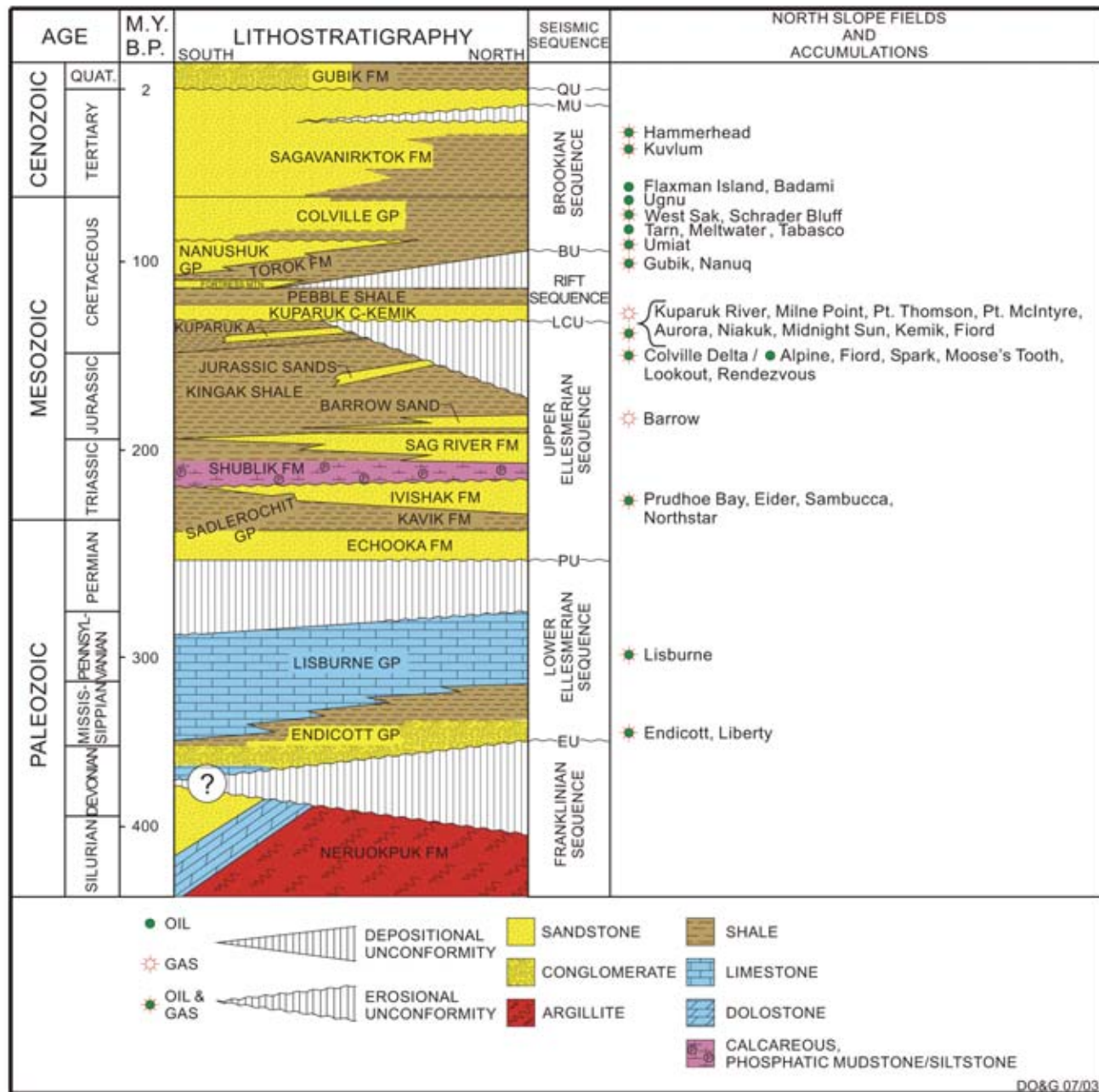


**Figure 3.2**

Alaska Department of Natural Resources, Division of Oil and Gas. "Oil and Gas Opportunities in Alaska, 2003"  
 Modified by Mapmakers Alaska, February 2005.



## General Stratigraphic Column for Northern Alaska



**Figure 3.3**

Alaska Department of Natural Resources, Division of Oil and Gas. "Oil and Gas Opportunities in Alaska, 2003"

### Rifting and the Barrow Arch

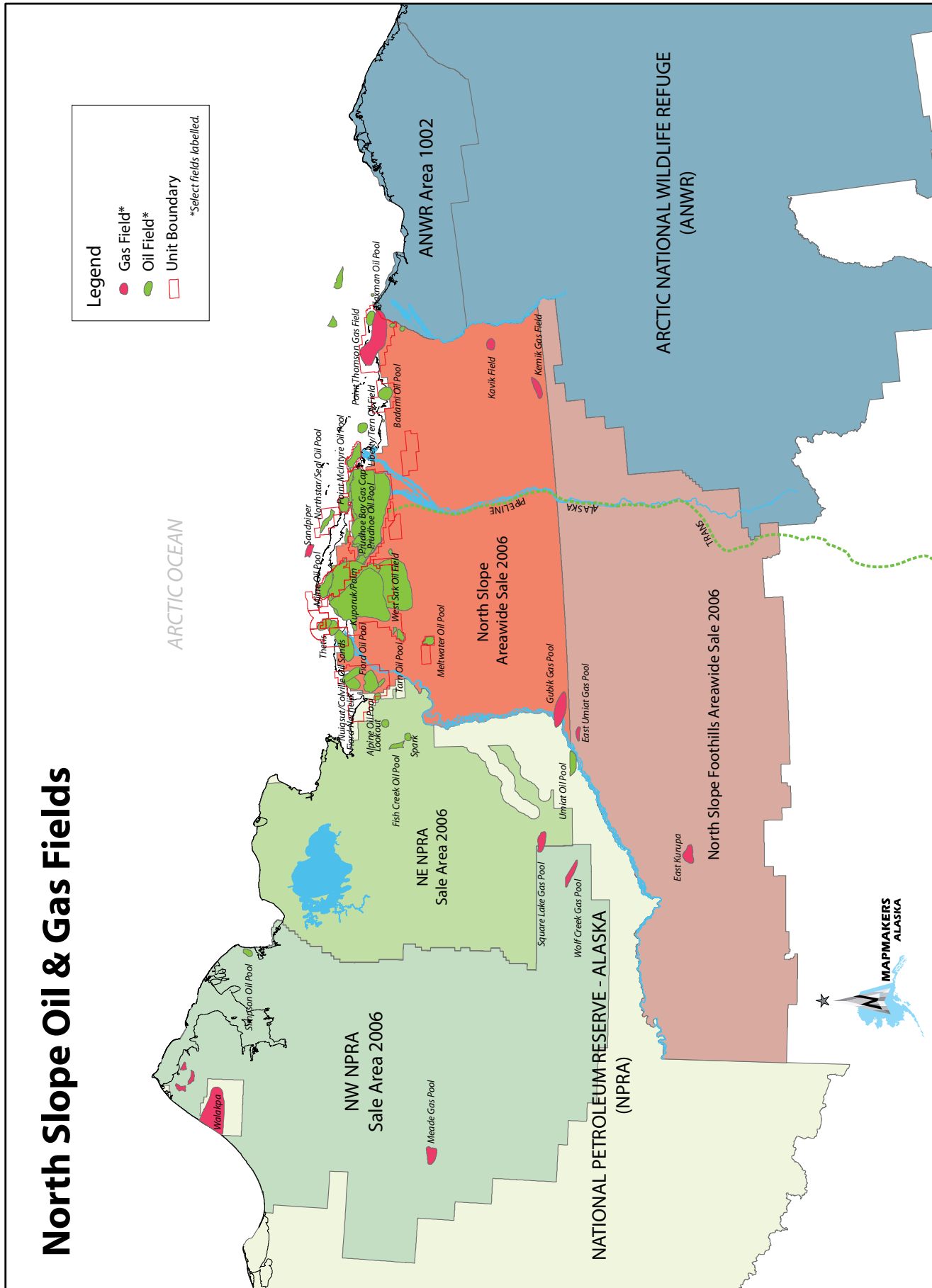
The Beaufortian sequence dates from between early to middle Jurassic and early Cretaceous and resulted from sediment deposition during major rifting or pulling apart of the earth's crust. People have proposed several hypotheses for this rifting. However, most geologists interpret the rifting as a result of the opening up of the Canada Basin of the Arctic Ocean by a counterclockwise rotational movement of

the North Slope Ellesmerian landmass away from equivalent platform rocks in Arctic Canada.

The east-west trending structural high known as the Barrow Arch developed along the present Beaufort Sea coast (see figure 3.1). According to the most widely accepted Beaufortian rift model the arch formed in multiple uplift phases. A system of rift grabens and plateaus that transition outboard into the oceanic crust of the

Canada Basin bounds the arch on its steep northern side. The less steep southern flank of the arch initially sloped very gently into the Arctic Alaska Basin.

Widespread surface erosion along the Barrow Arch probably occurred several times but culminated during the early Cretaceous to form an unconformity of regional east-west extent. The lower Cretaceous unconformity forms an important hydrocarbon migration and accumu-



**Figure 3.4** North Slope oil and gas fields. Alaska Department of Natural Resources, Division of Oil & Gas, July 2006. Prepared by Mapmakers Alaska, March 2007.



lation element for many of the oil fields on the North Slope, including the Prudhoe Bay field.

Most of the Beaufortian sediments eroding from the rising Barrow Arch likely drained off the gentle southern flank of the arch into the Arctic Alaska Basin, where they later became buried deep under the Colville Basin. Other erosion products from the Barrow Arch and from what is now Arctic Canada no doubt drained into the depths of the rift grabens on the north side of the arch.

Beaufortian sediments also accumulated in a variety of mostly shallow marine settings on the uplifted margin of the Barrow Arch. These sediments formed important sandstone reservoirs in subtle low points on the arch or perched on rift-related fault blocks stepping off the arch to the north. Key examples include the lower Cretaceous Kuparuk formation sandstones of the Kuparuk River and Point McIntyre fields and the upper Jurassic Kingak Formation sandstones of the Alpine field.

### The Colville Basin and the Brookian

Also in late Jurassic and early Cretaceous time the Brooks Range started to form, sending thick sheets of thrust-faulted rock to the north. These thrust sheets loaded and depressed the earth's crust and caused the Colville Basin to start to sink along the northern side of the range, between the range and the Barrow Arch.

Sediments eroded from the Brooks Range thrust sheets poured into the Colville Basin, progressively filling the basin by building a shelf platform from southwest to northeast and forming the Brookian sequence. Brookian sediments also spread out over the Barrow Arch and onto Alaska's continental margin during Cretaceous through Tertiary times.

In very general terms, the older, lower Brookian sequence sediments tend to consist of shales and sandstones deposited in water hundreds or thousands of feet deep. The rocks higher in the sequence typically consist of sandstones and shales associated with coastal plains, river deltas or other shallow-water environments. This transition through time toward progressively shallower deposition demonstrates the progressive filling of the Colville Basin.

While sediments filled the Colville Basin, the area of active sedimentation moved eastward. As a result the Brookian

rocks tend to become younger from west to east in the basin.

Nowadays Quaternary sediments cover the older bedrock along the North Slope. Most Quaternary deposits consist of unconsolidated sand and gravel, containing reworked Brookian sediments along with materials from the present day Brooks Range. Overlying these deposits are river-deposited silts and sandy silts that include variable amounts of organic matter. In addition to river deposits, wind-blown sands within the Quaternary sequence mark cold, dry Ice Age conditions.

Figure 3.3 shows a general stratigraphic column for northern Alaska.

## The central North Slope, including Prudhoe Bay and offshore state waters

More than 14 billion barrels of crude oil have passed through the trans-Alaska oil pipeline since oil first started flowing from the North Slope in 1977. Vast quantities of natural gas recovered from the oil fields have been pumped back into the reservoirs to maintain reservoir pressure and for future marketing.

The oil and gas originated from several prolific source rocks that occur in much of the area. These source rocks include the Triassic Shublik formation, the Jurassic Kingak formation and a Cretaceous unit called the Pebble Shale (see figure 3.3). Mississippian shales, mudstones and coals could also have sourced some of the hydrocarbons. The organic-rich Cretaceous Hue shale occurs near the base of the Brookian sequence and includes the gamma ray zone, a distinctive marker horizon in northern Alaska and a probable source of some of the oil in several North Slope oil fields.

The petroleum systems on the North Slope involve these multiple oil and gas sources interacting with several different reservoir and trap combinations. The subsurface geometry and thermal evolution has enabled oil and gas to selectively flow into traps, in some cases on multiple occasions. A 2005 USGS assessment of the central North Slope identified 24 oil and gas plays encompassing virtually all of the stratigraphic and structural elements of the North Slope geology. In fact, USGS views the whole region as one large petroleum system.

### Prudhoe Bay discovered in 1968

In 1968 the discovery of the giant Prudhoe Bay field, the first field to be discovered on the North Slope, triggered a North Slope oil industry that now includes 19 producing oil fields. Figure 3.4 shows the locations of the various oil fields on the North Slope. Table 3.1 lists some key information about the North Slope fields.

The main oil and gas pools in the Prudhoe Bay field lie in the Ivishak sandstones of the Triassic Sadlerochit group, a part of the upper Ellesmerian sequence (see figure 3.3). The Prudhoe Bay field involves an enormous combination trap at the crest of the Barrow Arch. From this crest the Sadlerochit and neighboring strata tilt gently to the south and southwest, but are cut off on their northern side by a steep east-west trending rift-related fault, and beveled off on the eastern side by erosion at the regional lower Cretaceous unconformity. Jurassic shales above the Sadlerochit and Cretaceous shales above the unconformity seal the reservoir. Figure 3.5 shows the general structure of the field.

USGS has in the past used the term Barrow Arch Ellesmerian play to classify this combination play, in which shales above the lower Cretaceous unconformity seal Ellesmerian carbonate or sandstone reservoirs on the Barrow Arch.

The increasing thermal maturity of rocks to the south of the Barrow Arch suggests that most of the oil and gas flowed up the south side of the arch into the Prudhoe Bay reservoir. In effect, the structure of the petroleum system has enabled the Prudhoe Bay reservoir to collect hydrocarbons from prolific source rocks from a wide area to the south.

The Prudhoe Bay field is the largest oil field in North America and is among the 20 largest fields ever discovered in the world. And for many years the size of the Prudhoe Bay field focused attention on seeking similar structures to the Prudhoe field along the Barrow Arch.

The Lisburne field, discovered at the same time as Prudhoe Bay, and the Endicott field, discovered in 1978, both involve the Prudhoe Bay-style Barrow Arch Ellesmerian play. The reservoir rocks for the Lisburne field consist of limestones and dolomites of the middle Ellesmerian Lisburne group. The Lisburne field underlies the northeast part of the Prudhoe Bay field, and shares the same combination trap. The reservoir for the

## The Geologic Setting of Prudhoe Bay Field

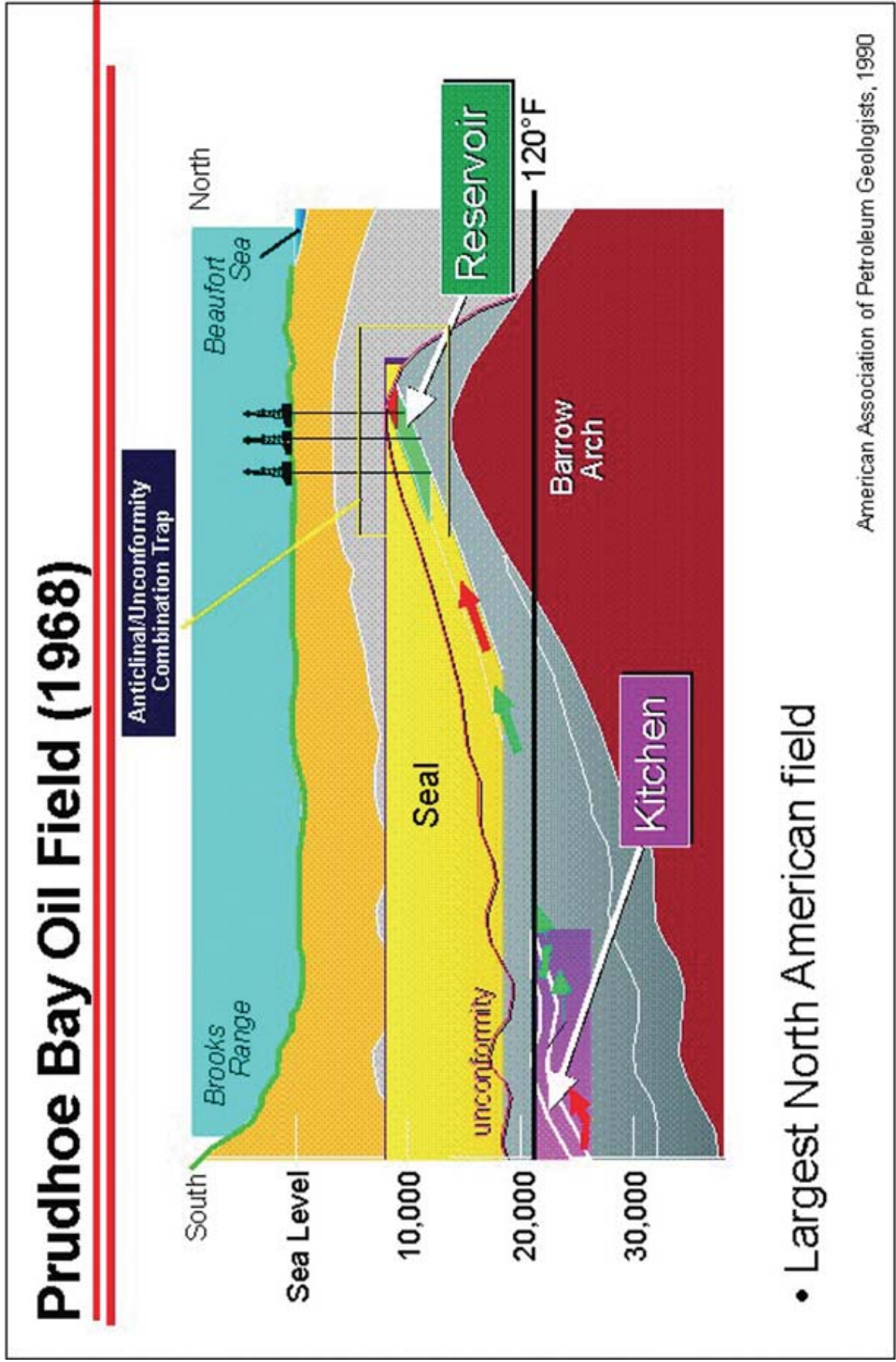
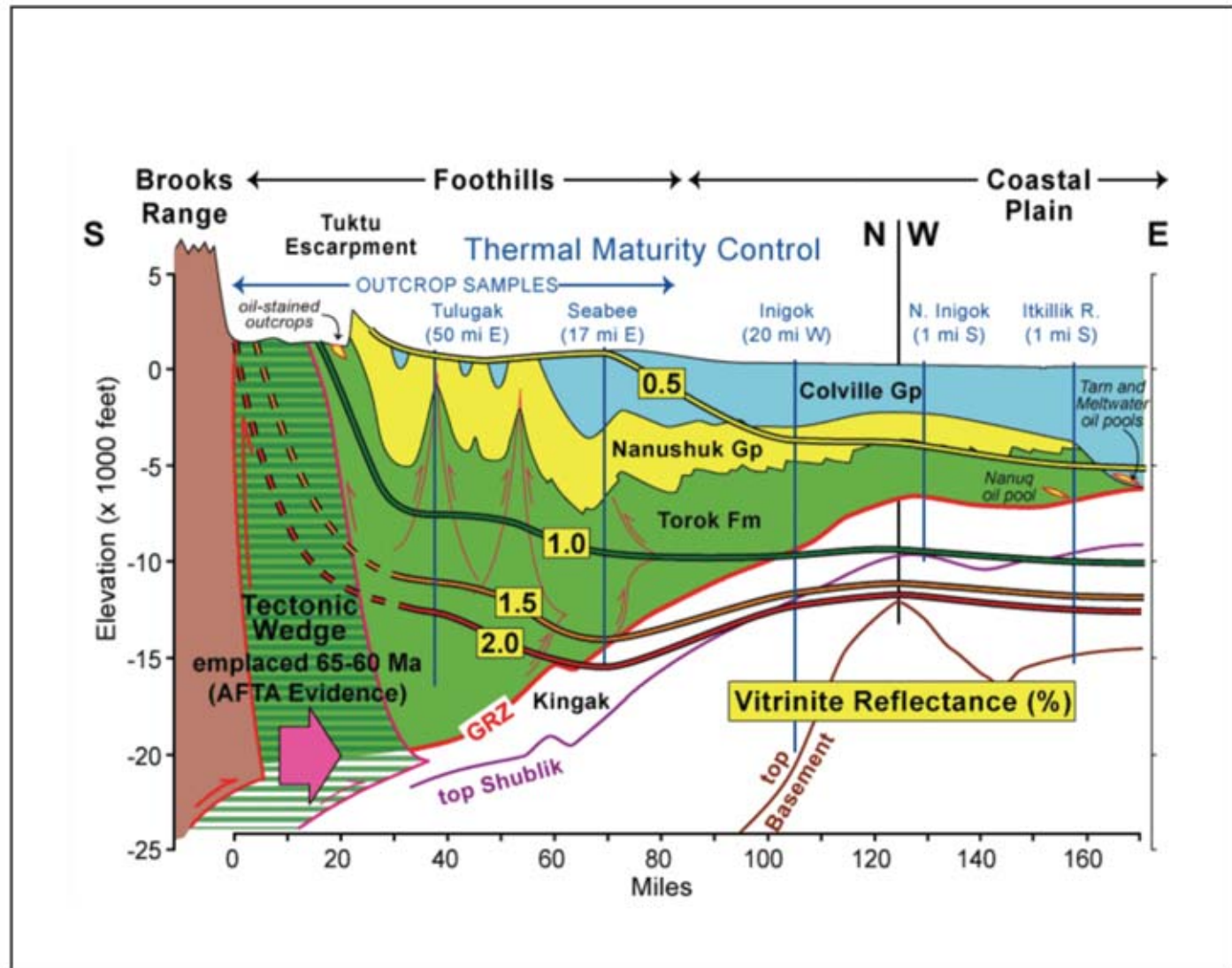


Figure 3.5  
 Source: American Association of Petroleum Geologists, John Armentrout, 1990.  
 (www.aapg.org/slide\_bank/amentrout\_john/074.ppt) Modified by Mapmakers Alaska 2005.



## A General North to South Cross Section of the Colville Basin



**Figure 3.6**

Source: <http://pubs.usgs.gov/of/2003/of03-039/fig3.htm>

Modified graphic resolution by Mapmakers Alaska, February 2005.

Endicott field consists of sandstone of the lower Ellesmerian Endicott group, trapped in a separate structural block northeast of the Prudhoe Bay structure.

### Kuparuk in Beaufortian sequence

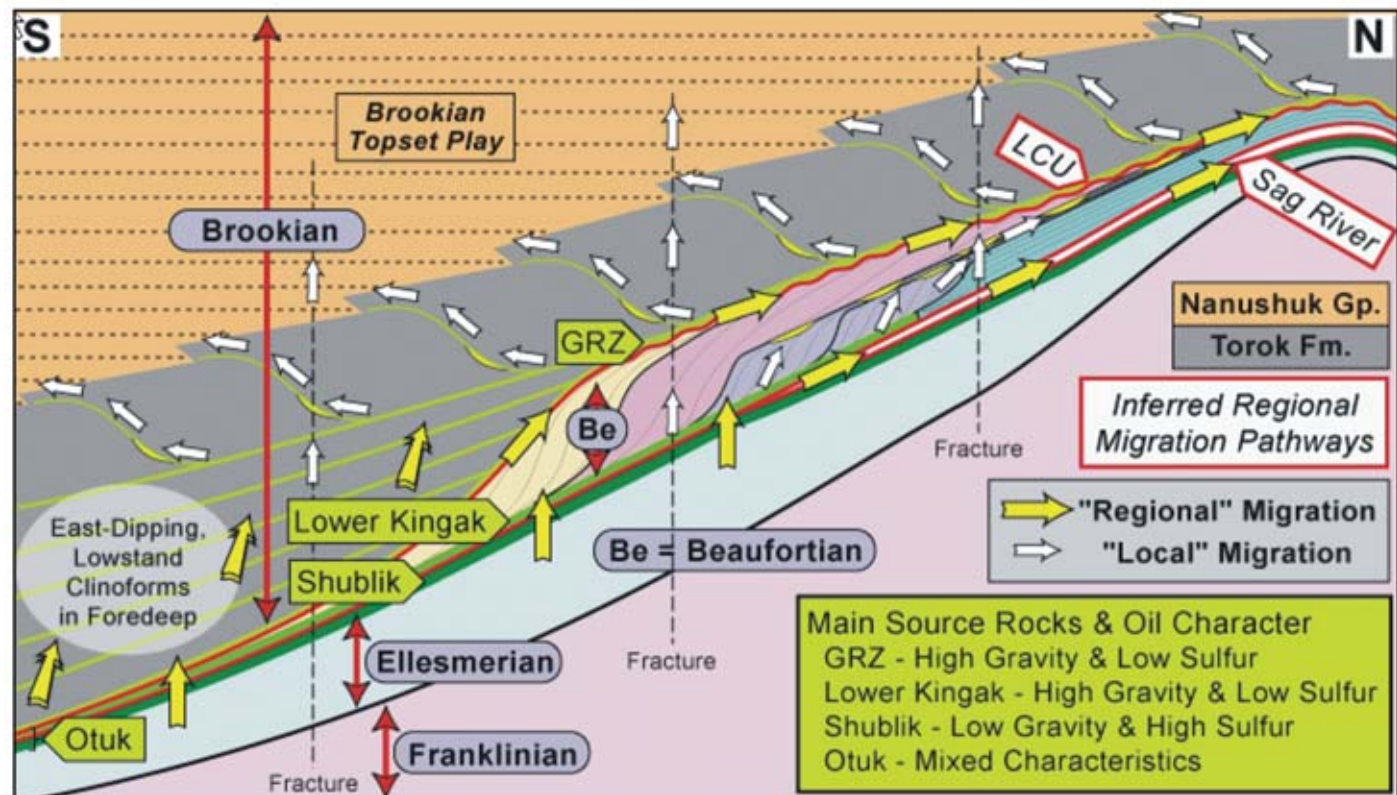
However, the Kuparuk River field, discovered little more than a year after Prudhoe Bay and now the second largest producing oil field in North America, has its main reservoir in the Kuparuk sandstones of the Beaufortian sequence. The Kuparuk reservoir is divided into upper and lower members by the lower Cretaceous unconformity. Each member further subdivides into sandstone zones

deposited during alternating cycles of rising and falling shorelines associated with the Beaufortian rifting.

USGS has designated the term Barrow Arch Beaufortian play for the oil and gas play associated with the Kuparuk River field. The play involves potential sandstone reservoirs that range in age from Jurassic to early Cretaceous and that lie along the Barrow Arch. The play thickness can range from 100 feet to nearly 2,000 feet. Faulting and folding combined with truncation of the reservoir rocks against the lower Cretaceous unconformity make this a combination structural and stratigraphic play.

The reservoirs of the Milne Point, Point McIntyre and Niakuk oil fields and of the Walakpa gas field south of Barrow are all associated with the Barrow Arch Beaufortian Play. The non-producing Point Thomson condensate and gas field is reservoired in lower Cretaceous sands just above the regional lower Cretaceous unconformity. The South Barrow and East Barrow gas fields and the non-producing neighboring Sikulik gas field are reservoired in older, possibly pre-rift, lower Jurassic sandstones. However, some assessments include these gas fields in the Beaufortian play.

## Petroleum System Operation in the Colville Basin



**Figure 3.7**

Source: <http://pubs.usgs.gov/of/2003/of03-039/fig5.htm>

Modified graphic resolution by Mapmakers Alaska, February 2005.

### Alpine a stratigraphic trap

The 1996 announcement of the discovery of the Alpine oil field in a purely stratigraphic trap in Beaufortian Jurassic sandstones under the Colville Delta led USGS to refine its Beaufortian oil and gas play scheme and introduce the more specific Beaufortian upper Jurassic topset play. Although the sandstone involved in this play tends to be rather fine grained, the light oil associated with the play combined with horizontal well completions has enabled good production rates. The success of the Alpine field has triggered a flurry of interest toward looking for similar stratigraphic plays on the North Slope rather than just looking for giant Prudhoe-style structures. The Fiord satellite field near the Alpine field and other announced discoveries nearby in NPR-A are associated with slightly older sandstones of this same play.

### Brookian turbidite play

Another pure stratigraphic play occurs in Cretaceous and Tertiary deep marine sandstones of the Brookian sequence. In this play, known as a turbidite play, ancient sands flushed off the shelf into water hundreds or thousands of feet deep were deposited as reservoir layers that became encased in much thicker marine shales. Oil has been found in the Brookian turbidite play at numerous locations and the play is associated with the Tarn, Meltwater, and Badami oil fields, and the Stump Island pool of the Point McIntyre field. Whereas performance at Tarn has far surpassed initial expectations, the complexity of the Badami reservoir has resulted in very disappointing flow rates from that field. The Nanuq satellite field near the Alpine field is also associated with the turbidite play.

A related play, the Brookian topset play, involves sandstone and conglomerate reservoirs deposited in shoreface, deltaic

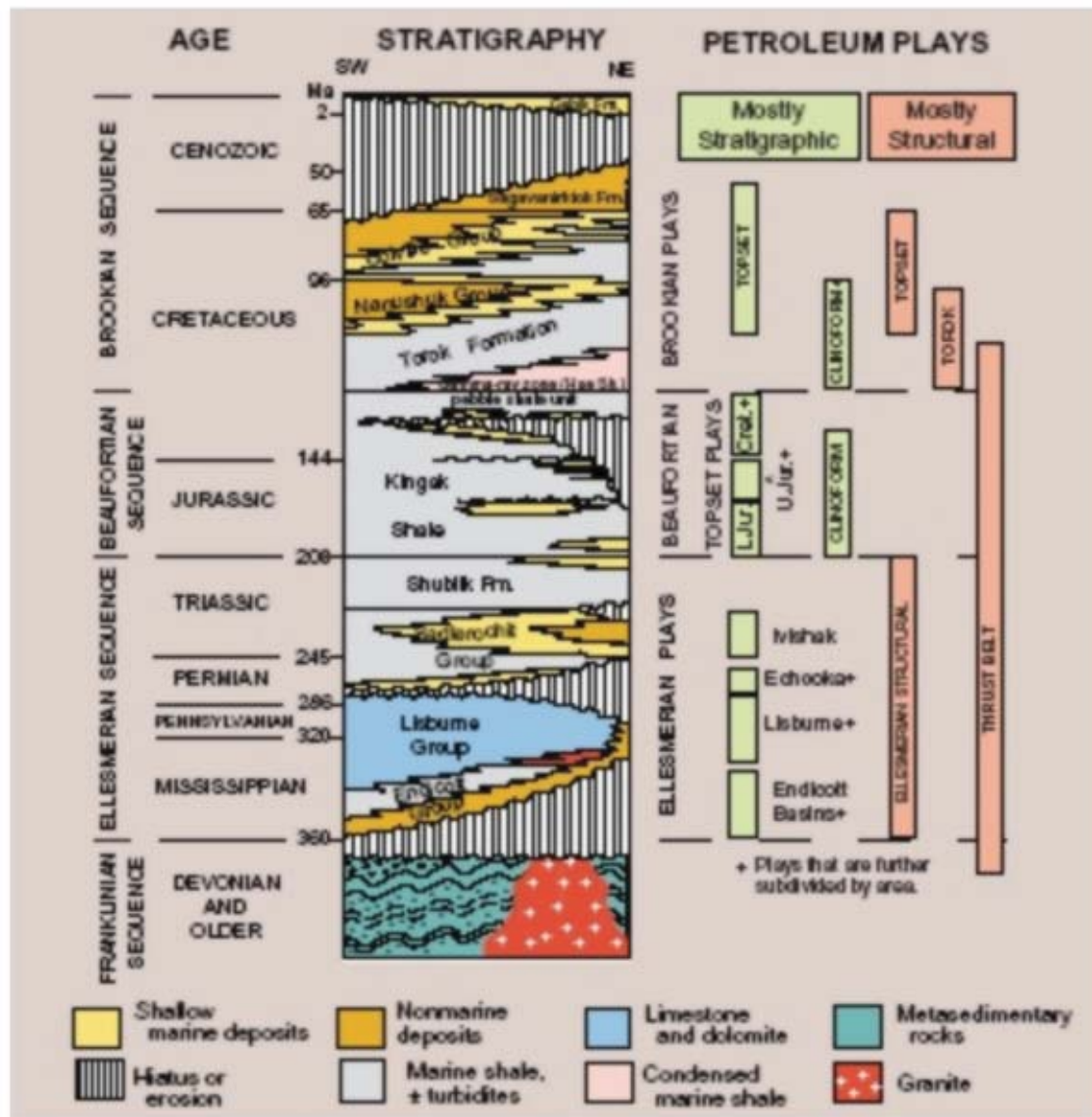
or other shallow water environments in the Cretaceous and Tertiary sediments. Thin sand bodies stacked between mudstones in the relatively flat-lying Brookian strata can contain hydrocarbons in structural or combination traps. Alternatively, if deposited during appropriate fluctuations of rising and falling shorelines, the sandstones and mudstones can form purely stratigraphic traps. The Tabasco pool in the Kuparuk River field is the best producer in this play and gas within this shallow depth play has been frozen into gas hydrates at some locations.

### Viscous oil

The enormous accumulations of viscous oil in the West Sak, Schrader Bluff, Orion, and Polaris pools occur in the topset play, directly over the Kuparuk River, Milne Point and Prudhoe Bay fields. Recent breakthroughs in multilateral directional drilling have made the development of these heavy oil deposits profitable: heavy oil from this type of accumu-



## Petroleum Plays in NPRA



**Figure 3.8**

Source: USGS Fact sheet 045-02 "2002 Petroleum Resource Assessment of NPRA," by Kenneth J. Bird and David W. Houseknecht.

lation is likely to constitute a significant proportion of North Slope oil production in the future.

In its 1995 resource assessment, USGS used the term Ellesmerian-Beaufortian clastics play to encompass a broad spectrum of sandstone reservoirs in the gently south-dipping Permian to early Cretaceous section to the south of the Barrow Arch. More recent USGS assessments have reassigned Beaufortian reservoirs to more specific plays, thus taking the older Ellesmerian-Beaufortian classification somewhat out of use. However, recent leasing and permitting activity and well testing announcements indicate that

industry has not exhausted the search for Triassic and older Ellesmerian reservoirs.

### Gas hydrates

There are known deposits of gas hydrates, estimated by USGS to contain as much as 100 tcf of natural gas, in Tertiary sandstones over the Prudhoe Bay, Milne Point and Kuparuk River oil fields. The hydrates occur in two trends, known as the Eileen and Tarn trends. And a broad area of gas hydrate stability under the permafrost of the North Slope suggests that there are gas hydrate deposits in other areas of the Slope as well.

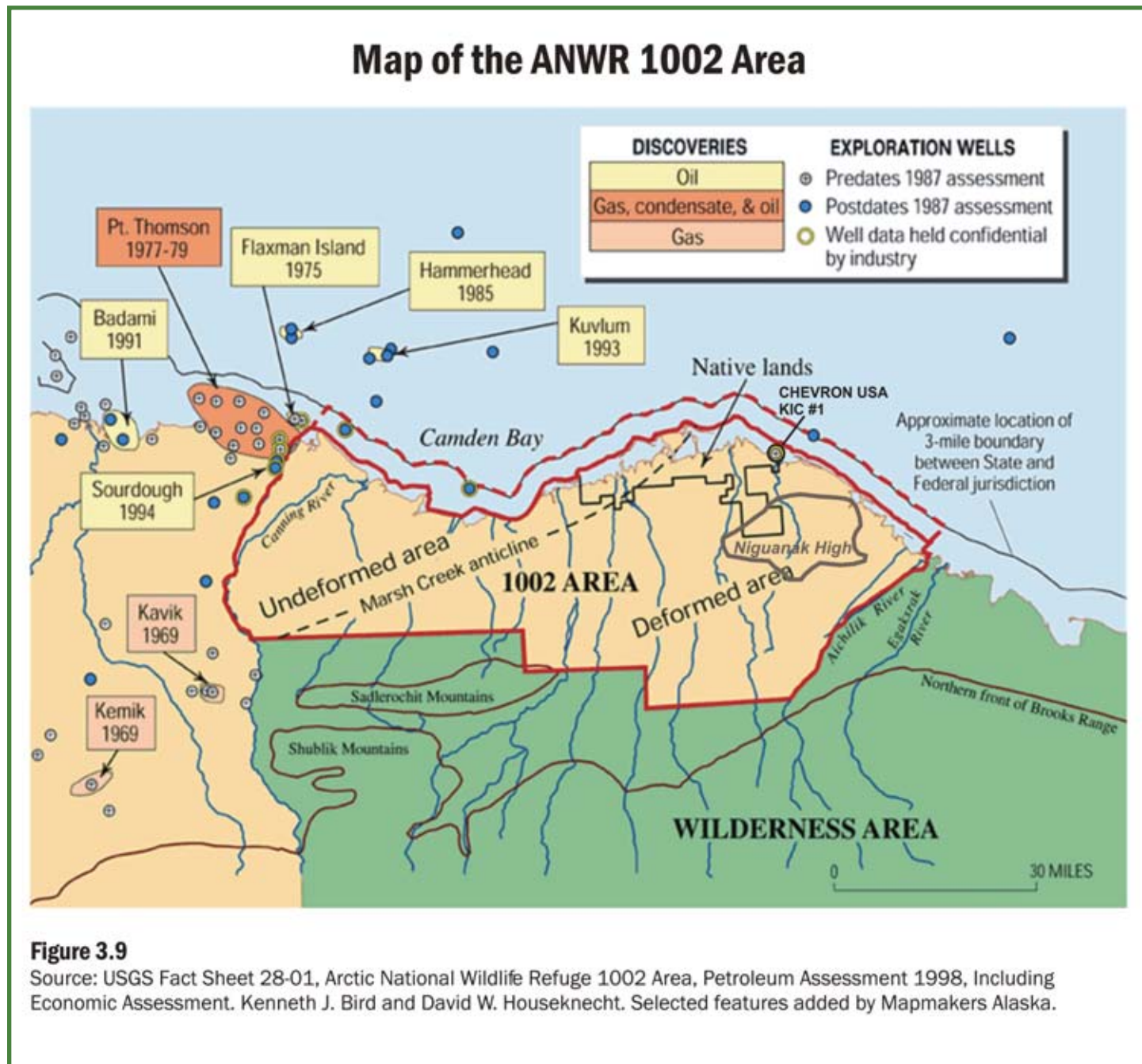
A team from industry, government and

industry is engaged in a multi-year project to investigate the commercial development of the North Slope gas hydrates.

Using subsurface data for areas where both free gas and hydrates are present, the team has modeled gas hydrate production rates that may be commercially viable, but this potential has yet to be demonstrated in practice. A 2007 stratigraphic test well in an Eileen trend prospect has confirmed the existence of gas hydrates predicted from seismic data.

### Plays lacking exploration

USGS has identified three other plays that so far have not been extensively



explored or yielded significant hydrocarbons. The Lisburne play involves potential carbonate or clastic reservoirs south of the Barrow Arch in the south-dipping middle Ellesmerian Lisburne group; trapping could be structural, stratigraphic or a combination of both. The Lisburne unconformity play involves stratigraphic traps at the regional Permian or lower Cretaceous unconformity at the top of the Lisburne group. The Endicott play involves sandstone or dolomite reservoirs in the Endicott group south of the Barrow Arch Ellesmerian play; traps would be combination structural and stratigraphic.

## The western North Slope, including NPR-A and offshore state waters

The National Petroleum Reserve-Alaska, or NPR-A, consists of a 23 million acre region at the western end of northern Alaska between the Beaufort Sea coast and the northern margin of the Brooks Range. The northern part of NPR-A lies within the coastal plain while the southern part straddles the Brooks Range Foothills belt.

People have long known of the petroleum potential of this huge land area — surface oil seeps and oil-stained rocks provide evidence of active petroleum systems. In 1923 President Harding established the area, then known as the Naval Petroleum Reserve No. 4, as a potential source of oil supplies for the U.S. Navy.

The U.S. government has conducted two exploration programs in NPR-A, one that led to several years of drilling by the U.S. Navy following World War II and one coordinated by USGS in the 1970s and 1980s. The earlier of these campaigns focused on exploring for strategic quantities of oil and gas, while the later phase



went to greater lengths to develop a detailed understanding of the geology of the area.

These programs resulted in more than 14,000 line-miles of seismic surveys and 126 exploration wells. In 1946 the U.S. Navy discovered a 70 million-barrel oil field at Umiat on the Colville River but no one has established a viable means of developing this field.

In 1985 ARCO drilled the Brontosaurus well to test a Sadlerochit prospect but the well proved dry.

The northeastern edge of NPR-A lies just south of the western extension of the Barrow Arch structure associated with the Prudhoe Bay field — a segment of the Barrow Arch in the Colville Delta area just east of northern NPR-A is referred to as the Colville High.

### Colville dominates NPR-A

The huge Colville Basin — filled with sediments of the Brookian sequence and then folded and thrust-faulted along its southern side by renewed Brooks Range compression — dominates the geology of NPR-A. Figure 3.6 depicts a general north to south cross section across the basin. Sediments of the Ellesmerian and Beaufortian sequences underlie the basin.

Figure 3.7 illustrates how the petroleum systems in and below the Colville Basin may have operated. Oil and gas sourced from the organic-rich source rocks flowed from south to north toward the Barrow Arch. These hydrocarbons may have charged a variety of stratigraphic and structural traps along the migration route and along the Barrow Arch.

In its 2002 assessment of the petroleum resources of NPR-A, USGS identified 24 petroleum plays. These plays cover the complete Brookian, Beaufortian and Ellesmerian sequences — figure 3.8 shows how, in general terms, these plays relate to the stratigraphic section. The plays include most of those that we've already discussed for the central North Slope.

In the northernmost part of NPR-A the Beaufortian rift trend contains a continuation of the Beaufortian stratigraphic and combination plays that are associated with several of the oil fields in the central North Slope. The discovery of the Alpine field in a Beaufortian stratigraphic trap near the coast just east of NPR-A has spurred renewed interest in exploration within NPR-A itself — stratigraphic plays in both the Beaufortian and Brookian

sequences in the area could yield large hydrocarbon accumulations fairly close to the existing oil and gas infrastructure.

Following a lease sale in 1999, industry drilled several exploration wells in northeast NPR-A. Some of these wells encountered oil and gas, including ConocoPhillips' Spark, Rendezvous and Lookout discoveries in the same play as the Alpine field. These discoveries contain light oil along with more gas and condensate than at Alpine and may point to a relatively high gas potential in NPR-A.

Brookian stratigraphic plays occur in the northern NPR-A within a Cretaceous Brookian trend that extends southward to central NPR-A. The relatively undeformed strata in this trend typically contain stratigraphic plays involving sandstone reservoirs. Some exploration wells in the trend have encountered oil shows and there are two small known oil accumulations at Fish Creek and on the Simpson Peninsula.

### Structural traps in southern NPR-A

In the southern part of NPR-A a fold belt trend underlies the Brooks Range Foothills. In this trend, northward pressure from the front of the Brooks Range has buckled the rocks into a series of long, narrow anticlines separated by broad synclines.

Folding of the Brookian strata in the fold belt gives rise to the potential for structural traps that are unlikely to exist further north. This Brookian structural play is associated with the Umiat oil field. Several other small accumulations have been discovered in the fold belt trend of NPR-A, but they contain mostly gas.

An overthrust belt trend at the extreme south of NPR-A marks the northern front of the Brooks Range. Folding and faulting within this trend have provided another possible play — the western thrust belt play. In this play thick Lisburne limestones and dolomites of the lower Ellesmerian sequence form potential reservoirs in structural traps. The discovery of some oil at the surface in porous Lisburne dolomites has confirmed the potential of this play. In addition, the East Kurupa well just south of NPR-A discovered gas in the lower Cretaceous Fortress Mountain formation.

The thermal maturity and organic composition of tested gas from the Brookian sequence and older rocks in northeastern NPR-A support the generation of oil. However, the higher thermal maturity and leaner organic content of Brookian rocks

in most of the foothills area points to the formation of natural gas rather than oil — most people consider the Brooks Range Foothills to be a gas prone province. However, evidence such as the Umiat oil field and oil-stained rocks at the surface hints at the existence of some oil, perhaps derived in part from Ellesmerian or Beaufortian source rocks.

## The eastern North Slope, including the coastal plain of ANWR and offshore state waters

At its eastern end the North Slope narrows to a north-south extent of 40 miles or less, as the northern front of the Brooks Range swings northeast to meet the Beaufort Sea coast near the Canadian border. This part of the North Slope forms the northernmost part of the 19 million-acre Arctic National Wildlife Refuge, commonly referred to as ANWR. Most of ANWR lies within the mountains of the Brooks Range, south of the coastal plain.

When the U.S. Congress established ANWR in 1980 Congress recognized the oil and gas potential of the coastal plain. As a result, section 1002 of the act establishing ANWR deferred a decision on the future management of the 1.5 million-acre coastal plain section of the refuge. The coastal plain section is now generally referenced as the 1002 area.

Seismic surveys conducted in the 1980s provide many of our current insights into the subsurface geology of the 1002 area — an extensive cover of Quaternary sediments obscures much of the bedrock in the area. However, excellent rock exposures in the mountains to the south, data from wells drilled on state lands west of ANWR and data from some offshore wells provide valuable information about the stratigraphy of the area.

### KIC well drilled in 1985-86

In 1985 and 1986 Chevron and BP drilled the KIC well in the 1002 area southeast of the village of Kaktovik. The KIC well remains the only well ever drilled inside ANWR but the findings from this well remain a commercial secret.

From what people know about the 1002 area it is clear that the geology closely resembles that of the rest of the North Slope. However, the proximity of



the Brooks Range front has caused the folding and faulting along this front to converge with the deformation associated with the opening of the Canada Basin and the deposition of the Beaufortian sequence. This convergence leads to some structural complexities not seen elsewhere in the region.

Geologists generally divide the 1002 area into a northwestern undeformed area and a southeastern deformed area (see figure 3.9). The deformed area represents a continuation of the Brooks Range fold and thrust belt that skirts the south side of the foothills to the west of ANWR.

Franklinian sediments, predominately carbonate rocks, sandstones and shales, form the base of the stratigraphic sequence. Spectacular exposures of more than 12,000 feet of Franklinian limestones and dolomites in the Sadlerochit and Shublik mountains of central ANWR have led to speculation that similar carbonate rocks could form oil reservoirs under the coastal plain.

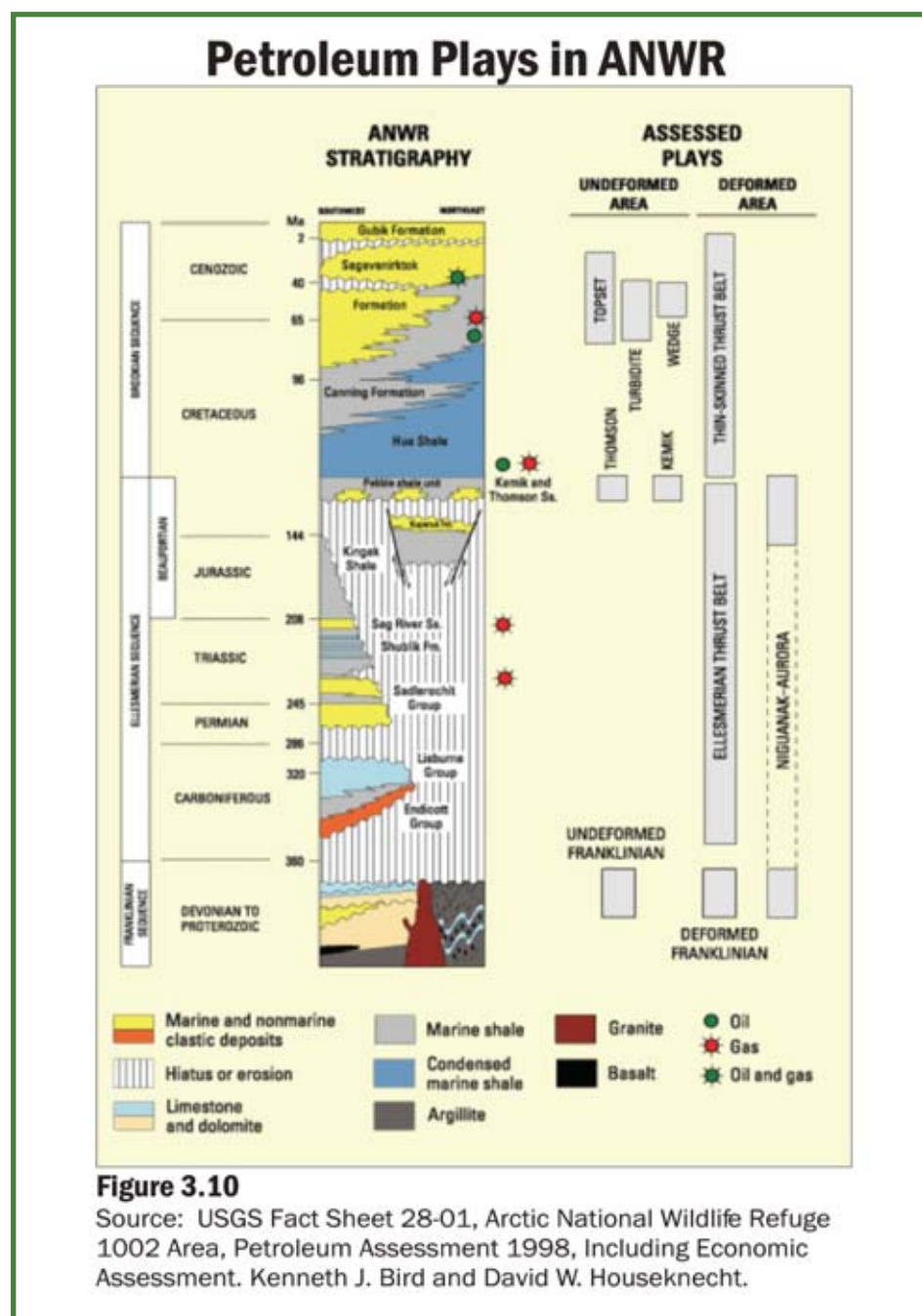
### Two Franklinian oil and gas plays

USGS has proposed two Franklinian oil and gas plays: the undeformed Franklinian play in the undeformed 1002 area and the deformed Franklinian play in the deformed 1002 area. These plays involve Brookian shales acting as both source and seal rocks.

Strata of the Ellesmerian sequence continue east from the central North Slope but erosion on the lower Cretaceous unconformity around the Barrow Arch has removed these units from much of the western part of the 1002 area. The same erosion also appears to have removed lower Beaufortian rock units and deposited the resulting detritus as the upper Beaufortian Kemik sandstone.

### Ellesmerian and Beaufortian plays

However, geologists have found the Beaufortian Kingak shale in the offshore Aurora well near the eastern end of ANWR and at a surface outcrop in the northeast of the 1002 area. These occurrences suggest the existence of Beaufortian and Ellesmerian sediments around two major structures, the Aurora structural high and the Niguanak dome, in the northeastern 1002 area. This structural and stratigraphic setting could prove similar to that of some of the major oil fields at Prudhoe Bay. However, there is considerable uncertainty about the existence of reservoir rocks and the timing of trap formation relative to oil generation and



**Figure 3.10**

Source: USGS Fact Sheet 28-01, Arctic National Wildlife Refuge 1002 Area, Petroleum Assessment 1998, Including Economic Assessment. Kenneth J. Bird and David W. Houseknecht.

migration. That uncertainty has led to debate regarding how much petroleum might exist in older rocks near the eastern end of the coastal plain, versus the younger Brookian rocks to the west.

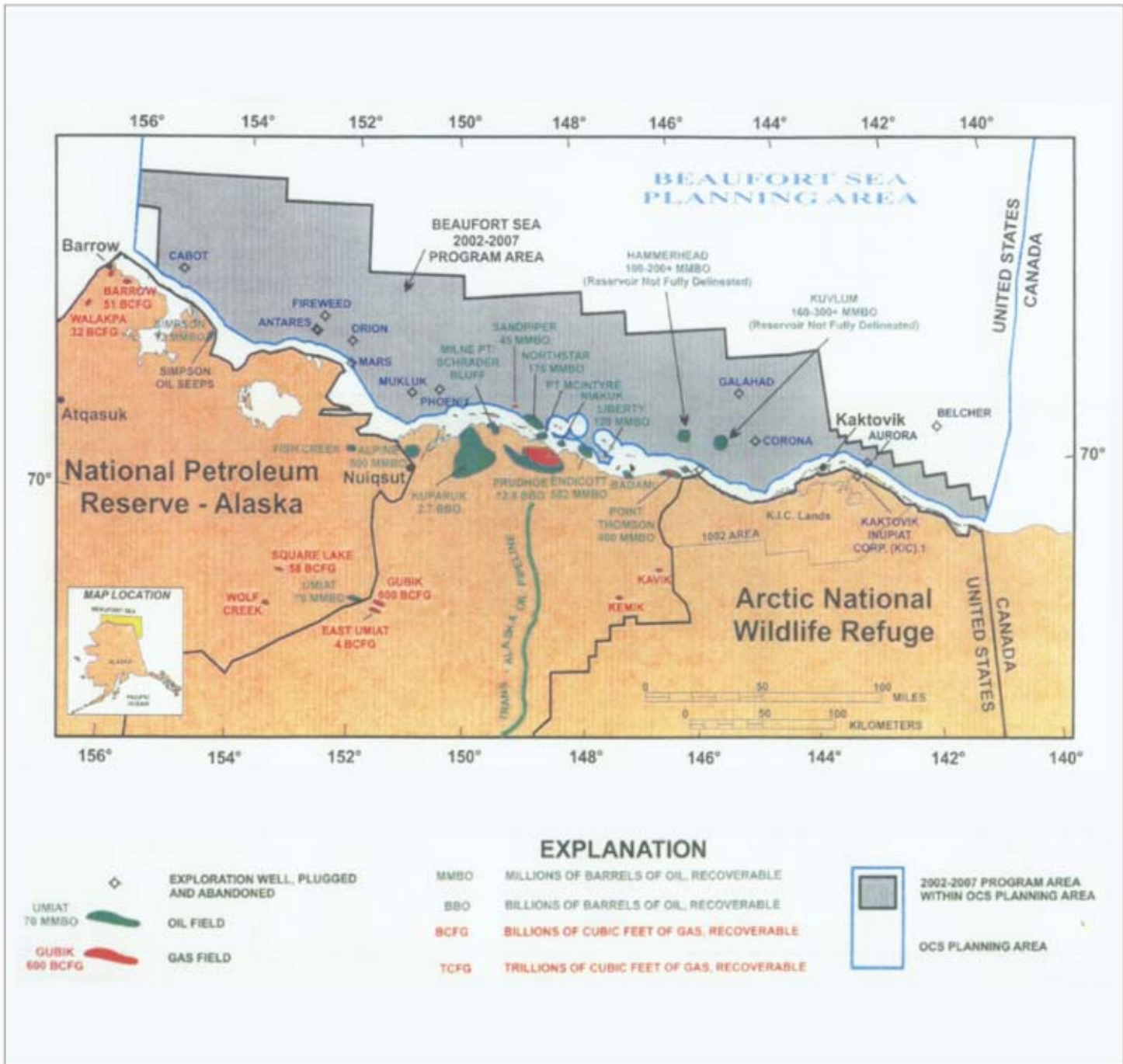
USGS uses the term Niguanak-Aurora play to identify the play that's associated with the Niguanak and Aurora structures.

Seismic sections in the south and southeast of the 1002 area depict up to 6,000 feet of Ellesmerian sediments and USGS has proposed an Ellesmerian thrust belt oil and gas play in these sediments. This play uses structural traps involving sandstones of the Sadlerochit group or Lisburne carbonates as reservoirs.

### Up to 30,000 feet of Tertiary

With the Colville Basin filling west to east, the 1002 area predominantly contains the younger elements of the Brookian sequence — seismic surveys have identified up to 30,000 feet of Tertiary fill under the center of ANWR's coastal plain. The Hue shale at the base of the Brookian sequence forms a well-established source of hydrocarbons. In the 1002 area marine sandstones and shales of the Canning formation overlie the Hue shale and include both potential source rocks and potential reservoir rocks. The thick Sagavanirktok formation at the top of the sequence consists predominantly

# Beaufort Sea Program Area



**Figure 3.11**

Source: US Minerals Management Service. "Exploring the Frontier-Alaska's Beaufort Sea". 2002  
 Layout modified by Mapmakers Alaska. February 2005.



of sandstones deposited in braided river, delta plain, and shallow marine environments.

USGS has identified several oil and gas plays within the Brookian of the 1002 area. The topset play and turbidite plays involve Brookian sandstones in the undeformed part of the area and are analogous to similar plays in the central North Slope. The thin-skinned thrust belt play in the Brookian of the deformed part of the 1002 area closely resembles the Brookian structural play in the Brooks Range Foothills.

A wedge play involves wedges of sediment observed in seismic surveys at the base of the Eocene. The Thomson play involves the Thomson sandstone, a potential reservoir rock found in wells in the Point Thomson area. The Kemik play proposes potential reservoirs in the Kuparuk equivalent Kemik sandstone.

Figure 3.10 summarizes the various plays proposed by USGS.

## The Brooks Range Foothills and overthrust belt

The Brooks Range Foothills, also referred to as the North Slope Foothills, extend in a broad east-west swath of territory north of the Brooks Range, from the Chukchi Sea to the western edge of the Arctic National Wildlife Refuge. East of the Canning River the foothills belt becomes less distinct and trends north and east to the Canadian border and under the Beaufort Sea. The overthrust belt of the Brooks Range front lies along the southern side of the foothills. The foothills and the overthrust belt together afford excellent opportunities to examine surface outcrops of rocks that lie deep underground elsewhere.

In recent years the foothills area has become a subject for detailed investigation by a team from the Alaska Division of Geological and Geophysical Surveys in collaboration with USGS and oil industry geologists. Near the North Slope haul road the team found potential reservoirs and source rocks in the lower Cretaceous Ellesmerian sequence, including organic-rich shales that correlate with the prolific Shublik formation — the Shublik is a primary hydrocarbon source in the central North Slope. To the east of the Haul Road the team found an organic-rich horizon that appears to be equivalent to the Hue shale source rock found throughout much

of northern Alaska. Oil-stained sands in the area provide tantalizing evidence that oil migrated through the rock units. Geologists have interpreted one oil-stained location about 40 miles south of Umiat as a pre-existing breached oil field.

The DGGs team has also found substantial outcrops of Ellesmerian Lisburne dolomites with reservoir potential.

A major part of the foothills belt lies within the southern part of NPR-A, so we've already discussed the main oil and gas plays in our overview of NPR-A.

The possibility of building a gas export line from the North Slope has spurred some renewed interest in the gas potential of the foothills. However, the DGGs-USGS team has found evidence of some oil-prone source rocks and perhaps the potential for oil accumulations at shallow depths — many unknowns remain about the true potential of this intriguing region.

## The Beaufort Sea OCS

The continental shelf of northern Alaska extends beneath the shallow Beaufort Sea for about 50 miles to a series of hinge-line faults that mark the edge of the Arctic Ocean continental slope. The geology of the continental shelf forms an extension of the onshore geology of the region — the Barrow Arch lies approximately along the coastline and strata of the Ellesmerian, Beaufortian and Brookian sequences all occur north of the Arch.

However, the existence of a pre-Cretaceous landmass to the north of the current Beaufort Sea coastline resulted in thinning and eventual disappearance of the Ellesmerian sequence within a few miles of the coastline. Extensive erosion of the Ellesmerian at the lower Cretaceous unconformity along the Barrow Arch further contracted the extent of the surviving Ellesmerian rocks.

Beaufortian rifting along the zone immediately north of the coast has resulted in deep basins that contain Beaufortian sediments.

Sediments of the Brookian sequence spilled northward over the Barrow arch on the north side of the Colville Basin from Cretaceous time onwards. These sediments poured all the way across the continental shelf and down the continental slope, especially in the late Cretaceous and Tertiary. The Brookian sediments attained thicknesses ranging from 3,000 to 10,000 feet west to east offshore near

the coast. However, thicknesses increase dramatically further offshore and reach 40,000 feet or more at the continental slope hinge line.

The Brookian stratigraphy north of the Barrow arch appears to be very similar to the stratigraphy within the Colville Basin. However, muds and turbiditic sandstones dominate the sediments lower down in the offshore Brookian sequence. Wells in the Canadian sector of the Beaufort have found excellent Brookian reservoir sandstone. But two wells in the U.S. sector north of ANWR found mud-dominated Brookian sediments with little sandstone.

### MMS: Fourteen oil and gas plays

The prolific source rocks that occur under the North Slope should extend through much of the offshore province — source rocks include the Shublik formation, the Kingak shale, the Pebble Shale and the Hue shale. Under the Beaufort Sea continental shelf there are many reservoirs and traps that could hold hydrocarbons — MMS has identified 14 oil and gas plays. Many of these plays correlate with plays already discussed in the sections on the central North Slope, NPR-A and ANWR.

In the Beaufort Sea the Ellesmerian plays lie in a narrow zone close to the coast, while the Beaufortian and Brookian plays extend much further out to sea. Brookian turbidite plays may contain particularly thick sandstone reservoirs along the continental slope hinge line.

The Brookian fold belt play associated with the Brooks Range Foothills occurs offshore just north of ANWR, north of where the Brooks Range front meets the coast.

In addition to the Ellesmerian, Beaufortian and Brookian plays, MMS has identified a play that involves pre-Mississippian carbonate reservoirs with oil sources in overlying shales. This play is equivalent to the Franklinian plays that USGS geologists have proposed near the Point Thomson field and in ANWR.

### Beaufort Sea exploration started early

Exploration in the Beaufort Sea dates back to the early years of central North Slope development and exploration, with the Tern (later named Liberty) and Endicott fields being discovered in 1977 and 1978 respectively.

The state and the U.S. Minerals Management Service held a joint lease sale in 1979. Since then 30 exploration



wells have targeted prospects in a range of plays from Ellesmerian to Brookian. Although an early well, the Mukluk well in Harrison Bay, achieved the dubious distinction of becoming the most expensive dry hole in history, several of the wells met with success: some good sized oil accumulations are now known to exist under the Beaufort Sea.

The 202 million-barrel Northstar oil field (formerly known as Seal Island) just north of Prudhoe Bay went into production in 2001. Northstar produces oil from the Ellesmerian Ivishak formation that forms the main reservoir at Prudhoe Bay. Rift-related fault blocks on the northern flank of the Barrow Arch trap the reservoir sand.

BP Exploration (Alaska) is evaluating the economics of developing the 120 million barrel Liberty field just east of the Endicott field. The reservoir for Liberty is in the same Ellesmerian Endicott group that contains the reservoir for the Endicott field.

There are three other undeveloped fields in the Beaufort Sea: the 100 million to 200 million barrel Sivulliq field (previously known as Hammerhead), the 160 million to 300 million barrel Kuvlum field and the 20 million to 70 million barrel Sandpiper field. Sivulliq and Kuvlum are reservoired in upthrown fault block traps in Brookian sediments north of the western end of ANWR while Sandpiper occupies the Sadlerochit reservoir in a series of rift fault blocks farther northwest, on the same trend as Northstar.

Figure 3.9 shows the locations of oil fields and exploration wells on the Beaufort Sea outer continental shelf.

## The Chukchi Sea

With huge geologic structures that correlate with the hydrocarbon-rich geology on the mainland of northern Alaska, the rocks under the Chukchi Sea contain all of the necessary ingredients for a world-class oil and gas province. It's even possible that there's a Prudhoe Bay scale of oil field in the area.

Deformed Franklinian rocks form the basement under most of the Chukchi Shelf, although an area of relatively undeformed Franklinian sediments lies under the northeastern sector of the shelf.

### The Hanna Trough

A basin called the Hanna Trough domi-

nates the geology of the central part of the Chukchi Sea shelf. The Hanna Trough forms a continuation of the onshore Arctic Alaska Basin, in which the Ellesmerian sequence accumulated (see figure 3.1). The Hanna Trough arcs around from the east-west alignment of the Arctic Alaska Basin onshore to a near north-south alignment under the Chukchi Sea (see figure 3.10). The Chukchi platform lies to the west of the Hanna Trough while the Arctic Platform lies to the east. A structural high termed the Herald Arch marks the present southern boundary of the trough. To the north the Hanna Trough disappears under the deep North Chukchi Basin, a subsiding area of thick sediments extending west from the Beaufort Sea continental shelf.

The Ellesmerian sediments in the Hanna Trough appear to include all of the major stratigraphic units that occur onshore. However, the character of some of the sediments under the Chukchi may differ from their onshore equivalents.

### The Beaufortian and Brookian

The North Chukchi Basin started to form as part of the rifting associated with the opening of the Canada Basin of the Arctic Ocean. This rifting event also caused the deposition of sediments within sunken faulted blocks across the Chukchi shelf. These sediments form the broad equivalents of the Beaufortian sequence found onshore, although the age span of the rift sequence offshore differs slightly from the onshore Beaufortian sequence.

The Barrow Arch extends northwest into the northern sector of the Chukchi Sea and the Colville Basin extends west over the southern part of the Hanna Trough. The extensive deposition of Colville Basin sediments on top of the Ellesmerian sequence in the underlying Hanna Trough has resulted in a total thickness of more than 38,000 feet of sediments in some places.

Under the Chukchi Sea a major unconformity separates the early Cretaceous and Tertiary components of the Brookian sequence. Seismic interpretations published by MMS show the unconformity as a surface marked by locally pronounced erosion of folded and faulted lower Brookian, Beaufortian, and Ellesmerian strata. Upper Brookian sediments fill what appears to be a giant canyon in lower Brookian sediments over the northern section of the Hanna Trough.

The fold belt that's associated with the Brooks Range Foothills extends west into the southern portion of the Chukchi Shelf, where huge fold structures trend southeast to northwest. The fold belt contracts and terminates to the west near the maritime border between the United States and Russia.

### MMS: hundreds of pools

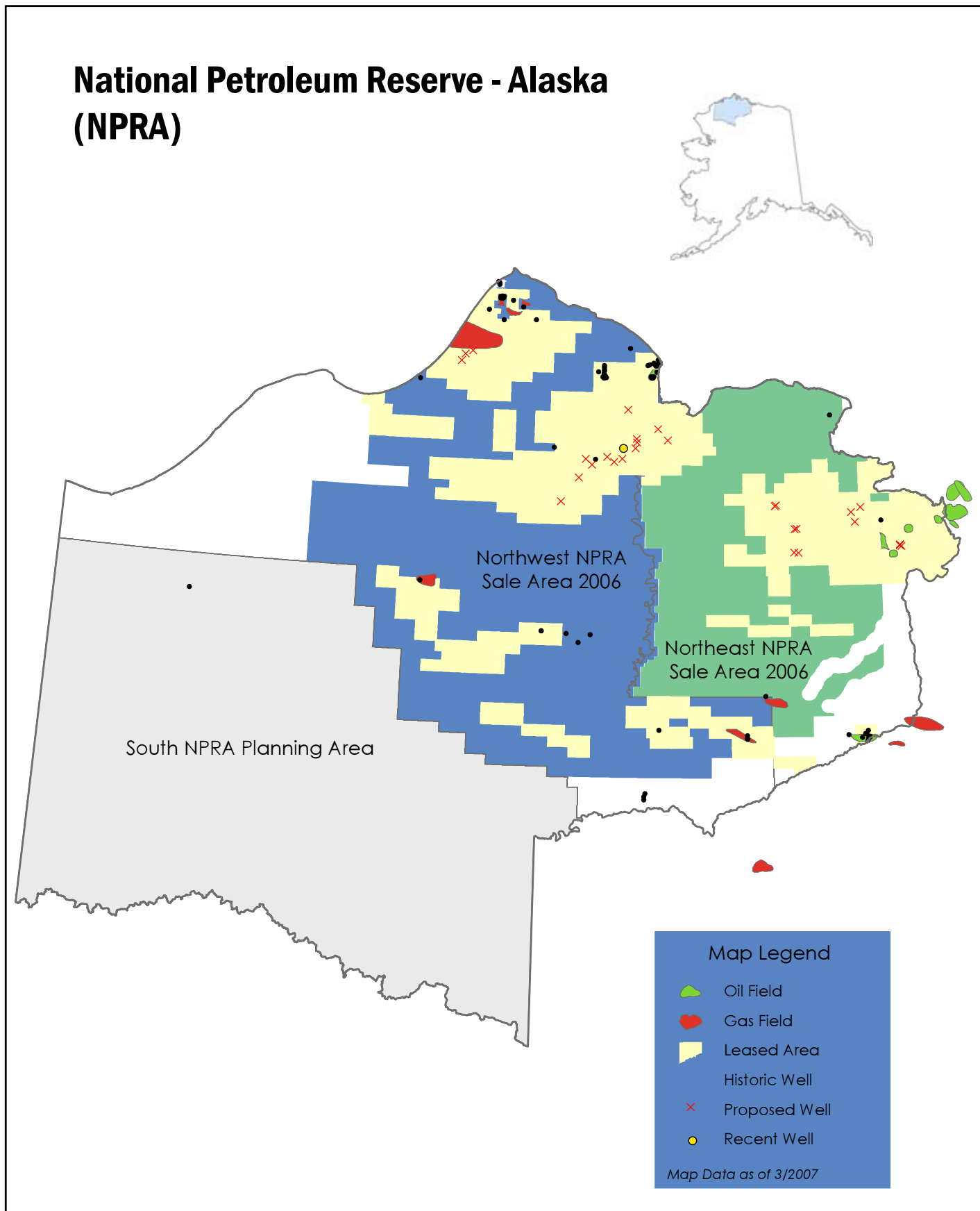
The abundance of potential source rocks, reservoirs and traps under the Chukchi Sea has enabled MMS to estimate that hundreds of hydrocarbon pools exist in a wide variety of plays involving the Ellesmerian, Beaufortian and Brookian sequences.

However, the remote location, sea ice and extreme climate deter exploration of the Chukchi — the high exploration and development costs and risks make sustained high oil prices a necessity for viable development of the area.

Between 1989 and 1991 a group of companies led by Shell did drill five exploration wells in the Chukchi, focusing on structures with similar features to the North Slope oil fields. One well, the Klondike well, drilled into a 1,000-foot section of rocks correlative to the Sadlerochit group that includes the main reservoirs at Prudhoe Bay. Unfortunately, this well found that the Sadlerochit under the central to southern part of the Chukchi consists mainly of shale rather than reservoir-quality sandstone. As in the Arctic Basin onshore, however, the Sadlerochit and other Ellesmerian clastic units typically exhibit better reservoir quality closer to the ancient landmass in the north of the area.

But all of the wells encountered some hydrocarbons and one well, the Burger well, found natural gas in a Kuparuk-equivalent sandstone reservoir 25 miles in diameter. MMS estimates this accumulation contains somewhere between 8 trillion and 27 trillion cubic feet of recoverable gas and between 31 and 1700 million barrels of condensate, with most likely values of about 14 trillion cubic feet of gas and 724 million barrels of condensate. The Klondike well found very thick Triassic source rocks largely equivalent to the prolific Shublik formation of the North Slope. Several of the wells encountered thick, high-quality reservoir rocks: 575 feet of Permian sandstone in the Diamond well and 540 feet of Paleocene sandstone in the Popcorn well.

A future exploration program in the Chukchi probably needs to focus on looking at the area on its own merits, rather



**Figure 3.12** National Petroleum Reserve Alaska (NPRA). Proposed wells for 2006. Sources: US Geological Society, US Bureau of Land Management, Alaska Oil and Gas Conservation Commission, and Alaska Department of Natural Resources, Division of Oil and Gas. Prepared by Mapmakers Alaska. March 2007.

Akita-Doyon Arctic Wolf Rig drilling the Amaguq No. 2 well in NPR-A in the winter of 2006-07 for operator FEX L.P., a subsidiary of Talisman Energy. Petro-Canada Alaska was a minority partner in the well.



COURTESY TALISMAN

than trying to find Prudhoe Bay look-alikes. For example, there may be as much as 20,000 feet of untested stratigraphic section below the deepest rock units drilled in the 1990s.

## Current exploration focus in northern Alaska

Over the last two decades, exploration on the North Slope has shifted away from prospecting for fields akin to Prudhoe Bay in size and configuration. This change has resulted not only from the fact that large traps of that type have been virtually exhausted, but also because better seismic data are available now for defining a large number of smaller, subtler traps.

In general terms, people widely recognize the petroleum systems of northern Alaska as hydrocarbon-rich but reservoir-poor. So, with an abundance of excellent source rocks and a relative shortage of reservoir-quality rock formations, any isolated stratigraphic trap stands a good chance of containing oil or gas. Recent exploration has exploited the newfound capabilities of high-end 3-D seismic techniques to find these stratigraphic traps.

Most of the hottest recent plays have either targeted Beaufortian shallow marine reservoirs or Brookian deepwater turbidites. The Beaufortian plays include the longstanding Kuparuk sandstones, particularly upper member sands above the lower Cretaceous unconformity. The high-performance reservoir of the Palm discovery on the western edge of the Kuparuk field led to the construction of a new drill site and expansion of the Kuparuk River Unit. This development serves as a reminder of how profitable exploration success close to the existing infrastructure can become.

But it was the discovery of unexpectedly prolific upper Jurassic sands at Alpine that opened the door to extending the Beaufortian play beyond the Prudhoe-Kuparuk infrastructure. Perched on the border between state lands and NPR-A, Alpine drove the decision to reopen federal acreage of the western North Slope to exploration. Figure 3-12 shows recent and historic drilling in Northeast NPR-A (as of Feb. 2, 2005).

### Alpine equivalents in NPR-A

Most of the wells drilled in NPR-A since the renewal of leasing there in 1999 have tested Alpine-equivalent prospects and have yielded discoveries of light oil, condensate,

and gas — the Spark, Rendezvous, and Lookout accumulations lie in stratigraphic traps overlooked before the advent of 3-D seismic imaging.

Exploration interest in Brookian turbidite reservoirs mushroomed in the mid-1990s with successful tests of the mid-Cretaceous Tarn sands and an optimistic move to commercialize the earlier discovery of oil in Paleocene sands at Badami. Exploration 3-D surveys began to carpet not only the areas flanking known production, but increasingly extended to areas where potentially productive trends could be extrapolated using 2-D data. In the eastern North Slope, BP and partners added turbidite oil reservoirs at Sourdough and Yukon Gold to the previous find at Flaxman Island as potential satellites to the Point Thomson field.

Unfortunately, development drilling at Badami confirmed earlier hints from both seismic and well data that the sands of its turbidite reservoir were less continuous and more highly compartmentalized than hoped. Production there has never lived up to design expectations. Other eastern North Slope turbidite stratigraphic traps have not been evaluated in detail, and may well have better potential.

In contrast to Badami, delineation and



development drilling at the Tarn field turned out surprisingly well. The Tarn reservoir includes thicker and much more laterally continuous sand layers. This discovery confirms that in the right setting Brookian turbidite reservoirs can prove extremely profitable. As a result there's been a rush of exploration leasing along a north-south trend targeting equivalent and similar-aged Brookian prospects. Subsequent discoveries of turbidite oil fields at Meltwater and Nanuq have both led to development.

Recent exploration of the Brookian turbidite sand play has continued, although apparently without much success, with drilling at the McCovey prospect offshore near Reindeer Island, the Heavenly and Grizzly wells south of Kuparuk and the Hunter well in NPR-A. Exploration permitting activity for more locations in NPR-A suggests that people continue to evaluate the play in the western North Slope.

### Nikaitchuq: Sag River discovery

Kerr-McGee and partners announced in 2004 the discovery of oil-bearing Ellesmerian Sag River sandstones in the Nikaitchuq unit north of the Kuparuk field. Long known but perhaps under-appreciated as a relatively thin, fine-grained, lower performance reservoir in the Prudhoe Bay field, the Triassic Sag River sands prove to be better reservoirs farther north in depositional settings closer to the ancient shoreline. Explorers on the North Slope must weigh such geological arguments for chasing reservoir sands to the north against the abruptly higher economic barriers they face as they look offshore toward the Beaufort Sea. The economics of these plays would improve if accompanied by tandem development of shallower productive zones.

The economically robust but declining fields onshore at Kuparuk River, Milne Point, and Prudhoe Bay are now seeing commercial uplift from development of viscous oil in shallow West Sak and Schrader Bluff reservoirs of the Brookian topsets. Likewise, smaller Beaufortian and Ellesmerian discoveries such as Oooguruk and Nikaitchuq just offshore may prove to have co-developable resource potential in Brookian topset and turbidite reservoirs.

### Beaufort and Chukchi Seas

Sustained high oil prices in 2005/2006, coupled with forecasts of continued upward price pressure and the emergence of new offshore exploration and development technologies, have encouraged a resurgence of interest in exploration on the

### Credits

Paul Decker of the Alaska Department of Natural Resources, Division of Oil and Gas, Dave Houseknecht of the U.S. Geological Survey and Kirk Sherwood of the U.S. Department of the Interior's Minerals Management Service all contributed material to this chapter. Paul Decker wrote the section on the current exploration focus.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.

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outer continental shelf of the Beaufort and Chukchi Seas. Shell led the charge in the Beaufort Sea with its purchase of a broad swathe of leases, including the Sivulliq field, in the U.S. Minerals Management Service's 2005 Beaufort Sea lease sale. ConocoPhillips also purchased a substantial lease position

in that sale.

Since the Beaufort Sea sale both Shell and ConocoPhillips have shot 3-D seismic in the Chukchi Sea in preparation for an MMS lease sale there. And Shell has moved ahead with its plans for an aggressive drilling program in the Beaufort Sea. ■

PETROLEUM NEWS, WEEK OF FEB. 25, 2007

# Shell building legacy

*Alaska 2007 program takes shape; environment, communities high priorities*

By ALAN BAILEY  
Petroleum News Staff Writer

A flurry of government regulatory filings and announcements in February provides the most visible sign that the clock is ticking toward 2007 field activity in Shell's exploration program for offshore northern Alaska. And on Feb. 21 Petroleum News asked Rick Fox, Shell's asset manager for Alaska, about the company's exploration plans and its vision for its Alaska operations.

"Our company has a proud legacy here," Fox said, referring to Shell's history of exploration in the state. Shell left Alaska in 1998 after more than 40 years of activity in the state that included exploration in the Beaufort Sea, the Chukchi Sea, the Bering Sea, and the discovery of the Beaufort Sea's Northstar and Liberty fields.

"We drilled four out of the five wells that have been drilled in the Chukchi and participated in most of the wells that were drilled in the offshore Beaufort," Fox said.

Fox himself was involved in Shell exploration activities in the Bering, Beaufort and Chukchi seas in the 1980s.

Now, high oil prices and the availability of new oil and gas technologies have attracted Shell back to the Alaska offshore regions, Fox said.

## Two fronts

Fox characterized Shell's current Alaska initiatives as pursuing two fronts — investigations that focus on finding new prospects, including the preparations for future lease sales, and work associated with known prospects. Work on the first of those fronts involves the acquisition of 3-D seismic data, while work on the second front primarily involves exploration drilling and drilling preparations.

Shell hopes to acquire 3-D seismic from both the Chukchi and Beaufort Seas in 2007, depending on sea ice conditions, Fox said. And, according to Shell's Alaska Coastal Management Program filing WesternGeco's M.V. Gilavar will conduct the seismic surveys, probably between early August and late October. In the summer of 2006 the same vessel acquired some Chukchi seismic for Shell, but the vessel could not operate in the Beaufort Sea in that year because of severe ice conditions.

As with last year, the Chukchi surveys will take

place 55 to 60 miles, or more, offshore, Fox said. Shell will work with the Alaska Eskimo Whaling Commission to adaptively adjust the seismic program, rather than applying an over prescriptive set of operational rules. That presents the best way to minimize any impact on subsistence hunting, Fox said.

"We will work with them adaptively to fit our seismic program into a schedule that does not affect the hunt," Fox said.

And Fox commented that the 2006 Chukchi seismic program had not impacted the hunt, although three different companies were all acquiring seismic.

"When we went back for the post-season reviews, the villagers on the Chukchi Sea declined ... because they saw no impact," Fox said.

Shell is also conducting a research program to test the feasibility of acquiring seismic data from winter sea ice rather than during the summer open water season (see the Jan. 21 edition of Petroleum News).

## Drilling at Sivulliq

On the other exploration front, the investigation of known prospects, Shell is focusing initially on the area of the Sivulliq prospect. Formerly known as Hammerhead, Sivulliq lies due north of Flaxman Island on the western side of Camden Bay. The prospect contains a known oil pool penetrated by two exploration wells drilled by Unocal in 1985 and 1986. According to information published by MMS the prospect is estimated to contain 100 million to 200 million barrels of technically recoverable oil in a Brookian sand reservoir. But the oil pool has not been fully delineated.

Interestingly, Shell participated in the original Hammerhead drilling and Fox was himself onboard the drillship that tested the Hammerhead oil discovery.

Shell's current plan involves the use of modern technology to appraise the known oil accumulation.

"You want to verify with today's technology what's there," Fox said. "You want to hinge your future on some strong possibilities early on."

Shell expects to drill three wells at Sivulliq during the 2007 open water season, as part of a program that anticipates the drilling of three to four wells per year during the period of the company's 2007 to 2009 eastern Beaufort Sea explo-



## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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Information about subscribing and the story archives can be found at this Web address: [www.PetroleumNews.com](http://www.PetroleumNews.com).





ration plan.

And the drilling plans include one deep target with a well depth approaching 14,000 feet, although the majority of currently planned wells will likely drill to depths of less than 8,000 feet, Fox said.

But Shell's choice of specific wells to drill after 2007 will depend on the results of the 2007 work.

"What we do after year one depends a lot more on (what happens in) year one than anything else," Fox said.

However, the need for a large petroleum find to justify the huge cost of arctic offshore petroleum exploration and development attests to Shell's confidence in the region.

"Frankly if we didn't believe there was a possibility of that (significant find) we wouldn't be in with this big investment," Fox said.

### Two drilling vessels

Shell will be using two drilling vessels, the Kulluk and the Frontier Discoverer, for the Beaufort Sea drilling program.

The Kulluk was originally designed to operate specifically in Beaufort Sea ice conditions, Fox said. And Shell has had the Discoverer completely refurbished for the Beaufort Sea operations, he said. One important feature of the Discoverer is an anchor system that allows the vessel to weather-vane around its center, without the need to move anchors, Fox said.

The use of two drilling vessels will enable Shell to obtain early evaluations of oil and gas prospects and will also enable one vessel to back up the other.

Fox pointed out that it is essential to use mobile drilling platforms in the water depths of more than 100 feet where Shell will be operating and that Shell has a protocol for removing the rigs from the drilling area in severe ice conditions.

A fleet of ice-rated vessels will support the drilling operations. But, because of the lack of an icebreaker fleet in the United States or Canada, the vessels are coming from several countries, including Russia and Finland. For example, the icebreaker Vladimir Ignatyuk will come from Russia.

Shell has commissioned and equipped a brand new U.S. 301-foot, ice-rated, anchor handling supply vessel as an oil spill response vessel. And the company is bringing on site a complete suite of offshore oil spill response equipment — ASRC RTS will manage the offshore oil spill response arrangements and has prepared Shell's oil discharge prevention and contingency plan. Alaska Clean Seas will provide nearshore oil

## MMS approves Shell's exploration plan

The regulatory process for Shell's Beaufort Sea drilling plans passed a major milestone Feb. 15 when the U.S. Minerals Management Service approved the company's eastern Beaufort Sea exploration plan and the accompanying oil discharge prevention and contingency plan. MMS said its analysis found that Shell's plans would not cause "undue or serious harm or damage to the human, marine or coastal environment."

The exploration plan approval only relates to Shell's drilling-related activities in the Beaufort Sea. On Feb. 6 MMS issued a separate permit for Shell's proposed 2007 3-D seismic operations in the Beaufort Sea; the agency is still reviewing a Shell permit application for acquiring 3-D seismic in the Chukchi Sea.

All of the MMS approvals are subject to conditions that must be met before the planned operations can be carried out. In particular, the offshore activities require incidental harassment authorizations from the National Marine Fisheries Service; a conflict avoidance agreement with the Alaska Eskimo Whaling Commission and the North Slope village whaling captains associations; and a bowhead whale monitoring program. The lighting configuration on drill ships must be configured to minimize the attraction of birds to the structures. And Shell must verify the absence of historic shipwrecks at the Sivulliq site where the company plans to drill in 2007.

Drilling of any Beaufort Sea well will also require an MMS drilling permit.

Approval of the oil discharge prevention and contingency plan is contingent on 22 conditions being met, including the need for clarification of some of the communications arrangements and the clarification of some response procedures. MMS will also require Shell to conduct equipment deployment exercises and a tabletop exercise to demonstrate the viability of the plan.

On Feb. 16 the 50-day review period for the Alaska Coastal Management Program review for Shell's Beaufort Sea drilling program began. In its ACMP filing Shell identified 12 possible locations for geophysical surveys, exploration and appraisal drilling — seven locations with Flaxman Island names on blocks 6658, 6707, 6708, 6709, 6765, 6824, and 6874; four locations with the name Barter Island on blocks 6801, 6802, 6962, and 7117; and one location with the name Harrison Bay on block 6222. The project description in the public notice said a total of 16 vessels would be operating in the Beaufort in connection with the drilling program in 2007.

Deadline for written comments under the ACMP review is 5 p.m. on March 19.

—ALAN BAILEY

spill response support.

Although he hopes that an oil spill will never happen, Fox is confident that the technology and equipment that Shell has available will enable an effective cleanup in the event of any size of spill. If there were a spill "we'll be there until it's cleaned," he said.

In parallel with the drilling activities, Shell is continuing with some other Beaufort Sea investigations that it started in 2006. An approximately 12-day program of geotechnical borings will determine the properties of the top 400 feet of soil under the sea floor. This scientific investigation forms an essential precursor to any petroleum development evaluation — preliminary engineering design and cost estimates for any development depend on data about the subsea soil.

And sea bottom surveys at potential future drilling sites will involve the use of a type of low-power seismic system that can identify drilling hazards such as shipwrecks

or shallow gas pockets.

"We proactively work ahead of time on potential sites and go get those surveys," Fox said.

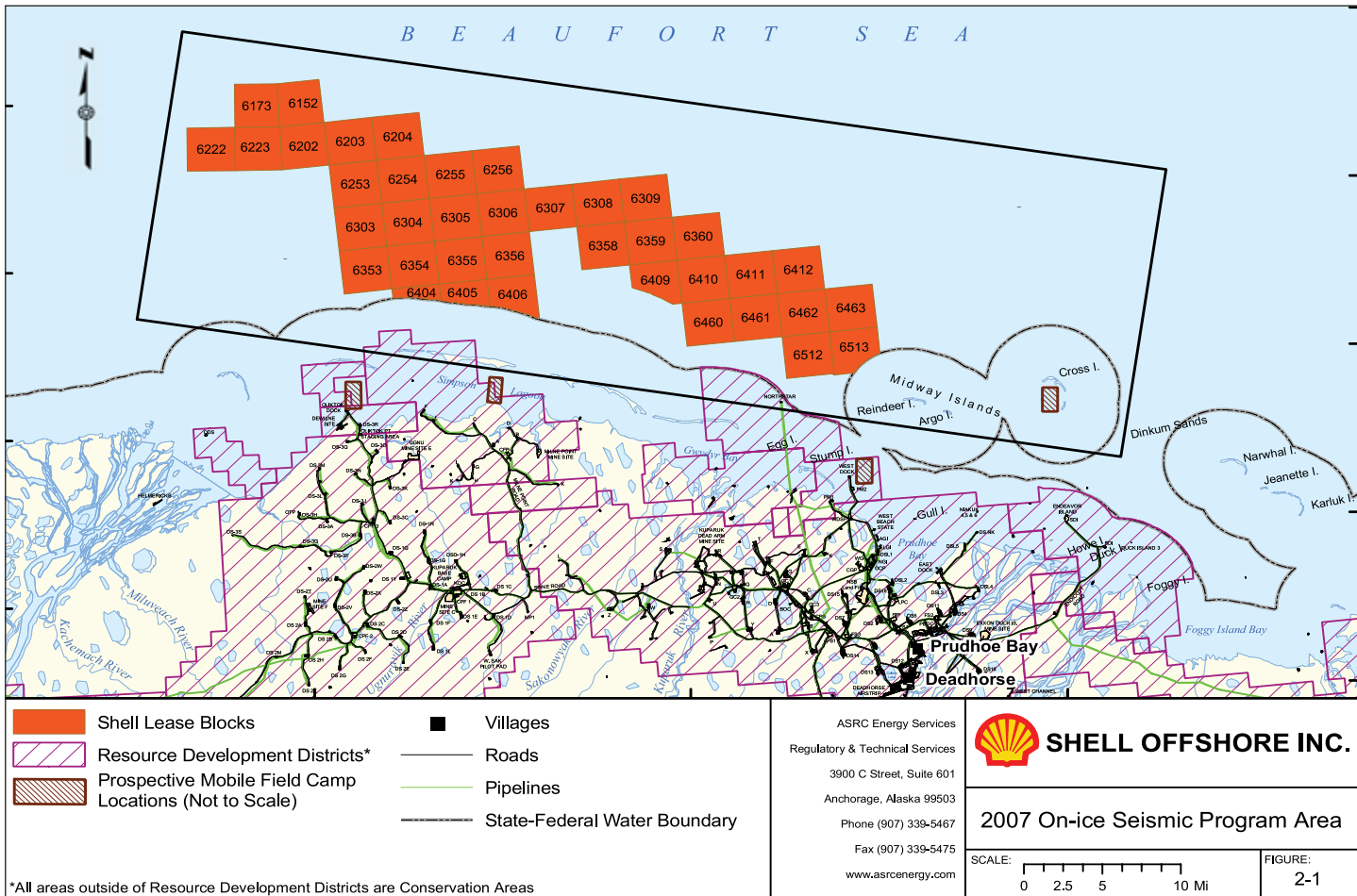
### Wildlife monitoring

During the 2007 open water season Shell will be mounting a major program to monitor marine mammals and mitigate any impacts of the industrial activities. Of particular concern is the potential for impacts on the migration routes of bowhead whales and the consequent impact on subsistence hunting.

"We have worked this with the Alaska Eskimo Whaling Commission and the North Slope Borough wildlife department," Fox said. "From all our conversations they are both very pleased with Shell's comprehensive approach to gathering data on the actual routes that the whales take."

Marine mammal observers recruited on the North Slope will be stationed on every Shell vessel, watching for wildlife 24 hours





per day, seven days per week. Shell has hired about 70 observers, Fox said.

Shell will deploy five passive acoustic arrays out in the Beaufort Sea, at intervals along the coast from near Point Barrow in the west to the Kaktovik in the east. Each array will extend about 20 miles out into the sea. The arrays will enable the continuous monitoring of whale movements during the open water season, by tracking whale sounds. Aerial monitoring flights will patrol out from the coastline twice a day during daylight hours. Shell also plans to test the use of unmanned aerial vehicles for wildlife monitoring, although the company has not yet reached the point of replacing manned flights by unmanned flights.

"We are working on a program to do further testing this season," Fox said. "We are very hopeful about that but we are not ready to replace the others yet."

Shell has conducted some tests of wildlife spotting from drones in the Puget Sound, in the Pacific Northwest.

"There were a lot of things learned and it was a very encouraging result," Fox said.

**Community involvement**

As in 2006, Shell is taking a lead in devel-

oping a single 2007 whaling conflict avoidance agreement that would apply to all offshore industrial activity, Fox said. In 2006, Shell contacted every possible offshore operator to ensure comprehensive involvement in the agreement.

"In return visits to the villages we got very positive remarks about the way we operated last year and we were invited to do it again," Fox said.

And a key component in communication with village subsistence hunters will be a Shell-operated communications center in every village, fully manned by village residents. Protocols require every vessel to call the centers at least every six hours.

"The Alaska Eskimo Whaling Commission and Shell and various other parties during the season will be talking every day," Fox said. "... We're committed to good communications and constant dialogue with the people representing the whaling captains and with the agencies. ... We'll be adjusting and adapting all the time. ... If communications are there you can work through a lot."

Going beyond the subsistence hunting issue, Shell sees safety and the protection of the environment, coupled with community

involvement, as critical components of its Alaska operations.

And community involvement goes way beyond having people say "okay" to what Shell is doing. It means having local people fully involved in Shell's operations, Fox said. Fox described a vision of life in a village home in which "there will be someone sitting at the (dining) table who is involved in our business, telling the truth about what is happening and making their family proud of what they're accomplishing."

"We believe that's essential," Fox said.

Shell wants Alaska to become a heartland for its operations.

"At this point there's a lot of road ahead for us. ... We're interested in the long term — long term exploration and development in Alaska. Everything we do is based on a belief that this will be a heartland for Shell," Fox said. "... Trust is going to be the foundation from which we can build our heartland business in Alaska."

And what are Fox's feelings about his return to Alaska?

"I've always loved Alaska and I'm very happy to be back. Part of the reason I accepted this job is because I believe it's a special place," Fox said. ■



PETROLEUM NEWS, WEEK OF FEB. 25, 2007

# North Slope gas hydrate well hits target

*BP-operated Mount Elbert well confirms presence of gas hydrate accumulation and enables coring and testing of gas hydrate zone*

By ALAN BAILEY  
Petroleum News

A joint government, industry and university team investigating gas hydrate deposits under Alaska's North Slope hit the jackpot in mid-February, when the BP-operated Mount Elbert stratigraphic test well successfully penetrated several hundred feet of hydrate bearing sandstone at Milne Point. Data obtained from the well will enable the scientists engaged in the project to make a more accurate evaluation than ever before of the resource potential of gas hydrates.

"With this project we have significantly increased our understanding of gas hydrate-bearing formations on the Alaska North Slope," said Scott Digert, BP resource manager and the gas hydrate project's technical adviser. "The results also illustrate the value of collaborative research," he said.

Gas hydrate consists of a white crystalline substance that concentrates natural gas by trapping methane molecules inside a lattice of water molecules (methane is the primary component of natural gas). The hydrate crystals remain

stable within a certain range of temperature and pressure, but when decomposed the crystals yield about 164 times their volume in methane.

Under the North Slope the gas hydrates permeate relatively shallow sandstones in large trends that straddle the base of the permafrost, around 2,000 feet below the ground surface. And the ability of the hydrates to concentrate natural gas gives rise to some huge estimates of in-place natural gas locked in the hydrate deposits — the U.S. Geological Survey has estimated that those North Slope hydrates may contain as much as 450 trillion cubic feet of methane.

But, although gas hydrates occur in many parts of the world, on ocean floors as well as in areas of permafrost, no one has ever succeeded in continuously producing natural gas from the hydrates. And the economic feasibility of exploiting the hydrates remains unknown.

## U.S. government funding

The huge resource potential of gas hydrates, however, has spurred the U.S. government into funding research into the feasibility of producing natural gas

from the hydrates, and the U.S. Department of Energy is funding the estimated cost of \$4.6 million of drilling the Mount Elbert well. The government wants to understand by 2015 how much of the North Slope in-place gas hydrate resource might be recovered, Ray Boswell, DOE methane hydrates technology manager, said.

The North Slope team has spent the past few years on the first phase of its project, modeling gas hydrate reservoirs, modeling potential ways of producing gas from the hydrates, developing seismic techniques for finding hydrate deposits and mapping potential North Slope hydrate accumulations. Those hydrates lie close to the existing oil industry infrastructure, in a geologic setting where production might be feasible.

"What we believe is that the arctic gas hydrates within sand reservoirs, particularly like the ones we've examined on the North Slope of Alaska in this project, are the most favorable for production," said Timothy Collett, Ph.D., a world-renowned gas hydrate specialist with USGS and a member of the North Slope team.

And the Arctic provides a very good natural laboratory to cost-effectively



obtain data from a naturally occurring gas hydrate accumulation, Boswell said.

### First test drilling

Having completed the “desktop phase” of the North Slope gas hydrate research, the drilling of the Mount Elbert stratigraphic test well represents the point at which theory starts to turn into practice. The purpose of drilling the well was to test the seismic techniques used to locate gas hydrates and to obtain detailed data about an actual gas hydrate deposit.

“This is an opportunity to gather the fundamental formation and fluid data that we need to help us really understand the potential performance of the reservoir,” Digert said.

Mount Elbert is one of many prospects within what is known as the Eileen trend, one of the two known gas hydrate trends in the central North Slope. Mount Elbert, individually, represents a relatively modest-sized hydrate accumulation but provides a well-defined target for the stratigraphic test, Collett explained. And BP was able to provide seismic data for the Mount Elbert location.

The team used that seismic data to make some predictions about the prospect and then drilled the well to see whether the predictions would prove correct.

“As it turned out our predictions were very correct,” Boswell said.

“We did confirm the presence of gas hydrates in our two primary target zones that we were calling the C and B intervals in the Sagavanirktok group,” Digert said.

### Drilled to 3,000 feet

Doyon Rig 14 drilled the well to a depth of 3,000 feet from an ice pad 1.4 miles south of the Milne Point B pad, northwest of the Prudhoe Bay oil field. Drilling from an ice pad was necessary because there are no suitable hydrate prospects below any existing gravel drilling pad, Digert explained.

The drillers used an oil-based drilling mud to avoid destabilization of the gas



Project manager Robert Hunter examines gas hydrate-bearing core from the Mount Elbert stratigraphic test well.

COURTESY BP EXPLORATION (ALASKA) INC.

hydrates by the salts within the more conventional water-based mud. And, also to avoid damage to the hydrates, the mud was cooled to about 30 degrees Fahrenheit. A wireline coring system enabled rapid recovery of core from the well, again to ensure that intact hydrate samples could be retrieved for laboratory testing. Several drilling service companies assisted with the drilling and sampling operation.

Once the hydrates samples were recovered they had to be kept cold, to prevent them from decomposing.

In addition to providing samples of gas hydrate-bearing rock, the well enabled a verification of the petroleum geology of a gas hydrate deposit in a relatively shallow reservoir setting.

“We penetrated in the first core a fairly hard shale layer which gave us more confi-

dence that there may be an adequate (reservoir) seal in the shallow sediments,” said Project Manager Robert Hunter of ASRC Energy Services.

Following completion of the coring from the well, the team ran a full suite of well logs, followed by a small-scale “micro-dynamics” test of how the gas from the underground hydrates would flow.

### Invaluable data

The well cores, log data and flow test are providing a wealth of information, to enable a better understanding of the potential for gas hydrate production, both on the North Slope and elsewhere.

“We’ve got a gold mine of data,” Boswell said.

The team will now investigate that data to determine, for example, the precise characteristics of the Mount Elbert reservoir and to refine the models for possible gas hydrate production. That investigation might take up to a year, at which point the team will make a decision on the next phase of its project, Digert said.

The plan for that next phase is currently unknown, but could involve drilling another well, perhaps to do a full-scale flow test from the hydrates. A full-scale production test from gas hydrates has never been done and would require new technologies, Hunter

said. Another complication arises from the probable need for a gravel drilling pad for a sustained gas hydrate test well, Digert said.

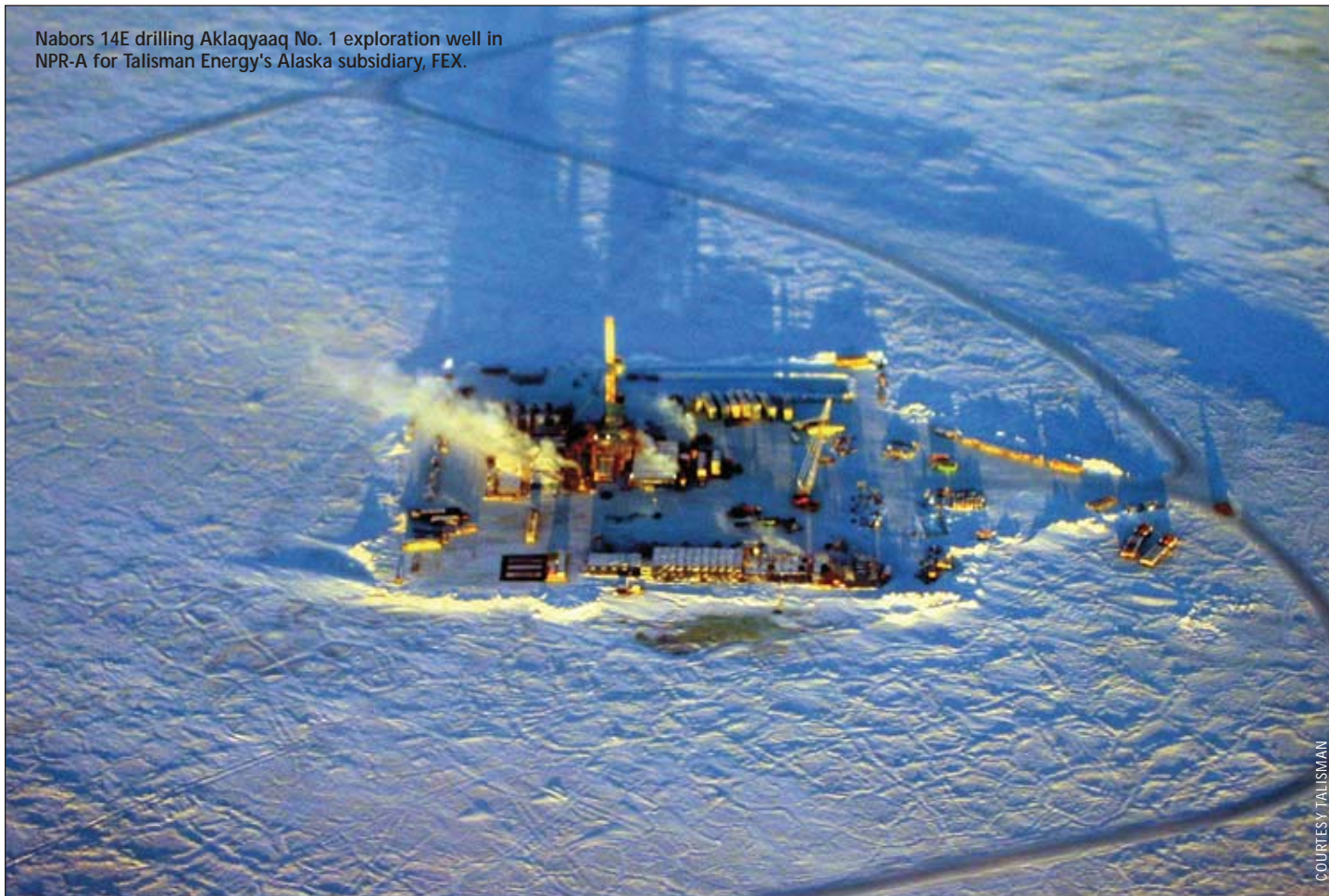
But meantime the team feels more than satisfied with the results from the Mount Elbert well.

“The big deal here is to cut that core and recover it to the surface with stable hydrates in that cold mud, then to run all of our logging tools ... and gather those physical and petrophysical data from the zone and ... do the (small-scale) flow tests,” Digert said.

The well has provided a confirmation of the model for the seismic identification of gas hydrate deposits, enabled the first ever retrieval of North Slope gas hydrate well cores and the second ever test anywhere in the world of the pressure response of gas hydrates, Collett said. ■



Nabors 14E drilling Aklaqyaaq No. 1 exploration well in NPR-A for Talisman Energy's Alaska subsidiary, FEX.



COURTESY TALISMAN

# Talisman NPR-A wells hit pay

*FEX encounters more than 225 feet of net hydrocarbon-bearing sandstones*

By KAY CASHMAN  
Petroleum News

All three of Talisman Energy's exploration wells in the National Petroleum Reserve-Alaska encountered hydrocarbon-bearing sandstones in several formations, the company said in a press release May 9. The wells are in the northwest planning area of NPR-A and were part of Talisman subsidiary FEX's 2006-07 winter drilling season on drill sites 60 miles southeast of Barrow.

One well was plugged and abandoned and two were suspended, Talisman said. The company said the "initial estimate of contingent resources present" in the formations of the two suspended wells was "300-400 million barrels" net to FEX, which has a 60 to 80 percent working interest in

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*In addition to the 300-400 million barrels, Talisman said "there is significant follow-up potential on many similar structures on Talisman's acreage if commercial productivity is proven."*

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the leases. Petro-Canada's Alaska subsidiary holds the remaining working interest.

In addition to the 300-400 million barrels, Talisman said "there is significant follow-up potential on many similar structures on Talisman's acreage if commercial productivity is proven."

The announcement was based on log analysis and "strong gas and oil shows, including oil staining and free oil in the drilling mud in one of the wells," the company said. The two wells encountered more than 225 feet of net hydrocarbon-

bearing sandstones. FEX plans to evaluate them next season, the winter drilling season of 2007-08.

"I am very encouraged by the results of our winter drilling program in Alaska, although disappointed that we did not have time to test the wells," said Jim Buckee, Talisman president and CEO. "The presence of black oil on the shakers is very positive as it confirms the presence of mobile oil as opposed to gas."

Although the well that was plugged and abandoned encountered hydrocarbon-bearing sandstones, FEX believed the well would be "subcommercial given current infrastructure" — a challenge all three prospects face west of the Ikpikpuk River. The company said "recently acquired high-fold seismic" will be used to analyze that

see TALISMAN page 3.27

PETROLEUM NEWS, WEEK OF APRIL 15, 2007

# BRPC announces North Slope crude discovery

*Operator Brooks Range says found 70 feet of oil-charged Ivishak sandstone north of Prudhoe at North Shore; Sag River a dry hole*

By KAY CASHMAN  
Petroleum News

**B**RPC Group has discovered oil at its North Shore No. 1 exploration well on Alaska's central North Slope, operator Brooks Range Petroleum Corp. said April 11. The offshore well was drilled from onshore to its target under the Kuparuk River delta.

Brooks Range told its parent company, AVCG, and BRPC's joint venture partners TG World Energy, Bow Valley Alaska Corp. and Ramshorn Investments, that Nabors Alaska Drilling Rig 16-E "has encountered approximately 70 feet of oil-charged Ivishak sandstone formation" while drilling the North Shore well, which is north of the Prudhoe Bay oil field.

North Shore No. 1 was drilled to "a final true vertical depth of 10,319 feet (13,309 feet measured depth) through the Ivishak sandstone," Brooks Range said.

The joint venture partners are in the process of casing the well as a potential oil producer.

## Testing program next winter

"The well is approximately 1,100 feet west of, and appears to be comparable to,

the 1974 Mobil Gwydyr Bay South No. 1 well, which flowed at an average rate of 2,263 barrels of oil per day on production test from the same formation," Brooks Range said. North Shore No. 1 was intended to test an oil accumulation first tested by Mobil with the South No. 1 well.

"We have identified a structural closure of interest on 3-D seismic," said Larry J. Smith, Brooks Range chief geophysicist, just prior to spudding North Shore No. 1. "Today's 3-D seismic technology and 3-D mapping techniques were not available to Mobil when they drilled their well making it difficult for them to map reservoir geometry."

The potential size and economic viability of the discovery will be evaluated using 3-D seismic data which BRPC acquired over the prospect area this winter and which Brooks Range said was completed by Kuukpik Veritas on March 31. The shoot involved approximately 130 square miles of data.

A full testing program of the North Shore No. 1 well will be undertaken during the 2008 winter season, Brooks Range said.

North Shore No. 1 is on a State of Alaska lease acquired through a farmout

arrangement with Exxon, Chevron and ConocoPhillips.

## Sag River a dry hole

In the same announcement, Brooks Range said BRPC's Sag River No. 1 well was drilled to "a final true vertical depth of 11,348 feet (13,110 feet measured depth)," but did not encounter hydrocarbons. The joint venture partners "have suspended the well, pending further evaluation, for the possibility of drilling an exploratory sidetrack during the 2008 winter drilling season."

Data gathered from the Sag River well "will be integrated with proprietary 3-D seismic to evaluate the sidetrack exploration opportunity."

"Brooks Range Petroleum Corp. is committed to safe operations, environmental stewardship, and economic growth which will provide jobs for Alaskans," Bo Darrah, Brooks Range president and CEO, said prior to spudding the wells. "We place a high priority on purchasing goods and services locally. We are committed to giving local contractors and suppliers the opportunity to participate in our projects through the competitive bid process." ■

*continued from page 3.26*

## TALISMAN

well, but would not identify it by name because of competitive reasons, a company spokesman told Petroleum News May 10.

The three wells FEX drilled this past winter were Aklaqaaq No. 1, Amaguq No. 2 and Aklaq No. 6. During the winter of 2005-06, the company drilled the Aklaq 2 well and a sidetrack, but due to weather problems had to forego testing. FEX did not test that well this past winter as planned, but indications are that it will be tested next winter.

In its May 9 release, Talisman did not say which of the three wells drilled this past

winter was deemed subcommercial because of the distance from infrastructure — a challenge all three prospects face west of the Ikpikpuk River. But in a May 10 interview with Petroleum News, Talisman spokesman Barry Nelson said Amaguq No. 2 was the subcommercial well.

## Tundra access restrictions dropped wells from 5 to 3

FEX, which entered Alaska in 2003 as Fortuna Exploration, was planning to drill as many as five wells in NPR-A this past winter as a continuation of the previous winter's exploration program, but a shorter-than-usual, already short, winter drilling season prevented that.

"A shortened winter drilling season due to the delay in tundra opening, and the need to demobilize equipment before the tundra started thawing, precluded flow testing this year. Formation evaluation will continue when longer-term test equipment is mobilized to the field area," Talisman said in its May 9 release.

The two rigs used to drill the three wells, Doyon Akita Arctic Wolf No. 1 and Nabors 14E drilling rig, and other equipment have been demobilized to the Cape Simpson Industrial Port on the Beaufort Sea coast. The industrial site is operated by Ukpeagvik Inupiat Corp.

Both Talisman and its minority partner Petro-Canada are based in Calgary. ■



# MACTEC: Engineering, environmental solutions

*Company provides one-stop shopping for industry studies and development projects*

**M**ACTEC Engineering and Consulting began its nearly four-decades-long relationship with the Alaska oil and gas industry with large-scale geotechnical programs on the North Slope, operating as Harding Lawson Associates.

Since those early days, MACTEC has matured and diversified along with the industry, adding a Fairbanks office, environmental impact analysis and permitting, comprehensive engineering services, construction administration, site monitoring and remediation, and design/build — services that span the life cycle of oil and gas operations.

## Diligent permitting starts development projects off right

Navigating the environmental permitting maze is an important early step in the exploration and development process. MACTEC provides one-stop shopping when studies and permits are required. David Berg, MACTEC's Environmental Planning and Permitting leader, notes "we have helped established companies, such as ConocoPhillips and Marathon, and new independents, including Aurora Gas, with planning and permitting. We know the permits, agencies, and NEPA, and we can conduct almost any environmental study necessary."

From wetlands delineations to endangered species consultation, MACTEC's biologists have conducted more than 20 environmental studies for industry clients since 2000. "Our Scientists have worked all over Alaska. Waterfowl studies on the North Slope, vegetation sampling on the Kenai Peninsula, and bald eagle nest surveys on the Copper River Delta are only a few examples," remarks Berg.

Oil and gas projects on federal lands require compliance with NEPA and preparation of an EA or EIS. MACTEC's recent NEPA experience includes Marathon's Wolf Lake EIS, ConocoPhillips' Alpine Satellites EIS, Alaska Railroad's Northern Rail Extension EIS, and nine EAs.

## Full-Service engineering provides sound infrastructure

MACTEC's Anchorage and Fairbanks engineering team provides full-service architectural and engineering capabilities.



MACTEC's ability to quickly mobilize for environmental studies, such as this wetland delineation on the west side of Cook Inlet, helps ensure that oil and gas exploration and development projects receive permits on schedule and within budget!



"Specialties of the house" include public works and transportation engineering and solid waste planning and design. We provide a wide variety of engineering support including surveying; site plan development; ROW/ utility conflict resolution; hydrology and hydraulic design; geotechnical investigations and foundation engineering; transportation engineering (road and airport design); solid waste landfill and septage disposal facility design; and owner support during bidding and construction.

MACTEC has always provided complete construction inspection and monitoring services.

## Focused environmental restoration for a better tomorrow

As wells are plugged and abandoned, there are reserve pits to close, contamination to assess and clean up, and gravel to remove. Steve Wren, MACTEC's lead for Environmental Restoration services, is always on the lookout for innovative methods to combine these services and help companies reduce costs associated with this work. Wren notes "during the 1990s we worked closely with the ADEC to close more than 100 reserve pits in the Cook Inlet region. Since 2000 we have received closure

from ADEC at 15 North Slope sites."

MACTEC was the first to design and construct a gravel cap directly on reserve pit ice that accounted for future settlement from ice thaw. This project involved the reuse of nearly 5,500 cubic yards of gravel from the drill pad.

For contaminated sites that require corrective action plans and remediation,

MACTEC is the go-to company. "We have prepared corrective action plans, characterized the contamination, and provided quality control and remediation services at 14 sites on the North Slope in the past 4 years," states Wren.

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## Design/Build for cradle to grave service

MACTEC has been providing design/build (D/B) for remediation projects for over 10 years. Our association with Wilder Construction has led to the cleanup of 24 contaminated sites across the state. This full-service contracting has saved our client's time and money through our innovative designs and fast track scheduling. Our commitment to cost and schedule control is exceeded only by our commitment to safety. In our 10 years of D/B experience, we have logged over 450,000 hours without a lost-time accident.

MACTEC has served the oil and gas industry for more than 30 years, and we look forward to providing scientific, engineering, and construction solutions far into the future. ■



# M-I SWACO delivers complete fluids, drilling waste management package

In the spring of 1999, industry, government and media representatives assembled at what is now ConocoPhillips' Alpine Field for the unveiling of an Alaskan first: a three-story oilfield module designed to dramatically reduce the environmental impact of drilling on the North Slope.

Five years later, the handiwork of M-I SWACO has eclipsed even the most optimistic projections. The so-called G.I.S. drill cuttings grind and injection unit has injected more than one million barrels of slurry with an astounding record of near zero downtime, says M-I SWACO Anchorage-based Project Engineer John Murphy.

The high-profile project is but one of a string of milestones Houston-based M-I SWACO has realized in the nearly four decades it has served the Alaskan oil and gas industry. The world's leading provider of drilling, reservoir drill-in and completion fluids and drilling waste management equipment and associated services is owned 60% by Smith International and 40% by Schlumberger.

Complementing the grind and inject module is a dry bulk handling facility and a liquid drilling and completion fluid plant, which to date has mixed and delivered well over 310,000 bbl. The Alpine project also showcases another M-I SWACO innovation that is helping operators throughout Alaska achieve all their eco-

economic and technical objectives, while simultaneously attaining the highest level of environmental performance. The M-I SWACO Integrated Fluids Engineering\*, or IFE, program is a cradle-to-grave approach designed to lower production costs, maximize drilling efficiency, increase production, while dramatically reducing environmental impact.

The program was employed on 30 onshore and offshore wells in Alaska in 2003 – a total that is forecast to double this year. The advantage of the IFE program is clearly reflected in the Alpine project, which thus far has helped drill over 80 wells totaling more than one million feet of hole, says Alpine IFE Coordinator Rob Reinhardt.

"Despite the logistical complexities of a roadless development, the drilling efficiency



The M-I SWACO cuttings grinding and injection unit at the Alpine field continues to roll up milestones.

and productivity shown by M-I SWACO and the Alpine rig teams is unmatched in all of Alaskan drilling operations," he said.

Alpine also augments the distinction of M-I SWACO as the industry's recognized leader in the introduction and application of new fluid technologies. Regional Manager Brad Billon specifically points to the FloPro\* rheologically engineered reservoir drill-in fluid and the

VersaPro\* mineral oil-base reservoir drill-in fluid. The latter has been employed in the production intervals of Alpine wells, resulting in a two- to three-fold increase in production over earlier wells drilled with water-base fluid systems. The success of the system led ConocoPhillips to acknowledge it with a 2003 "Mark of Excellence" award.

Elsewhere on the North Slope, the VersaPro system established two state records for the longest liner and footage drilled. Formulated specifically for the Schrader Bluff area, the system was used in Alaska's first quad-lateral. The four intervals ranged from 3,843 to 7249 ft in length with a cumulative footage of 27,743 ft. Total footage for the well was 34,798 ft.

Regional Manager Billon said M-I SWACO

over the years has made a concerted effort to position itself as the one company in Alaska that can provide operators the complete package of fluids, drilling waste management and associated engineering services.

"We have developed an infrastructure in Alaska that is second to none. Complementing our comprehensive portfolio of drilling, reservoir drill-in and completion fluids are some of the most highly trained and accomplished wellsite engineers in the industry. When you add our drilling waste management resources and capabilities and our emphasis on new, cost-effective technologies, M-I SWACO is well positioned to deliver solutions to all our clients' drilling, production and waste management needs," he said.

One such solution can be found in the Cook Inlet where the IFE program and a fit-for-purpose cuttings re-injection unit (CRI) reduced disposal costs some 37% while dramatically minimizing environmental impact. Installed in 2000, the CRI system reduced waste management costs by more than \$137/bbl when compared to the economics associated with the traditional method of transporting cuttings to shore for disposal. It marked the first total zero discharge application in the Cook Inlet.

Drilling and Waste Management Operations Manager Dana Rhodes said M-I SWACO remains Alaska's leading company for cuttings grinding and injection. In addition, the company has introduced to the Alaskan industry a number of new drilling waste management and solids control technologies, including its revolutionary Verti-G\* cuttings dryer, the 5500 and MagnaDrive\* centrifuges and the Super Auto Choke\*.

"We also provide a rather unique service with our solids-control vans. These are 40-ft tractor trailers equipped with a centrifuge, shaker and pumps designed for processing drilling fluids. This is a much more mobile system than the typical fluid processing system configuration," said Rhodes.

Unique to the M-I SWACO approach to drilling waste management is looking at wastes not as a commodity to be treated and disposed of, but rather one that could be transformed into a beneficial re-use, including pad and road maintenance. ■

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This small, highly specialized company operates from their office in historic downtown Palmer, 40 miles northeast of Anchorage. "Palmer was a tent city in 1935 when President Roosevelt's New Deal established a farming colony of 200 families who came from the mid-west," according to owner Brit Lively. "Our little building was constructed 12 years later with the first locally-produced concrete blocks."

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Mapmakers Alaska maps and files are used by the industry, government agencies and contractors for their diverse applications and content. They are used to track



Carrie Wang and Brit Lively at the Alaska Support Industry Alliance "2005 Meet Alaska" conference in Anchorage.

JUDY PATRICK



current lease ownership percentages, finding a previous well location on that lease, check for the presence of an Alaska Native allotment, or examine subsurface land status when planning to bid at a lease sale.

Having ready access to surface ownership of a parcel on the Kenai Peninsula or

*"We know where to find the components, use those that are relevant, and put them in order. Then, we make everything look nice and keep it up to date. Consistently."*

—Brit Lively, Owner, Mapmakers Alaska

in the Matanuska-Susitna Borough helps with easement acquisition or finding a location for plant and storage facilities. Wetlands, anadromous stream and surface cover data are must-haves for producing environmental assessments.

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They have a long track record of having made custom maps of oil and gas activity in Alaska for board rooms from East Coast financial centers to industry headquarters everywhere. By illustrating Alaska's oil picture in annual reports, national and local publications, Mapmakers Alaska has become a major contributor of information to tell the world about oil and gas in Alaska. ■

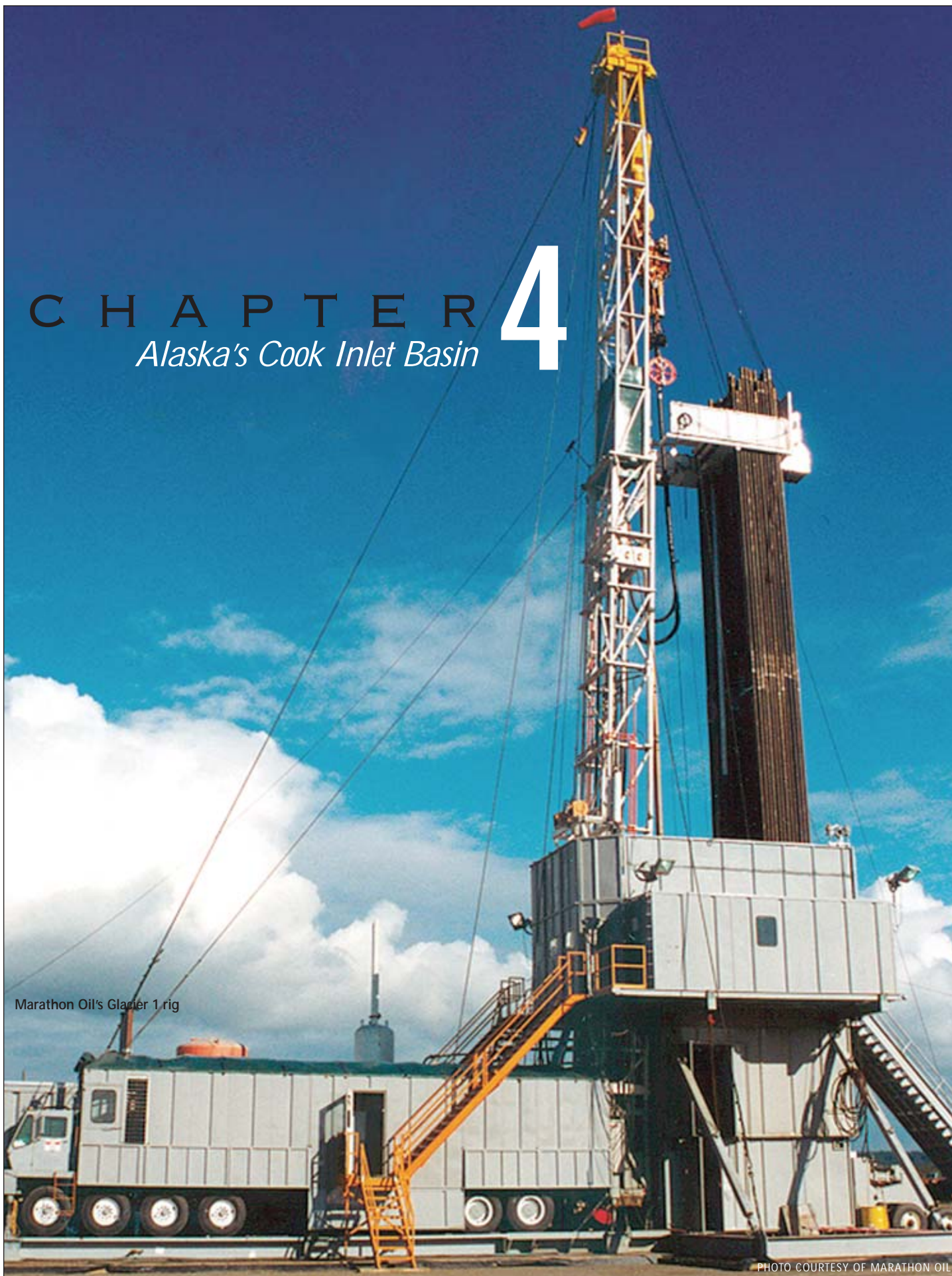
Mapmakers Alaska location in Palmer since 1985.





# CHAPTER 4

*Alaska's Cook Inlet Basin*



Marathon Oil's Glacier 1 rig



## CHAPTER 4

# Alaska's Cook Inlet Basin

## Geological setting

The Cook Inlet, a major sea inlet between the Kenai Peninsula and the mainland of Southcentral Alaska, lies over part of a deep sedimentary basin that has formed between the Kenai Mountains and the mountains of the Alaska and Aleutian ranges. This basin, known as the Cook Inlet Basin, extends beyond the Cook Inlet under the western side of the Kenai Peninsula and under the lower land on the west side of the inlet. The basin extends southwest under the waters of the Shelikof Strait.

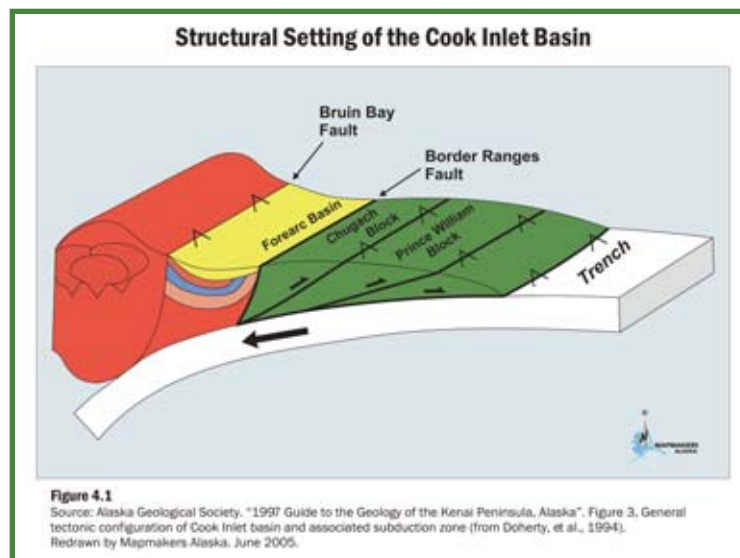
The surface topography of volcanoes, mountain ranges, flatlands and sea passages around the Cook Inlet area provides dramatic evidence of the zone of convergence of two tectonic plates, the Pacific and the North American plates.

The Pacific plate slides north along California and the Pacific Northwest coastlines before subducting beneath the North American plate in a zone marked by the Aleutian trench, south and east of Kodiak Island and the Alaska Peninsula. A combination of subduction forces and faulting has uplifted a chain of coastal mountain ranges, including the Chugach and Kenai mountains. Heat in the subduction zone has caused lava and ash to erupt through an arc of volcanoes, known as the Aleutian archipelago. The Cook Inlet Basin forms a classic forearc basin in which the crust has warped downward over the subduction zone. Figure 4.1 depicts the structural setting of the basin.

### Started 350 million years ago

The whole process of basin formation started during the late Paleozoic and early Mesozoic, around 350 million years ago, when a volcanic arc in the general vicinity of the present-day Alaska Range spewed lava and volcanic materials into adjacent areas. During Triassic times, around 240 million years ago, uplift of the area occupied by the volcanic arc started pouring sediments south into a marine basin in the area of the current Cook Inlet. As the basin continued to sink beneath the ancient sea during the subsequent Jurassic and Cretaceous periods, many thousands of feet of marine sediments, some rich in organic material, accumulated.

Uplift in the Late Cretaceous through early Tertiary periods, around 70 million years ago, started to form the Kenai and Chugach mountain ranges. Erosion of the mountains then dumped sediments into a Cook Inlet Basin that was by then above sea level. Deposition of river-borne sand and gravel alternated with luxuriant swamp vegetation growth. Through this repetitive cycle of vegetative growth and sediment deposition, peat layers were developed and buried,



## The Susitna Basin

Many people interpret the Susitna Basin as a northern extension of the Cook Inlet Basin. The Castle Mountain fault, a major regional structural feature of Southcentral Alaska, divides the two basins.

The structural style of the Susitna Basin consists of a combination of graben and half-graben basement faulting. The Tertiary sedimentary fill includes many of the same formations as those in the upper Cook Inlet Basin. However, the Eocene West Foreland Formation and Oligocene Hemlock Conglomerate reservoir rocks appear to be missing. The Jurassic oil-prone source rocks found in the Cook Inlet Basin have not been found in wells or outcrops.

Nine oil and gas exploration wells and four core holes have been drilled in the Susitna Basin. All exploration wells were plugged and abandoned as dry holes, though some did have minor gas shows. The two wells drilled near the deepest part of the basin were the Union Texas Pure Kahiltna Unit No. 1, completed in March 1964 to a total depth of 7,265 feet, and the Unocal Trail Ridge Unit No. 1, completed in October 1980 to 13,708 feet. Both wells probably bottomed in volcanic rocks of the Talkeetna Formation. Coal beds become prominent in the lower part of both of these wells, suggesting a correlation with the coal-bearing, gas-producing formations in the Cook Inlet Basin.

producing present-day coal formations. These non-marine sands and gravels would later become oil and gas reservoirs.

Renewed uplift, deformation and faulting began in the late Tertiary period and continue today. As a result of a massive earthquake in March 1964, most of the western Gulf of Alaska including Prince William Sound was uplifted while the entire Cook Inlet Basin from the Talkeetna Mountains to Kodiak Island sank. Areas of active volcanism still exist and are considered to have high geothermal potential.

### Fault bounded

As shown in figure 4.2, the present day Cook Inlet Basin sits between the Bruin Bay fault to the northwest and the Border Ranges fault to the southeast. The Castle Mountain fault at the north end of the basin divides the Cook Inlet Basin from the Susitna Basin, although many people consider the Susitna Basin to be an extension of the Cook Inlet Basin.

A structural uplift, the

Augustine-Seldovia arch, divides the Cook Inlet Basin into northern and southern centers of sediment deposition. One of these depositional centers lies under the upper Cook Inlet area. The other depositional center lies under the lower Cook Inlet and Shelikof Strait.

Figure 4.3 depicts a general stratigraphic column for the whole of the Cook Inlet Basin.

The Mesozoic sequence in this column is thermally mature and contains oil-prone source rocks, including known oil sources in the middle Jurassic. The Tertiary sequence is thermally immature but contains abundant coal seams and other organic-rich sediments that form a source for biogenic, bacterial gas.

Both the Mesozoic and Tertiary sequences contain potential reservoir rocks, although the Mesozoic rocks are well compacted and may be slightly metamorphosed in places. Zeolite formation has impacted the permeability of some of the Mesozoic rocks. The Mesozoic rocks are oil prone while the Tertiary rocks are gas prone.

## The upper Cook Inlet

The deepest part of the depositional basin under and around the upper Cook Inlet lies near the northwest corner of the Kenai Peninsula. In that area about 25,000 feet of Tertiary, coal-bearing, terrestrial sediments overlie a thick sequence of marine Mesozoic sediments. Unconsolidated, Quaternary-age deposits cover the bedrock. The sedimentary sequence contains an abundance of source, reservoir and trap formations.

This same sedimentary sequence extends across the whole upper Cook Inlet area, but thins toward the edges of the basin and toward the Augustine-Seldovia arch.

### Oil and gas in the Tertiary

Oil exploration in the area initially targeted the Mesozoic strata, but the 1957 discovery of the Swanson River oil field in Tertiary sediments shifted the attention of subsequent exploration to the Tertiary. To date there have been 11 significant oil finds and 28 significant gas finds in the upper Cook Inlet area, with all of the finds

**Table 4.1: The oil and gas fields of the Cook Inlet**

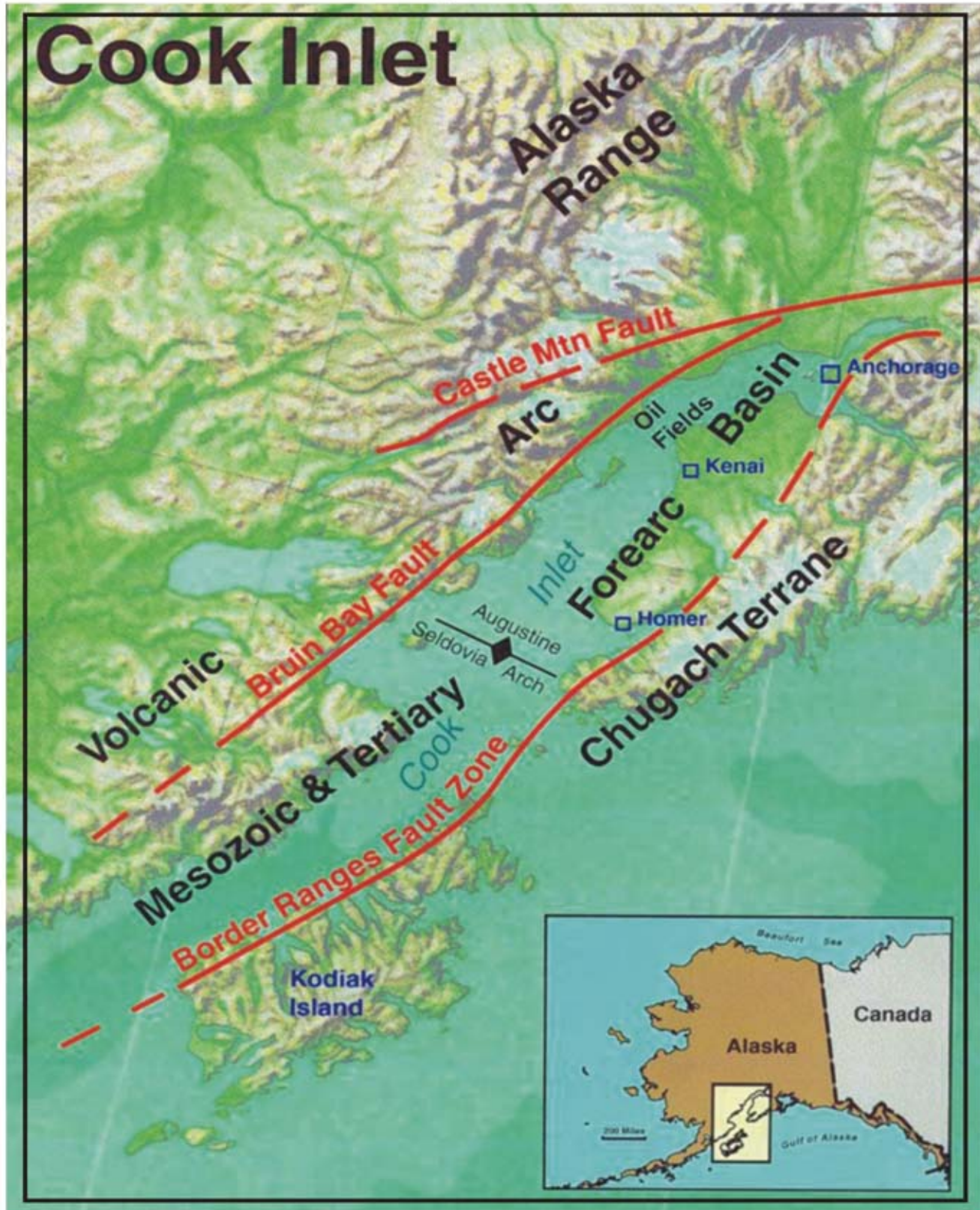
Field	Producing	Discovered	First production	Reservoir	Oil produced to Dec. 2004 (mmbbl)	Gas produced to Dec. 2004 (bcf)	Dec. 2003 estimate of recoverable oil (mmbbl) (1)	Dec. 2003 estimate of recoverable gas (bcf) (1)
Beaver Creek	Oil and gas	1972	1973	Tertiary lower Tyonek, Hemlock and Beluga formations	5.7	178.4	5.9	247.1
Beluga River	Gas	1962	1968	Tertiary Sterling formation	0	904.7	0	1,269.8
Cannery Loop	Gas	1979	1988	Tertiary Tyonek, Sterling and Beluga formations	0	110.7 (to Dec. 2003)	0	131.8
Granite Point	Oil and gas	1965	1967	Tertiary Tyonek and Hemlock formations	141.7	127.2	149.0	135.5
Ivan River	Gas	1966	1990	Tertiary Tyonek formation	0	75.7	0	-
Kenai	Gas	1959	1961	Tertiary Sterling and Beluga formations	0	2,394.1	0	2,427.1
Lewis River	Gas	1975	1984	Tertiary Tyonek and Beluga formations	0	11.2	0	-
Lone Creek	Gas	1998	2003	-	0	2.7	0	-
McArthur River	Oil and gas	1965	1967	Tertiary Tyonek, Hemlock and West Foreland formations	619.3	1,254.8	639.8	1,388.48
Middle Ground Shoal	Oil and gas	1962	1967	Tertiary Hemlock and Tyonek formations	191.7	108.4	198.3	111.8
Nicolai Creek	Gas	1966, 1967	2001 (restart)	Tertiary Tyonek and Beluga formations	0	3.1	0	-
Ninilchik	Gas	1961	2003 (restart)	Tertiary Tyonek formation	0	15.4	0	-
North Cook Inlet	Gas	1962	1970	Tertiary Tyonek, Sterling and Beluga formations	0	1,662.3	0	2,218.1
Pretty Creek	Gas	1979	1986	Tertiary Beluga formation	0	8.9	0	-
Redoubt Shoal	Oil and gas	1968	2002	Tertiary Hemlock formation	1.5	0.8	6.0	-
Sterling	Gas	1961, 1999	1962	Tertiary Tyonek, Sterling and Beluga formations	0	4.3	0	26.1
Swanson River	Oil and gas	1957	1960	Tertiary lower Tyonek, Hemlock and Beluga formations	228.6	2,905.2	230.8	2909.0
Trading Bay	Oil and gas	1965	1967	Tertiary Hemlock and Tyonek formations	101.3	76.7	103.8	87.7
West McArthur River	Oil and gas	1962, 1991	1994	Tertiary Tyonek and Hemlock formations	10.4	4.6	13.7	6.7

Table 4.1: The oil and gas fields of the Cook Inlet. Cumulative production data from AOGCC monthly reports.

(1) Cumulative production to December 2003 plus estimate reserves at December 2003 from DOG 2004 annual report



## Present Day Cook Inlet Basin



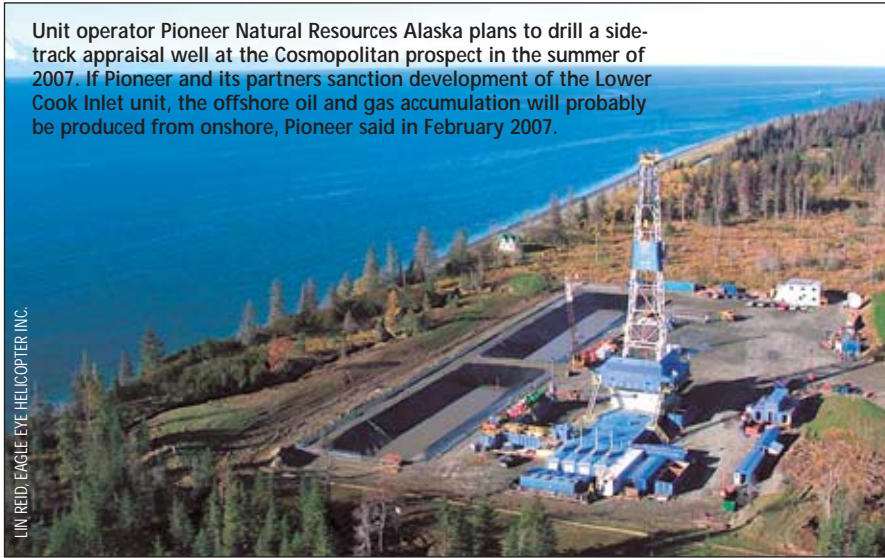
**Figure 4.2**

Source: Charles P. Thomas, Tom C. Doughty, David D. Faulder, David M. Hite, "South Central Alaska Natural Gas Study," US Department of Energy, National Energy Technology Laboratory, Arctic Energy Office. 2004 - by permission of Alaska Geological Society "Guide to the Geology of the Kenai Peninsula," 1997.



Unit operator Pioneer Natural Resources Alaska plans to drill a side-track appraisal well at the Cosmopolitan prospect in the summer of 2007. If Pioneer and its partners sanction development of the Lower Cook Inlet unit, the offshore oil and gas accumulation will probably be produced from onshore, Pioneer said in February 2007.

LIN REID, EAGLE EYE HELICOPTER INC.



## Current exploration focus in the Cook Inlet area

Nearly all of the operating oil and gas fields in the Cook Inlet derive from exploration done in the 1950s and 1960s, before the discovery of the giant Prudhoe Bay field caused the attention of explorers to switch to the North Slope. As a consequence, only limited secondary and tertiary exploration of the Cook Inlet has taken place.

However, dramatic changes in the natural gas market in Southcentral Alaska have sparked a renewed interest in exploration in the Inlet.

### Stranded gas

Although past exploration focused primarily on finding oil, large volumes of gas were also encountered during that drilling effort. A resulting excess supply of stranded natural gas drove the construction of LNG and fertilizer plants at Nikiski on the Kenai Peninsula and has enabled the residents of the highly populated Alaska Railbelt to enjoy cheap gas for heating and electricity generation.

In recent years demand for gas has started to exceed supply and the price of gas in Southcentral Alaska has begun to rise. However, gas shortages threaten closure of the fertilizer plant and may threaten the 2009 renewal of the export license for the LNG plant. Agrium Inc., the owner of the fertilizer plant, is investigating coal as an alternative feedstock to natural gas for fertilizer production.

Although the increasing price of gas compounds the gas shortage issues for the industrial plants on the Kenai Peninsula, the price changes have made gas exploration and development around the Cook Inlet area appealing and have spurred some new gas pipeline development on the Kenai Peninsula.

Companies are reappraising well data that includes long-ignored gas finds and drilling exclusively for gas. Unocal and Marathon, for example, have been developing gas accumulations on the Kenai Peninsula around Deep Creek and Ninilchik. The Northstar Energy Group is looking to develop a gas field in the North Fork Unit, also on the Kenai Peninsula. Aurora Gas and Forest Oil have focused on gas prospects on the western side of the inlet. Storm Cat Energy Corporation has been drilling for gas near Big Lake in the Mat-Su Valley.

Although the focus has moved to gas, there is still a market for oil. Pioneer Natural Resources, for example, is investigating the feasibility of developing a known Tertiary oil accumulation in the Cosmopolitan unit, offshore west of the southern Kenai Peninsula. Chevron has ambitious plans to extend the life of its offshore oil fields and to explore for new oil reserves. Aurora Gas, in partnership with Swift Energy Co., drilled a dry wildcat well in the southern Kenai Peninsula in 2006, but the partnership may also drill at other Aurora oil prospects. Escopeta Oil and Gas hopes to drill at its

see FOCUS page 4.5

occurring in the Tertiary. Figure 4.4 also shows the locations of the oil and gas fields in the area — all of the oil and gas produced in Southcentral Alaska comes from these fields. Table 4.1 provides some information about the oil and gas fields in the Inlet. Figure 4.3 shows where the main oil and gas reservoirs occur within the stratigraphic sequence.

The largest oil field in the upper Cook Inlet, the McArthur River field, had produced 624 million barrels of oil by the end of 2006 with ultimate recoverable oil reserves of about 639 million barrels. The largest gas field, the Kenai field, had produced 2.314 trillion cubic feet of gas with ultimate recoverable reserves of about 2.427 tcf.

### Jurassic oil

Although the reservoirs of the Cook Inlet oil and gas fields lie within Tertiary rocks, petroleum geologists have determined that the oil originated from the middle Jurassic, probably from the Tuxedni formation (see figure 4.3). Some of the gas in the oil fields may be associated with the oil but most of the gas originated from organic-rich Tertiary sediments as biogenic gas.

Cook Inlet exploration mostly occurred in the 1950s and 1960s and focused on potential oil accumulations in large structures in the Tertiary. Some undiscovered oil accumulations probably still exist in this type of setting. However, some geologists believe that substantial quantities of oil lie within Mesozoic reservoirs — very few wells have targeted this Mesozoic play.

A 2004 study by the U.S. Department of Energy has pointed out that the exploration of large oil-bearing structural traps has probably left undiscovered many gas accumulations in the Cook Inlet Basin. From a statistical analysis of the known gas accumulations, DOE has estimated that there may be as much as 10 tcf to 14 tcf of undiscovered natural gas in the Tertiary of the upper Cook Inlet area. DOE believes that much of this undiscovered gas lies in the stratigraphic and combination traps that people exploring for oil largely ignored.

There is also known to be widespread coalbed methane in the shallower Tertiary rocks around the upper Cook Inlet.

## The lower Cook Inlet

Under the lower Cook Inlet and Shelikof Strait, to the south of the Augustine-Seldovia arch, the Cook Inlet Basin contains as much

see COOK INLET page 4.5



*continued from page 4.4*

## FOCUS

Kitchen oil and gas prospects in the center of the Cook Inlet.

### Focus on subtle gas plays

However, exploration for new hydrocarbon accumulations has tended to move away from the big oil-bearing structures — all of these structures already contain significant numbers of well penetrations. Attention is now starting to focus on subtle, off-structure plays that may contain some of the huge quantities of Tertiary biogenic gas thought to still exist in the Cook Inlet Basin. And there's also interest in gas exploration in the Susitna Basin, with Forest Oil and Clearflame Resources having exploration licenses in that basin.

The poor quality of the seismic data for the Cook Inlet area has become an issue when searching for these subtle stratigraphic plays. The thick Tertiary section contains many coal seams and exhibits big density contrasts. This type of geology dissipates seismic energy and gives poor seismic reflections. It has even proven diffi-

cult to apply modern 3-D seismic techniques to delineate the stratigraphic traps. Considerable effort is now going into gaining a better understanding of how best to use 3-D techniques in the Cook Inlet geological situation, especially in the deeper parts of the section.

### Difficult area

These issues coupled with uncertainties about the lateral continuity of subsurface rock strata make the Cook Inlet a difficult area to explore — problems with reserve estimation in the Redoubt Shoals field have illustrated some of the risks in reservoir assessment with less than complete subsurface information.

In addition, onshore land access can prove challenging because of relatively complicated land ownership arrangements. However, companies are managing to handle the complexities of dealing with geology that doesn't always line up with land ownership boundaries. Offshore, the lack of a readily available jack-up rig for shallow water drilling has become an issue. Escopeta is trying to bring a jack-up to the Inlet, in conjunction with a South African partner. And the state of Alaska has

in the past proposed sharing the cost of bringing up a jack-up rig.

However, new developments in extended-reach directional drilling are also opening up possibilities for the development of offshore prospects, especially given the environmental sensitivities associated with the waters of Cook Inlet.

### Coalbed methane

Exploration for coalbed methane in Southcentral Alaska has proved controversial because of issues surrounding split estate land ownership between the state of Alaska and private landowners. However, the increasing demand for new gas sources together with new and better guidelines for coalbed methane exploration and development may lead to successful commercialization of this resource.

There has been a significant resurgence in exploration interest around the Cook Inlet Basin, with opportunities for both large oil companies and smaller independent companies. And the strong motivation to extend gas supplies in the area will perhaps drive some further technical breakthroughs, as has happened in other oil and gas provinces. ■

*continued from page 4.4*

## COOK INLET

as 36,000 feet of marine Mesozoic strata. In this area the Tertiary sequence that contains the oil and gas reservoirs in the upper Cook Inlet becomes very thin.

According to a 1995 MMS assessment of the Cook Inlet, late Triassic limestone and chert beds appear to have excellent source rock potential, with oil-prone kerogen types. The middle Jurassic strata include the same source rocks as those that generated oil in the upper Cook Inlet.

The MMS assessment also says that early Cretaceous sandstones may have good reservoir potential. However, late Cretaceous sandstones probably offer the greatest potential to form reservoirs in the Mesozoic.

The presence of zeolites in the pore systems of Mesozoic sandstones in the lower Cook Inlet has raised questions over the reservoir potential in the Mesozoic section — the zeolites plug pores and inhibit fluid flow through the rocks.

However, the distribution of the zeolites in the area remains incompletely understood and some of the rocks may contain fracture systems that allow fluids to flow.

### Credits

Paul Decker of the Alaska Department of Natural Resources, Division of Oil and Gas, Kirk Sherwood of the U.S. Department of the Interior's Minerals Management Service and Robert Swenson of Denali Geologic Services all contributed material to this chapter.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.

### Main references

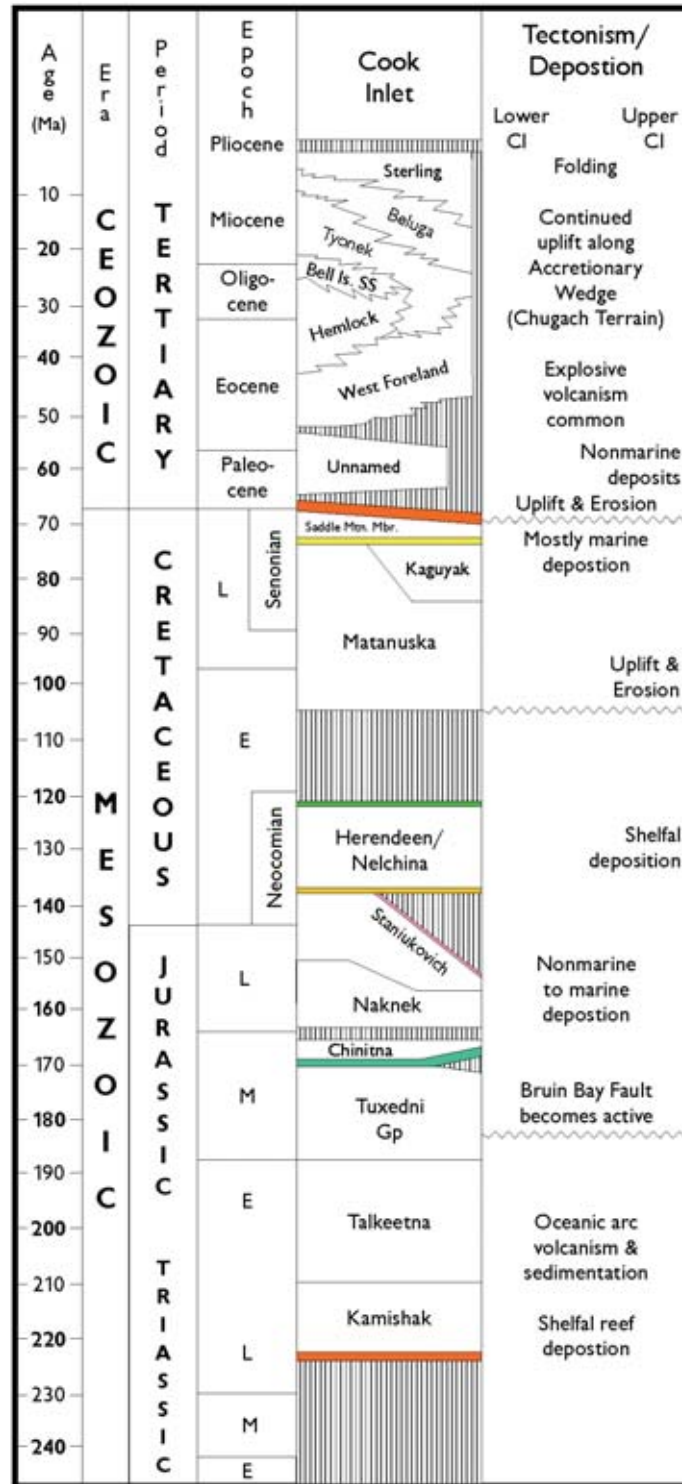
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### Eleven exploration wells

Figure 4.5 shows the locations of the 11 exploration wells that have been drilled in the offshore waters of the lower Cook Inlet. Two of the wells found significant oil shows in upper Cretaceous strata but the oil finds proved uneconomic. Another well only found minor oil shows.

Recent exploration drilling in the southern Kenai Peninsula, in the Cosmopolitan and South Fork units, is targeting Tertiary reservoirs north of the Augustine-Seldovia arch. So, although these exploration wells are close to the lower Cook Inlet, they are really associated with the geological setting of the upper Cook Inlet. ■

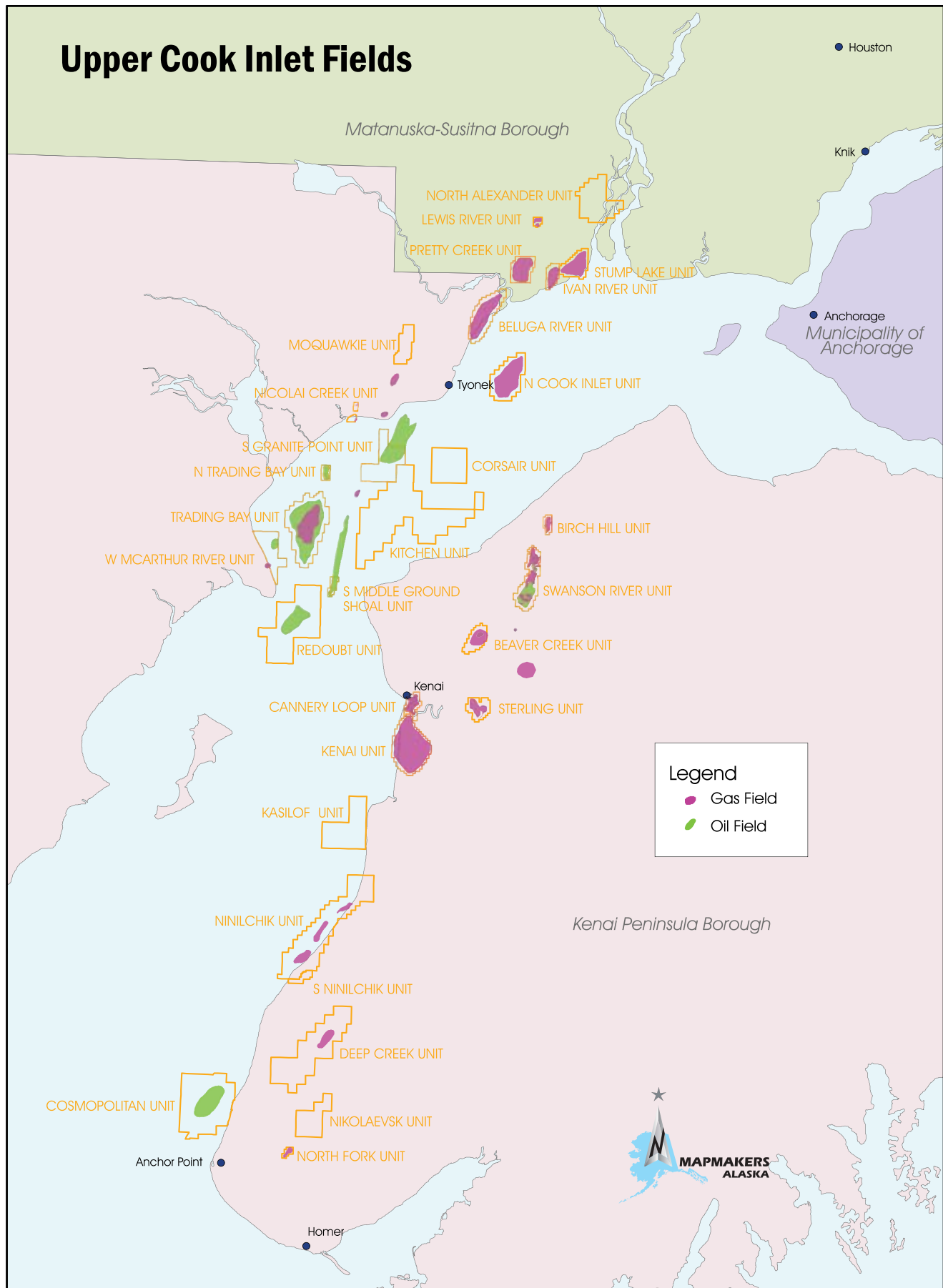
## Cook Inlet Tectonic-Stratigraphic Correlation Chart



**Figure 4.3**

Source: Alaska Geological Society. "1997 Guide to the Geology of the Kenai Peninsula, Alaska". Figure 2, Tectonostratigraphic correlation chart for the Cook Inlet (from Curry, et al. 1993). Redrawn by Mapmakers Alaska. April 2005.





**Figure 4.4** Upper Cook Inlet oil and gas fields. Alaska Department of Natural Resources, Division of Oil and Gas, September 2006. Prepared by Mapmakers Alaska, March 2007.



Figure 4.5 Exploration wells in the Lower Cook Inlet area.



PETROLEUM NEWS, WEEK OF OCT. 24, 2004

# The unexplored depths of the Cook Inlet basin

*The pre-Tertiary rocks of Southcentral Alaska present an intriguing and largely ignored petroleum exploration play, say veteran geologists*

By ALAN BAILEY  
Petroleum News Staff Writer

In 1957 Richfield Oil Co. discovered the Swanson River field in Tertiary sediments on Alaska's Kenai Peninsula. This event launched the oil and gas industry around the Cook Inlet. The discovery also caused almost all subsequent exploration in the area to focus on the relatively young Tertiary rocks of the region.

But there's a major sequence of older sediments underneath the Tertiary. Could these older sediments also hold oil and gas?

Deposition of sediments in the Cook Inlet basin started way back in the Triassic period, at the beginning of the Mesozoic era more than 200 million years ago. At that time the Pacific plate of the earth's crust started sliding under the crust along the line of the present-day Alaska and Aleutian Ranges. The sinking plate caused a trough to form along the general trend of the present-day Cook Inlet. Then from the Triassic through the subsequent Jurassic and Cretaceous periods huge thicknesses of marine sediments accumulated in this trough.

The end of the Cretaceous period about 65 million years ago marked the end of the Mesozoic era and the start of the Tertiary era. During the Tertiary the Cook Inlet area emerged from the sea to become a low landmass that gradually sank under enormous quantities of river borne sands washing down from surrounding highlands. These Tertiary sands provide the reservoirs for all of the known oil fields in the Cook Inlet basin.

Rich Nelson, a veteran petroleum geologist with several decades of experience in Alaska, told Petroleum News that the people who discovered the Swanson River field had really expected to find oil in the marine Mesozoic sediments.

"(At Swanson River) they were looking at 3,000 to 4,000 feet of Tertiary cover and then getting into Mesozoic rocks, which is where they saw the potential," Nelson said. "What they found was almost 12,000 feet of Tertiary sediments and the oil had migrated into the lower part of those sediments."

Very few later wells attempted to drill into Mesozoic, Nelson said.

"Historically within the basin if you got to the

(Mesozoic rocks) there has been no intention of drilling into them," he said.

## What's the potential?

So why might you expect to find oil in the older rocks?

Since early in the last century people have known about oil seeps from the Jurassic and Cretaceous rocks, where these rocks outcrop along the edges of the Cook Inlet basin. In addition, there's general agreement that the characteristics of the oil in the Tertiary of the Cook Inlet indicate a source in the so-called Tuxedni group of the Middle Jurassic.

But although the oil migrated into Tertiary rocks from the Mesozoic, there's a total absence of Mesozoic gas in the Tertiary — the gas that's produced in the Cook Inlet and on the Kenai Peninsula originated from the coal seams and other organic-rich sediments in the Tertiary strata.

Nelson believes that the absence of Mesozoic gas suggests that both gas and oil accumulated in Mesozoic reservoirs long before the oil migrated into the Tertiary. The young age of the structure of some of the Tertiary reservoirs also supports that idea — the oil must have migrated into these structures many millions of years after the oil formed.

If you look at Middle Ground Shoal and McArthur River, they have structures that were probably formed in the last 3 million to 5 million years, Nelson said.

"That means that the source and those older reservoirs ... have to be buried much deeper ... 25,000 to 30,000 feet and at higher temperatures," Nelson said.

So there's a high probability that oil still lies in some of these older reservoirs, Nelson said.

## Possible reservoirs

And geologists have identified several potential reservoir rocks within the Mesozoic.

Veteran oil and gas geologist Bob Warthen told Petroleum News that the middle Jurassic rock sequence includes sandstones and conglomerates that could act as reservoirs. There are also potential reservoirs in the Upper Jurassic and



## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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Cretaceous, Warthen said.

Warthen commented that in the southern part of the Kenai Peninsula pre-Tertiary rocks slope up under the flatter Tertiary strata.

“You could have a large stratigraphic entrapment in that area, stretching from let’s say the Homer area all the way through North Fork up toward Happy Valley and that area,” Warthen said.

However, Warthen thinks that any oil in the southern Kenai Peninsula and the Lower Cook Inlet would source from an area in the southern part of the Inlet, rather than coming from the more northerly source that fed fields like Swanson River.

But any reservoir evaluation needs to take into account the possibility that deep burial of the Mesozoic rocks has degraded their reservoir characteristics. For example, rising temperatures at depth can bake and modify the rocks — a process known as metamorphism.

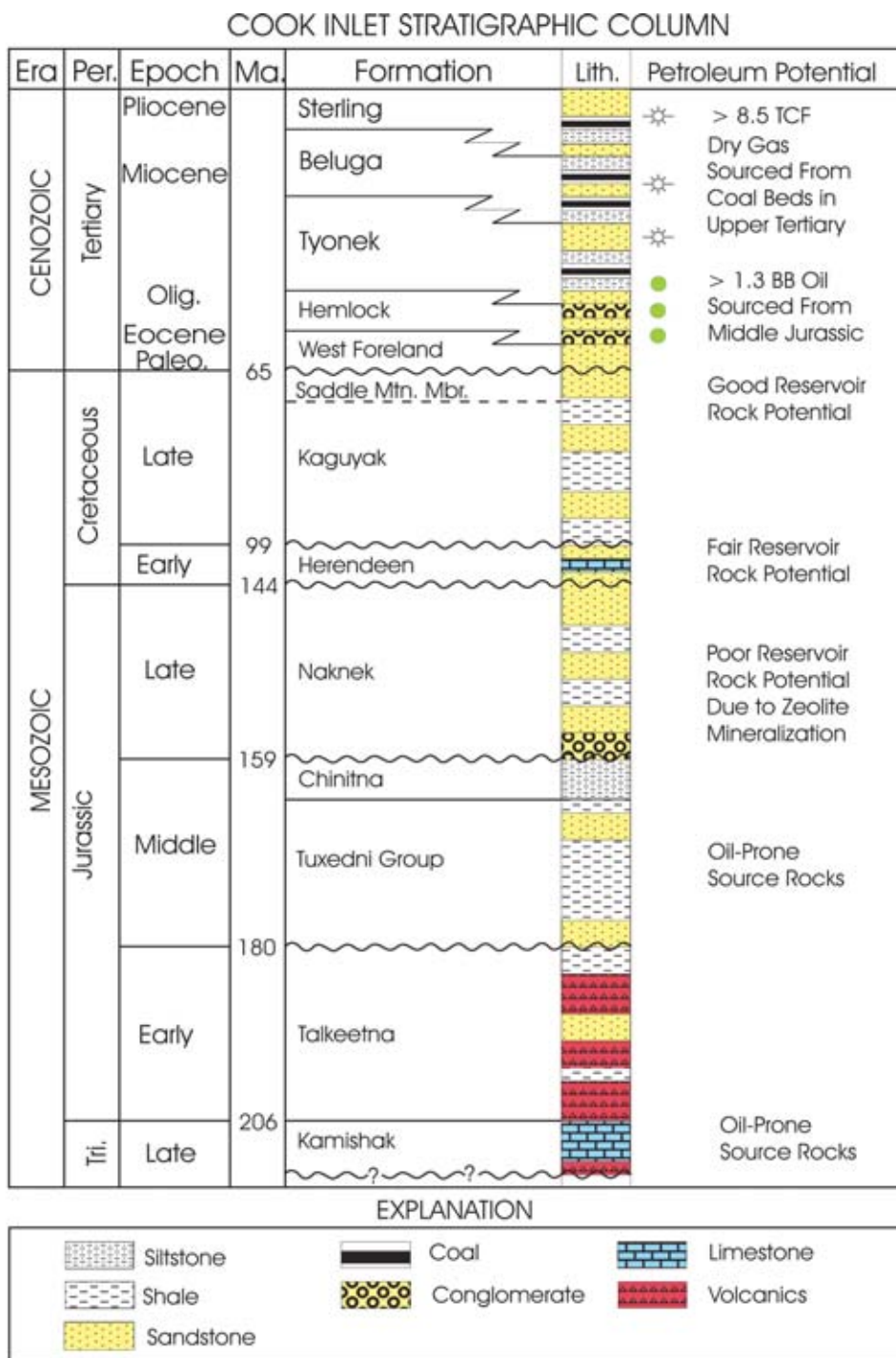
However, Nelson thinks that with a low thermal gradient in the Cook Inlet basin there’s unlikely to be pervasive metamorphism in the Mesozoic.

“Our temperature gradient here is about one degree Fahrenheit for every 100 feet of depth,” Nelson said. “That’s how you can go pretty deep into the section without really worrying about cooking it.”

Compaction of the rock at depth will reduce both the porosity, the ability of the rock to hold oil, and the permeability, the ability of the rock to allow oil to flow. But Nelson thinks that the porosity of the Jurassic sands, for example, should be quite reasonable and that fracture systems in the rock should provide permeability. Nelson cited evidence from one well that penetrated some Jurassic rock with low permeability — the drillers measured a flow rate of 850 barrels a day of salt water, presumably out of rock fractures.

Growths of secondary minerals in the rocks may prove a problem: An exploration well in the Lower Cook Inlet found mineral growths known as zeolites in Mesozoic sandstone. By blocking the gaps between pores in the rock these zeolites reduce the permeability.

Zeolites crystallize from mineral-laden water. U.S. Geological Survey geologist Les Magoon told Petroleum News that the abundance of a mineral called feldspar in the Cook Inlet sediments results in a chemical mix that’s likely to create a particular type of



zeolite.

“It depends on certain pressure and temperature regimes and also on feldspar-rich sandstones,” Magoon said. However, “you can’t condemn the entire section based on just one well,” he said.

And Nelson doesn’t think that there’s any reason to assume that this type of mineral formation is especially widespread. The need for specific temperature and pressure conditions and the potential for oil to displace mineral-laden water would both limit the formation of secondary minerals, he said.

### Few wells

With few wells drilled into the Cook Inlet Mesozoic, much of the debate about potential oil reservoirs remains speculation. Outside of the fields we’ve probably got less than 20 penetrations where we see Mesozoic within the basin and only a couple of those go very far, Nelson said.

In the early 1900s a well on the Iniskin Peninsula, on the west side of the Cook Inlet, opposite Homer, produced about 50

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PETROLEUM NEWS, WEEK OF APRIL 25, 2004

# New model needed

*Lower Cook Inlet geology differs from upper, developed area, says Boyd*

By KRISTEN NELSON  
Petroleum News Editor-in-Chief

**T**he Minerals Management Service has a lower Cook Inlet oil and gas lease sale scheduled for May 19 in Anchorage.

Whatever happens, it probably won't be what happened in October 1977.

At the 1977 sale, the first in lower Cook Inlet, 27 companies bid some \$400 million for 87 of the 135 leases offered, and started exploring the next year, drilling 10 wells and three redrills from drillships, jackups and semi-submersibles by 1985.

Ken Boyd told Petroleum News that he doesn't expect this year's sale to be that kind of a barn burner.

For one thing, the drilling ended, the leases are gone and there is no production from the lower inlet.

In addition to the oil price bubble

bursting, the companies who drilled wells variously named Guppy and Coho (Marathon), S. Arch and Bede (Phillips), Hawk, Ibis and Raven (ARCO Alaska) and Falcon and Shelikof (Chevron), discovered that lower Cook Inlet doesn't have the same geology as upper Cook Inlet.

Boyd said the price of oil, which was high and expected to stay high, was a driver in the 1977 sale. "I think the expectation was that the oil prices were never going to go down," he said.

So were the big structures in lower Cook Inlet, structures like those that yielded major finds in upper Cook Inlet in the 1960s — "these big reverse faults, these huge very obvious structures that you could see on seismic," said Boyd, who came to Alaska with Marathon in 1978 and later spent 10 years at the Alaska Division of Oil and Gas, as deputy director and then as director, and who is now a consultant for EnCana, which is prospecting North



Ken Boyd

Slope and Foothills acreage.

## Different geology

In the 1970s, Boyd said, companies "were probably using an upper Cook Inlet model for a lower Cook Inlet sale." Other than a stratigraphic well drilled by ARCO, "there were no wells down there ... and nobody really knew very much, and so they used the same model."

In upper Cook Inlet, Boyd said, "if you have the Jurassic rocks and you have Tertiary rocks sitting on top of them, you've probably got an oil field."

It may not be commercial, but it probably is an oil field, because the Jurassic Tuxedni formation is the source rock for the oil and the Tertiary Hemlock and Tyonek form the reservoirs that hold the oil.

"And if the Cretaceous gets in there" in the middle in the upper inlet, "then you probably don't have an oil field," because the Cretaceous prevents oil from getting

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barrels a day of oil from the Cretaceous, Nelson said. He also said that a well that Chevron and Richfield drilled south of Swanson River found a little oil in the top of the Cretaceous.

However, Nelson thinks that oil found in the Jurassic at Trading Bay probably flowed back into the Jurassic rocks from the Tertiary rocks.

"There's been at least two wells at Trading Bay that have drilled into the top of the Jurassic and produced some oil," Nelson said. "Now whether that is oil that has come directly there from the Jurassic ... I'm a little skeptical on that because those are pretty ugly rocks."

Magoon thinks that the Starichkof well near Homer found some oil in the Mesozoic.

"There were some turbidite sands down there in the Cretaceous that had some oil in them," Magoon said.

And according to a Minerals Management Service report, two exploration wells in the

Lower Cook Inlet encountered oil pools in Late Cretaceous strata.

However, with a wide scattering of wells offshore in the Lower Cook Inlet, Magoon is skeptical about making a major oil find south of Kalgin Island, in the middle of Cook Inlet.

"My feeling is that from south of Kalgin if there were some big oil accumulations either in the Tertiary or the Mesozoic they most likely would have been found by now, whereas in the Upper Cook Inlet the Tertiary oil has blinded everybody to the Mesozoic," Magoon said.

## Exploration challenges

So what are the challenges for anyone interested in exploring in the older rocks of the Cook Inlet?

Lack of data probably presents the biggest difficulty.

Surface Mesozoic rock exposures only occur at the edges of the basin; folding and faulting of the strata coupled with the potential for lateral changes in the nature of the rocks make estimations of the geology in the center of the basin extremely unreliable. And

the shortage of wells limits well control of the subsurface geology.

A lack of detailed, deep seismic subsurface information compounds this problem: Magoon said that the relatively steep dips of the rocks in the basin and weak stratification make it difficult to shoot good seismic.

"So you don't always get the energy back that you want," Magoon said. "The seismic data is less than clear cut."

Warthen thinks that a shift of attention from the Cook Inlet to the North Slope following the discovery of Prudhoe Bay has limited the use of modern seismic techniques in the Inlet. And Nelson believes that modern 3-D seismic could help clarify the deep Mesozoic structures.

However, to really find out what's going on down in the Mesozoic someone's going to have to take some risk and drill a deep hole.

And Nelson feels confident that the oil's there — it's all a question of finding an economic accumulation.

"For me I can't see any alternative to it; it has to be down there," Nelson said. ■



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## MODEL

into the reservoir rocks.

“But in the lower Cook Inlet ... the Cretaceous seems like it might be the reservoir,” Boyd said.

The Tertiary thins out as you move south, he said, and there is almost none in the body of the MMS sale area, so what is the source rock in the upper inlet, doesn’t continue into the lower inlet.

### New view needed for lower inlet

Boyd said he thinks anybody going to this year’s sale is going to have to rethink the way they explore.

They’re going to have to “forget about the upper Cook Inlet model, except in a few places.”

And, “you can mainly forget about these big structural plays. Maybe not forget about them, but maybe they’re not as important.”

Instead, he said, companies should do what has been done on the North Slope, “look for these stratigraphic plays.”

Prudhoe Bay and Kuparuk, Northstar and Milne Point and Endicott, “the great old fields of the North Slope,” were all discovered relatively early, he said, and then there was “this sort of dead period ... when people couldn’t find anything.” And then, with the advent of 3-D seismic, companies started to have exploration success on the slope again, but with stratigraphic plays, finding Badami on the east, Tarn and Meltwater south of Kuparuk, and Alpine to the west.

### No good seismic for area

Can you pull the same rabbit out of the hat in lower Cook Inlet? Boyd asked.

“Is the same rabbit available to be pulled out of the hat in lower Cook?”

It’s hard to know because there is very little 3-D seismic in lower Cook Inlet.

“Most of the seismic is very old and it’s very, very lousy,” he said. “So the database is pretty weak” going into the sale.

There are records from the wells, and MMS said in its draft environmental impact statement for the Cook Inlet planning area that three of the wells found oil in the Cretaceous. Two had significant shows in the late Cretaceous, but tested non-commercial flow rates; the third well had shows but was not tested. All of the



JUDY PATRICK

Nabors Rig 129 drilling for gas in the Cook Inlet area in 2004.

wells at the 10 prospects tested (13 wells including three redrills) were plugged and abandoned. No leases from the 1977 lease sale remain, nor do any from a second sale, in 1981, which brought in \$4.4 million from two bidders for 13 leases of 153 offered. Ten wells were drilled on leases from the first sale, three on leases from the second. A third sale of a portion of lower Cook Inlet, in 1997, offered 101 blocks but only two, now part of the Cosmopolitan unit off Anchor Point, were taken in that sale.

### Reservoir quality an issue

In addition to demonstrating that oil didn’t exist where companies expected to find it, Boyd said the drilling turned up a “huge problem, geologically, in lower Cook Inlet ... There are zeolites, in particular one called laumontite.”

Laumontite is a mineral that “deposits in the pore spaces,” destroying the porosity of what might have been good quality reservoir rock.

This is different than permeability, the ease with which oil moves between pore spaces, Boyd said: Laumontite cement plugs the pores in the rock, so you don’t have a reservoir to hold the oil.

If the oil didn’t go into potential reservoir rock cemented with laumontite, did

it go somewhere else? These, he said, are “the usual kind of questions you have to go through” when you try to figure out whether an area might produce hydrocarbons, and, he said, the laumontite question is probably not something you could figure out from seismic — if you had seismic.

### Different players than upper Cook Inlet

Not only are lower Cook Inlet rocks different than upper Cook Inlet rocks, but Boyd said he expects the players would be different, too. Upper Cook Inlet is attracting mature basin players, he said, smaller companies which are developing smaller fields and producing reserves around older fields.

But there is no infrastructure in lower Cook Inlet, and the costs to work there will be high.

Drilling from onshore won’t really be an option, he said, and costs of \$15 million to \$18 million have been discussed just to bring in a drillship or semi-submersible to work in water depths ranging up to 600 feet.

MMS estimates a mean of 600 million barrels of economically recoverable oil at \$30 oil prices. If that was one field, he noted, it would be in the range of Alpine, but perhaps in 200 feet of water some 25 miles from shore.

A small company, he said, probably couldn’t handle the “huge risks, the huge up-front costs,” and then the challenge of getting oil or gas to shore.

And with only poor data available, “it’s going to be a tough first go,” he said.

Good seismic is a necessity if you’re looking at stratigraphic plays, he said, and 3-D seismic is very expensive.

He said he hopes “somebody has the wherewithal to go out there and give it a shot, and at a minimum get some decent (seismic) data shot out there,” and either figure out that “this won’t work, will never work, or ... maybe if we looked over here, maybe if we look at this kind of thing.”

Boyd also said he wonders if the players who come to the lower Cook Inlet sale could be a clue to the kind of companies that might be interested in the state’s Bristol Bay sale. Bristol Bay is onshore, and the basins are very different, he said, but there also hasn’t been much success with the rocks there and it’s pretty far away from infrastructure. ■

PETROLEUM NEWS, WEEK OF APRIL 1, 2007

# Looking for Cook Inlet hydrocarbon kitchen

*Former Mobil Oil geologist Frank Banar explains how Escopeta's Kitchen prospects may contain large quantities of gas and light oil*

By ALAN BAILEY  
Petroleum News Staff Writer

Only a drill bit is going to determine how much oil and gas lies deep beneath Alaska's upper Cook Inlet in Escopeta Oil and Gas's Kitchen prospects. But a multi-year effort by Escopeta to bring a jack-up rig to the inlet for drilling at Kitchen indicates sustained expectations of a significant find.

On March 21 Escopeta consultant Frank Banar told Petroleum News about his latest ideas on the upper Cook Inlet petroleum systems, and how the petroleum geology of the region leads to optimism about Kitchen. Banar used to work on Cook Inlet geology for Mobil Oil and has been working for Escopeta for the past three or four years.

The U.S. Geological Survey originally proposed the concept of a Kitchen prospect as an oil trap against a major thrust fault that demarks the eastern side of the Middle Ground Shoal oil field, Banar said. Subsequent analysis by Escopeta using enhanced resolution seismic data identified the prospect as a thick wedge of Tertiary strata with a trap formed against what geologists term a normal fault, a relatively steeply inclined fault that cuts through the wedge of sediments.

"In Kitchen prospect you've got this huge dipping wedge of sediments ... that dip from Middle Ground Shoal to the east," Banar said.

## East Kitchen

A second prospect, called East Kitchen or South Cook Inlet, consists of a potential petroleum trap in Tertiary strata in a major anticline to the east of the Kitchen prospect.

The East Kitchen anticline consists of the southern extension of a north-northeasterly trending structure that also contains Forest Oil's Corsair prospect and ConocoPhillips' North Cook Inlet gas field. A similar trending anticline structure to the

west forms the Middle Ground Shoal and Granite Point fields — the Kitchen prospect lies on the eastern flank of that more westerly anticline. All of the Cook Inlet oil fields have reservoirs in Tertiary sandstones.

But, although the Kitchen prospects consist primarily of structural traps, formed from folding and faulting of the strata, an analysis of enhanced resolution seismic data has also revealed the potential for stratigraphic traps in what appear to be ancient river channels cutting through the sedimentary layers in both Kitchen and East Kitchen, Banar said.

And what's particularly intriguing about these river channels is that their locations seem to correspond to what geophysicists term "bright spots," teased from the seismic data using a technique called wavelet energy absorption. Bright spots consist of anomalies in the amplitudes of the seismic signals and can indicate the presence of hydrocarbons, especially natural gas.

## Recent structures

Geologists have determined that the major anticlines in Tertiary strata under the northern Cook Inlet formed in relatively recent geologic time, during the Pliocene and Pleistocene epochs (somewhere between 10,000 and 12 million years ago).

And Banar thinks that the more complex nature of the western anticline system, coupled with the removal by erosion of some of the stratigraphic sequence in the west, indicates that compression forces in the Earth's crust pushed the Tertiary strata over a relatively rigid platform of older Mesozoic rocks.

"The compression, I think, pushed against the Mesozoic platform there (at Middle Ground Shoal) and that's why you're starting to get overturned beds and missing section," Banar said. "Whereas when you go to North Cook Inlet, Corsair and East Kitchen it's still folded, but it's not as severe."

But the mechanism by which oil migrated into the Tertiary reservoirs presents

something of a puzzle, since geologists have established that the oil in the Cook Inlet Tertiary reservoirs originated from the Jurassic Tuxedni formation and that the oil started generating sometime before some of the trap structures formed.

How did oil move from the source rocks into geologic structures that deformed the Tertiary strata after the oil started to form? And how did some of the oil become trapped in somewhat older structures in fields such as Swanson River and Trading Bay, on the east and west sides of the Cook Inlet?

## Two-stage vs. one-stage migration

USGS geologist Les Magoon, in his seminal work on Cook Inlet petroleum geology, postulated that the oil migrated in two stages. In the first stage the oil would have flowed into a Tertiary stratigraphic trap. Then, during the upheavals associated with the folding of Tertiary strata the oil would have drained upwards from that trap into newly formed fold and fault structures.

But Banar thinks that variations in the API gravities of oil between different Cook Inlet fields point to a simpler single-stage oil migration model, similar to a model that he said Aurora Gas geologist Andy Clifford has proposed. In the single-stage model, oil would have been generated from the Tuxedni over an extended period of time and would have migrated directly into the current oil reservoirs.

Banar arrived at this idea by plotting on a map the API gravity data from one of Magoon's 1970s reports and from some more recent oilfield data.

"I saw that there was some relationship between oil gravity and the location of the fields," Banar said. "... It appeared there were higher gravity crudes down the middle of the Cook Inlet basin."

There is 44 API oil in the Tyonek formation of the Granite Point field and oils of around 42 API in the higher oil sands of the

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PETROLEUM NEWS, WEEK OF MARCH 25, 2007

# Chevron's revitalization

*Alaska plans include exploration programs and Cook Inlet oilfield rejuvenation*

By ALAN BAILEY  
Petroleum News Staff Writer

**W**hen Chevron took over Unocal in 2005, there was much nail biting on Alaska's Kenai Peninsula about what might happen to Unocal's Cook Inlet oil and gas fields.

Announcements by Chevron since then have shown that nobody need have worried.

And at the March 20 meeting of the Kenai Chapter of the Alaska Support Industry Alliance Steve Wright, Chevron's Alaska asset development manager, confirmed his company's bullish views on the Cook Inlet and Alaska.

"Chevron's business philosophy now in Alaska is that we intend to invest and grow here in the state and are committed to be an integral part of the state's energy future," Wright said. "... We really do have

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*"We're looking at the possibility of bringing in a flexible rig that we could move from platform to platform as our redevelopment efforts move ahead."*

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—Steve Wright, Chevron

a new critical mass after we have combined the legacy Chevron and Unocal portfolios here in state."

Chevron now operates three offshore Cook Inlet oil fields and the Swanson River oil field on the Kenai Peninsula. The company operates five onshore natural gas fields, and two gas storage facilities. Chevron also owns interests in two other gas fields that the company does not operate.

## Stem the oil decline

"One of our primary focuses now is

stemming the decline of the Cook Inlet oil production and extending the life of these mature fields here in the inlet," Wright said. "Our commitment is to invest to maintain current production."

There's even a possibility of increasing Cook Inlet oil production, he said.

A key to stemming the oil decline is an oilfield redevelopment drilling program that Chevron hopes to start later in 2007. That program will target, among other things, known oil pools between existing wells, Wright said.

But improved waterflood in the oil reservoirs will also substantially increase secondary oil recovery, Chevron believes.

"A second focus area for us is waterflood optimization, where we go back and rework the existing water injection wells, add new injector wells, change the

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## KITCHEN

Middle Ground Shoal field, Banar said. Shell found some 42 API oil when it drilled the Corsair prospect in 1965, and some 56 API condensate has been produced from the North Cook Inlet field, Banar said. Banar also said that one seismic section through the Corsair prospect appeared to show a gas chimney (vertical column of natural gas bubbling up through the rock strata) — a gas chimney suggests the presence of thermogenic gas that has formed by heating petroleum source material (most natural gas in the Cook Inlet area is biogenic and formed though bacterial action on coal seams).

By contrast, oils from the Trading Bay and McArthur River fields on the west side of the Cook Inlet, and from the Swanson River field on the Kenai Peninsula, have API values below 40, Banar said.

Magoon did recognize the variations in API gravity between different fields and had suggested that late oil generation, after the draining of the postulated intermediate stratigraphic trap, might have placed relatively high API gravity oil in fields such as Granite Point.

But Banar thinks that if the maturity of the source rock increased over an extended time period, a resulting transition from generating low API oils through higher API oil to condensate and natural gas would explain the current oil gravity distribution. With oil migrating into the reservoirs as the structures of those reservoirs formed, the older structures around the perimeter of the Inlet captured lower API oils than the younger structures along the central axis. Fields such as Trading Bay contain deep faults that could have provided migration routes for those lower API oils from the Jurassic source, Banar said.

"It looked to me like the first surge of source rocks produced the lower gravity crudes, say below 40 gravity, in Trading Bay, McArthur River, Swanson River and Beaver Creek, and then you had the late structures formed in the Granite Point, Middle Ground Shoal, North Cook Inlet and South Cook Inlet," Banar said. "That stopped any migration to the east and west and confined it to the center of the basin."

## Compelling evidence

Banar said that the structure of the older Mesozoic strata that underlie the Tertiary rock sequence also provides compelling evidence for the petroleum system that he is

proposing. A huge east-west oriented anticline in the Mesozoic strata predates the formation of the Tertiary rocks and plunges to the east from a point around the center of the Cook Inlet. As the major anticlines in the Tertiary strata formed, the older anticline would have formed a conduit, pumping the late-forming and high API oil and gas east to west into Tertiary reservoirs under the center of the Cook Inlet.

"That's what focused the oil to the west," Banar said.

Not only that. The Tuxedni source rocks in the core of the Mesozoic anticline come right up in contact with the base of the potential reservoirs of the Kitchen and East Kitchen prospects.

"That's what makes this whole thing so exciting because the source rock and the reservoir are so close," Banar said.

In addition, the Kitchen prospects are in some of the deepest parts of the Cook Inlet Tertiary section — with 25,000 feet of Tertiary rocks loading down on them, the Tuxedni rocks should have been pushed into the temperatures and pressures required for oil.

And that possibility of the prospects sitting over the main cooking pot for Cook Inlet oil is what inspired the name of the Kitchen prospects, Banar said. ■



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## CHEVRON

waterflood distribution patterns in the reservoir and hopefully recover a significant amount of additional incremental oil," Wright said.

And Chevron plans to use state-of-the-art drilling technology to extend field limits beyond existing field perimeters. Critical to that endeavor will likely be the use of extended reach directional drilling to penetrate horizontally through oil pools.

"You contact a much greater amount of reservoir surface area per foot drilled," Wright said. "We've found in many areas of the world this is really a key to unlocking some of the old mature assets in our portfolio."

Chevron also plans to do some drilling deep below the existing oil and gas fields into the Jurassic strata — Jurassic rocks are known to have sourced much of the Cook Inlet oil and geologists have long speculated about the possibility of an oil find deep below the Tertiary strata of the existing fields.

"We think there's a lot of additional deeper potential under existing fields that has yet to be developed," Wright said.

With the Cook Inlet natural gas market in transition between oversupply and undersupply, Chevron also plans to augment its gas production. The company thinks that there is an untapped gas accumulation above the Granite Point oil field and that there are opportunities for gas field development on the Kenai Peninsula. The company also plans to continue the development of its existing gas fields.

Gas storage in the Cook Inlet area is also becoming critical to ensuring adequate gas supplies during peak winter demand.

"We are continuing to work on gas storage expansion," Wright said. "... We can't develop fields fast enough to supply all that peak winter demand directly out of existing fields, so we use storage as a cushion."

### Many challenges

But the Cook Inlet remains a challenging and expensive region for oil and gas exploration and development. The severe winter climate makes travel difficult for many months of the year, and mobilizing

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*With the Cook Inlet natural gas market in transition between oversupply and undersupply, Chevron also plans to augment its gas production. The company thinks that there is an untapped gas accumulation above the Granite Point oil field and that there are opportunities for gas field development on the Kenai Peninsula.*

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supplies and equipment to remote locations often proves difficult.

Offshore, the 20- to 50-year-old oil platforms are showing their age, with some equipment needing replacing before Chevron can start its redevelopment efforts.

"A lot of the work that the Chevron operations team has under way now is focused on assessing how much of the equipment on these offshore platforms can be utilized and how much of it'll have to be removed and replaced," Wright said.

Of particular interest are the platform drilling rigs.

"We actually own more drilling rigs than any other company in state," Wright said.

Unfortunately, however, most of the rigs have been mothballed for years and are no longer in a suitable condition for use.

One option that Chevron is investigating is the development of a mobile primary rig, and perhaps a workover rig, that could be moved from platform to platform.

"We're looking at the possibility of bringing in a flexible rig that we could move from platform to platform as our redevelopment efforts move ahead," Wright said. "The benefits of that are pretty substantial. It means we no longer have to maintain 10 individual master derricks. ... We wouldn't have to maintain 10 individual sets of generators and mud pumps."

### North Slope

Although Chevron is a prominent operator in the Cook Inlet, the company also owns between a 1 percent and a 10 percent working interest in each of the major North Slope oil fields, Wright said.

Wright also talked about Chevron's White Hills exploration block, in the central North Slope south of Prudhoe Bay. That lease block currently encompasses

about 430,000 acres, he said.

"We're currently conducting 2-D seismic acquisition efforts on the slope this winter and we plan a two-year drilling program kicking off in the winter of 2007-2008 and extending into the winter of 2008-2009," Wright said.

Petroleum News reported March 11 that Nabors is building a new lightweight land rig that Chevron will use onshore on the Kenai Peninsula before moving to the North Slope for drilling in the White Hills region.

### Personnel constraints

With an aggressive Alaska program of exploration and development ahead, Chevron sees workforce recruitment and development as a major issue.

"We've got to have the manpower, the skill and expertise, to conduct those types of programs efficiently and economically," Wright said. "Internally we're facing a lot of competition for manpower. Chevron has a number of major capital projects worldwide that are competing for the technical resources that we're competing for."

An aging workforce, many of whom joined Chevron in the 1970s and 1980s, is compounding the problem — as much as half of Chevron's technical workforce will retire in the next 10 to 15 years, Wright said. And Chevron has been actively seeking new oil industry recruits at college campuses.

"There's going to be a huge gap, a critical need, for new talent to come in and pursue the opportunities that are currently being identified and developed," Wright said. "... The opportunities over the next 10 to 20 years for technical professionals coming into the oil and gas industry will be astounding ... just because of the number of openings that are going to develop."

Workforce issues are also hitting the contract services in Alaska, especially with the heightened level of exploration activity on the North Slope, Wright said.

"So we have to plan and pace our work to make sure that we utilize the contracting workforce effectively, that we don't overtax the system in trying to conduct a lot of work in the Inlet when the resources aren't available because they've moved up to the Slope," Wright said.

"Chevron sees a bright future here in Alaska and we look forward to working together with you all to realize that vision," he told the Alliance audience. ■

PETROLEUM NEWS, WEEK OF MARCH 18, 2007

# The 10-year itch

*Cook Inlet R-to-P ratio may make users nervous, but it spurs investment*

By KRISTEN NELSON  
Petroleum News

**T**here is a lot of concern in Cook Inlet about running out of natural gas — gas for electric utilities, gas for home heating and gas for industrial use.

Dealing with that concern is an issue for ConocoPhillips and Marathon, who applied in January for a two-year extension of the export license for their Kenai Peninsula liquefied natural gas plant.

Scott Jepsen, ConocoPhillips Alaska's Cook Inlet manager, says the concern is because natural gas supplies in the Cook Inlet basin are transitioning from oversupply to what is normal in the Lower 48, a 10-year supply.

Cook Inlet's situation is similar to what occurred in the Lower 48 in the 1970s, alarming users but prompting drilling, Jepsen told a March 8 joint meeting of The Alliance and the Resource Development Council.

It's a transition stage between a supply of gas so large that there is no incentive to drill and a supply of gas which — without any additional drilling — would last about 10 years, a close enough sales window that industry is interested in exploring for and developing more gas.

"In the mid-'60s, basically the Lower 48 was a stranded gas resource," he said. "But over time we burned through that oversupply" and by the mid-1970s, the reserves-to-production ratio was about 10 years: At the rate natural gas was being consumed, known reserves would last about 10 years.

There were a number of short-term reactions when the supply dropped to 10 years, Jepsen said: price controls were instituted to prevent rapid price rises, utilities quit expanding service and pipelines took expensive take-or-pay contracts to ensure they had supplies for their customers.

The price of natural gas did go up, and companies began drilling because by the 1970s if you "drilled and developed natural gas, you had a pretty good prospect of selling it without displacing somebody else from the market and you'd get a good price for it," he said.

The number of wells drilled for natural gas in the Lower 48 about trebled in the



JOHN BARNES



SCOTT JEPSEN

1970s.

"The market responded," Jepsen said. "And eventually the price controls went away; people ... stopped being concerned about natural gas supply and we've basically been at that R-P ratio now for about 30 years."

## An R-P ratio that encourages investment

Industry won't invest to develop a resource it can't sell for 20 or 30 years, he said, but when the reserves-to-production ratio reaches 10 then the market is right for investment.

Natural gas was discovered in Cook Inlet as companies explored for oil in the 1960s, so much natural gas that the LNG plant owned 70 percent by ConocoPhillips and 30 percent by Marathon was built to provide a way to commercialize some of that gas, as was the Kenai Peninsula fertilizer plant.

Those industrial facilities, along with the Southcentral utilities, have been burning gas since the 1960s.

Cook Inlet, Jepsen said, is now about where the Lower 48 was in the 1970s.

In the early 1980s the R-to-P ratio for Cook Inlet had dropped to about 30 — 30 years worth of supply at 1980 production rates.

Today, he said, the inlet is trending down to an R-to-P ratio of about 10.

What's happening? "We're concerned about price. We have issues about not letting contracts go forward that have an arms-length price negotiated. We have concerns that we're going to run out of gas" for the industrial facilities and the utilities. "We have concerns that exploration's not going to fill the gap."

"We're in that same uncomfortable posi-

tion that the Lower 48 was in, in the mid-1970s," Jepsen said.

"I think we'll transition into a period where we get more comfortable with the supply and demand balance," he said.

If you find gas today you can sell it

Jepsen noted that he'd given a talk on gas supply to The Alliance in April 2002, "and said just about the same things I'm saying today."

In 2002, he predicted that the next five years "would say an awful lot about what's happening in this industry," because in 2002 you could, for the first time, find gas in Cook Inlet and sell it for a good price.

In the 15 years before 2001, Jepsen said, "there was almost no exploration and development of gas fields in Cook Inlet." The price wasn't all that robust and with a high R-to-P ratio, there wasn't any point in looking for gas because to sell it you'd have to price somebody else out of the market.

But starting in 2001, 2002, "we started to get that R-P ratio of about 10." If you found gas, you could sell it for a price high enough that there was an incentive to drill for gas.

As a result, some 75 exploration and development wells have since been drilled for gas. At a nominal price of \$3 million to \$5 million per well, that's a \$200 million to \$350 million investment in wells, he said. "That doesn't count compressions, line looping, drill sites, roads, pipelines etc." Jepsen said that his back-of-the-envelope estimate is that \$300 million to \$500 million has been invested in the last few years looking for gas in the inlet.

## Why not shut the gas in?

In January ConocoPhillips and Marathon applied for a two-year extension to their export license for the LNG plant; the existing license expires in March 2009.

In that 2009-2011 timeframe, Jepsen said, the two companies have some 120 million to 150 million cubic feet a day of natural gas that they need to sell.

"We can sell a portion of it to the utilities, but not the lion's share," he said. "The vast majority of it we have to basically shut in."



### So why not shut the wells in until the gas is needed?

The answer, Jepsen said, is water. The experience of every operator in the inlet is that "if you shut in a producing gas well, you're asking for trouble." That trouble, he said, comes in the form of water, because a lot of the gas wells in Cook Inlet have started to produce a little water. "And the first rule of thumb when you're producing a gas field that's producing water is outrun that water," produce the gas before the water takes over.

"If you shut in these wells, water's going to continue to encroach, even if you're not producing," Jepsen said, and that causes "catastrophic failure of the sands." Sand fills the well bores and production can't be restored from those wells.

"In order to go back in you have to essentially drill replacement wells" and those wells aren't always successful, risking the "deliverability of reserves if you have to shut in these wells."

### Why a two-year extension?

As to why the companies have applied for a two-year extension, Jepsen said a two-year export license extension doesn't require the companies to have a sales contract in place, which means they can focus on getting the extension.

And there's the transition period Cook Inlet is in with the R-to-P ratio. "It will probably take a couple of years to get more history behind us, to get past this transition point and show that industry does respond the way I think it does."

Utilities will have contracts negotiated and will feel better about their future supply and in two years there should be clarity about what's happening with North Slope gas, he said, all of which will help show what Cook Inlet's long-term energy picture looks like.

"So it may be quite possible we'll be looking at another extension," he said. "But right now, we're at a point of uncertainty and two years I think is more defensible than trying to go out for a longer period of time."

### Application out for public comment

The U.S. Department of Energy put the ConocoPhillips-Marathon Oil application



ConocoPhillips and Marathon's LNG facility at Nikiski on Alaska's Kenai Peninsula.

for a two-year export license extension out for public comment March 8, coinciding with the March 8 presentation by Jepsen and John Barnes, Alaska production manager for Marathon.

Continued LNG operations supply energy security to Southcentral Alaska because gas can be diverted from the plant in extreme cold weather to meet local needs, Barnes said. It provides flexibility for the future, including continued exporting and perhaps importing and "it's a reason to continue looking for gas in the Cook Inlet," he said.

Barnes said DOE will look at two areas in approving the expansion application: Are there sufficient reserves and resources to meet local needs during the export period and does the export overall serve the public interest.

The Alaska Division of Oil and Gas shows 1.6 trillion cubic feet, of proved and probable reserves in its 2006 report, while the Netherland, Sewell analysis done for the companies' application from public data shows 1.7 tcf, a difference of about 5 percent, Barnes said.

DOE has made some estimates of a total resource of 15-plus tcf and the Colorado School of Mines' Potential Gas Committee

describes the Cook Inlet as having a resource base of about 14 tcf. The Potential Gas Committee cites a minimum exploration add of about 600 billion cubic feet, and a most likely exploration addition of about 1 tcf, Barnes said, while the U.S. Minerals Management Service had a wider range, about 700 bcf to 2.5 tcf.

But, he said, "none of these estimates look at what happens in-field, which is the first place that producers look."

"Frankly, we'd rather leverage off our existing infrastructure and get the most we can out of existing fields before we step out too far," Barnes said. The Cook Inlet basin is "highly prospective" for natural gas he said, and current price levels "are encouraging reserves' growth and aggressive reservoir management to maximize recovery."

### Public interest impacts

On the public interest issue that DOE will look at, Barnes said the LNG plant provides 58 direct jobs and about 128 indirect jobs, \$70 million in personal income and \$50-some million in severance, royalty and local taxes. "The LNG plant is a key part of the economic machine in Kenai," he said.

But there's also the upstream component: some 800 to 1,000 upstream jobs on the Kenai Peninsula "drilling wells, operating equipment (and) producing every day."

The LNG plant is important to long-term supply in Cook Inlet: "it provides a base-load market that can drive exploration and development," Barnes said. And it provides peaking capacity "at no cost to the utilities." Providing peak shaving has historically been part of the plant's license to operate, he said.

Jepsen said that the plant has had a 40-year sales agreement with Tokyo Electric and Tokyo Power and "they understand that we cannot supply them gas unless we supply it to the local economy first. . . . They're willing to work with us to make sure that we have gas in the local market," he said.

On the infrastructure side, the two-year extension provides "an opportunity to use that infrastructure, to keep it, maintain it for future operations, perhaps ongoing export," Barnes said, as well as the possibility, at some point in time, of "perhaps using it as an import facility, a peak-shaver type opportunity." ■



# Alaska Frontier Constructors: Ready for tomorrow, today

**A**lthough the name Alaska Frontier Constructors, Inc. is new, this pioneering group of construction specialists has been active in supporting resource development in the Arctic and remote Alaskan sites since the 1970s.

In addition to the completion of several major projects at some of Alaska's most prominent mines, the AFC team has developed and perfected numerous innovative offshore construction techniques that utilize the strength of the ice as a primary winter construction platform. The experience of AFC personnel in the development of remote site and Arctic construction technology is unsurpassed and has been sought after and adapted by oil industry leaders in other cold regions of the world such as Sakhalin Island, Russia.

AFC and its associates have the knowledge and experience necessary to provide the oil and mining industries with the right tools to safely complete a wide variety of projects. The experience of these individuals can be briefly summarized in the following projects:

- Extensive ice road construction and maintenance
- Gravel hauls in excess of 50,000 cubic yards daily
- Participated in or furnished equipment for all offshore gravel islands constructed over ice roads in Alaska between 1981 and present
- Involved in the construction of both oil production islands in existence –

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Endicott (1985) and Northstar (2000)

- Offshore pipeline trenching and backfilling of the only producing subsea arctic pipeline
- Site preparation, road and dam construction at Pogo, Red Dog and Fort Knox mines

#### Capabilities

AFC personnel are committed to safely and efficiently performing any project they undertake. Areas of expertise include:

- Large-scale earthworks
- Gravel quarry development



- Heavy haul trucking
- Ice road construction
- Island construction
- HDPE pipe and liner installation
- Bridge and dock construction
- Sheet, Z and pipe pile installation
- Slope protection fabrication and installation
- Subsea pipeline trench excavation and backfill

#### Experience

AFC draws upon the experience of its personnel, who are known throughout the resource industry. These personnel have been vital in the development of Arctic construction methods and in the completion of several major mine projects during the past 30 years. AFC is proud of its record for completing projects on time, within budget and at a level of quality that meets or exceeds expectations. ■



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**T**he Sheraton Anchorage hotel is conveniently located in downtown Anchorage, just a few short blocks from the Fifth Avenue Mall, Anchorage Museum of History and Art, and numerous other shopping, dining, and cultural venues. Our sixteen-story facility offers 375 well-appointed, inviting guest rooms, including four elegant luxurious suites, as well as numerous Junior Suites and accessible rooms.

With plentiful parking, main entrances located on both sides of the Hotel, and streets running in each direction, the Sheraton Anchorage provides the most convenient access to be found in the city.

The Hotel consistently performs above the standards as set forth by Starwood Hotel and Resort's discriminating standards and is rated a three Diamond property by AAA. We are proud of the high level of traditional friendly service we are pleased to offer in our comfortable, modern setting. Our meeting space has an inviting décor.

The Sheraton Anchorage Hotel is dedicated to providing unparalleled service, as well as the finest accommodations available in Alaska. Guests will enjoy a



number of conveniences that help to foster a "home away from home" atmosphere. These conveniences include:

- Sheraton Sweet Sleeper Beds in all guestrooms and luxury suites
- Hi-Speed Internet access in all meeting rooms and guestrooms
- Anchorage's most convenient & plentiful hotel parking for guests



- Voice-messaging system
- Coffee makers with complimentary coffee and tea
- Hairdryers, irons and ironing boards
- Complimentary

access to our health spa, offering a full range of cardiovascular and weight training equipment, in addition to a sauna, steam room and Jacuzzi.

Guests of the Sheraton Anchorage Hotel will also enjoy some of the finest quality food and service in the city. Dining options at the hotel include:

- Casual dining and specialty beverages next to our sky-lit atrium. Ptarmigan Bar features a locally renowned Sushi Bar five days a week.
- Elegance defined is our Sunday Brunch with a dramatic rooftop view of Anchorage.
- In-Room Dining – 24 hour service offering a varied menu.



The Hotel is located a mere seven miles from the Anchorage International Airport, and with the variety of taxi and shuttle options available at all times, your attendees can be checking into the Hotel just 15 minutes after gathering their luggage. Average transportation costs to the Hotel from the airport range from approximately \$17, dependant upon shuttle or taxi usage.

Whether you are holding a large conference, an elegant social gathering, or a corporate strategy session, our 23,000+ square feet of convenient and comfortable meeting space provides the perfect setting for enjoyable and productive events. The

hotel combines modern room décor, expansive meeting space (including windowed break out rooms), wireless public space technology and convenience while cele-

brating the past in its distinctive, museum-quality artwork featured throughout the facility. The past and the present meet seamlessly inside its walls. ■

#### CONTACT:

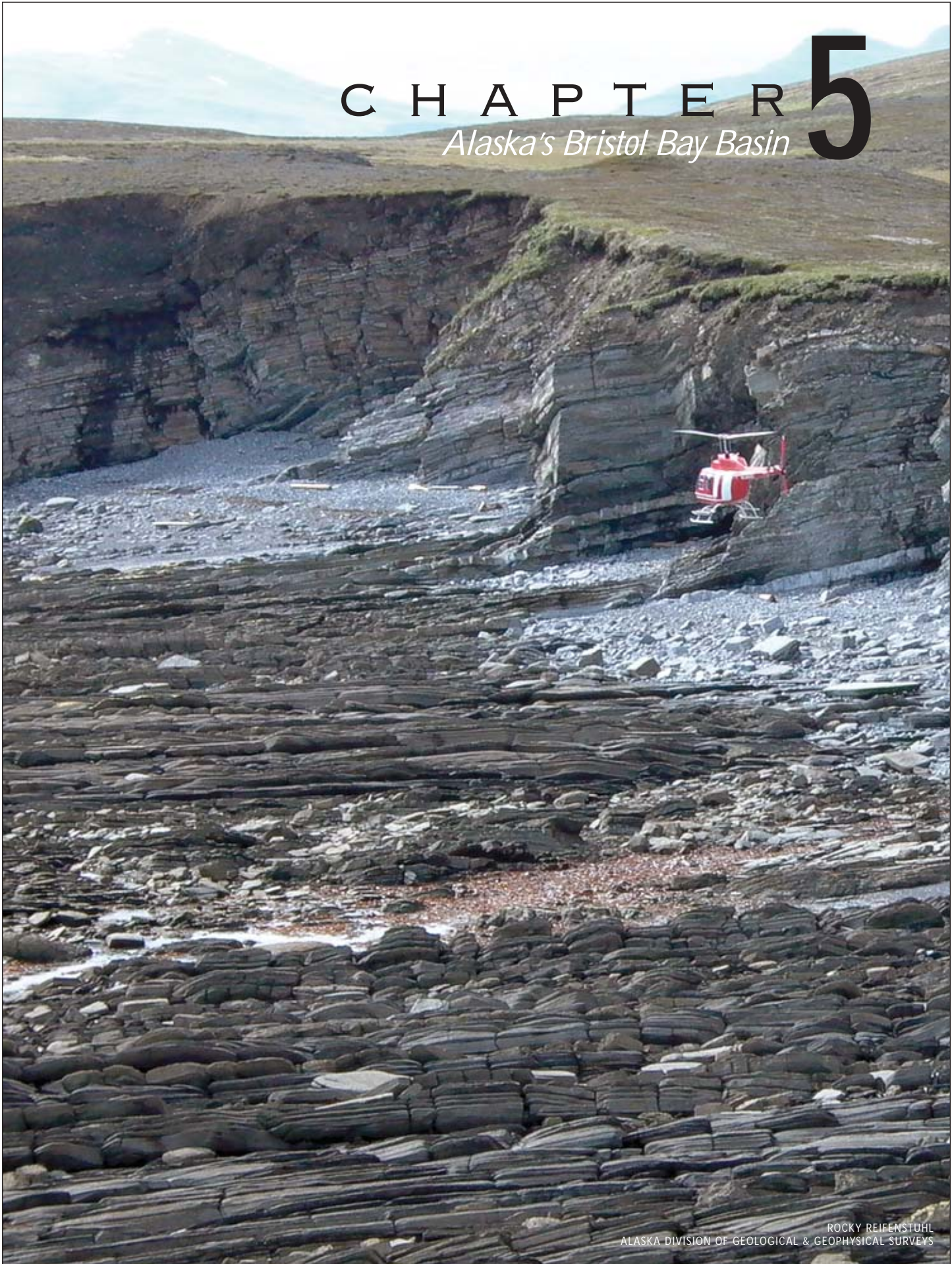
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# CHAPTER 5

*Alaska's Bristol Bay Basin*





## CHAPTER 5

# Alaska's Bristol Bay Basin

## Geological setting

The Bristol Bay Basin, also known as the North Aleutian Basin, extends more than 200 miles along the north side of the Alaska Peninsula and out into the southern Bering Sea shelf. The eastern portion of the Bristol Bay Basin underlies the northwest side of the Alaska Peninsula from north of Egegik to south of Herendeen Bay. An arch in the basement rocks separates the western end of the Bristol Bay Basin from the St. George Basin, another large basin in the southern Bering Sea continental shelf.

The geological history of the Bristol Bay Basin relates closely to that of the Cook Inlet Basin to the northeast — both basins formed along zones where the earth's crust warped downwards over a timeframe that spanned the Mesozoic and Cenozoic eras. More than 20,000 feet of Cenozoic sediments have accumulated in the deepest part of the Bristol Bay Basin. These sediments probably overlie a 25,000- to 30,000-foot sequence of Mesozoic sediments in the southwest sector of the basin. Figure 5.1 shows the general layout of the basin.

### Mesozoic seas

In the Mesozoic era, prior to the late Cretaceous, a wide area of southern Alaska, including the Bristol Bay, Cook Inlet and Copper River basins, lay under seas bordered by volcanic arcs. As a result, a sequence of broadly similar pre-Cenozoic rocks, generally known as the Alaska Peninsula terrane, extends under all of these basins. The Alaska Peninsula terrane is also known as the Peninsular terrane.

Geologists divide the Alaska Peninsula terrane into two subterrane: the Iliamna and Chignik subterrane. The Iliamna subterrane consists of thermally altered early Mesozoic and possibly Paleozoic rocks that outcrop west of the Bruin Bay fault that marks the west side of the Cook Inlet Basin (see figure 4.2 in chapter 4). The Chignik subterrane consists of Permian to late Cretaceous sedimentary rocks that include the oil source rocks of the Cook Inlet Basin oil fields. Most Mesozoic oil and gas interest focuses on the Chignik subterrane.

Geologists do not know where the boundary between the Iliamna and Chignik subterrane passes under the Bristol Bay

Basin. However, evidence from the Great Basins No. 1 well on the Alaska Peninsula suggests that the boundary may run east to west somewhere north of Pilot Point near the northeastern end of Bristol Bay. Granite-like igneous rocks of Jurassic age under the northeastern part of the Bristol Bay Basin have also cut through the older Mesozoic strata in that area.

An MMS assessment of the basin published in 2006 has postulated that the boundary passes east to west offshore from a point north east of Port Moller. This interpretation of the boundary location leads to the conclusion that the petroliferous Mesozoic sediments are absent from most of the outer continental shelf section of the basin. The interpretation is based on patterns of magnetic anomalies and the absence of evident stratification in the Mesozoic basement, as seen in offshore seismic sections.

Well data from the Black Hills area, on the Alaska Peninsula south of Port Moller, show a substantial thickness of Chignik subterrane strata on the immediate southwest side of a steep southern flank of the basin. And a seep of thermogenic gas from lower Cretaceous rocks between Port Moller and Herendeen Bay points to the existence of Mesozoic, Chignik subterrane source rocks under that location. But, in the absence of adequate seismic or well data, the existence of Chignik subterrane rocks under the southern part of the basin remains a subject of speculation.

The upper Triassic and lower Jurassic strata of the Chignik terrane consist predominantly of limestone and clastic sediments deposited on a shallow marine shelf. The clastic sediments contain volcanic materials. These volcanic materials were reworked into new sediments during the middle Jurassic. The upper Jurassic and Cretaceous sequences of the Chignik terrane include a variety of sediments that are mainly derived from erosion of the emerging Aleutian and Alaska Ranges.

### Emerging land

The onset of the Cenozoic era in the Bristol Bay Basin marked a change of sedimentary environment from a marine shelf to an environment that oscillated between terrestrial and shallow marine settings. Rivers deposited huge volumes of silt, sand and

pebbles into the subsiding basin. The resulting stratigraphy includes sandstones, organic-rich mudstones and coal. Depositional settings in the Miocene Bear Lake formation, for example, vary from fluvial and freshwater lake environments to tidal flats and marine, estuarine areas.

Figure 5.2 shows the general stratigraphy of the Bristol Bay Basin.

The area occupied by the Bristol Bay Basin has undergone a series of upheavals that have caused folding and fracturing of the rock strata. These upheavals ranged in age from early Jurassic to Pliocene and resulted from movement of tectonic plates of the earth's crust. The major folds and faults in the area trend sub-parallel to the Alaska Peninsula, although there are also structural trends that traverse the peninsula nearly east-west.

The east-west structures may reflect a gradual change in relative motion at the plate boundary between the oceanic crust of the Pacific plate and the continental crust of the Bering shelf. This change also resulted in an early Tertiary transform fault zone that runs from the southwest edge of the Bristol Bay Basin west and northwest to the St. George and Navarin basins.

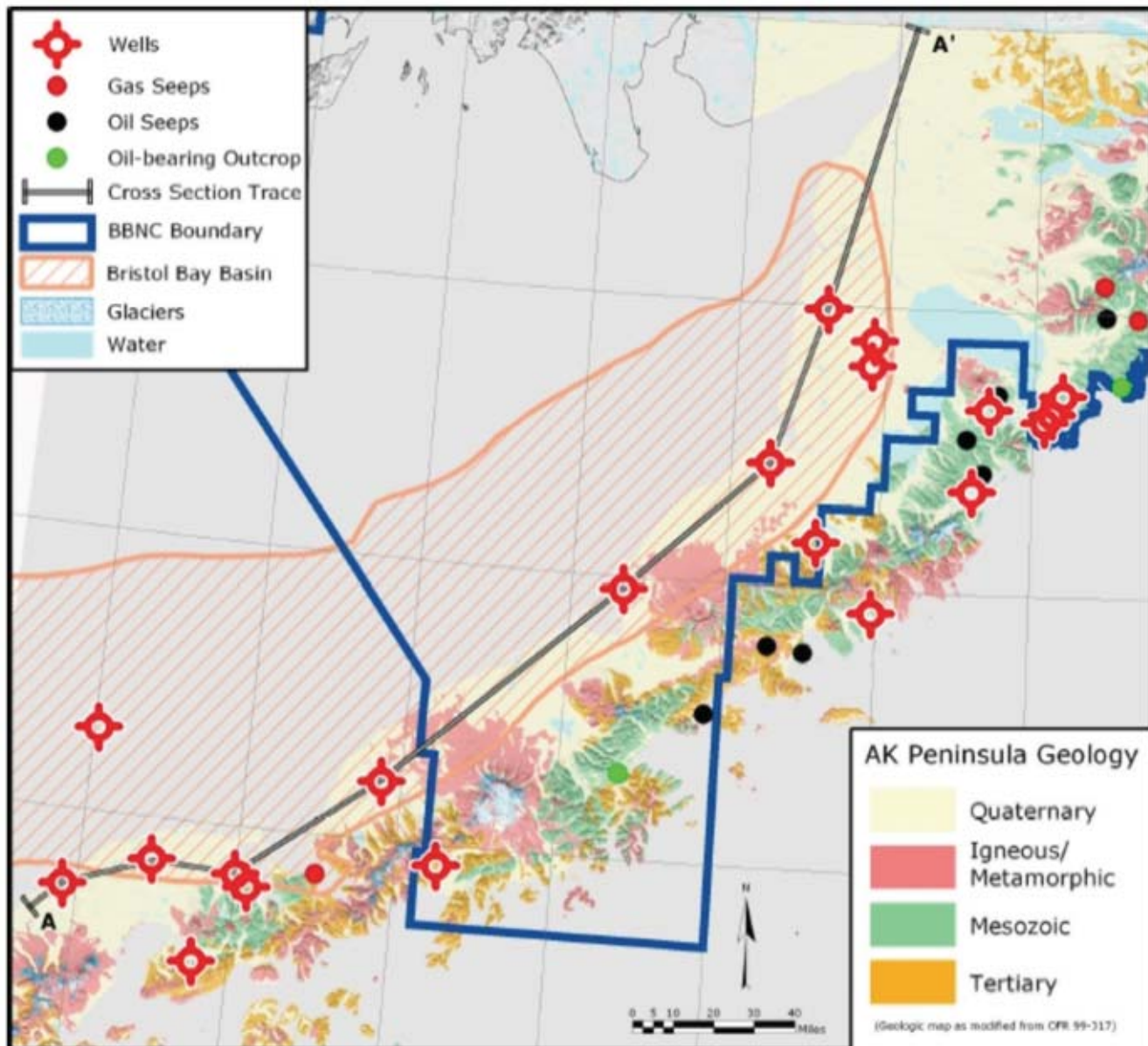
Across the southern flank of the Bristol Bay Basin, south of Port Moller, there is a rapid transition from large, open folds in the Mesozoic, probably indicative of compression forces, into extensional structures associated with basin subsidence. The folding of the Mesozoic is associated with extensive faulting, including north-vergent thrust faulting.

In general, both the onshore Alaska Peninsula and adjacent Bristol Bay Basin offshore contain an abundance of large folds, faults and other features that could provide structural traps for oil and gas.

## The oil and gas potential in the Mesozoic

From onshore well data and seismic interpretation there may be 15,000 to 20,000 feet of the oil and gas prone sediments of the Mesozoic Chignik terrane in the deepest part of the Bristol Bay Basin in the south. However, as noted in the previous section, there is a high probability that these sediments are absent under the northeast-

## General Layout of the Bristol Bay Basin



**Figure 5.1**

**Source: Bristol Bay Native Corporation. "Hydrocarbon Potential of the Alaska Peninsula and Bristol Bay Basin, Southern Alaska - Emphasis on Bristol Bay Native Corporation Lands. Figure 2."**

**Note: A - A' refers to section in Figure 5.3**

ern part of the basin and there is major uncertainty regarding their existence under the basin elsewhere — the most recent MMS assessment has concluded that the sediments are absent across much of the outer continental shelf portion of the basin.

At least two formations within the Mesozoic rocks appear to contain good potential source rocks for hydrocarbons. Both potential sources are oil prone.

The age and composition of the first of

these sources, the late Triassic Kamishak formation, resemble the Shublik formation, a major source rock on the North Slope. The Kamishak formation also resembles an oil shale, the Glenn shale, that is associated with the Yukon Flats and Kandik basins in east central Alaska. Well samples have demonstrated that the Kamishak formation is thermally mature at depth.

The other potential source rock is in the middle Jurassic Kialagvik formation that is

equivalent to the Tuxedni formation, the main source of oil in the upper Cook Inlet Basin. Analysis of rocks of the Kialagvik formation has shown carbon and hydrogen content that could support oil formation; hydrocarbon samples contain similar isotope compositions to the oil seeps and oils of the Cook Inlet oil fields.

Coal beds in the late Cretaceous Chisik formation could also support the generation of dry gas.



## Sandstones and conglomerates

Several formations within the Mesozoic include sandstones and conglomerates that could form oil and gas reservoirs. These potential reservoirs attain thicknesses of up to several thousands of feet. Compaction and alteration of the sediments at great burial depths may limit reservoir quality, although extensive fracturing could also have turned the rocks into effective gas reservoirs. The prevalence of feldspar and volcanic material in the rocks gives rise to chemistry that is conducive to the formation of pore-clogging zeolite minerals. More fieldwork might determine whether some of the Mesozoic units transition laterally into better quality reservoirs.

Some 2006 fieldwork by Hewitt Mineral Corp. has also found reservoir potential in what appears to be hydrothermal dolomite in a thick carbonate sequence of the Triassic Kamishak formation, in close proximity to potential Kamishak source rocks.

Widespread folding and faulting in the Bristol Bay area combined with the nature of the sediments has given rise to many potential stratigraphic, structural and combination traps. However, the likely degradation of potential reservoir rocks has introduced considerable risk into any play involving oil or gas in a Mesozoic reservoir. The most likely scenario for an oil field containing Mesozoic oil or gas would involve the migration of the hydrocarbons into a Cenozoic reservoir, as has happened in the oil fields of the upper Cook Inlet.

## The oil and gas potential in the Cenozoic

All of the Cenozoic formations in the Bristol Bay area contain organic material and most contain coal. Thermal maturities in many areas appear to be low or marginal for thermogenic hydrocarbon generation, but these organic-rich sediments could certainly have generated significant volumes of biogenic gas — 90 percent of the more than 9 trillion cubic feet of natural gas extracted from equivalent rocks in the upper Cook Inlet has proved biogenic in origin.

However, recent analysis of samples from the North Aleutian Shelf COST No. 1 well offshore in the Bristol Bay Basin has shown thermal maturities within the oil window in Tertiary rocks at depths below 12,300 feet and the existence of kerogens that could generate oil.

The east-west structural grain in the deep, southern part of the basin coupled

## Current exploration focus in Bristol Bay area

Between the late 1980s and early 2007, the federal government prohibited oil and gas leasing in the outer continental shelf waters of the Bristol Bay area, the location of a major salmon fishery. However, the lifting of the federal moratorium by President Bush in January 2007 should enable the U.S. Minerals Management Service to include two North Aleutian outer continental shelf lease sales in its 2007 to 2012 leasing program.

Meantime, however, the state of Alaska has started to encourage exploration onshore and along the coast and has initiated a program of areawide lease sales for state lands and adjacent state waters in the Bristol Bay Basin. The area of potentially leaseable acreage extends along the northwestern lowlands of the Alaska Peninsula from the east end of Bristol Bay to a point southwest of Port Moller.

At the first of these lease sales in October 2005 Shell Offshore Inc. purchased leases on about 190,000 acres onshore and offshore around Herendeen Bay and Port Moller. Shell appears to be targeting the southern edge of the Bristol Bay Basin and the northern edge of large compression structures immediately to the south of the basin — the leases appear to offer both Mesozoic and Tertiary plays in an area with significant potential for structural traps.

At the same sale Hewitt Mineral purchased four tracts straddling the margin of the basin, on the southwest side of Herendeen Bay. Hewitt is targeting a major anticline in the Mesozoic but also sees potential Tertiary plays below a major fault that has pushed the Mesozoic strata over Tertiary rocks of the basin. (See related article reprint at the end of this chapter.)

The second state areawide lease sale in February 2007 only resulted in the sale of one lease, an extension to Hewitt's Herendeen Bay holdings. Lack of interest in that sale suggests that exploration interest lies offshore in the deepest and most prospective part of the basin — Shell in particular has expressed an interest in offshore Bristol Bay exploration, if MMS holds a lease sale for the outer continental shelf. (See sidebar in the related article reprint at the end of this chapter.)

People generally consider that biogenic gas is likely to prove the most significant hydrocarbon resource in the region. This type of gas could occur in virtually any part of the basin that hasn't become hot enough to kill the gas-generating bacteria. But proof that gas from a seep in lower Cretaceous rocks between Port Moller and Herendeen Bay is thermogenic points to the possibility of plays involving thermogenic gas.

The strip of state waters included in the state lease sale planning area along the northwest lowlands of the peninsula includes subsided fault blocks with thermally mature, organic-rich Tertiary rocks. These rocks show some potential to generate thermogenic hydrocarbons. If such Tertiary kitchens exist, the most likely hydrocarbon products would consist of high gravity paraffinic oils or condensates with associated gas.

A three year research program initiated in 2004 by the state of Alaska's Division of Oil and Gas and Division of Geological and Geophysical Surveys has included the analysis of measured sections in the Mesozoic and Cenozoic stratigraphy, and geochemical analysis to fingerprint oils observed as staining in various reservoir formations. The state team has been trying to trace the oils back to their original source rock units, to determine whether the area's Tertiary and Mesozoic petroleum systems are self contained, or whether there is any observable mixing from one system to the other as occurs in Cook Inlet.

Strong local support for oil and gas exploration together with encouragement by the state of Alaska suggests that the Bristol Bay Basin is poised once again to become an active exploration province. ■

with the steep basin flank on the southeastern side suggest that the deeper, more thermally mature parts of the basin could extend under the lowlands of the Alaska Peninsula, north of Port Moller. However, there is no

seismic or well data to either support or disprove that theory.

There is seismic evidence for possible gas chimneys in Tertiary strata offshore the Black Hills area, west of Port Moller.

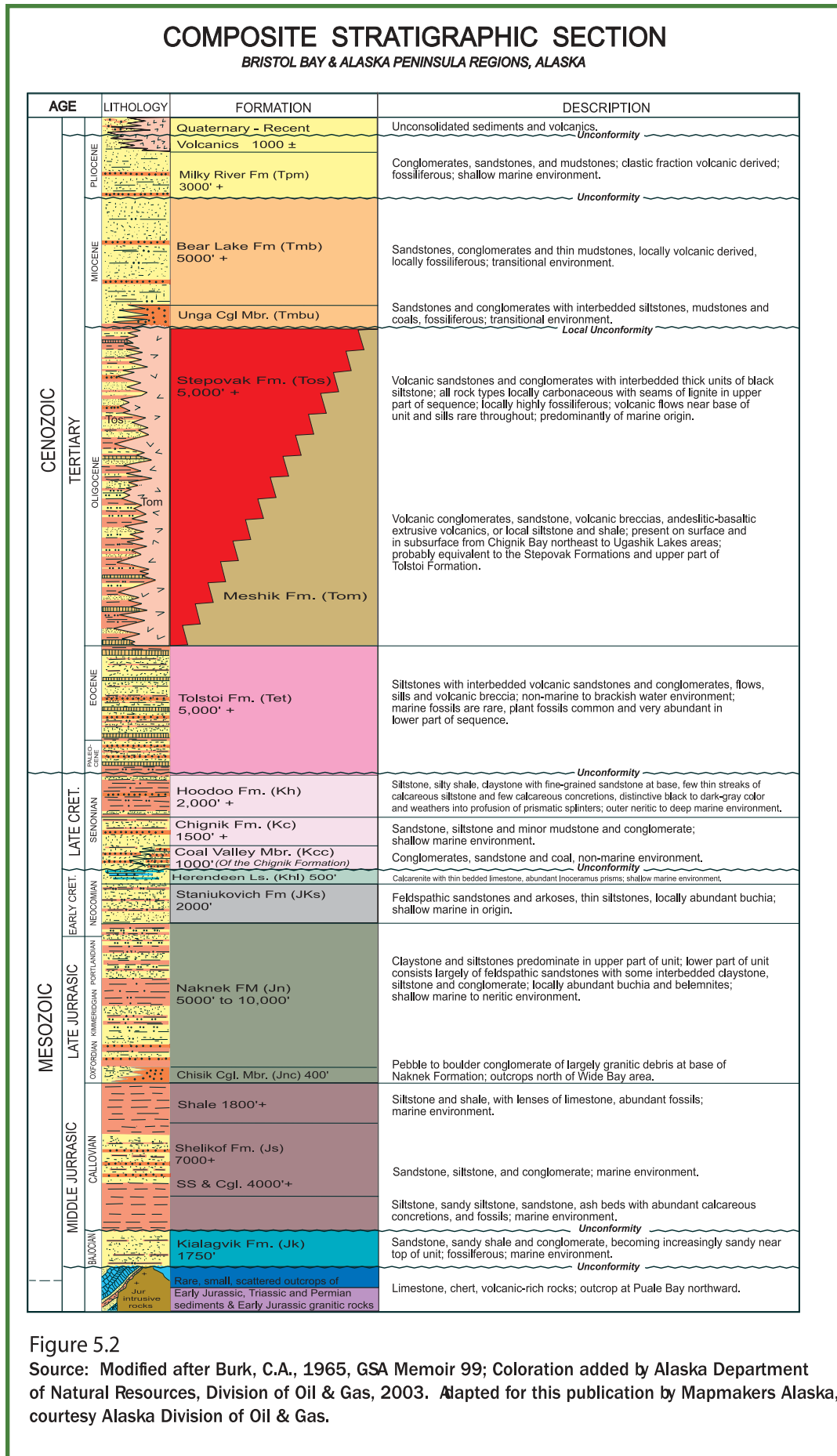


Figure 5.2

Source: Modified after Burk, C.A., 1965, GSA Memoir 99; Coloration added by Alaska Department of Natural Resources, Division of Oil & Gas, 2003. Adapted for this publication by Mapmakers Alaska, courtesy Alaska Division of Oil & Gas.

### Potential reservoirs

Several formations within the Cenozoic include candidate reservoir rocks. Reservoir quality seems variable and depends on the extent to which the rocks have undergone chemical alteration. However, two of the formations, the Oligocene Unga and Miocene Bear Lake formations, contain substantial thicknesses of good reservoir sandstones and conglomerates. The Pliocene Milky River formation exhibits good reservoir properties but lies at such shallow depths that overlying seals capable of holding hydrocarbons in the reservoir are probably lacking.

The lack of a thick, regionally blanketing shale seal unit in the shallow section above the best reservoir sands is a source of concern to some geologists. Others point to the stacked nature of Cook Inlet reservoirs, where hydrocarbons are contained in multiple sand layers, each capped by fairly thin non-marine mudstones of only local extent. Any one mudstone horizon may only seal one pay zone and only on that one structure, but several stacked pay zones can add up to large reserves. And recent fieldwork on the Alaska Peninsula has revealed locally thick mudstones that appear to extend over at least prospect sized areas.

The prevalence of folding and faulting in the area has given rise to many potential structural traps. And the geological setting supports the formation of stratigraphic or combination traps in the Cenozoic sequence — the close interleaving of fine-grained and coarse-grained rocks together with lateral changes in the sediments has given rise to sedimentary packages that include well-sealed reservoirs.

Overall, there is a very good chance of finding gas in the Cenozoic of the basin, in a very similar setting to the gas fields of the Cook Inlet. Also, as noted in the previous section, there is a possibility of finding oil that has migrated from source rocks in



the Mesozoic in areas where Cenozoic reservoirs overlie Mesozoic strata.

In its most recent assessment of the North Aleutian basin, MMS thinks that on the outer continental shelf the most prolific petroleum plays are likely to involve thermogenic gas from Tertiary strata deep in the basin bubbling upward into sandstone reservoirs of the Tolstoi, Stepovak and Bear Lake formations, where these formations have draped into domes over raised faulted blocks.

## Exploration history

People have known about the oil and gas potential of the Bristol Bay area since the mid-1800s — at that time the Russians discovered oil and gas seeps around the Iniskin Peninsula area on the west side of the Cook Inlet. Fourteen oil seeps and four gas seeps are now known to exist between the Iniskin Peninsula and the area around Sand Point toward the southwestern end of the peninsula. Geologists have found at least two outcrops of oil-bearing rocks.

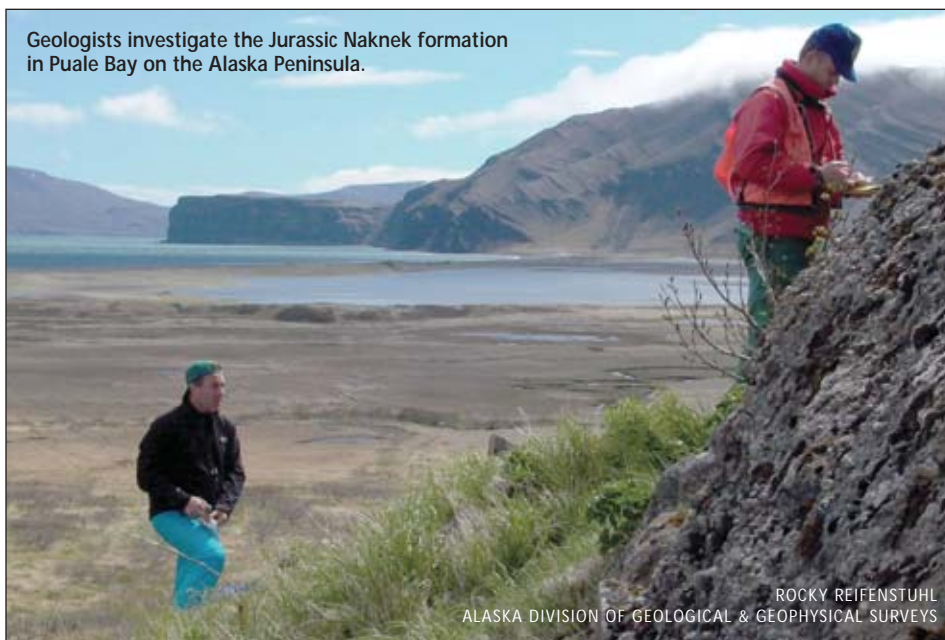
This evidence of an active petroleum system in the area has spurred exploration activity at various times since the early 20th century. Much of this exploration has focused on the Cook Inlet and Shelikof Strait side of the Alaska Peninsula and the onshore portion of the Bristol Bay Basin on the northwest side of the peninsula.

Two phases of early exploration drilling occurred in the early 1900s and in the 1920s. This drilling targeted relatively shallow rock formations near oil seeps along the southeast side of the Alaska Peninsula. None of the wells found commercial quantities of oil. A deeper well drilled on the peninsula by a major oil company in 1940 also failed to find commercial quantities of oil.

Between 1955 and 1974 a flurry of exploration activity in the Bristol Bay area resulted in some seismic surveys and 16 exploration wells, 10 of which penetrated the Bristol Bay Basin. In 1977 Phillips drilled an exploration well on the south side of the Alaska Peninsula, southeast of Port Moller. In 1982 and 1983 more than 20 companies participated in the drilling of a stratigraphic test well, the North Aleutian Shelf COST No. 1 well, in the deepest part of the basin. In 1985 Amoco drilled, plugged and abandoned an onshore well near Becharof Lake.

Among the 26 wells drilled on the Alaska Peninsula and the offshore North Aleutian Shelf COST No. 1 well, 19 wells encountered oil shows and 13 encountered gas shows. Three of the oil shows were very poor or

Geologists investigate the Jurassic Naknek formation in Puale Bay on the Alaska Peninsula.



ROCKY REIFENSTUHL  
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

### Credits

Paul Decker of the Alaska Department of Natural Resources, Division of Oil and Gas and Kirk Sherwood of the U.S. Department of the Interior's Minerals Management Service contributed material to this chapter.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.

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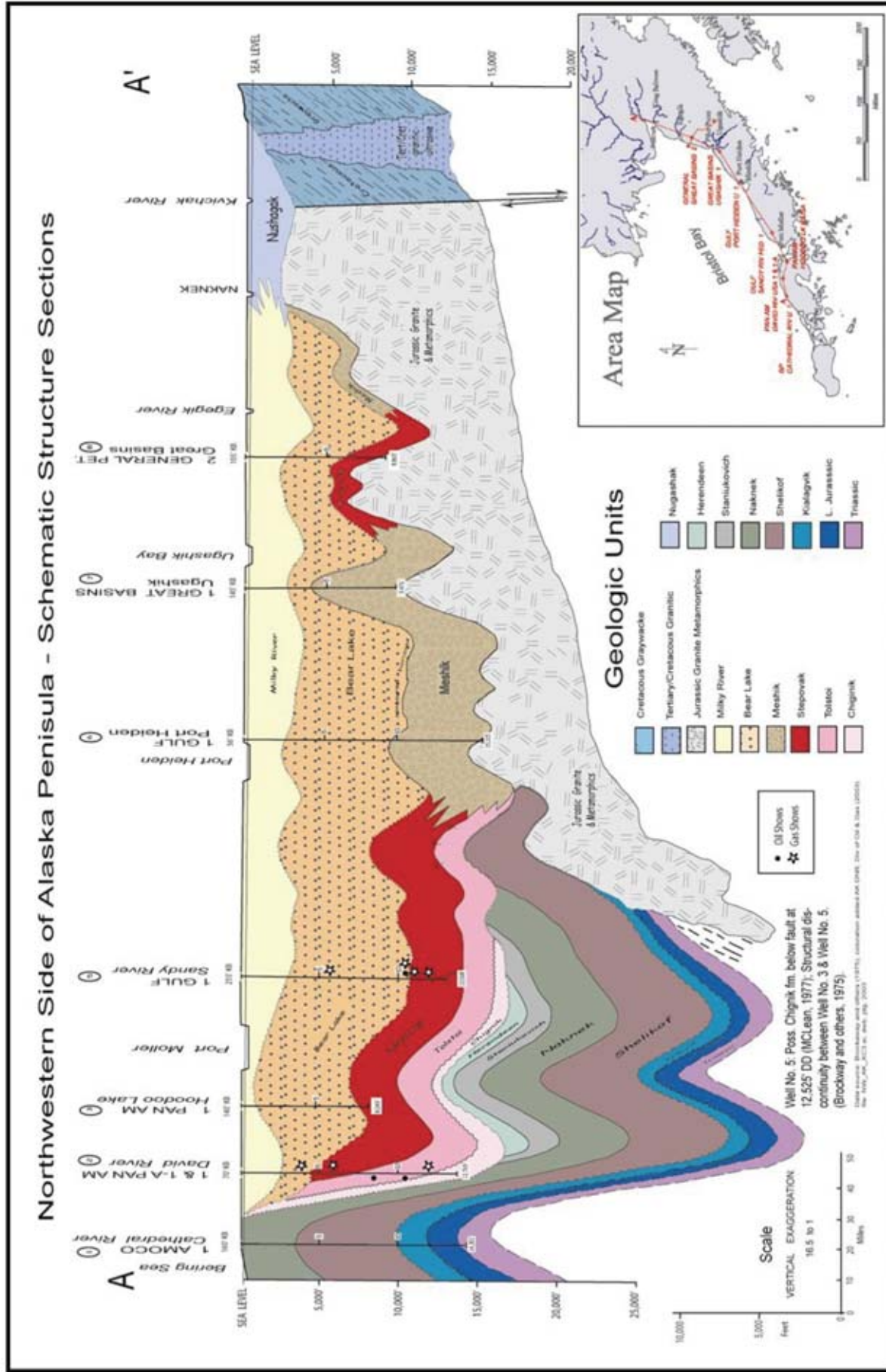
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minor and one consisted of oil residue. Data from three wells indicate measured gas flows, with flow rates of 5 million to 9 million cubic feet per day, 10 million to 90 million cubic feet per day and 450 million to 700 million cubic feet per day.

Exploration in the Bristol Bay area has

resulted in many thousands of line miles of seismic data, much of it offshore. However, the North Aleutian Shelf COST No. 1 remains the only offshore well in the Bristol Bay Basin and no wells have been drilled in the Bristol Bay area since the 1985 Amoco well. ■

# Alaska Peninsula Geologic Cross Section



**Figure 5.3**  
Source: Alaska Division of Oil & Gas Slide Show "Oil & Gas Opportunities in Alaska," 12/2003  
Data Source: Brockway and others (1975), coloration added Alaska Dept of Natural Resources Division of Oil & Gas (2003)



PETROLEUM NEWS, WEEK OF MARCH 4, 2007



The Triassic Kamishak formation exposed at Puale Bay.

COURTESY HEWITT MINERAL CORP.

## New Alaska Peninsula gas play?

*Hewitt Mineral investigations may have found something others have missed*

By ALAN BAILEY  
Petroleum News

**W**hen Ardmore, Okla.-based Hewitt Mineral Corp. picked up four tracts near Herendeen Bay at the State of Alaska's October 2005 Alaska Peninsula areawide lease sale, the company said that it was going to embark on a geologic investigation of the area of its new leases. And, as a consequence of that investigation, the company now thinks it has found a new natural gas play that exists under the Peninsula and may extend under the lower Cook Inlet.

"We now have identified some evidence that there could be a significant carbonate reservoir under the Peninsula that has not been recognized," Hewitt petroleum geologist Bryan Sralla told Petroleum News on Feb. 27.

The Hewitt leases lie over what geologists call the Sapsuk Lake anticline, a major fold in Mesozoic strata that outcrop at the surface in that area. The Mesozoic rocks are known to have petroleum potential, but presence of pore-clogging minerals formed from volcanic fragments in the rocks has long caused concerns about reservoir quality.

But following some advice from Alaska geologist Robert Blodgett, Sralla conducted a field investigation of Triassic strata of the Kamishak formation, where these rocks are exposed on the coast at Puale Bay on the southeastern side of the Alaska Peninsula.

### Carbonate rocks

At Puale Bay a thick sequence of carbonate rocks particularly intrigued Sralla. Carbonate rocks consist predominantly of calcium or magnesium carbonate — rock containing calcium carbonate is generally known as limestone, while rock containing calcium/magnesium carbonate (the mineral dolomite) is known as dolostone.

"At Puale Bay there is a thick carbonate sequence that is about 2,000 to 2,500 feet thick," Sralla said.

And in the lower sections of the Triassic Kamishak formation, Sralla found carbonate rocks, crammed with fossil corals and shellfish. Fractures, cavities and pores in the rocks indicated significant petroleum reservoir potential — a feature of particular importance since carbonate rocks would not become clogged with altered volcanic material in the same way as the



## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

For access to Petroleum News story archives you have to be a paid subscriber to either the print edition or online edition of Petroleum News, or be a subscriber to the newspaper's daily News Bulletin Service.

Information about subscribing and the story archives can be found at this Web address: [www.PetroleumNews.com](http://www.PetroleumNews.com).



potential reservoir sandstones of the region.

Later examination of microscope slides of the rocks confirmed a prevalence of dolomite in the lower Kamishak sequence. But what particularly caught Sralla's attention was microscope evidence that the rocks contain what geologists term "hydrothermal dolomite," formed when magnesium from warm underground fluids reacts with calcium carbonate in limestone.

Because the fluids that pervaded this type of rock tend to cause extensive fracturing, hydrothermal dolomites are associated with particularly good petroleum reservoirs.

"Very prolific reservoirs are often associated with these hydrothermal dolomites," Sralla said. "...Hydrothermal dolomites have been very much in the literature in the last several years. There is pervasive theory that a lot of prolific dolomite reservoirs are in fact hydrothermal dolomites."

And the known existence in the Alaska Peninsula area of very deep faulting that could have supported the movement of chemically laden fluids provides a plausible explanation of how hydrothermal dolomite could have formed.

### Source and seal potential

Above the carbonate rocks lie upper Kamishak shales. These shales are equivalent to the prolific Shublik oil source rock of Alaska's North Slope and contain a large amount of organic material. The shales would make an excellent source rock in the Alaska Peninsula Area and may be the source for a well known oil seep at Oil Creek, west of Puale Bay.

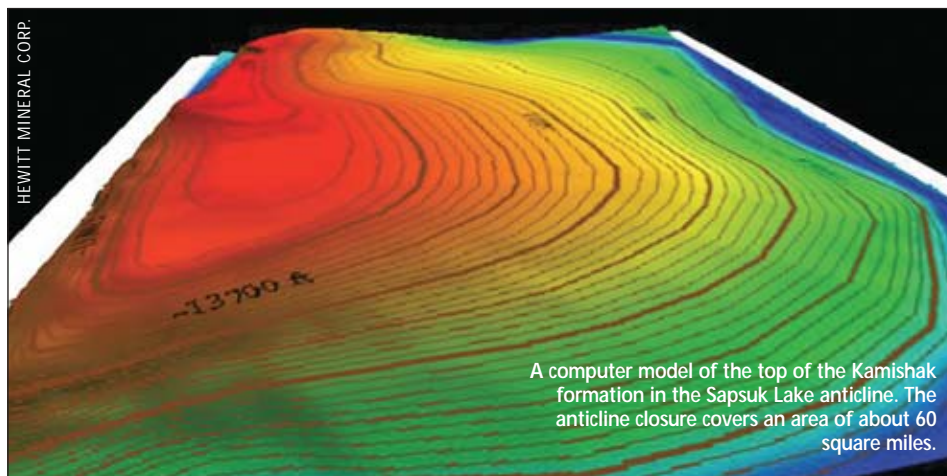
"We think that this looks every bit as good or better than the Shublik," Sralla said.

And just to confirm the source rock potential of the region, Sralla's microscope slides revealed pervasive bitumen staining and dead oil in pore spaces of the Kamishak carbonates. In addition, the upper Kamishak shales could effectively seal a Kamishak carbonate reservoir.

"So potentially the Triassic has three elements: a source, a seal and now a potential reservoir rock in a hydrothermal dolomite," Sralla said.

### Evidence from the past

Their interest piqued by an apparent lack of previous reports of dolomite in the Triassic of the Alaska Peninsula, Sralla and



Blodgett embarked on a detective adventure through the archives of Alaska Peninsula petroleum geology, pooling information from several companies that had been active in the region in the past.

"We've got a lot of data that's been buried for 50 years now," Blodgett said.

They discovered that legendary prospector and geologist Earl Grammer had championed a Triassic oil play on the Alaska Peninsula back in the 1950s; Grammer had, in fact, persuaded the Standard Oil Company of California to pursue that play.

But Sralla and Blodgett's investigations led them to the Bear Creek No. 1 well, drilled near Puale Bay in 1959 by Exxon; at a depth of 14,000 feet, this was the deepest well in Alaska at the time.

"They were drilling for the Triassic and drilled deep and didn't find any reservoir rock there," Sralla said. According to "Crude Dreams," Jack Roderick's account of the history of the Alaska oil industry, Shell partnered with Exxon in the drilling of Bear Creek No. 1 and the lease was held in the name of Earl Grammer's sister.

The rig used to drill the Bear Creek well later drilled the discovery well at Prudhoe Bay, Blodgett said (the Prudhoe Bay discovery in 1968 diverted the attention of oil explorers away from the Alaska Peninsula and Cook Inlet for decades to come).

But Sralla and Blodgett dug through boxes of core chips from the Bear Creek well, archived at the Alaska Geologic Materials Center, and concluded from fossil evidence that the well did in fact penetrate a Triassic reservoir. The prevalence of dolomite in the core chips confirmed that conclusion.

Sralla said that well logs from Bear Creek show good permeability over a 500-foot interval at the inferred level of the

Kamishak. A drill stem test in the top of that interval flowed some gas and also flowed saltwater. Sralla's calculations from the flow rate of water indicate a good permeability of about 21.4 millidarcies.

"What that tells us is that this Kamishak is a very good reservoir in this Bear Creek well where it was tested," Sralla said. "... We feel really good that we've uncovered some significant evidence that had been overlooked out there. We say with a pretty good degree of certainty that this test was in the lower Kamishak."

So what does all of this mean when it comes to oil and gas prospects under Hewitt's acreage near Herendeen Bay, or elsewhere?

Sralla said that the Sapsuk Lake anticline in the Hewitt acreage has a closure area of about 60 square miles, much larger than the structures associated with the oil and gas fields of the Cook Inlet. But the Triassic Kamishak formation appears to be buried to a depth of about 14,000 feet, likely placing it within the temperature window where the organic source material would have been cooked into natural gas rather than oil.

Assuming a reservoir thickness of about 120 feet, a porosity of about 7 percent and the high pressure resulting from deep burial, the reservoir could contain huge amounts of gas.

"With those sorts of pressures you could have multiple trillions of cubic feet of gas in a structure of this size," Sralla said.

Perhaps even more intriguing is the regional implication of a widespread Triassic reservoir rock. Carbonate rocks of the type found in the lower Kamishak form on stable marine platforms that can extend over large areas. And geologists have found Triassic carbonate rocks to the



## Alaska areawide lease sales draw just one bid

The scene in Anchorage's Loussac library prior to the State of Alaska's Feb. 28, 2007, North Slope Foothills and Alaska Peninsula lease sales looked suspicious from the outset: There were none of the usual racks of file folders of unopened bids. And those suspicions proved correct when Kevin Banks, acting director of Alaska's Division of Oil and Gas, announced that the division had received just one bid, an offer of \$6.77 per acre by Hewitt Mineral Corp. for 5,760-acre tract 0978 on the Alaska Peninsula, with a total bonus bid of \$38,995.

Banks attributed the lack of interest in the sales to two factors, both of which relate to pending actions by the federal government.

In the foothills a large swath of land still awaits conveyance from the federal government to either the State of Alaska or to Arctic Slope Regional Corp., Banks said, commenting that "a good deal of the (existing) state acreage is now under lease."

"Both the state and the Arctic Slope Regional Corp. have selected lands for conveyance from the federal government. Companies are unlikely to bid on the land until those competing claims are resolved," the division said in a statement following the sale.

Banks told Petroleum News that the U.S. Bureau of Land Management is committed to convey the land by 2009. Banks also said that expansion capability for a future North Slope gas pipeline is critical to future leasing and development in the foothills.

### Waiting for MMS lease sale

And the Alaska Peninsula?

Industry is anticipating a federal offshore Bristol Bay lease sale in the North Aleutian basin, Banks said. The deepest part of the basin lies offshore, so that onshore exploration is intrinsically linked to what happens offshore. The U.S. Minerals Management Service estimates the basin holds 750 million barrels of oil and 8.6 trillion cubic feet of natural gas, and has included the area in its next five-year lease sale plan.

"In the Peninsula it really is a story about the rocks," Banks said.

However, Banks said that the division wants to provide predictability for industry and is committed to holding regular lease sales.

"Participation in today's sales was dampened by some of industry's uncertainties," Banks said. "As oil and gas prices change, as other governments work on land status issues, and as access to a gas pipeline becomes more certain, the best thing for the state is

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*Hewitt concurs with the view that an MMS offshore lease sale will provide the key to opening up exploration in the Bristol Bay region. As a small company, Hewitt needs a partner to help fund the seismic surveying and drilling that would be required to explore its Alaska Peninsula acreage. Exploring the Triassic prospect that the company is interested in would require a 14,000-foot well.*

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to maintain our stable, predictable schedule of regular annual lease sales.

"We are committed to our regular schedule of lease sales around the state, and are confident that both established majors and enterprising independents will continue to take advantage of the outstanding opportunities for oil and gas exploration and production in Alaska."

### Hewitt Mineral

Hewitt Mineral told Petroleum News that the Alaska Peninsula tract it bid on consolidates the company's lease position southwest of Port Moller. The company bought four tracts in that area in the October 2005 lease sale and the new tract covers a section of the Sapsuk Lake anticline not included in the earlier leases.

Since the 2005 lease sale the company has been researching Alaska Peninsula geology and has identified what it believes to be a new natural gas play involving Triassic hydrothermal dolomite (see the accompanying article).

Hewitt concurs with the view that an MMS offshore lease sale will provide the key to opening up exploration in the Bristol Bay region. As a small company, Hewitt needs a partner to help fund the seismic surveying and drilling that would be required to explore its Alaska Peninsula acreage. Exploring the Triassic prospect that the company is interested in would require a 14,000-foot well.

"We've had some preliminary discussions with Shell and they've told us ... that their main focus is offshore in Bristol Bay," Hewitt geologist Bryan Sralla said.

But, apart from the cost of exploration, the cost of developing infrastructure and export facilities in the remote Bristol Bay area would require a significant scale of exploration and development, Sralla thinks.

"I think we need some critical mass in this area," he said.

—ALAN BAILEY

*continued from previous page*

## GAS PLAY

west of the Iniskin Peninsula (on the west side of the Cook Inlet, opposite Kachemak Bay), and at Port Graham on the eastern side of the lower Cook Inlet.

"What gives us some reason to believe that there might be an extensive areal extent of this carbonate deposition is that it appears that there was a fairly pervasive

carbonate platform during the Triassic," Sralla said.

And it appears that none of the wells in the lower Cook Inlet ever drilled deep enough to penetrate the Triassic.

"If it is shown that this lower Triassic carbonate is extensive it might have pretty large ramifications for exploration in the lower Cook Inlet," Sralla said. "... The interval seems to extend across the lower Cook Inlet. If that could be a seal, a source and a reservoir, it could make some of those anti-

clines down there attractive targets."

Meantime, Sralla and Blodgett are publishing their findings for peer review by geologists and industry.

"I can say ... that of all of the rocks that we've looked at on the Peninsula so far, this is by far and away the most interesting thing we've seen in the field," Sralla said. "... We think it could be significant. It argues that these structures need to be tested down to the Triassic to fully evaluate their potential." ■

# Life savers: When every second counts, count on Aeromed



**A**eromed International, a division of the Yukon-Kuskokwim Health Corporation, is a leader in Alaska's critical care air ambulance industry.

In operation since 1997, Aeromed performs over 1,500 missions each year and has earned a reputation throughout Alaska for delivering dependable critical care transport service that saves lives.

Medical flight crews are on stand by at Anchorage's Ted Stevens International Airport seven days a week - 24 hours a day. With a door seal time of 45 minutes or less from call, Aeromed is able to respond quickly to even the most remote work sites in Alaska. Each mission has an experienced flight nurse and paramedic onboard.

Aeromed has the ability to conduct simultaneous transports and respond to large scale accidents involving multiple patients, transferring them from regional



medical hubs or clinics directly into Anchorage for immediate critical care. Aeromed is also able to perform worldwide missions due to its strategic Pacific Rim base in Anchorage, including transfers to Seattle and many international destinations.

Experienced pilots specially trained to handle all types of airport conditions operate Aeromed's Anchorage and Bethel-based fleet for remote worksites and rural communities throughout Alaska.

Medical flight crews meet rigorous training requirements to ensure the highest quality patient care during all phases of the transport.

In 2005, Aeromed International's Critical Care Air Ambulance Anchorage and Bethel operations received accredita-

tion from the Commission of Accreditation of Medical Transport Systems (CAMTS). CAMTS is a non-profit organization dedicated to improving the quality and safety of medical transport services. The prestigious accreditation represents the highest standards possible for an air ambulance service and Aeromed joins the premier ranks of a limited number of accredited services worldwide to receive this honor.

The Aeromed Delta operation, based in Bethel, is Alaska's first regional medevac service to achieve the CAMTS accreditation. This operation is dedicated to servicing the rural communities in the Yukon-Kuskokwim Delta region. "Aeromed applied for the accreditation as part of our commitment to provide the highest standard of care to our clients as possible. We are proud of the CAMTS accreditation and the recognition of our service," said Brooks Wall, Aeromed's director of operations. ■



#### CONTACT:

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## TIW: Still Innovating in Alaska after 90 years



In 1917 Texas Iron Works was founded by the Pearce Family. Texas Iron Works (TIW), one of the few industry innovators, is still a family owned enterprise going back four generations. The Oil Industry nicknamed us TIW, the name has stuck and in 1991 we changed our name to TIW Corporation.

### Blacksmith to Oil Field

The first service center was located in Goose Creek, Texas; repairing Fishtail Bits, from that humble beginning the company has expanded its operation to become a manufacturer and worldwide distributor of down-hole tools for the oil industry. TIW has manufacturing facilities in; Houston, Texas; Lafayette, Louisiana; and Nisku, Alberta Canada. The company's products and services are represented by a comprehensive network of sales offices and agents in every major oil and gas province around the world. Global Headquarters are located in Houston, Texas.

### Bring us your challenges

TIW has always believed in the philosophy of innovation and responsiveness to provide a product the customer needs, wants, and specifically asked for; thus allowing us to compete with the largest equipment supplier companies in the Oil Industry.



### Providing Solutions

TIW began designing and manufacturing down-hole tools to solve specific problems, offering practical designs for drilling and completion equipment, and soon established a reputation for innovation and technological response to the specific industry needs.

In 1941, TIW was granted a patent on the first Hook-wall packer with an automatic bottom. In 1964, we developed the "Gold Seal" pack-off ring to protect the element from distortion during the run in, to reduce "cold-flow" and ensure a positive seal, under the most severe conditions. The 1970's marked the years of the patent on the Packer Bore Receptacle (PBR) and in the 1980's developed several new horizontal completion methods plus achieved several liner hanger records, including the heaviest liner on record of over 1 million pounds and 13,874 feet in length.

TIW has been working on new ideas to Support the Industry in Alaska since the early 1980's. With the desire for quality equipment, the HBBP Packer was developed in 1984, when Horizontal wells were conceived and implemented TIW was there to provide the equipment for the first Horizontal completions in 1988. When the ability to control drilling directions improved, and a cost effective approach to multiple laterals within the same well was conceived, TIW was there to provide the support and assistance, developing the tools to allow multi-lateral technology to move forward.

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### Products & services

- Liner equipment
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- Liner hanger packers
- Horizontal completion technology
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- Gravel-pack packers
- Packer systems
- Sand control services
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- Expandable Products

Today, the increasing requirement to perform work more cost effectively continues to drive the industry in Alaska and around the world, TIW is working with our customers to provide equipment that meets the current challenge of expanding the deliverability of wells through the introduction and improvement of innovative Multi-lateral systems design and expandable metals technology.

At TIW, we find inventive solutions to uncommon problems for every operator and contractor. We've specialized in that for over 80 years.

A long time ago, we threw out "the book" and started listening to what our customers needed. Projects that bigger companies avoid, we welcome. What smaller companies can't handle, we pursue.

When you need more than the standard approach to drilling, completions and window cutting, call on TIW. ■

# URS: 50-year Alaskan track record providing engineering and technical services

URS traces its involvement with the Alaska petroleum industry from the earliest Cook Inlet and North Slope exploration activities. URS legacy companies in Alaska were involved in the engineering of virtually all components of the Trans Alaska Pipeline System (TAPS), as well as ensuring mile-by-mile adherence to regulatory compliance requirements. Engineers and scientists from both companies comprised the major portion of geotechnical and environmental teams that provided in-house technical support to the TAPS design and construction efforts. The URS legacy companies led the way to ensuring environmentally responsible development of North Slope oil resources with "Arctic-smart" engineering.

URS Alaska staff have worked on exploration, development and operational issues in virtually every North Slope oilfield. Because the Alaska North Slope is the acknowledged "classroom" of the world hydrocarbon industry, URS Alaska engineers and scientists have frequently been in demand for assignments elsewhere commanding that experience. Senior staff from URS have designed, conducted, and managed major oilfield projects in Azerbaijan, Ecuador and Venezuela, and they have provided consulting support to projects in Philippines, Indonesia, and Tunisia.

## URS Knows the People

**North Slope Socioeconomic Environment:** URS staff members have worked extensively with North Slope Borough communities on oil and gas EIS/EA and coastal management projects over the past 25 years. In the last 5 years, we have worked with borough and community officials in Barrow, Nuiqsut, and Kaktovik, particularly with regard to public scoping meetings and hearings, collecting Traditional Knowledge related to offshore and onshore development, and addressing requirements for compliance with Executive Orders on



Lisa Loy Gray, URS' Project Environmental Planner, working with children in Buckland, Alaska, a village in the Northwest Arctic Borough

Environmental Justice and Government to Government Coordination.

## URS Knows How to Get Things Done — Fast and Professionally

**Situation:** In January 2001 the principal Alaska North Slope producers, [BP Exploration Alaska, Inc., ExxonMobil Production Company, and Phillips Petroleum Alaska Inc.] formed a consortium, Alaska Gas Producers Pipeline Team (AGPPT), to evaluate the feasibility of constructing a natural gas pipeline from Alaska to Illinois. AGPPT had set a target of mid-year 2002 to make major permit filings in both the US and Canada, for construction of the pipeline and associated facilities. URS was selected in March 2001 by AGPPT to collect all information necessary to prepare applications for Federal Energy Regulatory Commission (FERC) certification and related local, state and federal permits in the U.S. portions of the pipeline, the total length of which would be 1,851 miles through five states (AK, ND, MN, IA, and IL). The scope of work for this assignment included development of a permitting strategy and plan; design and execution of an environmental studies plan to support permit applications; and preparation of all required FERC resource reports for the two routes under consideration.

**Flexible and Targeted Response:** Following NTP on 3 April 2001, a month-long intensive planning effort by nine senior URS engineers and scientists produced scopes and strategies, and identified staffing requirements, for completing the necessary environmental studies and documentation for FERC applications

within a single field season. Less than sixty days later, a task force of 60 professionals and technicians were procuring and preparing equipment and logistical support for the upcoming field program. Field work began in earnest during June, with nearly 100 staff performing wildlife and wetland delineation studies. During July and August of 2001, when archaeological assessments were conducted, URS field staff strength grew to approximately 200 as work ramped up in all five states. As project effort shifted to data reduction and production of Resource Reports and other documentation, staffing was tailored for the finalization of the project, completed in early 2002

**Result:** AGPPT determined the project, as then conceived in 2001, was not yet economically viable. Accordingly, all FERC application materials were completed and the project was put on hold by AGPPT, but ready for future use. This enormous effort was completed on schedule, within budget, and to the satisfaction of AGPPT.

**URS: Ready to Dispel the Alaska Fear Factor!** URS Alaska has a proven track record for more than 50 years providing engineering and technical services to federal, state and local governmental agencies, as well as private clients including Alaska's oil and gas business. ■

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An aerial photograph showing a wide, braided river system with multiple channels and sandbars, winding through a vast, flat landscape. The terrain is a mix of green and brown, suggesting a mix of vegetation and bare earth. The sky is blue with scattered white clouds. The text 'CHAPTER 6' is overlaid in the upper right, with 'Alaska's other oil and gas basins' in italics below it.

CHAPTER 6  
*Alaska's other oil and gas basins*

## CHAPTER 6

# Alaska's other oil and gas basins

## Introduction

**A**lthough analysts think that the majority of Alaska's oil and gas resources lie within the major basins of northern Alaska, the Cook Inlet and Bristol Bay, there are several other basins and ocean shelves with oil or gas potential in and around the state.

Figure 1.1 in chapter 1 depicts the locations of these basins.

Much of the petroleum interest tends to focus on a series of Cenozoic basins that contain predominantly nonmarine, river borne and lacustrine strata. In general the basins lie in faulted blocks that have sunk when the Earth's crust has stretched. However, folding and faulting also provide evidence for compression of the rock strata after deposition.

Although some rock samples from the basins contain material conducive to oil formation, the non-marine rocks in most of the basins contain coal and other material that favors the production of gas.

Fragments of Mesozoic basins containing flysch deposits cover wide areas of western and Southcentral Alaska and the northern Interior. These Mesozoic deposits form the lower sections of several Cenozoic basins, including the Bethel Basin, the Cook Inlet Basin and the Copper River Basin. Geologists generally interpret the Mesozoic basins as marine basins associated with volcanic arcs.

Ocean shelf areas around the southern coast of Alaska contain huge thicknesses of sedimentary rocks, some of which exhibit oil and gas potential.

People have also reported oil seeps and shows from Paleozoic and Triassic sediments that occur in some other places onshore and offshore in western Alaska. However, the limited extent of these sediments makes their commercial petroleum potential very low.

## The Hope and Kotzebue basins

The Cenozoic Hope and Kotzebue basins lie under the Kotzebue Sound area of northwest Alaska. A trough called the

Selawik trough extends onshore from the east end of the Kotzebue Basin.

The Hope Basin sits offshore west of Kotzebue Sound in northwest Alaska. Eastward, under the Kotzebue Sound, this basin merges into the Kotzebue Basin. A structural high termed the Kotzebue Arch marks the boundary between the two basins.

The Hope and Kotzebue basins both consist of rift-faulted depressions in the Earth's crust filled with Tertiary sediments. Although the maximum thickness of the sediments reaches about 18,000 feet, the sedimentary fill is less than 10,000 feet in most places. Two wells drilled in the Kotzebue Basin discovered both marine and non-marine sediments but did not find oil or gas.

The shallow burial depth of the sediments suggests limited potential for oil generation. However, the sediments probably contain biogenic gas.

## The Holitna, Minchumina and Innoko basins

The Holitna Basin is a small Cenozoic basin that straddles the Farewell fault zone, next to the Kuskokwim River and west of the Alaska Range. The Minchumina Basin is a larger Cenozoic basin between the central Alaska Range and the Kuskokwim Mountains.

Both basins have formed as a result of fault activity and contain coal-bearing Tertiary rocks. Although the extent of the deeper sections of the basins is fairly limited, coal in the sediments has probably generated gas; sandstones within the sedimentary sequence could act as reservoirs. There is also the potential for extracting coalbed methane.

Up to 12,000 feet of Paleozoic shales and limestones under the Holitna Basin may be oil prone. Potential reservoirs exist both in this Paleozoic sequence and in the overlying Tertiary strata. However, the Paleozoic rocks may be over-mature for oil generation and any oil formed during the early history of the rocks may have escaped during later folding, faulting and uplift.

The Innoko Basin is another small

Cenozoic basin lying in a lowland area within the Kuskokwim Mountains.

In 2006 Alaska's Division of Oil and Gas denied an exploration license to Holitna Energy Company, for the exploration for gas in part of the Holitna basin. DOG said that it would have been difficult to avoid impacts on other users of the area and on fish and wildlife resources. The division also said that there was little local support for the exploration.

## The Nenana and Middle Tanana basins

The Nenana Basin and the Middle Tanana Basin underlie swampy lowland areas south and west of Fairbanks in the Alaska Interior. The Tanana and Nenana Rivers drain the area. The Nenana basin forms an elongated north-south trough west of the town of Nenana. The Middle Tanana Basin occupies a broad area immediately south of Fairbanks.

The basins exhibit many of the characteristic features of Alaska Cenozoic basins, with varying thicknesses of Tertiary nonmarine fill. The early Tertiary section has been strongly deformed and eroded. The Ruby-Rampart trough northwest of the basin and the Cantwell trough south of the basin also contain significant thicknesses of early Tertiary fill.

In the Healy Basin, an offshoot from the southeast corner of the Nenana Basin, the mid-Tertiary Usibelli group contains the coal seams associated with coal mining operations near Healy. The later Tertiary sediments in the basin consist of gravels and conglomerates that probably derived from erosion of the Alaska Range.

People have reported oil seeps at a couple of locations in the Nenana and Middle Tanana basins but these reports have not been confirmed. Coal beds and lake-formed shales are the most likely source of hydrocarbons — coal beds in the sediments have probably created gas and could act as a source of coalbed methane.

Apart from two wells in the Nenana Basin the subsurface of all of these basins remains largely unexplored. However,



working under a state exploration license, a consortium of companies completed a seismic survey in the Nenana Basin in the winter of 2004-05. The consortium plans to drill for natural gas in the basin.

And Usibelli Coal Mine has applied for a state exploration license to explore for gas in the Healy Basin.

## The Lower Tanana, Galena and Northway basins

A narrow sedimentary basin, known as the Lower Tanana Basin, lies along the Yukon River downstream from the village of Tanana. Not much is known about this basin. However, an area called the Palisades has become famous for mammal fossils found in Peistocene strata exposed in river bluffs up to 250 feet high. The bluffs along the river at Palisades and downstream from that location expose a section that includes 600 feet of Tertiary sediments, 200 feet of Tertiary or Quaternary sediments and 430 feet of Quaternary sediments. Some of the Tertiary rocks contain peaty lignite.

The Lower Tanana Basin may form an extension of the Ruby-Rampart trough.

The Galena Basin lies in a 5,000-square-mile area of flat, swampy land around the village of Galena on the Yukon River. Geologists think that the basin consists of a shelf-like structure containing Cretaceous and Tertiary sedimentary strata. Aeromagnetic data have indicated a Cretaceous section of several thousand feet. Coal bearing rocks occur in 800 feet of the upper Cretaceous sequence. A year 2000 USGS seismic survey at the village of Galena detected bedrock below 550 or 1,000 feet of permafrost, soil and sediment.

There is a nine-foot coal seam in Cretaceous rocks exposed on the banks of the Yukon River about 12 miles from Galena, at the edge of the Galena Basin.

The tiny Northway Basin, previously known as the Upper Tanana Basin, lies along the upper Tanana River, near the Canadian border. Two shallow wells drilled in this basin in 1955 found gas in Quaternary deposits.

## The Yukon Flats Basin

The Yukon Flats consist of an approximately 15,000-square-mile lowland area around the Yukon River, between the

trans-Alaska oil pipeline and the Canadian border. The flats lie over a deep sedimentary basin bounded by faults on the north and south sides. The basin is thought to contain up to about 25,000 feet of Tertiary nonmarine sediments.

The Tintina fault system that marks the southern boundary of the Yukon Flats Basin extends southeast from the basin. A series of narrow, subsiding basins occurs along this fault system.

Comparisons with other Cenozoic basins in Alaska suggest that the Yukon Flats Basin must at least contain biogenic gas. However, with modern lake and river deposits obscuring the bedrock there is little means other than drilling to find evidence of an active petroleum system in the flats. A 1,281-foot core hole drilled at Fort Yukon in 1994 discovered gas bubbling from coal. A consortium of federal and state agencies and others drilled a well to a depth of 2,287 feet at the same site in 2004. The 2004 well encountered two coal seams, both of which contain methane but exhibited rather low gas saturations.

Three wells were drilled to the east of the basin in the 1970s but failed to find any oil or gas shows.

### Tasmanite oil shale

It has long been known that loose pieces of tasmanite oil shale lie in the uplands northeast of the flats. Geologists have speculated about the possibility that the tasmanite could form an oil source under the basin but there is no direct evidence to support this possibility.

Oil companies have shot 10 seismic lines in the flats. Five of the lines dating from 1972 can be purchased through a broker. The other five lines, shot in 1988, remain confidential. The seismic sections depict a thick section of folded and faulted sediments, thought to be Cenozoic in age, abutting the Tintina fault system and thinning toward the north.

A few years ago the Alaska Division of Geophysical and Geological Surveys in conjunction with the Kansas Geological Survey shot 8.5 line-miles of seismic that detected some shallow coal beds but did not penetrate the deeper rocks.

In a 2004 USGS assessment of the basin investigations of surface rock exposures, comparisons with similar geology elsewhere and estimates of thermal maturities at depth within the basin all pointed to a gas-prone basin with some potential for oil. Both thermogenic and biogenic gas could be present. USGS has suggested

that gas reserves in the basin could prove comparable to the volumes of gas in the Cook Inlet.

Doyon Ltd., the Native regional corporation for the Yukon Flats area, is trying to expedite a swap of some Native lands for prospective land in the Yukon Flats National Wildlife Refuge, to encourage oil and gas exploration in the Yukon Flats Basin.

Geologists think that pre-Cenozoic rocks of the Angayucham and Tozitna terranes lie under the basin. These pre-Cenozoic rocks seem to hold little or no oil and gas potential.

## The Kandik Basin

The Kandik Basin straddles the Canadian border on the east side of central Alaska. Although this basin links with the southeast corner of the Yukon Flats Basin the two basins contain very different geological structures and stratigraphy. Geologists view the complex structures of the Kandik Basin as an extension of the fold and thrust belt that marks the western edge of the mountains of the Yukon Territory — deformation in the basin resulted from mountain formation to the east during the late Cretaceous and Tertiary.

The main stratigraphic sequence of the Kandik Basin consists of mostly marine strata ranging in age from Precambrian through Paleozoic to Jurassic and Cretaceous. The Paleozoic sediments include dolomites, limestones and shales, while interlayered sandstones and shales predominate in the Mesozoic sections. Another sequence of nonmarine Cretaceous and Cenozoic strata unconformably overlies the main sequence in part of the basin.

Geologists have identified three significant source rocks, all of which consist of organic-rich shales. Several of the limestone and sandstone formations in the sedimentary sequence could form petroleum reservoirs and there is an abundance of shales that could form structural or combination traps. Oil and gas discoveries in the similar Eagle Plain Basin, close by in Canada, suggest that the Kandik Basin should also yield oil and gas. However, the possible disruption of the petroleum system during the deformation of the basin together with degradation of potential reservoir rocks introduces significant exploration risk.

There has only been limited explo-

ration of the basin to date. Three industry exploration wells in the 1970s on the Canadian side of the basin all proved dry. One well in 1976 on the Alaska side of the basin encountered dead oil and traces of gas.

## The Copper River Basin

The Copper River Basin sits in a lowland area due north of the Gulf of Alaska and bounded by the Alaska Range, the Wrangell Mountains and the Chugach Mountains. The stratigraphy of the basin bears many similarities to the Cook Inlet stratigraphy, especially in the Mesozoic section — during Mesozoic times the Copper River and Cook Inlet areas formed part of a continuous marine basin.

The age of the Mesozoic marine sediments ranges from middle Jurassic to late Cretaceous. The stratigraphic sequence includes the Matanuska formation, Naknek formation and Tuxedni group that appear in the Cook Inlet stratigraphic column (see figure 4.3 in chapter 4). The Jurassic Nelchina limestone exhibits oil stains and petroliferous odors. Potential source rocks may occur in the Matanuska formation, the Nelchina and the Tuxedni group. Portions of the Matanuska formation contain coal and may have generated biogenic gas.

As in the Cook Inlet, Tertiary terrestrial deposits with coal seams overlie the Mesozoic sediments. The Tertiary rocks could source biogenic gas.

Some limited oil and gas exploration of the area was done prior to the mid-1980s, with geophysical surveys and 11 wildcat wells. Several of the wells encountered oil shows and gas. The wells also encountered overpressured zones, especially in the Nelchina limestone. Mud volcanoes in the Tolsona area emit gas containing a high percentage of methane.

A recent resurgence of interest in the area resulted in the issue of a State of Alaska exploration license, part of which has now been converted to a conventional lease; an industry group has shot some seismic lines and has drilled a well near Glennallen. The well does not appear to have found significant amounts of oil or gas, but final results of the drilling have yet to be announced.

## The Bethel Basin

The Bethel Basin lies beneath a low,

marshy plain on the west side of the Yukon-Kuskokwim Delta. Lakes cover much of the surface of the basin.

Strongly deformed and locally metamorphosed Cretaceous rocks occupy the lower sections of the basin. A relatively thin Tertiary sequence overlies the Cretaceous rocks — gravity lows in some parts of the basin indicate that the Tertiary sediments may not be more than about 1,900 feet thick and thicknesses are probably less than that over most of the basin.

The thin Tertiary sequence coupled with poor reservoir and source potential in the pre-Tertiary rocks has discouraged oil and gas exploration in the basin. There has only been one exploration well in the area — the Napatuk Creek No. 1 well, west of Bethel. This well encountered about 1,400 feet of Tertiary marine clays over a sequence of Cretaceous sandstones, siltstones and shales. Samples from the well and surrounding surface outcrops showed low organic content and poor reservoir properties.

There is potential for gas generation in the late Cretaceous sediments but the complex geological structures would probably limit the accumulation of large volumes of gas.

## The Yukon-Koyukuk-Kobuk terrane

The Yukon-Koyukuk-Kobuk terrane comprises a large Mesozoic basin in western and central Alaska. The basin divides into two segments — the Yukon-Koyukuk segment east of Norton Sound and the Kobuk segment immediately south of the Brooks Range.

The terrane contains a wide variety of sedimentary rocks including some coal-bearing sequences. Complex folding and some metamorphism severely limit the petroleum potential. However, some geologists have suggested that a more open folded area in the Kobuk segment might prove prospective for oil or gas, although there is no surface evidence of a petroleum system.

## The Gulf of Alaska

The Gulf of Alaska shelf lies along the northwestern and northern coast of the Gulf of Alaska and contains thick sequences of sedimentary rocks that

extend onshore. The Aleutian Trench lies seaward of the shelf while the Transition fault and the Fairweather-Queen Charlotte fault lie parallel to the Gulf coast along the southern boundary of the shelf.

The Prince William terrane that dominates the shelf east of the Kenai Peninsula consists of highly deformed Mesozoic and early Tertiary rocks that are thought to hold little or no petroleum potential. However the very thick Tertiary sequence of the Yakutat terrane south of Prince William Sound extends offshore and onshore along the north of the Gulf of Alaska and contains several petroleum plays.

### The Katalla field

The Katalla field, the first oil field in Alaska, started up in 1902 and extracted 154,000 barrels of oil from the Poul Creek formation in the Tertiary sequence of the Yakutat terrane east of the Copper River Delta.

The early Tertiary sequence of the Yakutat terrane contains about 10,000 feet of terrestrial river delta sedimentary rocks. These strata pass upward into shallow marine delta rocks. Up to 26,000 feet of deeper marine strata occupy the upper part of the sequence.

Onshore, USGS has recognized two oil and gas plays. The Yakataga fold belt play is associated with the Katalla field and involves Cenozoic sandstone reservoirs. Structural traps result from folding and thrust faulting along the edge of the mountains near the coast. The Yakutat foreland-Lituya play involves Cenozoic sandstone reservoirs associated with structural traps along a weakly folded and faulted zone between Icy Bay and Cape Fairweather.

### Offshore plays

The Yakataga fold and thrust belt play extends south under the Gulf of Alaska. However, in the offshore area MMS has recognized five other plays, all of which involve Tertiary sandstone reservoirs:

1. The Middleton fold and thrust belt play occurs in a large area south of Prince William Sound and involves structural traps in the fold and thrust belt of that area.

2. The Yakutat Shelf-basal Yakataga formation play south and east of Yakutat Bay involves stratigraphic or combination traps.

3. The Yakutat shelf-Kulkeith sands play resembles the other Yakutat play but only



involves reservoirs in the Eocene Kulkeith formation.

4. The southeast Alaska shelf sub-basin play involves a small Tertiary basin south of Prince William Island.

5. The subducting terrane play involves structural traps associated with an area of extensive folding and faulting southwest of the Bering Glacier.

Despite the large thickness of Tertiary rocks along the north of the Gulf of Alaska, fairly extensive drilling has so far failed to make a substantial find of oil and gas. The USGS 1995 assessment of the area cites structural complexity, the young development age of the potential traps and poor reservoir characteristics in the Yakataga formation as factors in this lack of success. Twenty-five wells and core holes were drilled on shore between 1954 and 1963. An industry consortium drilled a stratigraphic test well in the Gulf of Alaska in 1975 and 13 exploration wells were drilled offshore between 1969 and 1983.

Recently there has been renewed interest in testing for oil by deep drilling at the Katalla field — the original exploration and production wells in the field only penetrated relatively shallow depths in the Tertiary sequence.

## The Shumagin-Kodiak shelf

The Shumagin-Kodiak shelf consists of the continental shelf and slope surrounding the Kodiak archipelago and the Shumagin and Sanak Islands. The Aleutian trench lies immediately to the southeast and many of the sediments on the shelf consist of material accreted onto the continent as a result of the Pacific plate sliding under Alaska. Volcanic action has erupted some lava and ash into the sedimentary sequence.

The economic basement of the shelf correlates with the Prince William Sound terrane of the Gulf of Alaska shelf. Highly deformed Eocene sedimentary rocks that overlay the basement of the Shumagin-Kodiak shelf probably offer the best potential in the area as hydrocarbon source rocks. Neogene sandstones and shales that overlay the Eocene rocks offer the possibility of reservoirs with structural traps. In some places the Neogene sediments fill basins on the shelf.

Six stratigraphic test wells were drilled on the shelf near Kodiak Island in the 1970s.

### Credits

Kirk Sherwood of the U.S. Department of the Interior's Minerals Management Service, Richard Stanley of the U.S. Geological Survey and Charles Barker of the U.S. Geological Survey all contributed material to this chapter.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.

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## The Norton Basin

The Norton Basin under the Norton Sound in western Alaska exhibits many of the characteristic features of an Alaska fault-bounded Cenozoic basin, although its offshore location has resulted in a higher preponderance of marine sediments than usual in this type of basin.

Two subbasins, the St. Lawrence Subbasin in the west and the Stuart Subbasin in the east meet at a ridge called the Yukon horst. The two subbasins started filling with terrestrial sediments in early Tertiary times, but marine deposition predominated in the western basin from the Paleocene to the Oligocene. Then from the late Oligocene to the present the entire Norton Basin became marine.

Two stratigraphic test wells and six exploration wells in the basin have encountered good quality potential reservoirs in both marine and nonmarine sediments. Hydrocarbon analysis of well samples indicates that the basin has potential for gas rather than oil.

MMS has assessed five petroleum plays in the basin: Four of these plays involve Tertiary clastic rocks in a variety of structural and stratigraphic traps. The fifth play

speculates that hydrocarbons may have accumulated in fractures in the Paleozoic and Mesozoic rocks that underlie the basin. Hydrocarbons might have sourced from Paleozoic or Eocene rocks.

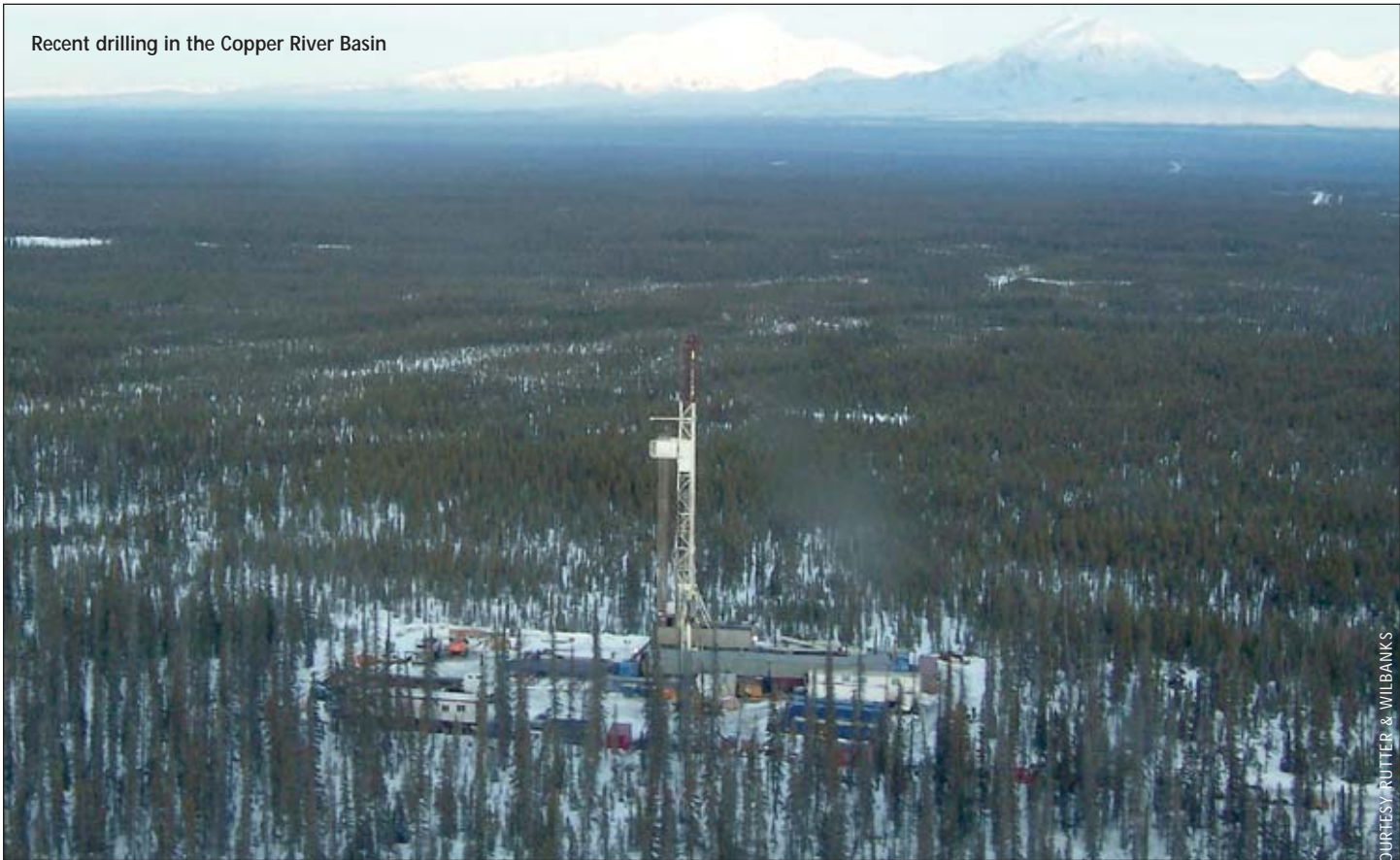
## The St. Matthew-Hall Basin

The St. Matthew Hall Basin, under the Bering Sea just south of St. Lawrence Island, consists of a series of subbasins filled with up to 13,000 feet of stratified sedimentary rocks. As with the other basins on the Bering Sea outer continental shelf the basin is associated with regional faulting that peaked in activity during the early Tertiary.

Because no wells have drilled into the basin, stratigraphic interpretations depend on seismic data and on comparisons with the nearby Norton Basin. Seismic sections depict two sequences of sediments within the St. Matthew-Hall Basin: a lower rift sequence that is cut by Tertiary faults and an upper sag sequence that lies on top of the faults. The upper sequence would have formed when the basin continued sagging after the faults ceased their activity.

The small volumes of rock deeper than

Recent drilling in the Copper River Basin



COURTESY, RUTTER &amp; WILBANKS

10,000 feet and comparisons with the known stratigraphy of the Norton Basin suggest that the St. Matthew-Hall Basin is gas prone.

## The St. George Basin

The St. George Basin lies in the outer Bering Sea shelf, immediately west of the Bristol Bay Basin and southeast of the Navarin Basin. The St. George Basin formed in a very similar manner to the Bristol Bay Basin — a Mesozoic marine area associated with a volcanic arc evolved into a Cenozoic basin that is associated with faulting caused by plate movements in the Earth's crust.

Within the basin a long, narrow sunken faulted block — the St. George graben — now extends northwest-southeast between platform areas to the northeast and southwest. A Cenozoic sequence of mudstones, conglomerates, shales, siltstones and sandstones lies over a pre-Cenozoic basement. The Cenozoic sediments achieve thicknesses of up to 40,000 feet in the St. George graben.

The Pribilof Basin, a smaller basin to the west of the main basin, contains up to 20,000 feet of Cenozoic sediments.

The large quantity of volcanic material

in the rocks appears to have caused a loss of porosity with depth, because of a tendency toward chemical alteration of this material.

MMS has identified three potential oil and gas plays within the main basin and one play within the Pribilof Basin. Oligocene sandstones seem to present the most favorable reservoir potential and a potential Jurassic source rock exists under the northern platform. Little is known about source rocks at depth within the St. George graben. Seismic data suggests some of the rocks in the Pribilof Basin are nonmarine.

MMS considers the St. George Basin to be gas prone — any oil would probably have had to originate from Jurassic rocks under the basin.

Two stratigraphic test wells and 10 exploration wells were drilled between 1976 and 1985 in the St. George Basin. None of these wells made significant oil or gas discoveries although some had minor gas shows. No wells have been drilled in the Pribilof Basin.

## The Navarin Basin

The Navarin Basin occupies an area of about 32,000 square miles on the Bering

Sea outer continental shelf about 350 miles west of the Yukon-Kuskokwim Delta. As with some other Cenozoic basins in the Bering Sea continental shelf, the basin formed at a pull-apart of the crust along the early Tertiary transform fault boundary, where tectonic plates moved laterally past each other.

Tertiary rocks in three subbasins attain thicknesses of up to 36,000 feet. The strata consist predominantly of a sequence of marine and nonmarine sandstone, silts and shales.

The best potential source rocks appear to consist of Eocene mudstones, shales and argillites. The sedimentary sequence also includes Paleocene coal. Although some of the deeper source rocks could probably have generated oil, people view the basin as gas prone. MMS has recognized seven potential oil and gas plays involving sandstone reservoirs mainly in stratigraphic traps but with some combination traps.

A stratigraphic test well in 1983 on the edge of one of the subbasins was followed by eight exploration wells drilled in 1986 and 1987. None of the wells made significant oil or gas finds, although some encountered oil and gas shows. ■



# CCI Alaska: Proven innovation, efficiency

**F**ounded in 1989, CCI, Inc. is an Anchorage based company licensed as a General Contractor. CCI is a wholly owned subsidiary of the Bristol Bay Native Corporation and is certified as a SDB in the SBA 8(a) program, as well as being a HUBZone contractor. CCI provides a broad spectrum of experience in five major divisions, Design/build, Construction Management, Renovations, Installations, Specialty Coatings, Asbestos Abatement, Environmental Remediation and Spill Response.

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CCI provides construction, environmental, oil field and rapid-response services, as well as containment products.



Environmental Secondary Containments on the North Slope



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Committed to safety, sustained growth, and environmental excellence, CCI strives to increase workplace diversity by recruiting and developing a highly skilled diverse workforce. In addition, CCI provides employment opportunities for Alaska Native peoples, including Bristol Bay Native Corporation shareholders.

The CCI Construction Management team combines a core group of experienced construction managers with standardized processes for successfully managing projects in some of the harshest and most remote work environments in the world. CCI applies established and proven project and program management procedures to ensure successful completion of work requirements, by aligning authority and responsibility while focusing on providing effective and responsive services. This expertise and experience translates into smooth logistical plans, efficient construction sequencing, and satisfied customers.

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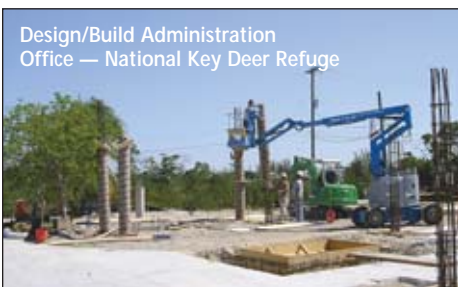
CONSTRUCTION & ENVIRONMENTAL SERVICES

wildlife habitats, the company is providing solutions to not only resolve the problems of the past and present, but to preserve our ecological heritage for the future. For the past 18 years, numerous successful projects have demonstrated CCI's ability to bring innovation, and identify cost savings, to many diverse projects. ■

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# Surveying Expertise

*F. Robert Bell & Associates gives clients all the advantages of 3D scanning technology, backed by over 30 years experience in remote Alaska*

**F** Robert Bell & Associates has been a strong, ongoing presence on the Slope for more than three decades.

Our clients have come to depend on Bell's commitment to providing cutting-edge technologies, backed by our specialized experience, to deliver accurate, cost-effective results.

## Advanced 3D scanning technology reduces costs, increases accuracy

Bell now offers second-generation 3D scanning technology, providing clients with unprecedented accuracy and cost-efficiency.

In the hands of Bell's experienced surveyors, data collection is rapid and complete, with accuracy to 2.5 mm at 100 meters. Additional site visits are now unnecessary. And fewer staff and fewer man-hours are needed to complete the project.

What once took two crews, 200 shots and several days now takes just one person, one scan, and one day to complete — with even more accurate results. Plus, raw pointcloud data can be easily converted into CAD format with minimal editing, saving even more time.

The savings potential with this technology is remarkable. It also enables Bell to help you solve a variety of surveying challenges that would simply be not possible with traditional methods or low-performance scanners.

## Proven results

On a recent Trans-Alaska Pipeline slope stability project, 3D scanning enabled us to create a surface mesh and find sink holes and ground jacking that may have gone unnoticed using traditional methods. Best yet, the whole project was completed for about 2/3 the cost of conventional surveys.

For BP Alaska's Milne Point facility on the Slope, Bell completed a thorough as-



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built on two oil production pads that gave BP engineers not only the critical point data but everything else on the site. This enabled them to extract coordinates and dimensions from anywhere within the model, saving them from wintertime trips, helping them finish their re-design plans far ahead of schedule and at a much lower cost.

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ed and by how much. The client was then able to fix them right there at the shipyard where the work could be done more efficiently.

## Experience & technical abilities set bell apart

Through its commitment to leading edge technology and 30 years experience in the industry, Bell has the unique ability to tie-in the latest scans with existing project survey data, to enhance accuracy, and to work well with engineers, architects, project managers and developers.

Bell specializes in Arctic & Subarctic surveying. In addition to a large staff of land surveyors experienced in all types of situations, Bob Bell has personal and professional contacts on the Slope and throughout Alaska in both civil engineering and surveying fields. This has proven to be a tangible asset for many of our clients.

## Stellar safety record

Over the last nine years, Bell has worked on the Slope and a variety of locations without a single Lost Time Accident and only three Recordable Accidents. Bell takes safety seriously and has fostered a strong safety culture that's endured through the years.

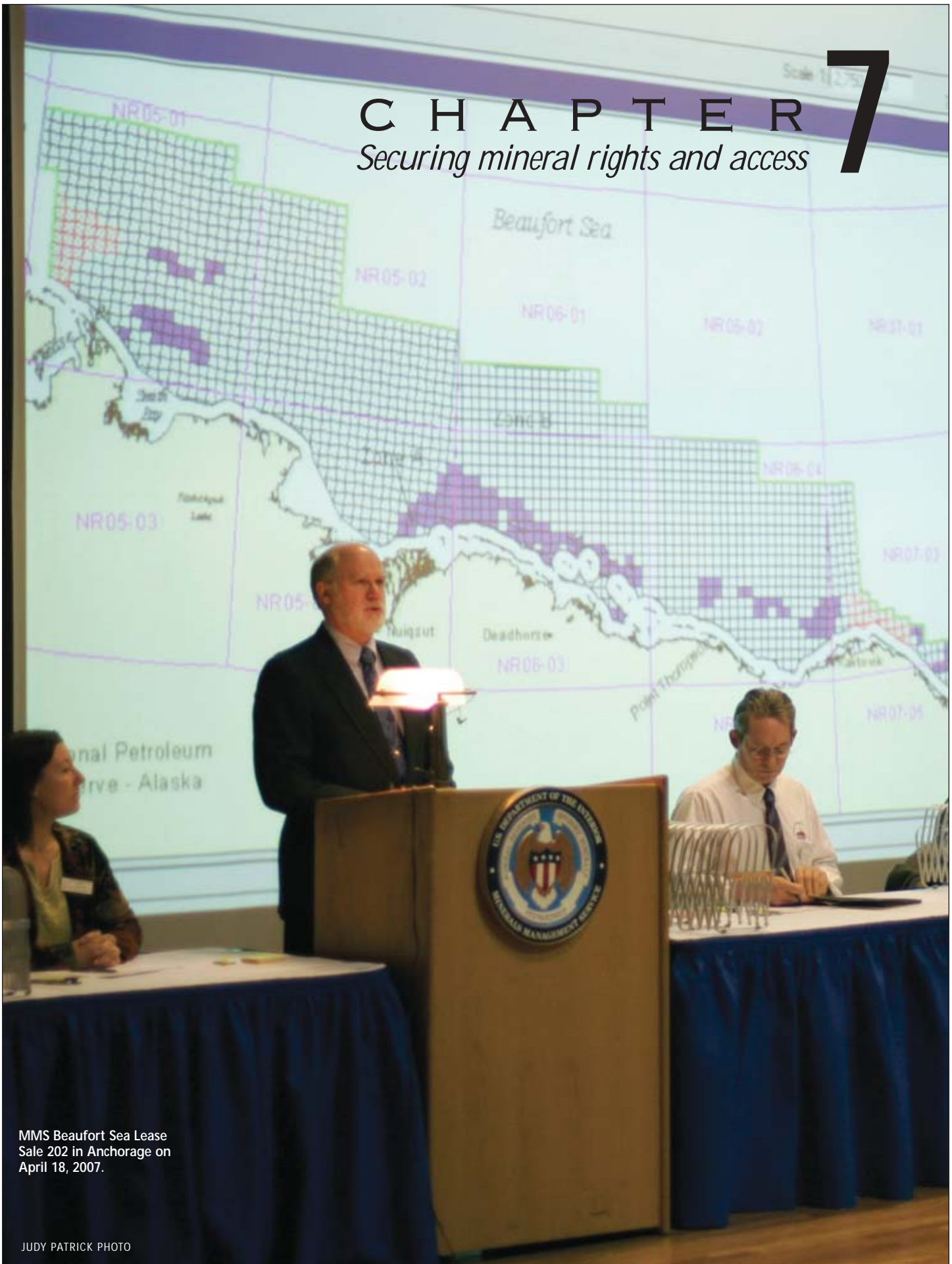
Technology plays a part, too. More efficient surveying equipment and techniques mean surveyors spend less time out in the elements. With new scanning technology, this exposure is further reduced as the numbers of surveyors, trips and hours in the field have significantly declined.

Today, Bell is well positioned to work on NPRA and Alaska Natural Gas Pipeline projects. We have the experienced crews, up-to-date equipment, cutting edge technologies and a well-seasoned organization with a strong safety culture already in place. For more information, call Bob Bell at 907.274.5257. ■



# CHAPTER 7

*Securing mineral rights and access*



MMS Beaufort Sea Lease Sale 202 in Anchorage on April 18, 2007.

## CHAPTER 7

# Securing mineral rights and access

## Introduction

**M**ineral rights and the access to oil and gas resources in Alaska relate to a land ownership situation that is closely tied to the history of the state since the arrival of the Russians in Alaska in the mid-1700s.

The Russians established a series of trading posts and settlements in Alaska, mainly along the coast. In 1867 Russia sold Alaska to the United States and the U.S. federal government took ownership of the Alaska Territory, a land area of about 375 million acres.

### Alaska statehood

When Alaska became a state in 1959 the federal government granted the State of Alaska rights to ownership of 28 percent of the total land area. The state could select lands from federal land not already reserved for other uses. The state has since selected lands for private settlement, for resource development and for recreation but has still not received title to all of these lands — at the end of 2004 the state had received patent to 87 percent of its land selections. BLM plans to complete the conveyance of the state's selected lands by the 50th anniversary of statehood in 2009.

The state of Alaska disposes of land to local government and private owners under various programs. However, under the terms of the acquisition of its land from the federal government the state can only transfer surface ownership. The state must retain the rights to the subsurface.

### ANCSA

In 1971, in response to land ownership issues relating to the proposed construction of the trans-Alaska oil pipeline, the federal government enacted the Alaska Native Claims Settlement Act, commonly known as ANCSA. ANCSA resolved the land claims of the indigenous Native peoples of Alaska by granting rights to 43.7 million acres of Alaska land to Alaska Natives.

ANCSA established 12 Native regional corporations and 224 Native village corporations; these corporations would take ownership of the Native lands. Twelve regional corporations own land within specific regions of Alaska and are owned by Native share-

**Table 7.1: Alaska land distribution on September 30, 2005**

#### Federal (in millions of acres)

BLM-managed public lands	85.4	23.37%
Defense and other federal	2.0	0.55%
National forest system	22.0	6.02%
National park system	54.0	14.77%
National wildlife refuge system	70.6	19.32%

#### State (in millions of acres)

State of Alaska	91.4	25.01%
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#### Private (in millions of acres)

Native corporations	37.4	10.23%
Other	2.7	0.74%

The total Alaska acreage is 365.5 million acres. The total State of Alaska entitlement is 104.5 million acres. The total Native corporation entitlement is 45.6 million acres (1).

#### Wilderness in Alaska (in acres)

Fish and Wildlife Service	18,676,320	5.11%
Forest Service	5,754,000	1.57%
National Park Service	33,492,269	9.16%

(1) This acreage includes 1.5 million acres in lieu of subsurface land under villages within pre-ANCSA National Wildlife Refuges

Source: U.S. Department of the Interior Bureau of Land Management, Division of Conveyance Management.

holders in those regions. ANCSA also allowed for the formation of a 13th regional corporation, which was incorporated several years after ANCSA, is owned by out-of-state shareholders and received no land entitlement. Shareholders from the villages own the village corporations. The village corporations own only surface land within township areas around the Native villages. The regional corporations can own fee simple interest in lands selected and conveyed in areas away from the villages or they can own the subsurface rights beneath the village corporation lands. In some regions some village corporations have merged with the regional corporation, so that the regional corporation owns fee simple interest in the village land.

Although the Native corporations have made most of their lands selections, title to some of this land has not yet been conveyed to the corporations. Most of the corporations have actually selected more land than they are entitled to, pending completion of the selection process.

Native allotments, consisting of landholdings of up to 160 acres held by the federal government in trust for Alaska Natives, were first established in the early 1900s. The

establishment of these allotments ceased after the passing of ANCSA. It is necessary to obtain permission to pass through or operate on a Native allotment. Permission may be obtained from the federal Bureau of Indian Affairs or the Native organization contracted to manage the allotment.

### Homesteading

Following purchase of the Alaska Territory from Russia in 1867 people could obtain title to homestead land in Alaska in the same way that they could elsewhere in the United States. Homesteading decreased rapidly in the Lower 48 in the early 20th century, but the practice continued in Alaska long after that. But, following the repeal of the homesteading act in 1976, the federal homesteading program in Alaska finally ended in 1986. The last homesteader to receive patent to a federal homestead in Alaska did so in Stony River, southwest Alaska, in 1988 (the homesteader had fulfilled necessary conditions for homestead ownership in 1979).

Although the government could retain subsurface mineral rights for homestead land, in many instances the homesteaders did acquire the subsurface rights, including



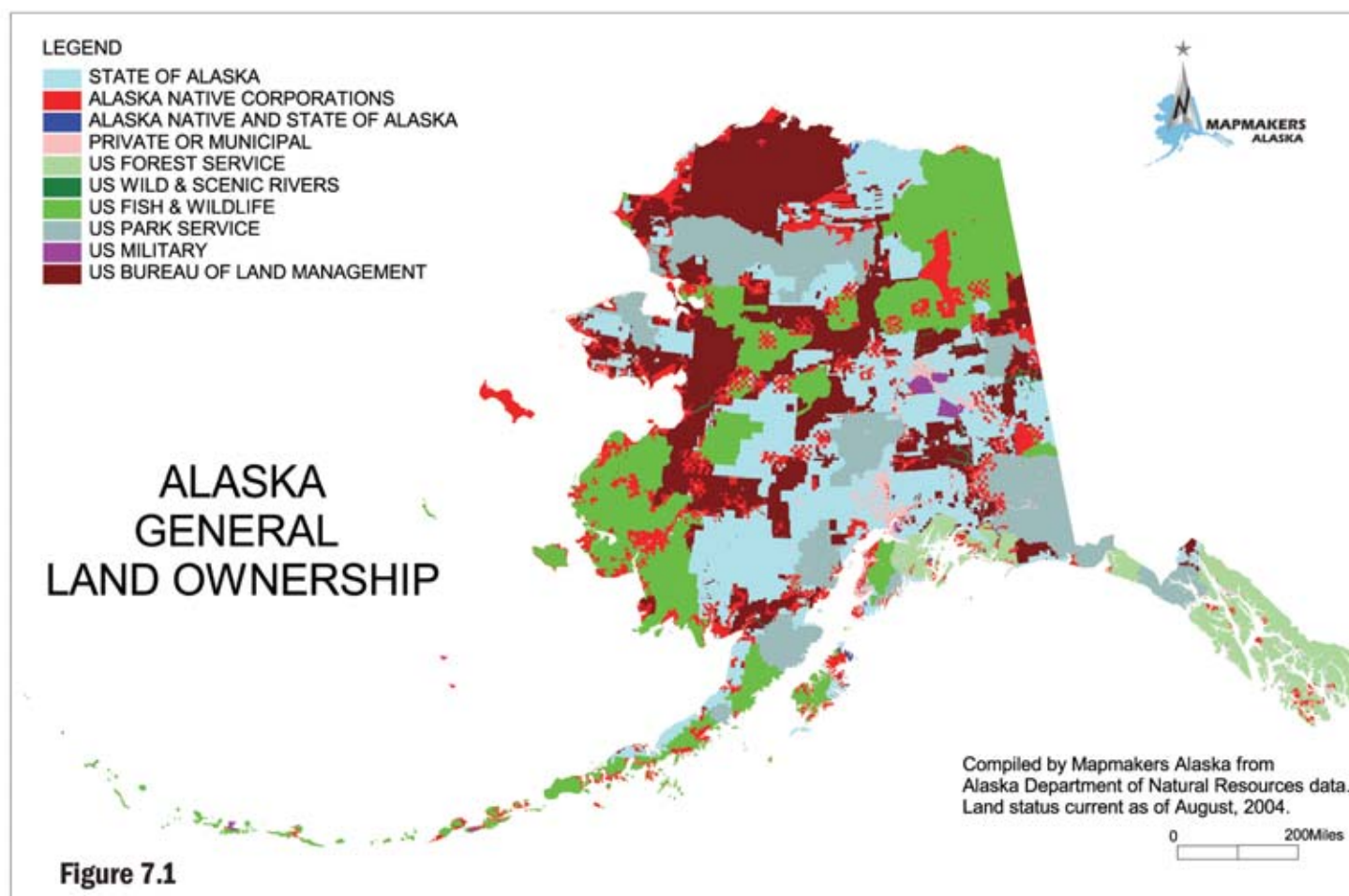


Figure 7.1

rights to oil and gas. This subsurface landownership can complicate oil and gas leasing especially in areas such as parts of the Kenai Peninsula, where homesteading was particularly common — across Alaska the extent of homestead land is quite varied.

The state of Alaska also used to operate a homesteading program but homestead land granted under that program did not include subsurface rights.

#### Federal land withdrawals

In 1980 the Alaska National Interest Lands Conservation Act, commonly known as ANILCA, triggered a series of federal land withdrawals from oil and gas exploration. ANILCA sought to protect those areas of Alaska that possess important aspects of scenic beauty, wildlife, ecosystems and subsistence lifestyle. The best known of these withdrawals is the Arctic National Wildlife Refuge or ANWR, although part of ANWR had actually become a refuge some years before the passage of ANILCA.

In 1956 the U.S. Congress established the Alaska Mental Health Trust with a grant of 1 million acres of land to be used to generate revenues to help meet the expenses of mental health programs. Land was selected throughout Alaska for this purpose.

In the 1980s a citizen lawsuit was filed claiming mismanagement of these Mental Health Trust lands. A 1994 settlement of the lawsuit created the Alaska Mental Health Trust Authority. The settlement also created the Trust Land Office, a separate unit within the Alaska Department of Natural Resources, to manage land for the trust. The settlement reconstituted the land Trust and transferred nearly 1 million acres of land to the Alaska Mental Health Trust Authority.

The University of Alaska owns and manages approximately 183,000 acres of land, 170,000 acres of which are used to generate income for the university (in 2005 the State of Alaska decided to transfer about 250,000 acres of state land to the university, but at the time of publication of this guide that land transfer had not been completed.) The university's land ownership dates back to federal legislation in 1915 and 1929. The university has settled a lawsuit with the state regarding lands that the university did not think the state had managed in accordance with university trust principles following statehood.

#### Private land

The federal government, the state of Alaska and Native regional corporations now

own the preponderance of subsurface land in Alaska. However, private entities other than Native corporations own a small amount of the subsurface, as a result of homesteading or the purchase of subsurface land from Native corporations. For example, oil companies have bought title to some subsurface land associated with oil or gas fields in the Cook Inlet area.

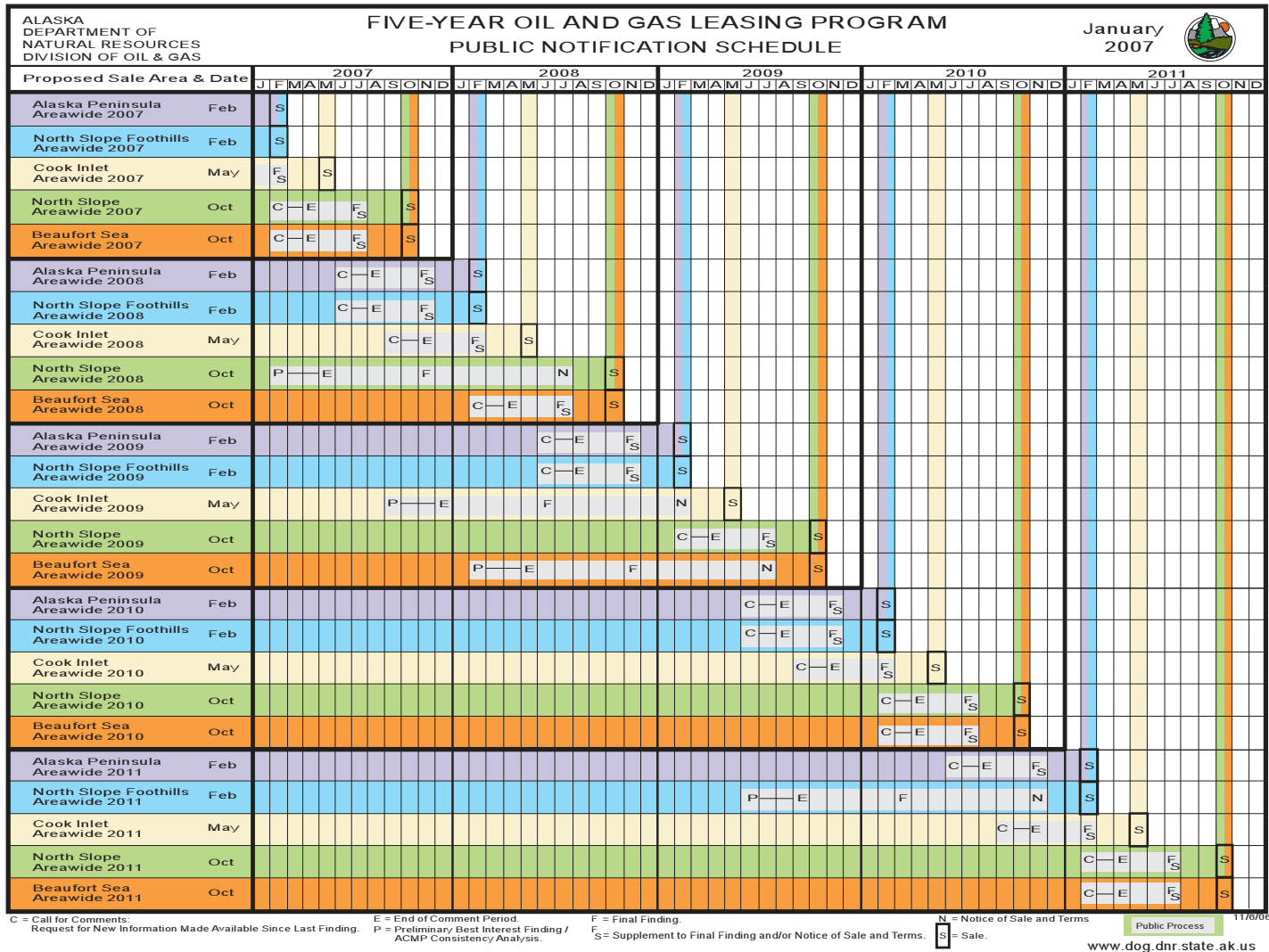
Table 7.1 summarizes the current land ownership situation in Alaska. Figure 7.1 shows a land ownership map for the whole state.

## Alaska Department of Natural Resources, Division of Oil and Gas

The Alaska Department of Natural Resources Division of Oil and Gas manages the oil and gas resources on state of Alaska lands, including submerged lands up to three miles offshore, and manages the state's oil and gas leasing and licensing programs.

State land is generally open for oil and gas development except for Alaska state parks and some other legislatively designated

# Alaska Department of Natural Resources Division of Oil and Gas Five Year Oil & Gas Leasing Program



**Figure 7.2** Source: Alaska Department of Natural Resources, Division of Oil & Gas. Five Year Oil & Gas Leasing Program. January 2007.

areas.

State lands include a substantial part of the central North Slope, most submerged lands in the Beaufort and Chukchi seas within the three-mile limit and much of the upper Cook Inlet and Susitna basins.

The Division of Oil and Gas submits a five-year lease sale program to the state legislature during each legislative session. Lease sales under this program involve competitive bidding and only apply to proven petroleum areas. The division issues leases with initial primary terms of five to 10 years.

The Division of Oil and Gas issues exploration licenses for areas that do not lie within proven petroleum areas.

The Commissioner of the Department of

Natural Resources issues a best-interest finding for each area that is scheduled for a lease sale or evaluated for an exploration license. The best interest finding evaluates the potential impacts of oil and gas exploration and development on the lease sale area and sets conditions for mitigating these impacts. The development of a best-interest finding is an inter-agency process that results in a preliminary finding followed by solicitation of public comment and normally takes one to three years to complete. The Division of Oil and Gas publishes its best-interest findings on its Web site at [www.dog.dnr.state.ak.us/oil/](http://www.dog.dnr.state.ak.us/oil/).

A best interest finding for a competitive lease sale remains valid for 10 years and may

be used for several lease sales. However, the state schedules a call for new information ahead of each lease sale — following this call, the commissioner will issue a finding of no significant new information or a supplement to the best interest finding. A best interest finding for an exploration license proposal is valid for that license proposal only.

### Areawide oil and gas leasing program and schedule

The state has introduced an areawide leasing program to achieve stability and predictability in the leasing program and to respond to industry requests for more fre-



quent lease sales. The first areawide lease sale applied to the North Slope and occurred in 1998.

In the areawide lease sale program the state annually offers for lease all remaining available state acreage within each of the major state-owned oil and gas areas. These areas consist of the North Slope, the North Slope Foothills, the Beaufort Sea, the Cook Inlet and the Alaska Peninsula.

Because areawide sales always apply to a large number of tracts of land in the same general areas of Alaska, the state does not solicit industry interest in particular tracts prior to a sale. Nor does the state research the title and access status of tracts prior to the sale — prospective bidders should research the status of any tract of land that they are interested in. However, if part of a tract of land turns out not to be available for lease the state will adjust the lease price after the sale.

North Slope Foothills and Alaska Peninsula areawide sales occur in February each year, while Cook Inlet areawide sales occur each May. North Slope and Beaufort Sea areawide lease sales occur in October.

### Exploration licensing

For state lands that are not part of a proven oil and gas province, the state issues exploration licenses rather than conventional oil and gas leases. The intention of exploration licensing is to provide exploration access at low cost for lands where the exploration risk is relatively high.

As with a lease, an exploration license grants exclusive rights to conduct oil and gas exploration in an area over a set period of time. However, instead of paying bonus money to buy a lease, the licensee commits to some level of exploration expenditure during the period of the license and posts a bond for the exploration commitment. Provided that the licensee meets the exploration commitment, the only money that the licensee needs to pay to the state consists of a \$1 per acre license fee.

A license applicant may submit an exploration license proposal to the Commissioner of the Department of Natural Resources in April each year. Or the commissioner can at any time issue a request for exploration proposals for a specific area.

Within 30 days of the receipt of a proposal the commissioner will either reject the proposal or give public notice of the intent

**Table 7.2: Minerals Management Service lease sale schedule**

Sale location and number	Sale date
Chukchi Sea sale 193	Feb. 6, 2008
Beaufort Sea sale 209	2009
Cook Inlet sale 211	2009
Chukchi Sea sale 212	2010
Beaufort Sea sale 217	2011
North Aleutian basin sale 214	2011
Cook Inlet sale 219	2011
Chukchi Sea sale 221	2012

**Table 7.2: The Minerals Management Service lease sale schedule. Prepared May 21, 2007.**

**Note: The Cook Inlet sales will be held only if there is interest shown by industry in response to a call.**

to evaluate the proposal and request competing proposals. A later public notice gives the public an opportunity to comment on the proposals. As a result of comments received the commissioner may amend a proposal or request an applicant to change a proposal.

After this initial public review the commissioner prepares a best interest finding for the proposed license. If this best interest finding determines that the license should be issued, the license applicant has 30 days in which to accept or reject the license. If there is more than one license proposal for the same area, the commissioner will request sealed bids for the proposed work commitment in dollars and award the license to the applicant with the highest bid.

The state issues licenses for periods of up to 10 years — all or any portion of a licensed area can be converted to a standard oil and gas lease at any time during the term of the license following completion of the work commitment.

If the licensee fails to meet the required exploration commitment, the licensee progressively loses portions of the license area and may ultimately forfeit all or part of the bond for the exploration commitment.

For further information about oil and gas leasing on State of Alaska lands contact:

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## Federal government

The management of oil and gas leasing

on federal lands is the responsibility of the Bureau of Land Management. The Minerals Management Service administers oil and gas leasing on the outer continental shelf. The U.S. Fish and Wildlife Service administers access to national wildlife refuges and the U.S. Department of Agriculture Forest Service administers access to national forests.

The National Park Service administers the national park system within Alaska. The national park system constitutes part of the federal land withdrawals in Alaska and is out of bounds for oil and gas development.

Oil and gas leasing is also prohibited on federal military land, most of which is associated with major military installations near Anchorage and Fairbanks.

### Minerals Management Service

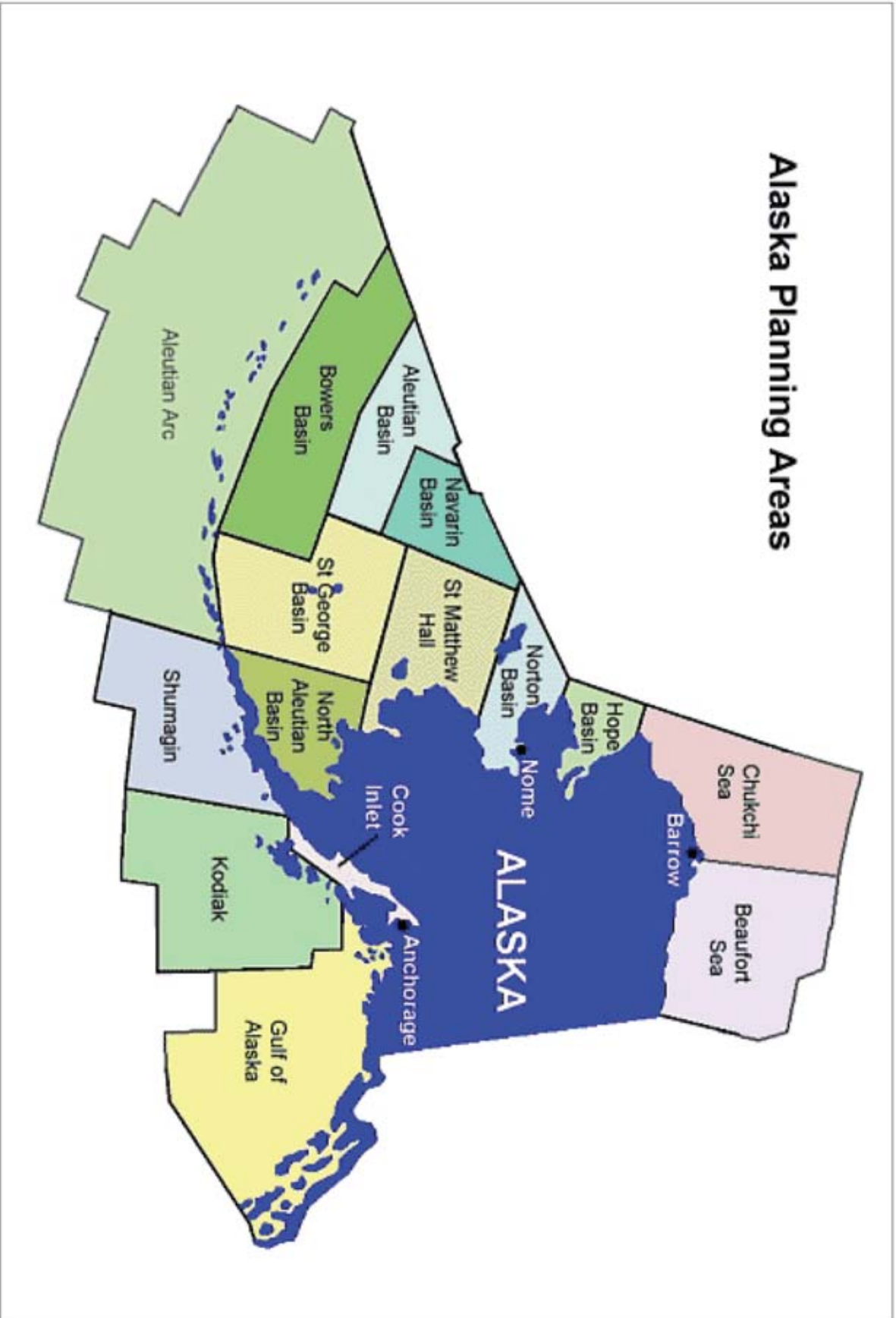
The Minerals Management Service administers oil and gas leasing on the federal portion of the Outer Continental Shelf, or OCS, an area that includes major oil and gas basins such as the Beaufort and Chukchi seas. The federal OCS includes all submerged lands that lie more than three nautical miles from the shoreline. The State of Alaska administers submerged lands within three miles of the shore.

For the purposes of planning and conducting oil and gas lease sales in Alaska, MMS has divided the OCS into 15 major planning areas. The Beaufort Sea, Chukchi Sea, and Cook Inlet are all examples of MMS planning areas — figure 7.3 shows the locations of the 15 planning areas.

The OCS Lands Act requires the U.S. Department of the Interior to prepare and maintain an oil and gas leasing program that indicates the size, timing and location of leasing activity determined to best meet national energy needs over a five-year period. The five-year program for 2002-2007 proposed a total of eight lease sales offshore of Alaska. Five of those sales applied to the Beaufort Sea and Cook Inlet planning areas and followed a conventional MMS procedure. The other three sales were special interest sales in the Chukchi Sea, Hope Basin, and Norton Sound planning areas and follow a different procedure.

The five-year program for 2007-2012 recognizes increased industry interest in the Chukchi Sea by scheduling a conventional lease sale in that planning area, in addition to the sales for the Beaufort Sea and Cook Inlet.

# US MINERALS MANAGEMENT SERVICE PLANNING AREA MAP



**Figure 7.3**

Source: US Minerals Management Service, "Planning Area Map, 2005."



This five-year program will also likely include lease sales in the North Aleutians basin in 2010 and 2012, following the lifting of a federal moratorium there. However, in response to the concerns of local communities, the North Aleutians sales will only cover about 5.6 million acres in the most prospective area of the basin northwest of Port Moller.

When MMS proposes to conduct a conventional lease sale in one of its planning areas, it first issues a call for tract nomination and comments. It then prepares a National Environmental Policy Act analysis, which may consist of an environmental impact statement (commonly known as an EIS), a supplemental EIS or an environmental assessment (commonly known as an EA) to evaluate the potential impacts of oil and gas leasing in the planning area. The National Environmental Policy Act is commonly referred to as NEPA.

The preparation of an EIS involves a standard procedure. As part of this procedure MMS schedules public scoping meetings to garner initial comments from the public on the proposed sale. The EIS procedure also includes a public hearing and a 60-day period for public comments after publication of the draft EIS.

The EIS will analyze several alternatives for future management of the area, including a no action alternative and alternatives that make all or portions of the planning area available for oil and gas leasing. Each alternative offers a different balance between serving the energy needs of the nation and protecting surface resources from unnecessary and undue degradation. If significant environmental issues arise, MMS may propose mitigation to reduce or eliminate any adverse effects, defer leasing in the area for a period of time or delete the area entirely from the proposed sale.

Given the high number of previous sales and the high level of interest in the Beaufort Sea and other planning areas for multiple sales in a five-year program, MMS has streamlined the lease sale process in these planning areas and now prepares a multi-sale EIS for each area. By applying a multi-sale EIS to more than one sale within a planning area, it is possible to eliminate much of the time and cost associated with developing a separate EIS for each sale. However, to ensure compliance with NEPA, a supplemental EIS

**Table 7.3 BLM land use plans and lease sale schedule**

Area	Land use plans	Lease sales
Northeast NPR-A	Integrated activity plan/environmental impact statement (EIS) completed in August 1998. Amendment completed January 2005. Record of decision for supplement scheduled for completion in March 2008.	Held in 1999 and 2002. Next sale tentatively scheduled for June 2008.
Northwest NPR-A	Integrated activity plan /EIS completed January 2004.	Held in 2004 and 2006.
South NPR-A <i>See page 7.12 for update</i>	Integrated activity plan /EIS scheduled for completion in 2010.	2010 or later.
East Alaska resource management plan	Final EIS released July 2006. Record of decision is pending settlement of protest.	Pending the signing of the record of decision followed by nomination of tracts from industry.
Ring of Fire resource management plan (southeast, southcentral and southwest Alaska)	Final EIS published August 2006. Record of decision is pending settlement of protest.	Pending the signing of the record of decision followed by nomination of tracts from industry.
Kobuk-Seward Peninsula resource management plan	Final EIS is scheduled to be published summer 2007. The record of decision is scheduled for October 2007.	Pending the signing of the record of decision followed by nomination of tracts from industry.
Bay resource management plan (Bristol Bay and Goodnews Bay)	Final EIS is scheduled to be published late summer 2007. The record of decision is scheduled for late 2007.	Pending the signing of the record of decision followed by nomination of tracts from industry.

or an EA still precedes each lease sale. A proposed lease sale also requires a review under the OCS Lands Act and the Coastal Zone Management Act. All post-lease activities also require NEPA compliance.

MMS has a different procedure for offering special interest lease sales in the Norton Sound and Hope Basin planning areas, where there is gas potential but little recent interest in purchasing leases. Each year MMS invites inquiries about oil and gas leasing in these three frontier planning areas. The general approach in these areas is to only proceed with a sale if sufficient exploration interest is shown in an area. If there is no interest, the process goes on hold until the next year. A response to the interest invitation triggers an 18-month process to prepare a lease sale for just those small, focused parts of a planning area that companies are interested in exploring. Lease sale preparation includes NEPA compliance.

In recent years MMS has included incentive strategies in its lease programs for the Cook Inlet and Beaufort Sea planning areas. The same types of incentives could apply in other planning areas. Incentives include reduced minimum bids, extended lease periods, royalty suspension volumes and reduced rental rates.

Table 7.2 shows the current MMS lease sale schedule.

For further information contact:

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Tina Huffaker

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Web site: www.mms.gov/alaska

**Bureau of Land Management**

The Bureau of Land Management manages the federal mineral estate in Alaska, which includes the National Petroleum Reserve-Alaska, generally known as NPR-A

NPR-A consists of a 23 million-acre region in northwestern Alaska that originally came into existence in 1923 as the Naval Petroleum Reserve No. 1 — President Harding established the Naval Petroleum Reserve as a potential source of oil for the U.S. Navy.

In 1976 the U.S. Congress renamed the Naval Petroleum Reserve No. 1 as the National Petroleum Reserve-Alaska and

transferred management of the reserve to the Bureau of Land Management. The Bureau of Land Management started offering oil and gas lease sales in NPR-A in the early 1980s.

The terms of Federal Lands Policy and Management Act govern the management of federal lands. Section 202 of this act mandates the development of land use plans that, in part, determine which lands are suitable for leasing.

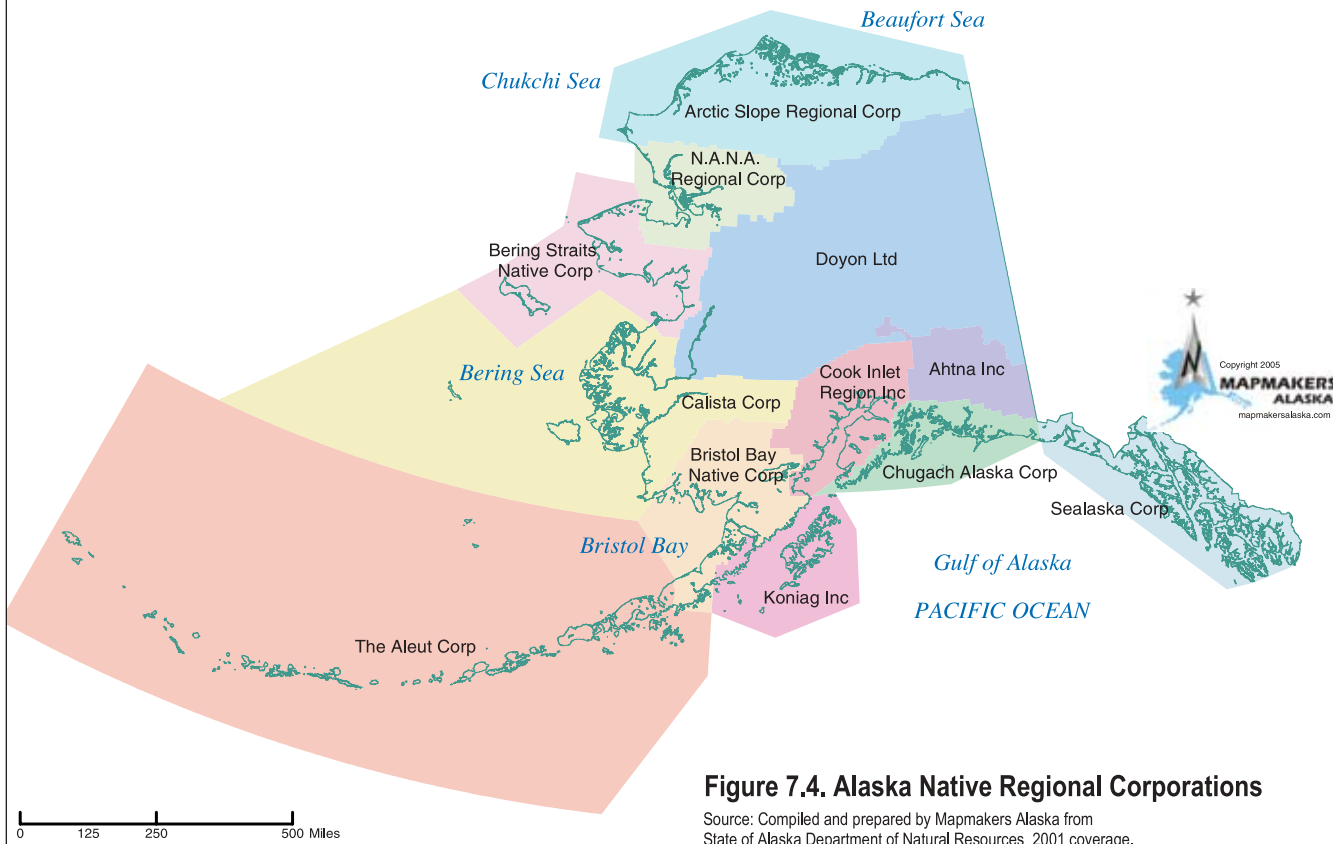
Federal lands within NPR-A are exempt from the section 202 of the Federal Lands Policy and Management Act — there's no legal requirement for land use plans for NPR-A. However, the bureau develops activity plans for NPR-A. These activity plans serve a similar role to land use plans and include decisions regarding the suitability of lands for oil and gas leasing.

Land use plans and activity plans include any necessary environmental impact statements for oil and gas leasing.

Lands outside NPR-A that are identified for leasing within a land use plan are then leased according to the terms of the Mineral Leasing Act. The leasing procedure under this act involves the following steps:

1. BLM accepts tract nominations for leasing.
2. BLM conducts an oral auction for the nominated tracts.
3. BLM awards leases to the highest bid.
4. If no bids are received, the tracts

# Alaska Native Regional Corporations



**Figure 7.4. Alaska Native Regional Corporations**

Source: Compiled and prepared by Mapmakers Alaska from State of Alaska Department of Natural Resources 2001 coverage.

remain available for non-competitive bidding for two years.

5. Leases are issued for a primary term of 10 years.

6. Lease rentals are \$1.50 per acre for the first five years and \$2 dollars per acre for the next five years.

Lands suitable for leasing within NPR-A are leased under the terms of the Naval Petroleum Reserves Production Act. Leasing under this act involves the following steps:

1. BLM conducts a competitive lease sale.
2. BLM reviews high bids to ensure that they exceed fair market value.
3. Within 90 days BLM issues leases if the tracts received acceptable high bids.
4. Leases are issued for a primary term of 10 years.
5. Lease rentals are \$3 per acre or \$5 per acre, depending on the terms in the lease sale notice.

BLM has published a schedule for the issuance of land use and activity plans for different areas in Alaska. In preparing these plans the bureau has divided NPR-A into three areas: northeast NPR-A, northwest NPR-A and southern NPR-A. Table 7.3 outlines the schedule of activity plans and lease

sales across Alaska.

Under the terms of 43 Code of Federal Regulations part 3150 BLM also issues permits for geophysical exploration on federal lands in Alaska. These permits last for one year and enable companies to conduct seismic surveys and other geophysical work without having to first purchase an oil and gas lease. An application for a permit should be submitted with a filing fee to the nearest BLM office. Permits are subject to review under the National Environmental Policy Act and may contain restrictions and conditions to mitigate adverse impacts on the environment.

**Contacts:**  
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 Bureau of Land Management  
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 Phone: (907) 271-3128

**Greg Noble**, Energy Branch Chief  
 Bureau of Land Management  
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**Evvie Garis**, Mineral Law Supervisor  
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Web site: [www.blm.gov/ak/](http://www.blm.gov/ak/)

## U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service administers the national wildlife refuges in Alaska. Under the terms of ANILCA, the secretary of the Interior can open lands within a wildlife refuge for oil and gas exploration leasing, provided that oil and gas exploration and development does not conflict with the purpose of the refuge. However, the Alaska National Wildlife Refuge can only be opened for oil and gas leasing by an act of the U.S. Congress.

If land inside a national wildlife refuge is opened for leasing, BLM will plan and conduct lease sales. BLM will then administer the leases in cooperation with Fish and Wildlife Service. Access to the land, including activities such as gravel quarrying and sur-



face or subsurface pipeline construction, remains under the control of the U. S. Fish and Wildlife Service.

For further information contact:

**Sharon Janis**

U.S. Fish and Wildlife  
Service – Alaska  
1011 East Tudor Road, MS 221,  
Anchorage, Alaska 99503  
Phone: (907) 786-3490  
Email: ak\_realty@fws.gov  
Web site: alaska.fws.gov/

**U.S. Department of Agriculture  
Forest Service**

The Forest Service is vested with the management and regulation of the Chugach and Tongass national forests in Alaska. These forest lands occupy onshore portions of the Kenai Peninsula, uplands along the Gulf of Alaska and the Alexander Archipelago of southeast Alaska.

The U.S. Geological Survey characterizes these National Forest System lands in Alaska as having low oil and gas potential — the most prospective areas for oil and gas development within the lands in Alaska consist of the Katalla area on the Chugach and the Yakutat forelands on the Tongass.

The Forest Service maintains total management authority over surface activities on the national forests and over the sale of certain minerals such as quarried rock, sand and gravel. However, BLM retains responsibility for oil and gas in the subsurface of the national forests and would conduct any oil and gas sales on Forest Service lands. Surface access and surface facilities within the national forests require permits from the Forest Service.

**Contacts:**

For the Chugach National Forest  
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Chugach National Forest  
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For the Tongass National Forest  
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For all other enquiries  
**John Kato**, Regional Geologist and

## Alaska Mental Health Trust Land Office

The Trust Land Office manages land on behalf of the Alaska Mental Health Trust and has a mission to generate income for the Alaska Mental Health Trust Authority. The Authority uses this income to improve the lives and circumstances of Alaska Mental Health Trust beneficiaries in the state. These beneficiaries include individuals who suffer from mental disabilities, chronic alcoholism, Alzheimer's disease and dementia.

The Trust's oil and gas resources occur mainly in Southcentral and Interior Alaska. The Trust owns the fee or mineral estate to approximately 300,000 acres of land around the Cook Inlet and on the Kenai Peninsula. These lands have the potential to contain oil and gas resources. The Trust also owns land in the gas-prone Nenana Basin. In addition the Trust Land Office is currently investigating the oil and gas potential of Trust land holdings amounting to approximately two townships around Icy Bay.

As of April 2007, about 138,000 acres of the Trust's land were under oil and gas leases.

The Trust Land Office has held competitive lease sales annually since 2001. Sales occur in the fall and are conducted in a very similar fashion to those that are held by the state's Division of Oil and Gas. Leases are awarded based on bonus bids. Lease terms are very similar to those of the state, with leases issued for five years and rentals escalating from \$1 per acre in the first year to \$3 per acre in the final year. Royalties typically begin at 10.5 percent for production in the primary term and increase to 12.5 percent after that.

The Trust Land Office may also negotiate leases or hold competitive sales at other times of the year if it would be in the best interest of the Trust to do so.

For additional information regarding the Trust's oil and gas resources or leasing program, contact Mike Franger in the Trust Land Office, mikefr@dnr.state.ak.us or phone (907) 269-8658, or refer to the TLO website at [www.mhtrustland.org](http://www.mhtrustland.org)

## University of Alaska

The University of Alaska owns prospective land in the Cook Inlet Basin on the Kenai Peninsula, in the Susitna Basin near Wasilla, in the Nenana Basin and in the Copper River Basin. The university is open to proposals for oil and gas leasing.

**Contact:**

**Kristi Sherman**

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## Alaska Native regional and village corporations

Twelve Alaska Native regional corporations own all the subsurface rights to Native lands in Alaska. Alaska Native village corpora-

tions often own surface land rights in and around Native villages, but several regional corporations own millions of acres in fee (surface and subsurface). The amount of Native land with oil and gas potential varies considerably from one regional corporation to another.

In general the regional corporations welcome offers from private industry to conduct oil and gas exploration and development on the Native lands. Conditions for oil and gas leasing are negotiable — a Native corporation will expect to see benefits for its shareholders and will want protections for subsistence and cultural use of the land.

Figure 7.4 shows the regions associated with each of the regional corporations.

The village of Nuiqsut on Alaska's North Slope



JUDY PATRICK

### Ahtna Inc.

Ahtna currently owns 1,528,000 acres of land in the Copper River Valley area and upon completion of the ANCSA land selection process will own 1,777,000 acres. The Ahtna region includes the Copper River Basin.

In 1980 seven of the eight village corporations of the Ahtna region merged with Ahtna Inc. As a result Ahtna owns both the surface and subsurface rights to land in these villages. However, any development work within former village land requires permission from the appropriate village.

Chitina village corporation chose not to merge with Ahtna Inc. and still owns the Chitina surface estate. So, although Ahtna Inc. owns the Chitina subsurface estate, access to the subsurface requires permission from Chitina village corporation.

#### Contact:

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P.O. Box 649, Glennallen, Alaska 99588  
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Fax: (907) 822-3495  
Anchorage contact: brebne@ahтна.net  
Web site: www.ahтна-inc.com

### Aleut Corp.

Under the terms of ANCSA Aleut Corp. selected about 1,572,000 acres of subsurface estate and 66,000 acres of surface estate in the Aleutian, Shumagin and Pribilof islands, and on the western half of the Alaska Peninsula. These lands include part of the Bristol Bay Basin.

The corporation's holdings include the village site of Attu and numerous historical and cemetery sites. The corporation has acquired the closed military facility on Adak Island, which was the site of an early Aleut community.

Because much of the Aleut land has not yet been conveyed to Aleut Corp., the U.S. Fish and Wildlife Service would handle any oil and gas leasing at present. However, companies interested in oil and gas exploration in Aleut lands should contact:

**Contact:**  
**Melvin Smith**

Facilities & Resource Manager  
The Aleut Corp.  
4000 Old Seward Hwy, Suite 300  
Anchorage, Alaska 99503  
Phone: (907) 561-4300  
Fax: (907) 563-4328  
Web site: www.aleutcorp.com

### Arctic Slope Regional Corp.

Arctic Slope Regional Corp., or ASRC, owns approximately 5 million acres of land on the North Slope. The corporation's land lies within the prolific oil and gas province of northern Alaska and includes 46 percent of the Alpine oil field. ASRC's land holdings also include 92,000 acres on the coastal plain of the Arctic National Wildlife Refuge.

ASRC welcomes proposals for oil and gas leasing on its property. The corporation negotiates leases on an individual basis and favors lease terms based on work commitments. Royalty rates normally align with rates in adjacent public leases.

However, land in the Colville Delta area is owned as a split estate with the State of Alaska. So, in that area the state conducts a competitive lease sale and then ASRC manages its component interest of the leases.

Village corporations own some of the surface land — separate surface access agreements are needed for that land.

#### Contact:

**Teresa Imm**  
Director, Resource Development  
Arctic Slope Regional Corp.  
3900 C Street, Suite 801  
Anchorage, AK 99503  
Phone: (907) 339-6000  
Email: timm@asrc.com  
Web site: www.asrc.com

### The Bering Straits Native Corp.

The Bering Straits Native Corp., or BSNC, owns 2,037,601 acres of land on the Seward Peninsula and at the eastern end of the Norton Sound. The BSNC region lies at the northern side of the Norton Basin.

#### Contact:

**Matt Granley, Land Resource Manager**  
Bering Straits Native Corp.

2441 Cinnabar Loop, suite 200  
Anchorage, AK 99507  
Phone: (907) 632-7197  
Fax: (907) 344-0827  
Web site: www.beringstraits.com

### Bristol Bay Native Corp.

The Bristol Bay Native Corporation, or BBNC, boundaries contain approximately 34 million acres of land. A visual image of the boundary paints a skewed diamond in Southwest Alaska: beginning at Koliganek in the north, coasting over to Togiak in the west, heading down to Ivanof Bay in the south and finally looking north to Pedro Bay in the east.

BBNC welcomes proposals for oil and gas exploration on its lands. As the regional corporation, it owns and manages 2.85 million acres. Almost all lands are split estate between the village and the regional corporation. As one of the development steps, industry makes agreements with both the surface and subsurface owner. BBNC continues to help streamline the agreement process.

#### Contact:

**Tiel Smith, Resources Manager**  
Bristol Bay Native Corp.  
111 West 16th Avenue Suite 400  
Anchorage, AK 99501-6299  
Email: tsmith@bbnc.net  
Phone: (907) 278-3602  
Web site: www.bbnc.net

### Calista Corporation

Calista Corporation's ANCSA entitlement is 6.5 million acres in the Yukon-Kuskokwim Delta and in the western Interior. Calista lands include parts of the Bethel, Yukon River Delta, and Holitna basins. The Yukon Delta area is the on-shore extension of the Norton Basin.

The corporation welcomes proposals for oil and gas exploration and development on its lands and negotiates leases on an individual basis. Village corporation consent is required for surface access to Calista subsurface property and the villages promote similar resource development policies to Calista's.



**Contact:**

**June McAtee**, vice president land and natural resources  
Calista Corporation  
301 Calista Court, Suite A  
Anchorage, AK 99518-3028  
Phone: (907) 279-5516  
Web site: www.calistacorp.com

**Chugach Alaska Corp.**

The Chugach region extends along the coast of Southcentral Alaska from the southern tip of the Kenai Peninsula easterly to the 141st meridian near Icy Bay. Most of Chugach's 885,573 acres of land lie along the coast of the Prince William Sound, Gulf of Alaska and along major waterways within the region. Chugach lands include parts of the Gulf of Alaska shelf — lands in the Controller Bay, Cape Yakataga and Icy Bay areas are particularly prospective for oil and gas. Chugach's full fee estate at east Icy Bay, Cape Yakataga and on Middleton Island could also support services for offshore oil leasing in the Gulf of Alaska.

Chugach welcomes proposals for oil and gas exploration in its lands and would want to be involved in any regional exploration program. In the past Chugach has negotiated exploration options that allow exploration activity and include options to convert to oil and gas leases.

**Contact:**

**Rick Rogers**, vice president lands, resources and tourism  
Chugach Alaska Corp.  
560 East 34th Avenue  
Anchorage, AK 99503  
Phone: (907) 563-8866  
Email: rrogers@chugach-ak.com  
Web site: www.chugach-ak.com

**Cook Inlet Region Inc.**

Cook Inlet Region Inc., or CIRI, owns land around the Cook Inlet, within the area of the productive Cook Inlet Basin. CIRI develops its oil and gas resources in partnership with oil and gas companies.

**Contact:**

Land and Resource Department  
2525 C Street, Suite 500  
Anchorage, AK 99509-3330  
Phone: (907) 274-8638  
Web site: www.ciri.com

**Doyon, Limited**

Doyon has entitlement to 12.5 million acres of land in a vast area of the Alaska interior, between the Brooks Range and the Alaska Range, and extending east to the

Canadian border. The corporation owns lands within the Nenana, Yukon Flats and Kandik basins. All of these basins are prospective for oil or gas.

Doyon is currently leasing for oil and gas exploration 38,000 acres of its land in the Nenana Basin, where the company is also investing with partners in the exploration. The partnership gathered more than 200 miles of seismic in the winter of 2004-2005 on an almost 500,000-acre block of lands owned by Doyon, the State of Alaska and the Alaska Mental Health Trust, and has not yet made a decision on drilling. The target is conventional natural gas for Railbelt consumers and power generation.

Doyon has reached an agreement in principle for a land swap in the Yukon Flats with the U.S. Fish and Wildlife Service, to consolidate some Doyon oil and gas prospects with prospects on adjacent federal lands. About 200,000 acres of land, including fee land and some oil and gas-only rights, would be added to adjacent Doyon land to form more than 500,000 contiguous acres with exploration potential. The swap is currently the subject of a federal environmental impact statement, due to be completed in spring 2008. Additional large blocks of Doyon land in the Yukon Flats have exploration promise, some within 35 miles of the trans-Alaska oil pipeline. Doyon is currently talking with possible partners to explore its lands there, regardless of the land exchange outcome.

In general, about three-fourths of Doyon's land is owned in fee, with the remainder in a split estate arrangement in which Native village corporations own the surface estate. In split estate situations lessees of Doyon land need to negotiate surface access rights with the surface owner. Doyon has a long history of successful negotiations for surface access for exploration, including recently in the Nenana Basin exploration.

Doyon has acquired and reassessed the public and proprietary data for the oil and gas basins within its region and has set up a data room for viewing the data. The corporation welcomes proposals for oil and gas leasing and is happy to negotiate competitive lease terms.

**Contacts:**

**James Mery**, vice president lands and natural resources  
Phone: (907) 459-2039

**Norm Phillips Jr.**, resource manager  
Phone: (907) 459-2033

**Doyon Limited**

1 Doyon Place, Suite 300

Fairbanks, AK 99701-2941  
Web site: www.doyonlands.com

**Koniag Inc.**

Koniag owns surface and subsurface land in and near Kodiak Island and on the eastern side of the Alaska Peninsula.

**Contact:**

**Charlie Powers**  
Vice President Corporate Affairs  
**Charles Reft**  
Manager Lands & Natural Resources  
104 Center Avenue, suite 205  
Kodiak, Alaska 99615  
Phone: (907) 486-2530  
Email: creft@koniag.com  
Web site: www.koniag.com

**NANA Regional Corp. Inc.**

NANA is entitled to 2.08 million acres of surface and subsurface land located in the greater Kotzebue Sound area of northwest Alaska plus an additional 161,260 acres of subsurface underlying the Kotzebue village entitlement. NANA owns both the surface and subsurface estate to those ANCSA lands in and around the other Native villages of the NANA region.

A significant percentage of the corporation's lands are located within or adjacent to the Kotzebue and/or Selawik basins; Tertiary analogs to the productive Cook Inlet Basin of Southcentral Alaska. NANA owns a database with surface and subsurface data that relate to potential oil and gas in its lands. The data includes outcrop, seismic and drilling information.

NANA welcomes proposals for oil and gas exploration.

**Contact:**

**Walter Sampson**, Vice President Lands and Resources  
NANA Regional Corp.  
P.O. Box 49, Kotzebue, Alaska 99752  
Phone (907) 442-3301  
Web site: www.nana.com

**Sealaska Corp.**

Sealaska has transferred title to 290,000 acres of surface land and 568,000 acres of subsurface land in southeast Alaska.

**Contact:**

**Michele Metz**  
One Sealaska Plaza, Suite 400  
Juneau, Alaska 99801  
Phone: (907) 586-9276  
Web site: www.sealaska.com

## Field unitization in Alaska

Unitization is a common oilfield practice that serves a number of essential purposes with respect to the lessor and the lessee. Units are formed by government agencies in consultation with the applicant.

Depending on the location of the leases the units may be formed and administered by state, federal or joint state-federal agencies. To date, the majority of units in Alaska have been formed by the state. The agency with responsibility for unit formation and administration on state lands is the Division of Oil and Gas.

The key to successful unitization is preparation by the applicant. The easiest and best way to prepare is to study previous unit applications and decisions. There are a large number of these documents on the Division of Oil and Gas Web site ([www.dog.dnr.state.ak.us/oil](http://www.dog.dnr.state.ak.us/oil)). There is also a useful Power Point demonstration that walks the applicant through the entire unitization process.

By reviewing these documents the applicant will get a clear sense of what is required by the state in order to form a unit. Following these guidelines will help avoid delays and disputes.

Much of the following is taken directly from the division's Web page. This brief summary is meant as an overview of key points and is not a substitute for a detailed review of existing unit decisions by the applicant.

### State units

The state is guided by three basic principles when deciding whether to form a unit:

1. Promote the conservation of all natural resources.

Without unitization the development of a reservoir becomes a race for possession by competing companies. Each company will seek to maximize its gain at the expense of its competitors. This will result in the drilling of unnecessary wells, building of duplicate facilities and an overall waste of time, effort and resources. This is both economically and environmentally unsound.

Unitization allows the partners to explore and develop their acreage as if it were one large lease rather than a disparate group of individual leases. Unit formation allows for orderly and efficient exploration and production. By adopting a Unit Operating Agreement and through a

Plan of Development unnecessary duplication of effort is avoided.

2. Promote the prevention of economic and physical waste.

A successful unit plan will equitably apportion costs and production to each partner and will assure maximum physical and economic recovery from the reservoir. The apportionment of production to each partner is perhaps the most difficult part of the process. This is especially true if some lease terms, royalty rate for example, vary from lease to lease. The state will require that sufficient data and other documentation be available on which to base its decision.

Sharing costs on an equitable basis promotes sensible subsurface development as well as the efficient use of surface facilities. Duplication of effort is avoided and redundant expenditures are eliminated.

A comprehensive reservoir management plan helps assure maximum ultimate recovery of the resource.

By combining the efforts of multiple leases into a single, unified effort infrastructure is shared thus eliminating the need for standalone facilities. This reduces costs and maximizes recovery. Less profitable portions of the reservoir that could not be developed with standalone facilities can now be economically produced.

3. Provide for the protection of all parties of interest, including the state.

The unit protects the economic interest of all partners as well as the state (the royalty owner). The terms of the Unit Agreement and the Unit Operating Agreement assures each party an equitable allocation of costs and revenues commensurate with the relative value of their leases.

### Exploration units

As leases approach the end of their primary term (usually seven or 10 years) a company (or companies) can approach the state to form an exploration unit.

An exploration unit allows the applicant(s) to extend the primary term of the leases in exchange for a firm work commitment.

This commitment usually involves shooting more seismic data and drilling wells.

Failure to meet the work commitment obligations will result in the unit being dissolved and the leases reverting to the state.

The terms of an exploration unit are determined on a case-by-case basis. Examples of such units are available on

the division Web site.

### Participating areas

A participating area is that portion of a unit that actually contributes to production.

Units are usually formed to encompass a larger area than that which will ultimately produce. After exploration drilling has better defined the area which will produce, companies will apply to form one or more participating areas within the unit area.

Over time units will contract to the boundary of the participating area. This process is outlined in a Power Point presentation on the division Web site and examples of participating area applications and decisions are also provided.

### Federal units

There are no current standalone federal units on the North Slope. Several have been formed in the past (e.g. Kuvlum, Hammerhead) but have now been relinquished.

There are several joint state-federal units including Northstar, a producing unit, Cosmopolitan, and McCovey (now abandoned).

All the units mentioned above are in the Beaufort Sea except Cosmopolitan, which is a Cook Inlet exploration unit, and the U.S. Minerals Management Service is the federal agency with oversight for its portion of these units. The Division of Oil and Gas maintains the state portion.

Given the level of activity in the March 2005 Beaufort Sea lease sale a review of MMS unit procedures may be warranted.

The U.S. Bureau of Land Management is the federal agency that will have responsibility for units in the National Petroleum Reserve-Alaska.

A number of companies, both individually and through the Alaska Oil and Gas Association, have been working with BLM to create a unit plan. This plan will be the "rulebook" for unit formation and oversight in NPR-A.

BLM recognizes that operations in Alaska are substantially different from those in the Lower-48 states, so it has modified its standard unit plan to fit conditions in Alaska. These modifications are currently under review by the U.S. Congress and passage and adoption of the new rule is expected soon. ■

*Note: The above text was written in May 2007*





## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, *Dispelling the Alaska Fear Factor*.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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PETROLEUM NEWS, WEEK OF MAY 20, 2007

# BLM stops work on South NPR-A

*DOI Assistant Secretary Stephen Allred says energy development 'not appropriate at this time in the South NPR-A'*

By KRISTEN NELSON  
Petroleum News

**T**he Department of the Interior has stopped its planning work for the southern area of the National Petroleum Reserve-Alaska.

DOI Assistant Secretary for Land and Minerals Management Stephen Allred said May 14 that the Bureau of Land Management will discontinue the planning effort.

"We came to this decision after listening to comments from local communities during our public outreach effort," Allred said.

At public meetings last year the agency said local residents expressed concern over potential impacts to subsistence resources, especially the western Arctic caribou herd, whose primary calving area is within the 9.2 million acre South NPR-A.

"Our decision to stop this effort underscores Secretary Kempthorne's commitment to sound planning decisions and environmental protection," Allred said. "The BLM weighed the practicality of energy development and determined it is not appropriate at this time in the South NPR-A."

BLM resource assessments indicate the South NPR-A planning area contains limited oil reserves, estimated to be approximately 2.1 percent of the undiscovered oil in NPR-A. Although the area contains an estimated 27 percent of NPR-A's undiscovered natural gas reserves, there is no transportation system to move the gas to market.

BLM is continuing work in its supplemental plan for the Northeast portion of NPR-A.

The 23 million acre petroleum reserve was set aside by President Harding in 1923 to provide an emergency supply of oil for the U.S. Navy. NPR-A is managed by the Department of the Interior for the future development of national oil and gas reserves.

### Infrastructure a major challenge

The South NPR-A land use plan isn't likely to be taken up again in the foreseeable future, BLM Alaska District spokeswoman Sharon Wilson told Petroleum News May 15.

"The major challenge is the infrastructure," she said. While there is certainly potential for natural gas in South NPR-A, at this time there is no way to transport any gas that might be found.

Another factor in the decision to stop work, Wilson said, was the agency's desire to channel planning efforts to the supplemental environmental impact statement for the Northeast NPR-A. BLM started work on the supplement to the Northeast plan amendment in December in response to a September decision by the U.S. District Court for Alaska which found the Northeast NPR-A amendment to the integrated activity plan-EIS failed to adequately address cumulative impact. The court vacated BLM's January 2006 record of decision which opened lands that had been closed to oil and gas leasing in the 4.6 million acre Northeast NPR-A.

Wilson said BLM expects to complete the supplement by March 2008.

### Coal a known resource

Addressing a question that came up early in the South NPR-A planning efforts, Wilson agreed that coal is a known resource in South NPR-A. For many years people have expressed an interest in developing coal and hardrock minerals in the area.

NPR-A was designated an oil and gas reserve, but is "closed to coal leasing hardrock mining activities" and BLM cannot permit those activities, so "it doesn't make sense to address them in a land use plan," she said.

"The agency wants to put its time and effort where the public would reap the most benefit," Wilson said.

While South NPR-A work has been halted, work is continuing on the Colville River special area management plan, she said. That work is being led by BLM's Arctic field office in Fairbanks. The plan will address subsistence; wildlife and their habitat; and scenic, recreational, scientific and other resources, values and uses of the Colville River special area.

BLM expects to complete the Colville plan in 2008. ■

# H.C. Price: A construction industry leader

## *Company involved in some of Alaska's largest projects*

**A**s a leading participant in some of Alaska's largest construction projects, H. C. Price Co.'s presence in the Alaska construction industry has obtained high acclaim. Specializing in the construction of pipelines, process facilities, power plants, utilities, design and engineering, H. C. Price has proven itself as a top contractor in the state.

The company was founded in 1921 when Hal Price borrowed \$2,500 to pursue the development of electric arc welding. Initially the welding technique was used for tank repairs, but by 1928, Price had completed a 169-mile section of 8" diameter pipeline in Texas, thus starting a new era of pipeline construction. Over the years, Price developed other innovative welding techniques,



such as shield arc welding, removable backup-rings and the "stove pipe" method of welding around a pipe, as well as being the first to use pipeline coating systems for buoyancy control.

Among Price's early standout accomplishments was installing some of the first large diameter pipelines ever envisioned. The "Big-Inch" pipeline, a 24" pipeline, was built to deliver fuel from the Gulf Coast to Naval Operations on the Atlantic seaboard during World War II, and the "Biggest-Inch" pipeline, a 30" diameter high pressure gas pipeline, extended from the Colorado River to Los Angeles. Such pipelines are commonplace now-a-days thanks to Price's pioneering. In addition to constructing hundreds of pipelines nationwide over the years, Price also completed pipelines in the Middle East and North Africa.

Price and its companies have installed more Arctic and Sub-Arctic pipelines than any other pipeline contractor in the Western Hemisphere. Price's first exposure to Arctic conditions came during World War II, when they built a 1,700-mile oil line in Canada between Fort Norman and Whitehorse to supply fuel to the defenses based in



Alaska. The challenges of this project included welding in extreme cold and crossing the four-mile wide McKenzie River.

H. C. Price Co. established its Alaska Division in 1975 when it was awarded Section 3 of the Trans-Alaskan Pipeline, (TAPS), the 144-mile stretch from the Yukon River to Fairbanks. The pipeline crossed two fault zones in this mountainous section, and offered challenges to both the engineers and construction workers alike. After TAPS, Price continued to perform work in the North Slope oil fields, branching out into constructing oil field facilities and installing massive sealift modules.

Throughout its three decades in Alaska, H. C. Price Co. has diversified to become a major constructor of infrastructure projects and electrical generating utilities. In the late-1980's, Price successfully completed two projects for the Army Corps of Engineers in Fairbanks. The first was the expansion of the coal-fired power plant at Eielson Air Force Base, which included a new state of the art instrumentation system. The second project was the expansion of water, heating, electrical and sewage utilities at Fort Wainwright.

In 1990, Price constructed a 90-megawatt hydroelectric power plant at Bradley Lake, remotely located at the head of Kachemak Bay near Homer. This project included fabricating the powerhouse building, installation and testing of all equipment and support systems, and installing the first and only gas-insulated substation in Alaska. Logistics and barging items into a tidal zone area added to the challenge of this project.

In 1994, H. C. Price was awarded the construction of the Healy Clean Coal

Project, a 50-megawatt power plant near Denali National Park. The project was part of a Department of Energy sponsored program to demonstrate clean coal burning technology, and included new and unique technology, including installing special coal combustors for maximum burning efficiency and scrubbers to remove sulfur-containing gases.

In 2003, H. C. Price Co. was a major infrastructure installation contractor for the Ground Based Mid-Course Missile Defense project at Ft. Greely, Alaska. This work was performed under seven separate contracts working concurrently.

In 2004, H. C. Price Co. was awarded the contract for the Engineering, Procurement and Construction of the North Pole Expansion Project from Golden Valley Electric Association. The plant is a new gas fired 60 mega-watt co-generation high efficiency power plant at North Pole Alaska utilizing GE gas and steam turbine generators and a once-through steam generator.

Currently, H. C. Price Co. is the Front End Engineering and Definition (FEED) team on the Pioneer Natural Resources Ooguruk Development Project on the North Slope of Alaska. H. C. Price Co. has been awarded the 2007 flowline installation contract, which will include many Arctic installation challenges requiring new and innovative construction techniques. The project will include the installation of off shore bundled pipelines tying into a conventional on shore pipeline system. The entire route will also require the installation of power cables and fiber optic communication systems.

H. C. Price Co. is proud to promote its diverse capabilities and will continue to provide its clients with a reliable source for its contracting needs in this time of Alaska's changing economy. While more than a pipeline construction company, H. C. Price Co. is the only company, with such specialized expertise, that has maintained continuous construction operations in Alaska since the construction of the trans-Alaska pipeline, and they expect the record to continue. ■



# PGS Onshore: Superior geophysical imaging solutions

**P**GS Onshore is a leading seismic acquisition contractor providing best in class service in land, transition zone and shallow water worldwide. We have built our company to provide superior geophysical imaging solutions in challenging and complex environments by equipping highly experienced people with proven operating abilities around the world with the best equipment available.

PGS Onshore has pioneered the most environmentally sensitive crews operating on the Arctic North Slope by developing and deploying innovative seismic acquisition systems and equipment. This equipment allows our crews to operate efficiently in arctic extremes while leaving an extremely light footprint. PGS Onshore provides solutions, acquiring high quality seismic data at high production rates even with a limited recording season, remote access, and challenging climate and terrain conditions. Through joint technology development partnerships, PGS has implemented specialized rubber-tracked equipment

PGS Onshore uses superior technology, innovative equipment applications and powerful HD3D™ designs to fulfill our clients' geophysical imaging needs. Today, PGS Onshore operates between 9 to 11 crews equipped with versatile field equipment to record land vibroseis or dynamite data worldwide in arctic, mountains, swamp, and desert terrains.

## HD3D™

PGS Onshore has developed HD3D™ to image increasingly complex structural and stratigraphic geologic objectives. HD3D™ surveys are acquired by deploying large channel counts in customized designs. PGS Onshore's high-density acquisition techniques deliver 3D data with unequalled fidelity and resolving power while maintaining operational efficiency. HD3D™ data are optimized for advanced processing algorithms and are "4D ready" for reservoir characterization and monitoring applications

HD3D™ benefits include:

- HD3D™ solutions provide incompara-

PGS Onshore's specialized fully rubber tracked equipment received environmental recognition from the Alaska Department of Natural Resources.



Visit the company online

[www.pgs.com](http://www.pgs.com)

ble imaging in the most challenging reservoirs,

- Order of magnitude greater trace density,
- Competitive pricing with conventional surveys,
- Longlife datasets through G&G cycle, and
- Unparalleled P wave information with excellent offset sampling at all azimuths for pre-stack analysis (AVA, AVO).

PGS Onshore is a highly regarded provider of superior, high-technology 3D designs. Our 3D design team provides innovative and cost-effective 3D design solutions that are tuned to our clients' geologic objectives.

## Arctic operations

In Alaska's rugged Brooks Range Foothills, our highly specialized HD3D™ arctic crew recorded over 77,500 VPs to generate 297,600,000 traces of high density 3D in a single season; two times more traces than any other crew has recorded in a single North Slope season. Equally as important, PGS Onshore's specialized fully rubber tracked equipment developments enabled us to complete this stand out performance with environmental recognition from the Department of Natural Resources. DNR stated that our operation resulted in the least tundra impact (effectively none) ever observed on arctic tundra.

After testing and post survey follow-up, Harry Bader, Northern Region Land Manager, Alaska Dept. of Natural Resources had ringing praise of PGS Onshore's work:

"I am pleased to inform you that both the winter field inspections and the intensive site investigation this summer found no significant tundra damage associated with seismic activity that exceeds the acceptable range of disturbance. PGS is to be congratulated for their close cooperation and collaboration with DNR in making this project a resounding success."

PGS Onshore was recently awarded a certificate of "Partner in Development and Stewardship" by the Alaska Department of Natural Resources for contribution of equipment and logistical support to the North Slope Tundra Modeling Project. The North Slope Tundra Modeling Project is the first joint research effort by industry, government and academia integrating real time environmental variables to determine the conditions for tundra travel season.

In collaboration with PGS Onshore and other private industry, and financial support from the U.S. Dept. of Energy and Alaska DNR, an ecological model is being developed to take into account the affects of snow depth, snow density, ground hardness, and vegetation to predict tundra resistance to ultimately replace the cur-

rent tundra travel standards. The current standards were adopted in the 1970's without the benefit of a systematic investigation or foundation in science. The new model is designed to provide a refined understanding of tundra resistance to disturbance, so that increased exploration and development activity can take place concurrently with enhanced environmental protection.

Alaska is just one of the regions where equipment and procedures that minimize environmental impact is offering PGS Onshore a significant competitive advantage.

For more information on PGS Onshore's seismic capabilities please contact Larry Watt in Anchorage at 907-569-4049 or James Bogardus in Houston at 281-589-6732. ■



# Doyon Drilling continues to set new standards

**D**oyon Drilling Inc. began its career in Alaska in 1982 with one rig and 50 employees.

Now the company operates 7 rigs with 380 employees and is celebrating 25 years of operations on the North Slope.

The 100 percent Alaska native owned drilling contractor is proud of its ability to have survived the ups and downs of the industry over these past decades — rare in areas with not only challenging operating conditions, but strict environmental guidelines.

The company credits its success to its ability to continually adjust to demands and changes within the industry. Projects have included the construction and/or operation of modular rigs, production rigs and smaller exploration rigs capable of venturing into the North Slope foothills and the National Petroleum Reserve-Alaska.

DDI's focus has always been on innovative rig design, improved efficiency, improved safety, and overall performance enhancement.

The 2006/2007 season marked the company's second rig construction, the Arctic Wolf, used to drill two wells in NPR-A for FEX. The Wolf's predecessor, the Arctic Fox, was delivered to Pioneer



in 2005. Other projects on the horizon include a labor agreement for Akita Drilling and Anadarko Petroleum for the Jacob's Ladder No. 1 exploration well.

And while Ron Wilson, DDI's general manager, admits this past year has been a challenging season for the industry as a whole, Doyon managed just fine. He credits the in-house training department for consistently producing the talent the company needs to operate as efficiently as it does.

DDI is proud of its 88 percent local hire and continues its efforts to get Doyon shareholders into entry level positions with its ongoing roustabout pro-

gram. Employees have an excellent understanding of the company's operation, solid knowledge about the environment they're going to be in, and what the client expects on the bottom line. Wilson

knows that "well trained employees mean a successful operation and cost-saving for our customers."

This year the company will honor 40 employees that have dedicated over 20 years to the business, and that doesn't happen unless things are getting done the right way.

DDI also understands that successful operations require an above-average safety record. And in terms of safety, the company's rounding out an excellent season. Three rigs have gone over five years without a lost time incident and two have gone over a year without a single recordable incident. Rig downtime is less than 1 percent and the company expects these trends to continue.

Overall performance enhancement is a major factor. Parent company Doyon Limited recently acquired a 70 percent interest in Emerald Consulting Group, a professional services company that specializes in process engineering and consulting. DDI has also added two more field HSE reps on the North Slope to oversee projects.

Records and reputation speak for themselves. DDI wants potential clients to know that it's flexible, and invites the call to meet and exceed changing industry demands. "And as a smaller company we're able to react a lot faster," says Wilson.

"You can come to us with a new idea and not worry about getting doors shut. We welcome it, and look forward to the fact that new projects challenge us to create innovative solutions for the North Slope industry," says Wayne Stotts, drilling superintendent.

After 25 years Doyon Drilling still views Alaska as a viable place for growth. It plans to continue concentrating on what it does well and what's gotten the company to where it is today.

"We still believe a hand shake means something, our word is extremely important," assures Stotts. ■



Visit the company online

[www.doyondrilling.com](http://www.doyondrilling.com)

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# CHAPTER 8

*Securing seismic and well data*



JUDY PATRICK PHOTO

Offshore seismic activity on  
the frozen Arctic Ocean

## CHAPTER 8

# Securing seismic and well data

## Introduction

**M**any of Alaska's oil and gas basins are relatively underexplored. Consequently, wells tend to be sparsely distributed, except in the developed areas of the central North Slope and upper Cook Inlet.

However, a considerable amount of seismic has been shot at various times, especially in the more prospective areas. The quality of this seismic data varies considerably — there is everything from decades-old 2D two-dimensional data to relatively up-to-date three-dimensional data.

Securing existing seismic data is normally quite a bit cheaper than shooting a new survey. And even if the existing seismic is of poor quality, the data may prove helpful in determining where to focus exploration efforts.

If you need to shoot new seismic data there are several geophysics companies with experience operating in the state. These companies can provide cost estimates and guidance on what is involved.

Because of the environmental sensitivities in Alaska it's particularly important to work with a geophysics company that understands the environmental issues and has established a top-notch record in environmental protection.

## Permitting for seismic exploration

Permitting forms a critical component of the environmental aspects of doing a seismic survey. Landowners and local governments in Alaska generally have permitting requirements that ensure minimum impact to the natural environment and to the activities of local residents — the exact permitting needed for a particular project will depend on land ownership and local government jurisdiction.

Chapter 9 contains detailed information about permitting.

### Federal government

If you want to conduct any form of geophysical survey on federal land you



A PGS Onshore seismic vehicle

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will need an oil and gas geophysical survey permit from the U.S. Bureau of Land Management.

On the outer continental shelf you will require a permit for geological and geophysical exploration from the U.S. Minerals Management Service, unless you are exploring within the terms of an oil and gas lease. If you are exploring within the terms of a lease you need to submit an exploration plan to MMS for approval.

If you are conducting a survey that involves working on wetlands you will probably need a wetlands permit from the U.S. Army Corps of Engineers.

Permitting through any federal agency will trigger a review under the National Environmental Policy Act. This could result in the need for an environmental assessment but, for geophysical work, is unlikely to require an environmental impact statement.

### State government

A geophysical survey on state lands requires a geophysical exploration permit from the Alaska Department of Natural Resources. You may need a land use permit from DNR as well.

If you are going to cross or work in a stream used by fish in Alaska you will need a title 41 fish habitat permit from DNR. And if you're working in a state special fish and wildlife habitat area, you will need a permit from the Alaska Department of Fish and Game.

You also need to check in with

Alaska's Office of Project Management and Permitting, to see if your project requires a coastal zone consistency review. And you will need a letter from the Alaska State Historic Preservation Office, stating that your operation doesn't impact any archaeological or cultural sites.

### Local government

You may need permits from a local government that has jurisdiction over the land on which you are conducting a survey. The North Slope Borough, in particular, has permitting requirements designed to protect subsistence activities and, where necessary, to obtain mitigation for any impact on those activities.

### Private landowners

The only significant private owners of subsurface land in Alaska are the Native regional corporations. However, Native village corporations own surface land in and around Native villages, and the regional corporations also own some surface land. You will need permission from the appropriate corporations to conduct surveys across their lands.

The University of Alaska and the Alaska Mental Health Trust also own land in Alaska. You will need permission from these organizations to conduct a survey on their lands.

### Native allotments

It's essential to find out if your geo-





physical survey operation will involve crossing or working on a Native allotment. If you need access to an allotment you will have to obtain permission from the Native organization that administers the allotment. See chapter 9 for more information on this topic.

## Existing seismic data

Most of the existing seismic data for Alaska is privately owned. But this data can often be obtained under license either through a broker or directly from an oil company. License terms normally prohibit you from disclosing the data to anyone not licensed to use it. But you can normally disclose the results of your analysis of the data.

The U.S. Geological Survey and MMS supply some public domain data that can be freely used and disclosed.

### Northern Alaska

If you are looking for seismic data for the North Slope, the data that BP and ConocoPhillips have made available under the terms of the Charter for Development of the Alaska North Slope (as discussed in chapter 11) makes a good starting point. Private seismic companies broker this data and you may also be able to license the data directly from BP or ConocoPhillips. Pre-1975 data have to be supplied at no charge other than produc-

tion costs, so those data sets provide an especially low-cost option for reconnaissance seismic analysis.

Private companies also broker seismic data shot by a consortium of companies in the Alaska National Wildlife Refuge in the 1980s.

PGS (see company profile in chapter seven of this guide), WesternGeco, and CNG Veritas all sell seismic for some parts of the North Slope, the Beaufort Sea and the Chukchi Sea.

WesternGeco has also released some of its Alaska offshore data USGS for public domain access — you can find out about this data through a Web site at <http://walrus.wr.usgs.gov/NAMSS/>.

The U.S. government has shot about 14,000 line miles of seismic in the National Petroleum Reserve-Alaska. USGS distributes this public domain data online or by CD through a Web site at <http://ner-slweb.cr.usgs.gov/NPRAWEB/seissrch.asp>.

MMS maintains the right to procure any seismic data acquired on the outer continental shelf. Any data that MMS procures becomes public domain 25 years after the date of procurement. MMS public domain data includes some seismic surveys in the Beaufort Sea — the release schedule for the MMS data can be found at [www.mms.gov/alaska/re/relgg/INDEX.HTM](http://www.mms.gov/alaska/re/relgg/INDEX.HTM)

### Cook Inlet and other areas

Much of the existing seismic data in the

Cook Inlet basin belongs to a group of oil companies that jointly shot seismic surveys in the area. You may be able to obtain licenses for some of this data by contacting oil companies that have been active in the Inlet. You may also be able to obtain Cook Inlet data through a broker or private seismic company.

In other parts of Alaska seismic data tend to belong to individual oil companies that have done surveys. Securing data becomes a question of finding out what surveys have been done and who did them. A good starting point for this type of research is government permitting data — the state and federal governments maintain records of all permits issued for seismic surveys.

Seismic data brokers may also have data for the area that you're interested in. And Alaska-based geology and geophysics companies may be able to help you locate sources of data.

MMS has some public domain seismic data for the outer continental shelf — for information about this see [www.mms.gov/alaska/re/relgg/INDEX.HTM](http://www.mms.gov/alaska/re/relgg/INDEX.HTM)

USGS has some public domain offshore data at <http://walrus.wr.usgs.gov/NAMSS>

## Well data

Under Alaska law, data for a well anywhere in Alaska become publicly available 25 months after the well has been drilled.

PGS Onshore seismic vehicles participate in field work near Alaska's Brooks Range

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However, the company drilling the well can apply to the commissioner of DNR to make the data confidential indefinitely. The commissioner will agree to this confidential-indefinitely status if the value of adjacent unleased land warrants data confidentiality.

The Alaska Oil and Gas Conservation Commission maintains records of all wells drilled in Alaska.

AOGCC also stores and distributes all publicly available well log data. Its Web page is at <http://www.state.ak.us/aogcc/publicdb.shtml>. The site includes instructional videos and links to the well data repository.

If you wish to obtain well logs for a specific area in Alaska, you can use AOGCC's Web site to view a map of well locations. Then you can use AOGCC's data repository to look for information on specific wells.

To obtain the well logs you will need to send an e-mail to AOGCC — the e-mail address is on the agency's Web site.

The Alaska Geologic Materials Center is the central repository in which geologic

#### Credits

Dave Houseknecht of the U.S. Geological Survey, Sue Bennet of the U.S. Minerals Management Service, Jim Weeks of Winstar Petroleum, Tom Walsh of Petrotechnical Resources of Alaska and Bob Crandall of the Alaska Oil and Gas Regulatory Commission all assisted with this chapter.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.

materials collected from Alaska are cataloged, stored, and studied. The center is permanently maintained and managed by the State of Alaska under cooperative agreements with other agencies (BLM, USGS, MMS and AOGCC) and support from private industry.

The materials center houses nonproprietary rock core and cuttings that represent nearly 12 million feet of exploration and production drilling from federal, state, and private lands of Alaska, including the Alaska outer continental shelf. The materials center collection includes rock materials from more than 1,415 oil and gas wells, rock core from more than 1,071

exploratory hard-rock mineral holes, and surface samples. There are 211,700 feet of diamond-drilled hard rock mineral core at the facility. The collection also includes extensive geochemical data, porosity/permeability data, petrographic thin sections, and micropaleo glass slides derived from this rock.

The center is located at 18205 Fish Hatchery Road, Eagle River, Alaska. Although the facility is open from 8 a.m. to 4:30 p.m. Monday through Friday with a lunch break generally taken from 12 noon to 12:30 p.m., it is best to call ahead (907) 696-0079 for an appointment.

The center's Web site is <http://www.dggs.dnr.state.ak.us/GeologicMaterialsCenter.htm>

Some geology and geophysics companies also supply publicly available well log data from Alaska wells. These companies provide convenient services such as easy-to-use data indexing and consistent electronic formatting for computer processing. So, although these companies charge fees for the data, their services can save you processing time and costs. ■



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# Dowland-Bach: High-tech fabrication gives customers exactly what they need

**D**owland-Bach's 20,000-square-foot shop in Anchorage is warm, dry and lined with special tools for working stainless steel into products that can withstand harsh conditions on the North Slope and elsewhere in the 49th state.

The company designs and builds custom products from stainless steel and other alloys for the petroleum industry and others, as well as providing an inventory of stainless steel components.



Stainless isn't the company's sole focus, however. Its custom industrial control panels are hard at work throughout the oil and gas industry, from the wellhead to urban service stations.

Dowland-Bach was founded in 1974 to meet the need for fail-safe wellhead shutdown systems at Prudhoe Bay. The company's hydraulic equipment packages and their pneumatic counterparts continue to be an important part of the company's product line today.

## Strategic location

The company's Anchorage facility gives it an edge in competing with out-of-state firms. Customers can drop by for a face-to-face meeting with Dowland-Bach engineers, or see 3D modeling of their designs on the company's AutoCAD system.

In the manufacturing stage, it's not uncommon for a customer's employees — who will actually install or use the equipment — to drop by the shop and view products as they're being assembled. Changes suggested by those field experts can result in major savings when the gear is installed.

"We're familiar with North Slope specs," said Reed Christiansen, Dowland-Bach general manager. "Operators from the slope drop by; we make changes on the spot."

## Meeting customers' needs

This front-line responsiveness to Alaskan industry — combined with Dowland-Bach's capabilities — has won major business for the firm, from Alyeska Pipeline Service Co., Veco Inc. and Cominco Alaska Inc., among others.



Because Dowland-Bach products have served so reliably in remote and extreme environments, the company has even won business with BP-Colombia for jungle installations. The company also has delivered for customers on Sakhalin Island in Russia.

## Design and engineering

Dowland-Bach now employs three engineers and has a specialist in AutoCAD 3D modeling in its design department.

"The Inventor software for 3D modeling gives us a working model without the cost and time of manufacturing one," said Dowland-Bach engineer Mike Wise. "We can see moving parts and alignment, and we can tweak the product electronically."

The software also helps the company design more tightly to meet the industry's growing demand for increasingly compact components within oil and gas facilities. What's more, the design team can instantly view the footprint of various configurations with its AutoCAD system.

Dowland-Bach emphasizes its commitment to quality and customer service at every step.

"We have grown into an international corporation while still providing the highest level of customer satisfaction," the company states on its Web site. "We pride ourselves in the fact our products have been operating automatically in remote locations, providing our customers with years of trouble-free service. Even though we maintain a

large diversified customer base, we have the capability to engineer and manufacture products to meet our customers' special needs."

Dowland-Bach uses only quality components such as Swagelok Co. valves and fittings, Sandvik seamless stainless steel tubing, Haskel pumps and pressure components, Tescom regulators and Kocsis Technologies hydraulic accumulators, Johnson said.

He sees a bright future for the company as it builds its specialized business.

"We're actually a niche player. We have unique products and a UL certification," Johnson said. "We're vertically integrated from structural, to sheet metal, to piping, to instrumentation, to controls."

## Further expansion

The company welcomes the possibility of further exploration in Alaska, including opening of the Arctic National Wildlife Refuge, Johnson says. But the company also anticipates substantial work ahead on refurbishing existing pipelines and upgrading drill sites.

Some of the company's equipment has been in place for more than a quarter of a century in Alaska oil fields, he said. Because of the trouble-free service of the company's products, Johnson is confident that Dowland-Bach will be involved as customers modernize their systems.

"We're all about customer service and innovation, and we're proponents of buying and building in Alaska," Johnson said. "We're pioneers in that." ■



# Shell: Helping Alaska meet America's energy challenges

Shell's history in Alaska spans nearly 50 years as one of the most prominent explorers in all of the frontier basins of Alaska. Shell participated in the exploration of the Alaska Peninsula and the North Slope and established its lasting presence in Cook Inlet Middle Ground Shoal after it struck oil in 1963 and operated continuously in Alaska until 1998.

In 2005 Shell returned to Alaska. A significant change in the world energy dynamics led Shell to believe Alaska has significantly untapped potential and can play an increasingly important role in meeting America's energy challenge. Shell has re-entered the Alaska market and has been active in several lease sales.

While Shell has been quiet for some time in Alaska, it has continued operations in arctic conditions elsewhere, steadily gaining further experience both onshore and offshore in areas such as Canada, Russia and Norway. In the years since Shell's activity in Alaska, it has designed many technological improvements as it operates in the world's most challenging environments.

Shell engineers have designed platforms to withstand extreme weather conditions: in winter the sea freezes and temperatures drop to -40° F; in summer the heat reaches 85° F. Their latest project is two platforms under construction for installation off the north east coast of Sakhalin Island in sub-arctic Russia.



When Shell Alaska sets up operations, it does so with a clear oil and gas business objective, but we believe that success in business comes from creating strong relationships and open communication with a foundation of frequent, ongoing and constructive dialogue with the communities in which we will operate.

Local hire is a high priority for all Shell projects. Working offshore takes highly trained employees so we'll work with the local schools and governments to achieve that goal. It will require an educated, trained and committed local workforce for all of us to succeed.

Shell's presence in a community brings about diversification of the local economy. With local businesses providing support services to Shell, the economic multiplier factor comes into play adding more opportunities to the local economies.

Onshore support services will demand increased infrastructure. Some of these facilities will benefit local communities by providing meeting halls, improved telecommunications and power generation as well as the availability of search and rescue vehicles.

For Shell, our commitment in Alaska isn't only for ourselves, it's for all Alaskans. Providing needed energy for America, creating good jobs while protecting the environment and minding the safety of our employees means success for the next 50 years in Alaska. ■



CHAPTER 9  
*Environmental compliance and permitting*





## CHAPTER 9

# Environmental compliance and permitting

## Introduction

For someone new to the Alaska oil and gas industry the prospect of applying for the necessary permits for an exploration or development project may seem like trying to map a way through a minefield. However, some up-front planning, the enlistment of local knowledge and a willingness to work with the regulators will help you navigate through the whole permitting process.

The protection of the environment has become a crucially important issue in Alaska — most people want to see responsible oil and gas development that safeguards the environment. But the regulators also hold a duty to issue permits for work that can proceed in a legally compliant manner. So, if you're sensitive to the environmental issues and plan carefully, your permitting should proceed smoothly.

Here are a few guidelines for successful permitting.

First of all, determine the types of permit that you'll need for your project — section 9.2 of this publication provides some help with this, but you'll need to work with the landowners, the regulatory agencies and appropriate experts to make sure that you've "covered your bases." The precise nature of the project will determine the permit requirements, so it's important at the outset to pin down the scope of the project and what's involved in carrying out the project. For example, use of an ice road will require less permitting than constructing a gravel road.

The location of the project may prove critical in determining the permit requirements — different landowners tend to require different permits. For example, a drilling project on federal land will probably require more permits than the same project on private land. Working within the coastal zone will trigger some permitting requirements.

While you're identifying the permit requirements you may find opportunities to eliminate some of these requirements



A wolverine surveys the situation at the Kuparuk River field

by changing the project. For example, moving the project location, eliminating the need for certain types of equipment or avoiding the construction of an access road could all reduce the permit requirements.

Permitting experts recommend contacting the regulators at an early stage of the permitting process and maintaining a dialogue with the regulators during the process. In fact it's best to hold a pre-application meeting with all of the relevant agencies, to confirm the permitting requirements and initiate a dialogue.

A dialogue with the regulators becomes critical because regulations and their interpretations change constantly and you don't want to find some major glitch at the end of the permitting process. Also if you run into a problem you need to let the regulators know — surprising them late in the project is a bad idea. Making sure that the regulators understand your project can also help avoid legal and other problems.

Some permitting involves multiple agencies. And although the agencies generally understand their roles in the permitting process it's helpful to clarify up front what is required, so that each agency understands its role in your project.

Once you've identified the required permits you'll need to gather all the data for the permit applications. This data gathering often proves the most time consuming part of the permitting process. Just how much work is involved depends on the type of permit and how much data already exists. For example, winter fieldwork in the Arctic will probably require an evaluation of winter wildlife in the area of the work — you may be able to draw on previous studies to obtain this data or you may have to commission a contractor to do a new study.

However, don't fall into the trap of presenting more data than you need. If you send unnecessary data to the regulators you'll probably confuse the situation and you may even trigger an expectation for additional permits. Also, including more detail than you need in the project specifications may lead to inflexible permits that require later modification.

On the other hand you might want to somewhat overstate your project requirements — it's easier to scale a permit back than to extend it.

Be prepared to negotiate with the regulators over the terms of a permit, if those terms will have a major impact on your project. However, when negotiating permits be aware that you may run into

**Table 9.1: A general guide to the types of permits required for an oil and gas project in Alaska**

Sources: Bob Britch, of Northern Consulting Group, the Alaska Department of Natural Resources, U.S. Department of the Interior Bureau of Land Management, U.S. Department of the Interior Minerals Management Service  
 The "Required for" column indicates whether this type of permit may be required for an exploration project, a field development project or for both types of project.

**Local government (North Slope Borough, Kenai Peninsula Borough etc.)**

Permit	Required for	Comments	Approximate preparation time	Approximate approval time
Local government permits	Exploration Development	A local government may require various permits such as development permits for activities within its jurisdiction. Public meetings may be required as part of the permitting process. You should check with the planning department of the local government to see if they require a permit for the proposed activity.	One week	Two weeks

**Alaska Department of Environmental Conservation**

Permit	Required for	Comments	Approximate preparation time	Approximate approval time
Oil discharge prevention and contingency plan (C-Plan)	Exploration Development	This is needed for drilling in most areas where not much is known about the geology or if you're drilling into a zone that might contain liquid hydrocarbons. You can get a waiver if you can provide evidence that you cannot encounter liquid hydrocarbons. Application forms are available at <a href="http://www.state.ak.us/dec/spar/guidance.htm#cplans">www.state.ak.us/dec/spar/guidance.htm#cplans</a>	One month	Three to four months (AEDC also requires 60 days advance notice prior to submittal of a plan for approval)
Air quality general permit	Exploration Development	Approval for this is very straightforward for most exploration projects. Sample permits and permit application forms can be found at <a href="http://www.state.ak.us/dec/air/ap/genperm.htm">http://www.state.ak.us/dec/air/ap/genperm.htm</a>	One day	One week
Solid waste temporary storage permit	Exploration Development	It's best to haul waste to an existing permitted facility. Information is available at <a href="http://www.state.ak.us/dec/eh/sw/">www.state.ak.us/dec/eh/sw/</a>	Less than one week	Two months
Waste water disposal permit	Development	The disposal of wastewater into or onto land, surface water or groundwater requires an ADEC permit.	One week	Two months

**Alaska Department of Natural Resources**

Permit	Required for	Comments	Typical preparation time	Typical approval time
Land use permit	Exploration	You need a permit to cross state lands for seismic or other activities. Information about land use permits can be found at <a href="http://www.dnr.state.ak.us/mlw/permit_lease/index.cfm">www.dnr.state.ak.us/mlw/permit_lease/index.cfm</a>  Note that the use of land for the construction of a permanent facility is generally covered by the plan of operations for a state lease. Permanent access across state land outside a lease or unit requires an easement. A pipeline on state land requires a right-of-way permit.	Less than one week (for a land use permit)	Two to three months (for a land use permit)
Temporary water use permit	Exploration	You need to apply for this from the Division of Mining Land and Water for the use of water during activities such as drilling. You may run into issues if you need to draw particularly large quantities of water. Further information is available at <a href="http://www.dnr.state.ak.us/mlw/water/index.htm">www.dnr.state.ak.us/mlw/water/index.htm</a>	Less than one week	Two to three months
Water rights application	Development	You will probably need long-term water rights. You can apply through the Division of Mining Land and Water. Information is available at <a href="http://www.dnr.state.ak.us/mlw/water/wrfact.htm">www.dnr.state.ak.us/mlw/water/wrfact.htm</a>	Less than one week	Two to three months
Title 41 permit	Exploration Development	You require this permit from the Office of Habitat Management and Permitting to work in a stream that has fish, regardless of land ownership. Further information can be found at <a href="http://www.dnr.state.ak.us/habitat/FHpermits.htm">www.dnr.state.ak.us/habitat/FHpermits.htm</a>	Less than one week	Two to three months
Coastal Zone Consistency Determination	Exploration Development	This applies to activities within the Alaska coastal zone. An activity within the coastal zone must be found consistent with the Alaska Coastal Management Program (ACMP) before any other permits can be issued. You should check with the Office of Project Management and Permitting to see which agency will be issuing the consistency determination for your project. The coastal project questionnaire that serves as the ACMP application also is a useful tool for determining what state and federal permits may be needed for your project. Further information is available at <a href="http://www.alaskacoast.state.ak.us">www.alaskacoast.state.ak.us</a> .	Less than one week	Two to three months
Lease operations permit	Exploration Development	The Division of Oil and Gas requires a plan of operations for activities on state oil and gas leases or within state managed units. You don't need this on private lands outside units. Further information and plan applications can be obtained at <a href="http://www.dog.dnr.state.ak.us/oil/programs/permitting/plan_of_operations_info.htm">www.dog.dnr.state.ak.us/oil/programs/permitting/plan_of_operations_info.htm</a>	Less than one week	Two to three months
Geophysical exploration permit	Exploration	A geophysical exploration permit is required to conduct a seismic survey on state lands or waters. Permit applications can be obtained at <a href="http://www.dog.dnr.state.ak.us/oil/programs/permitting/applications.htm">www.dog.dnr.state.ak.us/oil/programs/permitting/applications.htm</a>	Not available	Not available
Cultural resource clearance	Exploration Development	You need a letter from the Alaska State Historic Preservation Office stating that your operation doesn't impact any archaeological or cultural sites. You might need to have an archaeologist review the area of your operations. Further information is available at <a href="http://www.dnr.state.ak.us/parks/oha/index.htm">www.dnr.state.ak.us/parks/oha/index.htm</a>	Less than two weeks	Depends on whether summer fieldwork is needed
Environmental and cultural training program	Exploration Development	Environmental and cultural training is sometimes a requirement of a state lease.	One to two months	Not applicable
Gravel sale	Exploration Development	If you need more than 25,000 cubic yards of gravel the state has to go through a gravel sale. This is not needed if you obtain gravel from a private source.	Less than one week	Two to three months

issues of conflicting priorities between the agencies. Establishing a good relationship with the agencies at the outset of the permitting process will prove critical at the negotiating stage.

Above all make sure that you factor adequate time for the permitting into your project plans. In recent years Alaska has made great strides in streamlining the permitting process. However, you can still expect to spend several months permitting an exploration project and the permitting required to construct a major oil facility may take several years to accomplish.

If the permitting issues seem daunting, don't forget that it's easy to find help. Some permitting and environmental consultants have achieved a high level of expertise in permitting in Alaska. In addition, some service businesses, such as engineering companies, have amassed considerable permitting experience in Alaska — these companies often offer permitting support in conjunction with their other services.

## Permit requirements

This section provides an overview of the permitting requirements for an Alaska oil and gas exploration or facility development project. Pipeline construction requires additional permitting. Table 9.1 summarizes the permits discussed in this section and provides some general information on how long it might take to apply for and obtain approval for each type of permit.

Please note that the information that we provide here is only intended to give a broad overview of permitting in Alaska. When embarking on a project it's essential to consult the relevant regulatory agencies and obtain appropriate professional assistance.

### Local government, including North Slope Borough

If you construct a building or an industrial structure within the jurisdiction of an Alaska municipality, the local government will have permitting requirements to ensure compliance with local building codes, building regulations and zoning rules. You will probably also need a permit to access municipal land or municipal rights of way.

The North Slope Borough has specific oil industry-related permitting



requirements. The borough has created a set of land management principles and procedures designed to meet the needs of its comprehensive plan; ensure growth and development in accord with the values of borough residents; identify and secure the benefits of development; identify, avoid and mitigate or prohibit negative impacts of development; and ensure that future development is of proper type, design and location and is served by a proper range of public services and facilities.

For zoning purposes the North Slope Borough has divided its region into four districts:

1. A conservation district encompassing undeveloped areas and intended for nature conservation;
2. A resource district intended for large-scale development and straightforward permitting;
3. A transportation corridor district that provides strips of land for transportation facilities such as road and pipelines; and
4. A scientific district in the Barrow area for the research and development of facilities.

The City of Barrow’s zoning commission handles Barrow zoning issues within the city limits.

A proposal to develop an industrial activity in an inappropriate North Slope Borough district requires a rezoning negotiation with the borough. However, if the borough agrees to approve the rezoning, construction permits for the development will still be required.

You can obtain information about these permits from the borough’s land management regulation division — the division’s telephone number is (907) 852-2611, ext. 320. Also see an article by Rex A. Okakok Sr., the former head of the North Slope Borough’s land planning and permitting section, at the end of this chapter.

### Alaska Department of Environmental Conservation

The Alaska Department of Environmental Conservation has a mission to “conserve, improve, and protect its natural resources and environment and control water, land, and air pollution, to enhance the health, safety, and welfare of the people of the state and their overall economic and social well being.” DEC’s home page is at

**Table 9.1: A general guide to the types of permit required for an oil and gas project in Alaska**

**Alaska Department of Fish and Game**

*Continued from page 9.2*

Permit	Required for	Comments	Typical preparation time	Typical approval time
Habitat or special area permit	Exploration Development	You will need a permit if you’re working in a special habitat, a wildlife refuge or other legislatively designated use area. Applications can be obtained at <a href="http://www.sf.adfg.state.ak.us/SARR/SpecialAreas/sapermit.cfm">www.sf.adfg.state.ak.us/SARR/SpecialAreas/sapermit.cfm</a>	One week	Two to three months
Fish passage obstruction permit	Development	Required for a structure that will obstruct a fish passage	Less than one day	Up to 40 days

**Alaska Oil and Gas Conservation Commission**

Permit	Required for	Comments	Typical preparation time	Typical approval time
Permit to drill	Exploration Development	This is required for drilling and is straightforward to prepare and obtain. Applications forms are available at <a href="http://www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-401.pdf">www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-401.pdf</a>	Less than one month	Seven days
Sundry permits	Exploration Development	Needed for approval of changes to the drilling plan. Application forms area available at <a href="http://www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-403.pdf">www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-403.pdf</a>	Varies	5 to 10 days, if the request is compliant
Annular disposal permit	Exploration Development	This is required for small-scale disposal of cuttings when drilling. It is straightforward to prepare and obtain. Need to be able to demonstrate mechanical integrity. Permit applications may be obtained at <a href="http://www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-403AD.pdf">www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-403AD.pdf</a>	Varies	7 days
AOGCC orders	Development	There are a number of AOGCC orders that can apply to drilling and well operations. The order process normally includes a 30-day notice period. AOGCC orders include aquifer exemption orders, disposal injection orders, area injection orders, conservation orders (including pool rules and spacing exceptions), enhanced recovery injection orders, storage injection orders and commission orders. The AOGCC Web site is at <a href="http://www.state.ak.us/local/akpages/ADMIN/ogc/homeogc.htm">www.state.ak.us/local/akpages/ADMIN/ogc/homeogc.htm</a> .	Varies	60 days, including the notice period

**U.S. Environmental Protection Agency**

Permit	Required for	Comments	Typical preparation time	Typical approval time
NPDES permit	Exploration Development	It’s best to keep water discharges within the limits for EPA general permits. Otherwise you’ll need an individual discharge permit and that could become a yearlong project. See <a href="http://cfpub.epa.gov/npdes/">http://cfpub.epa.gov/npdes/</a> for further information.	One week	Only a notice is required for a general permit
Spill prevention control and countermeasure (SPCC) plan	Exploration Development	Required for an onshore drilling rig. Drilling contractors regularly use these plans and have templates for them.	One week	No approval required
Facility response plan	Exploration Development	This is a requirement of the Oil Pollution Act 1990. Depending on the location and nature of the operation this plan could come under the Environmental Protection Agency, the U.S. Coast Guard or the Mineral Management Service. Each agency has its own format of plan. For further information see the EPA publication at <a href="http://www.epa.gov/oilspill/pdfs/frpguide.pdf">www.epa.gov/oilspill/pdfs/frpguide.pdf</a> .	Usually part of the oil discharge prevention and contingency plan — there’s a single document that covers spill response.	Part of state spill response plan
Environmental assessment (EA)	Exploration Development	May be needed for exploration work. For example, the Bureau of Land Management requires environmental assessments for individual exploration projects.	One to three months	Three to six months
Environmental impact statement (EIS)	Exploration Development	This is rarely needed for exploration work. On federal land or waters the relevant federal agency will issue an EIS prior to a lease sale. This may be required for a production project.	Varies	Two to four years

**U.S. Army Corps of Engineers**

Permit	Required for	Comments	Typical preparation time	Typical approval time
Wetlands permit	Exploration Development	When you’re dealing with water you could need some form of a wetlands permit. One Corps of Engineers application covers all of these types of permit. You should try to minimize the impact of your project on water so that you can get a standard nationwide permit. Further information is available at <a href="http://www.poa.usace.army.mil/reg">www.poa.usace.army.mil/reg</a>	Two weeks	Three to four months
Section 401 certification (from Alaska Department of Environmental Conservation)	Exploration Development	This is required from the state if there are wetlands involved in the project, to ensure compliance with the state’s water quality regulations and is initiated and implemented by state and federal agencies. For further information see <a href="http://www.state.ak.us/dec/water/wnpssc/wetlands/wetlandspermitting.htm">www.state.ak.us/dec/water/wnpssc/wetlands/wetlandspermitting.htm</a>	Varies	Three months
Environmental assessment (EA)	Development	A permanent development will normally trigger the need for an EA.	One to three months	Three to six months
Environmental impact statement (EIS)	Development	A permanent development might trigger an EIS.	Varies	Two to four years

**Table 9.1: A general guide to the types of permit required for an oil and gas project in Alaska**

**Bureau of Indian Affairs**

*Continued from page 9.3*

Permit	Required for	Comments	Typical preparation time	Typical approval time
Access to a Native allotment	Exploration Development	You will need a permit from a Native non-profit organization recognized by BIA if you need to cross or work in a Native allotment. Table 9.2 lists the regional Native non-profit organizations in Alaska.	Varies	Varies

**U.S. Department of the Interior Bureau of Land Management**

Permit	Required for	Comments	Typical preparation time	Typical approval time
Oil and gas geophysical exploration permit	Exploration	This permit allows geophysical exploration to be done without having to first purchase an oil and gas lease.	Not available	Not available
Permit to drill	Exploration Development	Any drilling operation on federal onshore land requires a permit to drill from BLM.	Not available	Not available
Plan of development	Development	A plan of development needs to be approved by BLM for field development on a BLM lease. The plan of development enables roads, facilities and other structures for the field to be permitted.  Development of a transportation pipeline from a field requires a right-of-way permit.	Not available	Not available
Environmental assessment (EA)	Exploration Development	May be needed for exploration work. For example, the Bureau of Land Management requires environmental assessments for individual exploration projects.  An EA may be needed for a development project.	One to three months	Three to six months
Environmental impact statement (EIS)	Exploration Development	This is rarely needed for exploration work. On federal land or waters the relevant federal agency will issue an EIS prior to a lease sale.  An EIS may be needed for a development project.	Varies	Two to four years

**U.S. Department of the Interior Minerals Management Service**

Permit	Required for	Comments	Typical preparation time	Typical approval time
Oil and gas geological and geophysical exploration permit	Exploration	This permit allows geological and geophysical exploration to be done on the outer continental shelf without having to first purchase an oil and gas lease.	Not available	Not available
Exploration plan	Exploration	Exploration activities within an oil and gas lease on the outer continental shelf require an MMS-approved exploration plan.	Not available	Not available
Permit to drill	Exploration Development	Any drilling operation in the outer continental shelf requires an approved application for permit to drill, known as an APD, from MMS.	Not available	Not available
Development plan	Development	A development plan needs to be approved by MMS for field development on an MMS lease. The development plan enables field facilities and structures to be permitted.  Development of a transportation pipeline from a field requires a right-of-way permit.	Not available	Not available
Oil spill response plan	Exploration Development	Any oil facility seaward of the coastline requires an oil spill response plan approved by MMS.	Usually part of the oil discharge prevention and contingency plan — there's a single document that covers spill response.	Could also be a state spill response plan
Environmental assessment (EA)	Exploration Development	May be needed for exploration work. For example, the Bureau of Land Management requires environmental assessments for individual exploration projects.  An EA may be needed for a production project.	One to three months	Three to six months
Environmental impact statement (EIS)	Exploration Development	This is rarely needed for exploration work. On federal land or waters the relevant federal agency will issue an EIS prior to a lease sale.  An EIS may be needed for a production project.	Varies	Two to four years

**The U.S. Department of Commerce National Oceanic and Atmospheric Administration Fisheries Service (NMFS)**

Permit	Required for	Comments	Typical preparation time	Typical approval time
Incidental Harassment Authorization (IHA)	Exploration Development	Although not strictly a permit, meeting the stipulations of an IHA ensures that an activity that may unintentionally disturb marine mammals complies with the Marine Mammals Protection Act. NMFS oversees the incidental take of cetaceans (whales) and seals.	Not available	Varies. Could take several months
Letter of Authorization (LOA)	Exploration Development	An LOA performs a similar function to an IHA for long-term operations.	Not available	Six to 12 months
Incidental take permit	Exploration Development	An activity that may involve incidental take of a threatened or endangered species will require an incidental take permit. If the activity requires federal government action (permitting, funding or involvement), a consultation with NMFS under section 7 of the Endangered Species Act will also be required.	Not available	Section 7 consultation can take two to four months

[www.state.ak.us/dec/index.htm](http://www.state.ak.us/dec/index.htm).

If you plan to drill in an area where there is a possibility of encountering oil you will require DEC approval of an oil discharge prevention and contingency plan, or C-plan. Application forms are available at

[www.state.ak.us/dec/spar/guidance.htm#cpans](http://www.state.ak.us/dec/spar/guidance.htm#cpans). Preparing and gaining approval for a C-plan can often prove the most time consuming aspect of permitting a project. And operators of oil and gas facilities have to provide DEC with proof of financial responsibility for the cost of responding to an oil spill.

DEC also requires training in oil spill prevention for all personnel involved in the inspection, maintenance or operation of oil storage or transfer equipment. The department may audit training records.

The State of Alaska has developed an Alaska Incident Management System, known as AIMS, for managing oil spill response. AIMS is an Alaska version of the Incident Command System, or ICS, that is widely used for crisis response in the United States.

The state maintains a register of oil spill response contractors that can supply resources for spill response work. These contractors generally operate as industry co-ops, in which co-op members pay membership and other fees for access to the use of the co-op's resources. The high cost of these fees, especially on the North Slope, used to be a major obstacle for small companies that wished to enter the Alaska oil and gas industry. However, restructuring of the fees in recent years has made the co-ops more accessible for small operators.

A number of communities in Alaska hold caches of pre-staged spill response equipment and have made formal agreements to provide spill response support.

Further information about contingency planning for oil spill prevention and response can be obtained from:

Louise Cochrane  
Secretary for Larry Dietrick, Director  
Department of Environmental  
Conservation  
Division of Spill Prevention and  
Response  
410 Willoughby Avenue, Suite 303  
Juneau, AK 99801-1795  
Phone: (907) 465-5250  
Fax: (907) 465-5262  
E-mail:  
[Louise\\_Cochrane@dec.state.ak.us](mailto:Louise_Cochrane@dec.state.ak.us)



Any industrial activity involving emissions into the air, including the operation of diesel or gasoline engines, requires an air quality permit from the DEC Division of Air Quality. Permit application forms and information about the air quality program can be found at

[www.state.ak.us/dec/air/ap/mainair.htm](http://www.state.ak.us/dec/air/ap/mainair.htm).

DEC regulates the disposal of waste from industrial operations such as drilling — all waste disposal facilities need to be permitted by the state. If possible avoid having to permit a permanent waste disposal facility by using an existing permitted facility. However, even if you use an existing facility you will still need to prepare a waste disposal plan and obtain a temporary waste storage permit.

Information about the state's solid waste program can be found at [www.state.ak.us/dec/eh/sw/](http://www.state.ak.us/dec/eh/sw/).

The Alaska Department of Environmental Conservation Web site is [www.dec.state.ak.us/](http://www.dec.state.ak.us/).

Phone: (907) 465-5066

### Alaska Department of Natural Resources

The Alaska Department of Natural Resources' mission is "to develop, conserve and enhance natural resources for present and future Alaskans." As part of that mission DNR regulates uses of state owned resources, including water. DNR also oversees the protection of historical or cultural sites and the protection of fish habitats. DNR's Web site is at [www.dnr.state.ak.us](http://www.dnr.state.ak.us).

Most oil and gas activities on state lands will be associated with a state oil and gas lease. A lessee of a state oil and gas lease must prepare a plan of operations for approval by Alaska's Division of Oil and Gas. The application for approval of a plan must contain sufficient information for DNR to determine the surface use requirements and impacts directly associated with the proposed operations. The plan must include items such as the schedule of operations; specifications of the use of locations, facilities, sites and equipment; and plans for rehabilitating the lease area. The plan must also describe operating procedures that will prevent or minimize impacts on natural resources other than oil and gas and that will minimize impacts on features such as fish and wildlife habitats; historical and archaeological sites; and public use areas.

When approving the plan, DNR may attach stipulations that bring the plan into compliance with any mitigation measures specified in the lease and that address any

**Table 9.1: A general guide to the types of permit required for an oil and gas project in Alaska**

**The U.S. Department of the Interior Fish and Wildlife Service** *Continued from page 9.4*

Permit	Required for	Comments	Typical preparation time	Typical approval time
Letter of Authorization (LOA)	Exploration Development	Although not strictly a permit, meeting the stipulations of an LOA ensures that an activity that may unintentionally disturb marine mammals complies with the Marine Mammals Protection Act. The Fish and Wildlife Service oversees the incidental take of polar bears, sea otters and walruses, typically for long-term operations along the coast or offshore.	Not available	
Incidental take permit	Exploration Development	An activity that may involve the incidental take of a threatened or endangered species will require an incidental take permit. If the activity requires federal government action (permitting, funding or involvement), a consultation with the Fish and Wildlife Service under section 7 of the Endangered Species Act will also be required.	Not available	

**U.S. Coast Guard**

Permit	Required for	Comments	Typical preparation time	Typical approval time
Facility response plan	Exploration Development	Any marine transportation-related facility that could discharge oil into navigable waters, adjoining shorelines or exclusive economic zone requires a Coast Guard-approved facility response plan.	Usually part of the oil discharge prevention and contingency plan — there's a single document that covers spill response.	Part of state spill response plan
Fuel transfer manual	Exploration Development	This will be needed if you're working on or near navigable waters.	Two weeks	One month

site-specific concerns associated with the plan.

Further information and plan applications can be obtained at [www.dog.dnr.state.ak.us/oil/programs/permitting/plan\\_of\\_operations\\_info.htm](http://www.dog.dnr.state.ak.us/oil/programs/permitting/plan_of_operations_info.htm).

A geophysical exploration permit is necessary for conducting seismic surveys on state lands and waters. This permit is a type of land use permit and is sometimes called a seismic permit. The Division of Oil and Gas is responsible for issuing this type of permit.

Applications and further information on applying for Geophysical Exploration Permits can be found at [www.dog.dnr.state.ak.us/oil/programs/permitting/applications.htm](http://www.dog.dnr.state.ak.us/oil/programs/permitting/applications.htm).

Access through state land outside a lease or unit for the development or production of resources will require an easement from DNR.

Pipeline construction across state land requires a right of way from DNR. For common carrier lines, the right of way would be issued by the State Pipeline Coordinator's Office. This office is the state's portion of the Joint Pipeline Office. Rights of way for gathering lines will be issued by the Division of Oil and Gas, as a component of a plan of operation approval for pipelines on oil and gas leases or within oil and gas units. Gathering lines outside leases or units will need a right of way from the Division of Mining Land and Water.

A number of activities that involve temporary access to nonleased state lands

require a land use permit from DNR's Division of Mining, Land and Water. Land use permits range in duration from one to five years.

Further information about land use permits can be found at [www.dnr.state.ak.us/mlw/permit\\_lease/index.cfm](http://www.dnr.state.ak.us/mlw/permit_lease/index.cfm).

If you are going to use a significant amount of water for an operation that continues for less than five consecutive years you will need a temporary water use permit from DNR's Division of Mining, Land and Water. This permit does not establish a water right but will avoid conflicts with fisheries and existing water right holders.

Water use at a permanent site such as an oil and gas production facility will require a water right, also obtained from DNR's Division of Mining, Land and Water. A water right allows a specific amount of water from a specific water source to be diverted, impounded or withdrawn for a specific use. Public notice is required if the water appropriation is more than 5,000 gallons per day, if the water comes from an anadromous fish stream or if the water source has a high level of competition among water users.

Information about applying for temporary water use permits and water rights can be found at [www.dnr.state.ak.us/mlw/water/index.htm](http://www.dnr.state.ak.us/mlw/water/index.htm).

Under Alaska statutes you also need to notify the Alaska Department of Natural Resources Office of Habitat Management

## Alaska Coastal Zone Districts

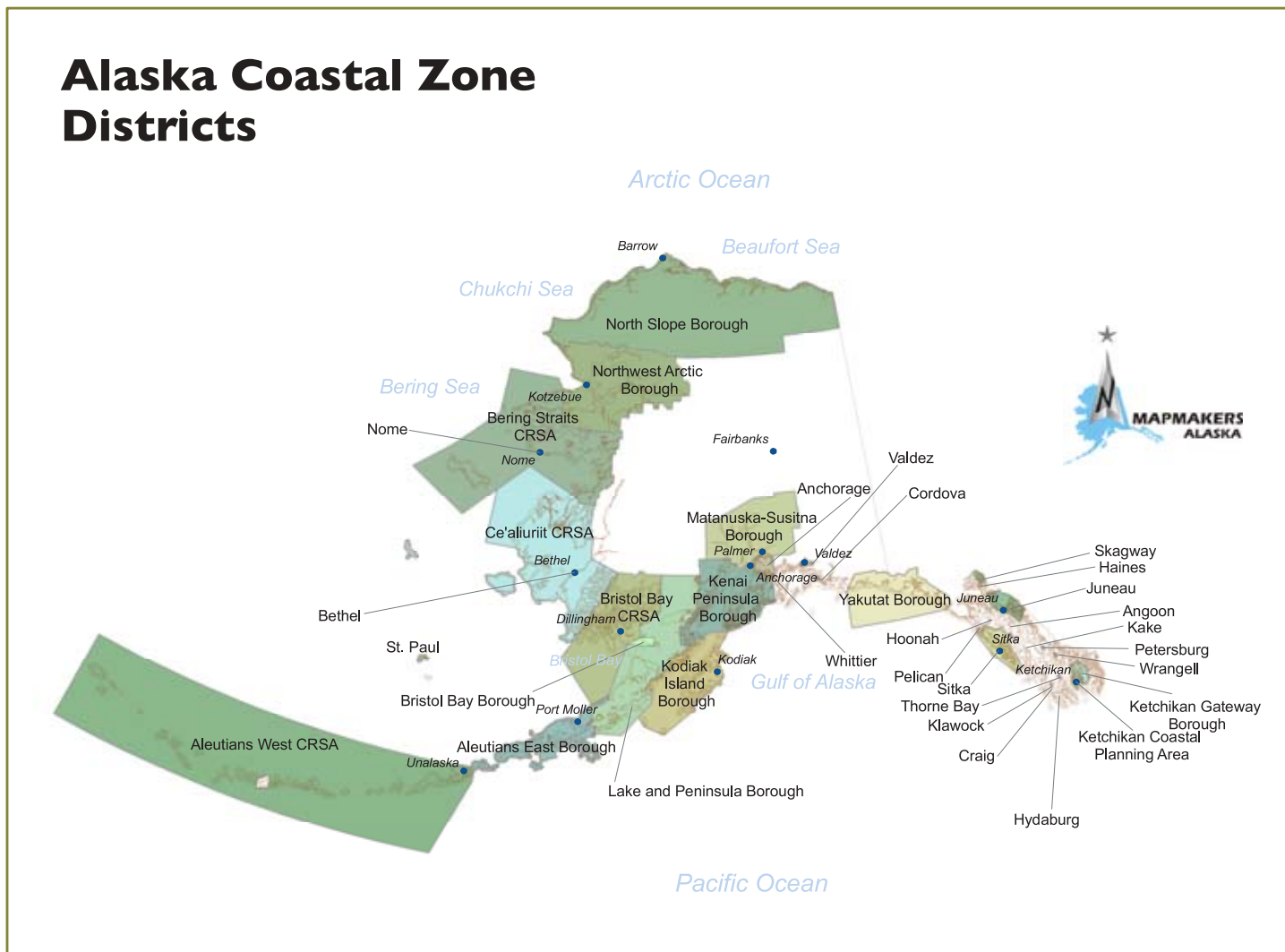


Figure 9.1 - Alaska Coastal Zone Districts. Source: Alaska Coastal Management Program. Prepared by: Mapmakers Alaska, April 2005.

and Permitting about any proposed activities within or across a stream used by fish. If OHMP determines that such activities could represent an impediment to the efficient passage of fish you will need a Title 41 fish habitat permit. All activities within or across a specified anadromous water body and all instream activities affecting a specified anadromous water body also require approval from OHMP.

Some common activities that require a fish habitat permit include stream fords, heavy equipment operated on ice, water withdrawal, boat launch, dock construction and culvert placement. Information about title 41 fish habitat permits can be found at

[www.dnr.state.ak.us/habitat/FHpermits.htm](http://www.dnr.state.ak.us/habitat/FHpermits.htm)

The Alaska Coastal Management Program, or ACMP, implements the Alaska Coastal Management Act passed by the Alaska Legislature in 1977, to implement the federal Coastal Zone Management Act.

The ACMP requires that projects in Alaska's coastal zone be reviewed by coastal resource management professionals and found consistent with the ACMP policies and standards. A finding of consistency with the ACMP must be obtained before permits can be issued for a project.

Coastal districts generally consist of cities and boroughs that contain a portion of Alaska's coastal area. In coastal areas outside the boundaries of local government, coastal districts known as Coastal Resource Service Areas may be formed. Figure 9.1 shows a map of the 35 coastal districts in Alaska. There has been controversy in the past regarding the geographic extent of Alaska's coastal zone.

Most coastal districts develop a coastal management program. Once approved, a district coastal management program becomes a part of the ACMP.

During the consistency review process, an affected coastal district reviews your

project against the enforceable policies of its coastal management program. By complying with its enforceable policies, your project can help the district achieve its goals and objectives for coastal development within its boundaries.

Project Review Coordinators from Alaska's Office of Project Management and Permitting can help you determine if your project requires an ACMP consistency review and guide you to the state agencies and coastal districts you may need to contact. You can also assess the permits that you're likely to need by filling in a coastal project questionnaire. In fact it's worth filling in this questionnaire even if you don't need an ACMP consistency review.

For further information on the ACMP see the Office of Project Management and Permitting Web site at [www.dnr.state.ak.us/opmp/](http://www.dnr.state.ak.us/opmp/).

The Alaska Historic Preservation Act mandates that any project with state



involvement be reviewed for impact on significant historic properties. And there's a similar requirement for projects that involve the federal government.

Staff from the state's Office of History and Archaeology provides information on the location of sites and on cultural resources surveys previously done in an area. If there is a high potential to discover unknown sites, OHA may recommend that a new cultural resources survey be carried out.

You will need a letter from the Alaska State Historic Preservation Office stating that your project will not impact any archaeological or cultural sites.

The OHA Web site is at [www.dnr.state.ak.us/parks/oha/index.htm](http://www.dnr.state.ak.us/parks/oha/index.htm) and the Alaska State Preservation Office Web site is at [www.dnr.state.ak.us/parks/oha/shpo/shpo.htm](http://www.dnr.state.ak.us/parks/oha/shpo/shpo.htm).

The Alaska Department of Natural Resources Web site is at [www.dnr.state.ak.us](http://www.dnr.state.ak.us)

Phone: (907) 269-8400

### Alaska Department of Fish and Game

The Alaska state Legislature has classified certain special areas as being essential to the protection of fish and wildlife habitat. A special area may be classified as a state refuge, a state critical habitat area, a state sanctuary or a state range. You can find a list of special areas at [www.sf.adfg.state.ak.us/SARR/SpecialAreas/SpecialAreas.cfm](http://www.sf.adfg.state.ak.us/SARR/SpecialAreas/SpecialAreas.cfm).

If you are going to be working or operating in one of these areas you will need a special area permit from the Alaska Department of Fish and Game. You can obtain a permit application at [www.sf.adfg.state.ak.us/SARR/SpecialAreas/sapermit.cfm](http://www.sf.adfg.state.ak.us/SARR/SpecialAreas/sapermit.cfm). Submit the application to the Department of Fish and Game Office that represents the area in which you will be working — the application form gives you the office addresses.

Construction of an oil and gas facility that obstructs a fish passage will also require a Department of Fish and Game permit.

The Alaska Department of Fish and Game Web site is at [www.adfg.state.ak.us](http://www.adfg.state.ak.us)  
Phone: (907) 465-4100

### Alaska Oil and Gas Conservation Commission

The mission of the Alaska Oil and Gas Conservation Commission consists of looking after the public interest in oil and gas resources and protecting under-

ground supplies of drinking water. You will need permits from AOGCC for any activity that involves drilling for oil and gas or injecting material into a well. In addition to regulating drilling operations, AOGCC regulates oil and gas pool development rules.

To drill a well for oil or gas anywhere in Alaska you will need an AOGCC permit to drill, regardless of whether the well is an exploration well, a development well, an injection well or a service well. The purpose of the permit is to ensure the use of appropriate equipment and to ensure the use of acceptable practices to maintain well control, protect groundwater, avoid waste of oil or gas and promote efficient reservoir development. AOGCC permits to drill do not consider issues such as land use or conflicts between surface and subsurface interests. The issuance of a permit does not relieve the applicant from obligations to meet the permitting requirements of any other state, federal or local government agency.

The permit application needs to include information about the drilling site, the drilling targets and the drilling techniques to be used — detailed information about permitting requirements can be found at <http://www.state.ak.us/local/akpages/ADMIN/ogc/functions/OvrSurvIndex.shtml#PTD>.

If after starting a drilling project you find that you need to diverge from the specifications in your permit-to-drill application, you will need to apply for a sundry permit that approves the exceptions to your original drilling plan. Application forms are available at [www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-403.pdf](http://www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-403.pdf).

Also, if you plan to carry out disposal of drill cuttings down your well you will need an annular disposal permit, available at [www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-403AD.pdf](http://www.state.ak.us/local/akpages/ADMIN/ogc/forms/10-403AD.pdf). Alaska administrative code places limits on the disposal, including the volume of cuttings that can be disposed.

A number of AOGCC orders apply to drilling operations, although these orders generally apply to the drilling and operation of development wells. AOGCC orders include aquifer exemption orders, disposal injection orders, area injection orders, conservation orders (including pool rules and spacing exceptions), enhanced recovery injection orders, storage injection orders and commission orders. The proce-

cedure for issuing an order usually includes a 30-day public notice period. Sample orders can be viewed at <http://www.state.ak.us/local/akpages/ADMIN/ogc/orders/ordindex.shtml>.

The AOGCC Web site is at [www.state.ak.us/aogcc/homeogc.shtml](http://www.state.ak.us/aogcc/homeogc.shtml)  
Phone: (907) 279-1433

### The U.S. Environmental Protection Agency

Under the terms of the federal Clean Water Act, the National Pollutant Discharge Elimination System controls water pollution by regulating point sources that discharge waste into the waters of the United States. Point sources consist of discrete conveyances such as pipes or man-made ditches. Discharges either directly into a natural water system or into a wastewater collection system require NPDES permits. Alaska is not authorized to administer NPDES permitting and so permit applications need to go through EPA. Alaska is in the process of applying to take over primacy for the program, but primacy is unlikely to be transferred before 2008.

Obtaining an NPDES permit is an extremely time consuming process. However, general permits are available for many industrial situations and enable you to avoid the time and work involved in gaining approval for your own unique permit. A general permit authorizes a category of discharges within a geographic area and is not tailored for an individual discharger.

To use a general permit you will have to find the general permit that matches your requirements, design your project so that the discharges remain within the limits specified in the permit and then send a notice of intent to EPA. The format of a notice of intent depends on the specific general permit. You can find details of general permits for Alaska oil and gas operations at <http://yosemite.epa.gov/R10/WATER.NSF/NPDES+Permits/General+NPDES+Permits>.

The NPDES Web site at <http://cfpub.epa.gov/npdes/> provides detailed information about the NPDES program.

Any onshore drilling operation requires a spill prevention control and countermeasure plan specifying the spill prevention and control measures for the operation. This SPCC plan must be available to EPA for on-site review and inspection. Drilling contractors know how to prepare these plans and have plan tem-

plates.

Under the terms of the federal Clean Water Act and the Oil Pollution Act of 1990 the operator of a facility that could cause “substantial harm” to the environment by discharging oil into navigable waters or adjoining shorelines must prepare and submit a Facility Response Plan to the EPA. It’s important to take appropriate professional advice to determine whether your operation falls within this EPA requirement.

A facility response plan must:

- be consistent with the National Contingency Plan and area contingency plans;
- identify a qualified individual who has full authority to implement removal actions, and require immediate communication between that person and the appropriate federal authorities and responders;
- identify and ensure availability of resources to remove, to the maximum extent practicable, a worst-case discharge;
- describe training, testing, unannounced drills and response actions of persons at the facility;
- be updated periodically; and
- be submitted for approval with each significant change.

A facility response plan is normally part of the oil discharge prevention and contingency plan that the Alaska Department of Environmental Conservation requires.

Information about EPA facility response plans can be found at [www.epa.gov/oilspill/frps/frp\\_index.htm](http://www.epa.gov/oilspill/frps/frp_index.htm). The EPA also publishes a useful guide at [www.epa.gov/oilspill/pdfs/frpguide.pdf](http://www.epa.gov/oilspill/pdfs/frpguide.pdf).

A project that involves the federal government in any way comes under the terms of the National Environmental Policy Act, or NEPA. NEPA may require an environmental assessment or an environmental impact statement. For oil and gas exploration on federal lands, the relevant federal agency will normally issue an environmental impact statement prior to a lease sale. However, exploration and development projects in federal leases may require additional environmental assessments or environmental impact statements, depending on the environmental impact of what is proposed. The National Environmental Policy Act section of this chapter discusses the implications of NEPA in detail.

The EPA Web site is at [www.epa.gov](http://www.epa.gov)  
Phone (Alaska Operations Office):  
(907) 271-5083

## The U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers regulates activities that impact U.S. navigable waters and wetlands.

Regulations at 33 CFR Part 329 define navigable waters as waters that have been used in the past, are now used, or are susceptible to use as a means to transport interstate or foreign commerce up to the head of navigation. Under section 10 of the Rivers and Harbors Act of 1899 a permit is required to do any work in, over or under these navigable waters, or to do work that affects the course, location, condition or capacity of such waters.

Under section 404 of the federal Clean Water Act you need a permit from the Corps of Engineers to discharge dredged or fill material into the waters of the United States. Also, under section 401 of the Clean Water Act, the Alaska Department of Environmental Conservation has to review the federal section 404 permit application to identify potential water quality impacts. When warranted, DEC will grant section 401 certification. The Corps of Engineers will require this certification before it can issue a section 404 permit.

Waters of the United States consist of all surface waters, including all navigable waters and their tributaries, all interstate waters and their tributaries, all impoundments of these waters, all wetlands adjacent to these waters and certain isolated wetlands.

The term “wetlands” refers to those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include tundra, permafrost areas, swamps, marshes, bogs and similar areas.

Depending on what you are doing you may need a Corps of Engineers’ individual permit, or you may be able to use a nationwide permit or a regional general permit.

The Corps of Engineers issues individual permits for specific projects. The permitting procedure involves a public review process as well as a review by the Corps of Engineers. Permit applications are available at [www.poa.usace.army.mil/reg/PermitApp.htm](http://www.poa.usace.army.mil/reg/PermitApp.htm).

You can avoid having to apply for an individual permit if you can ensure that

your project falls within the terms of a nationwide permit. The Corps of Engineers headquarters issues these nationwide permits to authorize certain activities that are minor in scope and that result in no more than minor adverse impacts. Work done under a nationwide permit must meet regional conditions specific to Alaska as well as the general, nationwide terms of the permit.

If your project requires work that does not fit within the parameters of a nationwide permit you may be able to operate under the terms of an Alaska regional general permit.

The Corps of Engineers Alaska District Engineer issues regional general permits for activities that are similar in nature and cause minimal environmental impact (both individually and cumulatively) and when the regional permit reduces duplication of regulatory control by State and Federal agencies.

For further information about Corps of Engineers permitting see the Corps’ Alaska regulatory branch home page at [www.poa.usace.army.mil/reg.Alaska](http://www.poa.usace.army.mil/reg.Alaska) contact information for the Corps of Engineers can be found at [www.poa.usace.army.mil/reg/contactus.htm](http://www.poa.usace.army.mil/reg/contactus.htm). The Corps has offices in Anchorage, Kenai, Juneau and Fairbanks.

If your project involves a permanent development and requires a Corps of Engineers’ permit you will normally require an environmental assessment under the terms of the National Environmental Policy Act. You may need an environmental impact statement. Environmental assessments and environmental impact statements are discussed in the National Environmental Policy Act section of this chapter.

Web site for the Corps of Engineers Alaska district:  
[www.poa.usace.army.mil/hm/default.htm](http://www.poa.usace.army.mil/hm/default.htm)  
Phone (Anchorage office): (907) 753-2712

## The Bureau of Indian Affairs

You will require permission to cross or work in a Native allotment. The Bureau of Indian Affairs has ultimate responsibility for the administration of access to Native allotments in Alaska. However, BIA generally contracts this administrative role to a recognized Native nonprofit organization such as a regional Native nonprofit or a village council.

If you need access to an allotment it’s probably best to first contact the regional Native nonprofit organization for the



region in which the allotment is located. If the regional non-profit doesn't administer the allotment it will probably know which organization does do the administration. It's then a question of contacting the appropriate organization and negotiating an access permit.

Table 9.2 lists all of the regional Native non-profit organizations in Alaska.

Bureau of Indian Affairs Web site: [www.doi.gov/bureau-indian-affairs.html](http://www.doi.gov/bureau-indian-affairs.html)  
Phone: (202) 208-3710

**The U.S. Department of Commerce  
National Oceanic and Atmospheric  
Administration National  
Marine Fisheries Service**

If you are planning an activity that might disturb marine wildlife you need to find out whether you require an authorization or permit from NMFS under the terms of the Marine Mammals Protection Act or the Endangered Species Act.

NMFS administers the incidental take management of whales, porpoises and seals (the U.S. Fish and Wildlife Service performs a similar function for some other types of marine wildlife).

Information about authorizations and permits, and how to apply for them, can be found at the NMFS Web site at <http://www.nmfs.noaa.gov/pr/permits/> — the regulators apply some discretion about exactly what comprises a wildlife “take,” requiring a permit, and it is best to find out from the regulators whether your particular operation requires permitting.

Disturbance of a threatened or endangered species has specific permitting requirements. Otherwise, there are two types of authorization that commonly apply to the incidental or unintentional harassment of marine wildlife.

1. An incidental harassment authorization (known as an IHA) applies to the unintentional take of wildlife during a short-term operation. The take must not involve serious or fatal injuries to the wildlife. An IHA would typically be required for a marine seismic survey or an offshore drilling operation.

2. A long-term operation or an operation that could involve a serious or fatal injury to marine wildlife requires a letter of authorization (known as an LOA). The LOA would include regulations that would apply to the permitted operation.

The length of time required to obtain one of these authorizations depends on the NMFS workload at the time of the application. So, it is best to apply well

**Table 9.2: Alaska regional Native nonprofit corporations**

Regional non-profit	Region	Web site or phone number
Aleutian/Pribilof Islands Association (APIA)	Aleutian Islands	<a href="http://www.apiai.com/">http://www.apiai.com/</a>
Association of Village Council Presidents (AVCP)	Calista Corp. region (Yukon-Kuskokwim Delta)	<a href="http://www.avcp.org/">http://www.avcp.org/</a>
Bristol Bay Native Association (BBNA)	Bristol Bay	<a href="http://www.bbna.com/">http://www.bbna.com/</a>
Chugachmiut	Chugach Alaska Corp. region (Gulf of Alaska, Prince William Sound, Lower Cook Inlet).	<a href="http://www.chugachmiut.org/">http://www.chugachmiut.org/</a>
Cook Inlet Tribal Council, Inc. (CITC)	Cook Inlet Region Inc. region	<a href="http://www.citci.com/">http://www.citci.com/</a>
Copper River Native Association	Ahtna Inc. Region (Copper River Valley)	<a href="http://www.copperriverna.org/">http://www.copperriverna.org/</a>
Inupiat Community of the Arctic Slope	North Slope	(907) 852-4227
Kawerak Inc.	Bering Straits Native Corporation region (Nome area)	<a href="http://www.kawerak.org/">http://www.kawerak.org/</a>
Maniilaq Association	NANA Regional Corp. region (northwest Alaska)	<a href="http://www.maniilaq.org/">http://www.maniilaq.org/</a>
Tanana Chiefs Conference (TCC)	Doyon Ltd. region (Interior)	<a href="http://www.tananachiefs.org/">http://www.tananachiefs.org/</a>
Tlingit and Haida Indian Tribes	Central Council of the Tlingit and Haida Indian Tribes of Alaska	<a href="http://www.ccthita.org/">http://www.ccthita.org/</a>

Table 9.2: Alaska regional Native non-profit organizations

before you plan to start your operation, to avoid the potential for delays.

National Marine Fisheries Service Web site: [www.nmfs.noaa.gov](http://www.nmfs.noaa.gov)  
Phone (Office of Protected Resources): (301) 713-2332.

**U.S. Department of the Interior  
Fish and Wildlife Service**

The Fish and Wildlife Service administers the incidental take management of polar bears, sea otters and walrus under the terms of the Marine Mammal Protection Act. If your activity may disturb any of these animals you will first need an authorization. The Fish and Wildlife Service usually issues Letters of Authorization, rather than the shorter-term Incidental Harassment Authorizations that NMFS tends to issue for exploration activities.

If your activity may involve the incidental take of a threatened or endangered species, either onshore or offshore, you will need an incidental take permit. And if that activity requires federal government

action of any kind (typically permitting, funding or actual involvement in the activity) the government agency involved will need a consultation with NMFS or the Fish and Wildlife Service under section 7 of the Endangered Species Act.

If your activity may impact wildlife that comes under the jurisdiction of both NMFS and the Fish and Wildlife Service you should start by contacting whichever agency is responsible for the majority of the impacted wildlife.

Information about the U.S. Fish and Wildlife incidental take program can be found at <http://alaska.fws.gov/fisheries/mmm/itr.htm>.

The U.S. Fish and Wildlife Alaska region Web site is at [www.r7.fws.gov](http://www.r7.fws.gov)  
Phone: (907) 786-3868.

**The U.S. Department of the Interior  
Bureau of Land Management**

Under the terms of 43 CFR 3150 BLM can issue permits for geophysical exploration on federal lands in Alaska. These

permits last for one year and enable companies to conduct seismic surveys and other geophysical work without having to first purchase an oil and gas lease. An application for a permit should be submitted with a \$25 filing fee to the nearest BLM office. A filing fee for a geophysical exploration permit is not required if the applicant holds title to the oil and gas lease upon which the exploration occurs. Permits are subject to review under the National Environmental Policy Act and may contain restrictions and conditions to mitigate adverse impacts on the environment.

Drilling on federal land is subject to Onshore Oil and Gas Order No. 2. Before drilling a well on federal land you must file an application for a permit to drill, known as an APD, with BLM. Onshore Oil and Gas Order No. 1 describes the process for submitting an APD to the BLM. It's possible to file a single APD for a group of wells. The APD includes the drilling plan, a surface use plan and plans for reclaiming the land. Before approval of the APD, BLM will require a bond and conduct a site inspection. Changes in the drilling plan may be imposed to mitigate environmental impacts or to ensure that the plan complies with federal regulations.

Oil and gas development proposals are submitted by sundry notice (Form 3160-5) if the proposal is on a lease or a right of way. Projects on federal lands come under the terms of the National Environmental Policy Act and require an environmental assessment or an environmental impact statement. Environmental assessments and environmental impact statements are discussed in the National Environmental Policy Act section of this chapter.

BLM Alaska Web site: [www.blm.gov/ak/](http://www.blm.gov/ak/)  
Phone: (907) 271-5960

### The U.S. Department of the Interior Minerals Management Service

Under the terms of 30 CFR 251, MMS can issue permits for geological and geophysical exploration on the outer continental shelf. These permits enable companies to conduct seismic surveys and other geological and geophysical work without having to first purchase an oil and gas lease. An application for a permit should be submitted with a filing fee to the Minerals Management Service Alaska OCS office in Anchorage, Alaska. If your exploration involves shallow drilling not requir-

ing a drilling permit you need to submit a drilling plan to MMS and, possibly, to the appropriate coastal zone management agency.

Under 30 CFR 250.200 exploration activities associated with an outer continental shelf oil and gas lease require an exploration plan approved by MMS. The exploration plan needs to include information such as the activities to be carried out, the type of drilling equipment to be used, the proposed locations of wells and the safety precautions that will be taken.

Before drilling a deep well on the outer continental shelf you must file an application for a permit to drill, or APD, with MMS. The APD includes a specification of the drilling equipment to be used, the drilling plan and specification of safety precautions to be used.

Development of an oil or gas field on the outer continental shelf will require an MMS-approved development plan. The development plan needs to include information about details of planned activities, locations of proposed wells and descriptions of structures to be constructed. The development plan can be used to permit the construction or field structures and facilities. However, a pipeline that is not part of the field gathering system will require a right-of-way permit.

Regulation 30 CFR 254 states that "if you are the owner or operator of an oil handling, storage, or transportation facility, and it is located seaward of the coast line, you must submit a spill-response plan to MMS for approval. Your spill-response plan must demonstrate that you can respond quickly and effectively whenever oil is discharged from your facility." The regulation defines a facility as "any structure, group of structures, equipment, or device (other than a vessel) which is used for one or more of the following purposes: exploring for, drilling for, producing, storing, handling, transferring, processing, or transporting oil. The term excludes deep-water ports and their associated pipelines as defined by the Deepwater Port Act of 1974, but includes other pipelines used for one or more of these purposes. A mobile offshore drilling unit is classified as a facility when engaged in drilling or downhole operations."

The response plan must provide for response to an oil spill from the facility and you must immediately carry out the provisions of the plan whenever there is a release of oil from the facility. You must also carry out the training, equipment testing, and periodic drills described in

the plan, and these measures must be sufficient to ensure the safety of the facility and to mitigate or prevent a discharge or a substantial threat of a discharge.

The plan must be consistent with the National Contingency Plan and the appropriate Area Contingency Plans.

If your facility is operating in state waters within the 3-mile limit you can use the oil discharge prevention and contingency plan that you need to submit to the state, provided the plan contents meet MMS requirements. There are also some specific spill prevention requirements that apply to state waters.

You need to submit copies of your response plan to the appropriate MMS Alaska regional office. Or you can submit your plan electronically. You can contact the MMS Alaska regional office at:

Minerals Management Service Alaska  
OCS  
Centrepoint Financial Center,  
3801 Centerpoint Drive, Suite 500  
Anchorage, Alaska 99503  
Phone: (907) 334-5208

Projects involving MMS come under the terms of the National Environmental Protection Act and may require an environmental assessment or an environmental impact statement. Environmental assessments and environmental impact statements are discussed in the National Environmental Protection Act section of this chapter.

MMS oil and gas leases normally include appropriate stipulations and conditions to mitigate potential adverse impacts on the environment. For example, the lessee may have to contact Native organizations to avoid conflicts with subsistence hunting and other activities.

In addition to lease stipulations, MMS may prescribe additional stipulations and conditions for proposed operations or associated activities on the outer continental shelf. For example, as a condition to obtain a right-of-way grant, MMS may require additional mitigating measures (stipulations) be taken by the applicant to protect human, marine, and coastal environments, life (including aquatic life), property, and mineral resources located on or adjacent to the right of way.

The Web site for the MMS Alaska regional office is at [www.mms.gov/alaska/](http://www.mms.gov/alaska/).

Phone: (907) 334-5208



## The U.S. Coast Guard

Under 33 CFR 154 the owner or operator of any marine transportation-related facility that could reasonably be expected to cause substantial harm or significant and substantial harm to the environment by discharging oil into or on the navigable waters, adjoining shorelines or exclusive economic zone must prepare a facility response plan. The owner or operator must submit this facility response plan to the local U.S. Coast Guard captain of the port for approval.

The Coast Guard requires specific contents for this plan. However, it's normally possible to prepare a single facility response plan that meets the requirements of several regulatory agencies. The plan needs to be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan and any area contingency plans.

There are also specific response requirements for a facility operating under the Trans-Alaska Pipeline Authorization Act in Prince William Sound.

The U.S. Coast Guard also requires you to use a Coast Guard-approved fuel transfer manual if you are working on or near navigable waters.

Vessels carrying oil as cargo also require a Coast Guard-approved vessel response plan.

U.S. Coast Guard District 17 Alaska Web site: [www.uscg.mil/d17/](http://www.uscg.mil/d17/)

## The National Environmental Policy Act

The National Environmental Policy Act of 1969, commonly referred to as NEPA, comes into play for any activity that involves a federal action or approval. Although an action taken by the federal government can itself come under the terms of NEPA, involvement of the federal government could simply entail federal funding, federal licensing, federal permitting or the use of federal lands as part of a project. In any of these situations a designated federal agency needs to ensure compliance with NEPA before the project can start.

As a minimum, NEPA requires that the designated agency identify and disclose the potential environmental impacts of the activity. The agency may then require the development of an environmental assessment, referred to as an EA, to docu-

ment the impacts. If the agency determines that the environmental impacts are likely to be significant the agency will mandate the development of an environmental impact statement, referred to as an EIS.

The Bureau of Land Management manages the federal mineral estate and is normally the lead agency for NEPA compliance for mineral activities on federal land. The Minerals Management Service is the lead agency for offshore activities in federal waters beyond the State of Alaska's three-mile limit.

When the federal government wishes to initiate an action requiring an EIS the appropriate federal agency will prepare the EIS, perhaps using external consultants. The agency will complete the EIS prior to a final decision on whether to proceed with the action. For example, when the Bureau of Land Management writes a land use plan or an activity plan, an EIS describing the impacts of the plan is produced.

If, on the other hand, an application for federal funding, licensing or permitting requires an EIS, receipt of the application will trigger development of the EIS. For example, the application to renew the trans-Alaska oil pipeline right of way on federal lands in 2004 resulted in the development of a major EIS for the Bureau of Land Management.

When an application for funding, licensing or permitting triggers the EIS the applicant itself may have to prepare the EIS for federal review and approval.

An EIS consists of a document that describes the impacts on the environment of a proposed action. The standard government EIS format includes sections that:

- describe the purpose and need for action;
- provide alternatives to the proposed action;
- describe the affected environment; and
- describe the environmental consequences of the action.

Regulations issued by the president's Council on Environmental Quality set out the steps involved in preparing an EIS. These steps safeguard the rights of both the public and the government to comment on what is proposed in the EIS. The steps consist of:

1. Issuing a Notice of Intent in the Federal Register. The notice of intent specifies a period during which public comments on the scope and potential content

of the EIS can be gathered;

2. Preparing a draft EIS for review by the public;

3. Publishing in the Federal Register a Notice of Availability for the draft EIS, including a schedule for a public comment period and a specification of how the public can comment;

4. Preparing a final EIS;

5. Publishing in the Federal Register a Notice of Availability for the final EIS;

6. Publishing a Record of Decision in the Federal Register 30 days or more after the final EIS is published. The Record of Decision describes the responsible federal agency's decision on the proposed action.

If you're planning a project that requires an EIS it's vital to factor into your plans ample time for the EIS process. The environmental studies for gathering data for the EIS document may take several field seasons to complete; the public review and agency approval process can take many months. The total time period required to complete the EIS process depends on the scale and complexity of the proposed action; on the amount of environmental data that's already available; and on the level of public interest — a major EIS can take two or more years to complete.

BLM or MMS can help you identify the need for an EIS and explain what is involved in the EIS development. In addition, environmental and engineering firms operating in Alaska have acquired considerable experience in EIS development — these firms can provide expertise and advice on what is involved.

Refer to the following Web sites for further information:

The National Environmental Policy Act of 1969 (NEPA)

[http://ceq.eh.doe.gov/nepa/regs/nepa/ne\\_paeqia.htm](http://ceq.eh.doe.gov/nepa/regs/nepa/ne_paeqia.htm)

Council on Environmental Quality regulations for implementing NEPA

[http://ceq.eh.doe.gov/nepa/regs/ceq/toc\\_ceq.htm](http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm)

The Federal Register

[www.gpoaccess.gov/fr/index.html](http://www.gpoaccess.gov/fr/index.html)

Bureau of Land Management

[www.blm.gov](http://www.blm.gov)

Minerals Management Service

[www.mms.gov](http://www.mms.gov)

## Bonding requirements

The following bonds are required for oil and gas leasing.



JUDY PATRICK

Geese at the Kuparuk River field

### Alaska Department of Environmental Conservation

ADEC requires proof of financial responsibility to respond to damage caused by an oil- or gas-related facility such as an oil terminal, production facility, pipeline or oil-carrying vessel. The dollar amount of financial responsibility is inflation-adjusted and depends on the type and location of the facility.

### Alaska Department of Natural Resources

The Division of Oil and Gas requires bonding of \$10,000 for activity on an oil and gas lease. Alternatively a \$500,000 bond will cover all lease activities statewide.

The Division of Oil and Gas also requires bonding of \$100,000 for a single oil well and \$500,000 for multiple wells statewide. The bonding for a gas well is from \$25,000 to \$100,000 depending on the location and potential impact from the operation.

The Commissioner of DNR can require additional bonding in circumstances that indicate additional risk. A separate statewide bond of \$100,000 will also be required for a geophysical exploration permit.

### Alaska Oil and Gas Conservation Commission

AOGCC requires a bond of \$100,000 to drill a single well or a bond of \$200,000 for multiple wells.

### U.S. Department of the Interior Bureau of Land Management

BLM requires a bond of \$100,000 prior

to the issue of an oil and gas lease in the National Petroleum Reserve-Alaska. The bond is not required if the bidder for the lease already maintains or furnishes a bond of \$300,000 for all of the bidder's leases in NPR-A. Alternatively the bidder can furnish a rider on a nationwide bond to bring bond coverage for all the bidder's NPR-A leases to \$300,000.

BLM can also require additional bonds in NPR-A if the agency determines that additional security is required after operations or production have begun.

A lease outside NPR-A requires a bond of \$10,000. Alternatively, the lessee can furnish a bond of \$25,000 to cover all of the lessee's BLM leases in Alaska outside NPR-A, or \$150,000 to cover all BLM leases nationwide. BLM can require additional bond amounts as a result of specific risk factors.

### Department of the Interior Minerals Management Service

Each MMS Regional Office requires a bond of \$50,000 prior to issuing an oil and gas lease on the outer continental shelf. The bond is not required if the bidder provides and maintains an areawide bond of \$300,000 to cover all of the bidder's oil and gas leases issued by a particular MMS Regional Office. These bonds are required on the basis of no activity.

MMS will require a \$200,000 lease exploration bond prior to approval of an exploration plan. This bond is not needed if the lessee maintains an areawide exploration bond of \$1 million that covers all of the lessee's oil and gas leases with exploration activities in a particular MMS Region. MMS also requires a \$500,000 lease

development and production bond prior to approval of a development and production plan. This bond is not needed if the lessee maintains an areawide development and production bond in the amount of \$3 million that covers all of the lessee's oil and gas leases with development and production activities in a particular MMS Region.

MMS may require additional security above the amounts prescribed above if the agency determines that additional risk factors apply to proposed operations. On a case-by-case basis, to ensure compliance with the regulations and the obligations under the lease, MMS may also require supplemental bonding after considering a lessee's cumulative potential obligations and liabilities.

MMS also requires proof of financial responsibility for oil spill response plans. Nationwide oil spill response bonding can be used as proof of financial responsibility anywhere in U.S. offshore waters.

### North Slope Borough

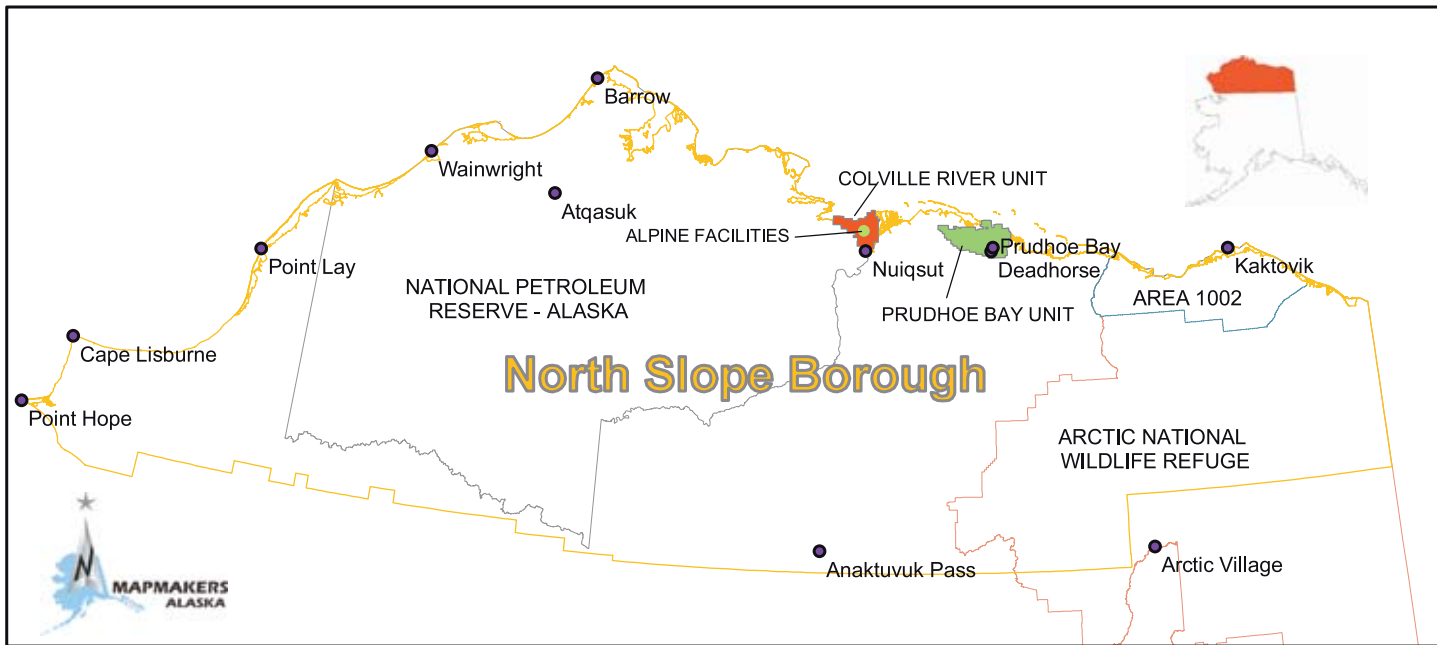
The North Slope Borough requires surety for reclamation or mitigation costs associated with borough permits. ■

#### Credits

Bob Britch of Northern Consulting Group, Rex A. Okakok Sr. of North Slope Borough, and staff from the Alaska Department of Natural Resources, the U.S. Department of Interior Bureau of Land Management and the U.S. Department of Interior Minerals Management Service all contributed information to this chapter.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.





# Rezoning and permitting oil and gas projects within the North Slope Borough

By REX A. OKAKOK SR.

Former head of the North Slope Borough's land planning and permitting section

**T**he North Slope Borough created a unique set of land management principles and procedures for development within the borough. Officials and residents of the borough participated in many public meetings to develop the North Slope Borough Comprehensive Plan, the coastal management program and other planning studies, and to develop regulations. These procedures and administrative matters are designed to be as efficient and fair as possible to all concerned and to comply with legal requirements.

The procedures were developed a) to achieve the goals and objectives and implement the policies of the North Slope Borough Comprehensive Plan, including the NSB Coastal Management Program; b) to ensure that the future growth and development of the borough is in accord with the values of its residents; c) to identify and secure for present and future, the beneficial impacts of development; d) to identify and avoid, mitigate, or prohibit the negative impacts of development; and e) to ensure that future development is of proper type, design, and location, and is served a proper range of public services and facilities.

## Planning commission

The members of the planning commission are from the eight villages with staggered terms for continuity. The commitment and dedication of the commission brings stability, strength, and support to the land management staff. Thus the staff recommendations are more consistent, fair, equitable and legitimate.

The commission is charged from time to time to consider amendments to the comprehensive plan, coastal management program and land management regulations for the North Slope Borough Assembly. The commission's powers include: 1) review and recommend to the assembly rezoning and amendments; 2) annually review capital improvement program for annual budget review; 3) reporting and recommending of public improvements to the assembly; 4) decide on all preliminary plats, except those of minor subdivision; and 5) hear and decide conditional use permits.

## Duration of permits

The duration of a permit is valid only if developers are complying with the terms and conditions of the permit. The permit automatically expires 12 months after issuance. If the permit is not used, there is no activity, within its 12-month life, the

applicant has to re-apply for a new permit. If the permit was revoked for violation or non-compliance then the applicant has to apply for a new permit. However, requests can be made prior to the end of the 12-month life of a permit to extend it beyond 12 months.

The administrator or commission may place reasonable limits on the duration of an approval or establish a longer duration. Approved development or uses, unless ordered to cease by the administrator, shall be allowed to continue during the appeal process.

## Mitigation

Reasonable conditions and stipulations are placed which are necessary or desirable to ensure the policy, standard or intent will be implemented in a manner consistent with Title 19. The amount of surety shall be reasonable to protect the borough based on the magnitude, type and costs of the activities planned; however the amount of the surety shall not exceed 100 percent of the estimated cost of the reclamation or mitigation.

## Four districts

There are four districts: The conservation district that encompasses undeveloped

areas of the borough and is intended to conserve the natural ecosystems for all of the various plants and animals upon which the borough residents depend for subsistence; the resource district that is designed and intended to address the cumulative impacts of large-scale development and to offer quick, inexpensive, and predictable permit approvals; the transportation corridor district that provides strips of land to accommodate linear transportation facilities, such as roads and pipelines, and within which are special nodes for development of public and commercial facilities; and the scientific research district located in the Barrow area for research and development of facilities.

The Village of Barrow has a zoning commission that handles zoning issues and concerns within city limits.

### Permitting process

When the applicant submits a permit application, within five days of receipt of the application, the administrator must determine whether the application is complete and the submission requirements are met. If the submissions are not met, then the administrator can return the application for modification or corrections. If the administrator fails to act within five days, the permit application is deemed complete and goes through the normal process for reasonable stipulations and conditions. If it requires a coastal review process, the administrator will contact the state coordinator.

If the permit application is accepted for an administratively approved use or development, the administrator may issue a consistency determination or recommendation. He may place reasonable stipulations and conditions and issue a letter of approval, including coastal consistency determination if required. If he fails to act within 10 days of acceptance of the permit as complete, the letter of approval will be issued on demand, unless the developer consents to an extension beyond the 10 day period. Most of the administrative approval permits are approved within days of review by staff if they have met all the conditions. It is up to the applicant to provide adequate information for quick review and approval.

If the permit is accepted for use or development, the administrator shall within 10 days of acceptance issue a draft permit for review and comment. The comment period for a draft permit outside of the Barrow zoning area is 20 days; otherwise it is 15 days for Barrow. After the close of the comment period, he has five days to approve the draft permit, approve the revi-

sions, deny the draft permit or elevate the decision to the planning commission. Administrative decisions can be appealed to the commission. It is the burden of the applicant to prove by preponderance of evidence that the criteria set forth in Title 19 are met.

### Conditional uses

Conditional uses (districts) require an approval by the planning commission which meets regularly once a month. The staff makes recommendations for reasonable conditions and stipulations to the commission for its consideration. If the application requires a coastal review, notice is given to the proper authorities. The public notice is given to the applicant, village council(s) if the development is in a village area of influence, and the reviewing parties — for instance the Alaska Eskimo Whaling Commission, Inupiat Community of Arctic Slope, Native Village Tribal Councils, or village corporations.

The written comment period for conditional use permits is 30 days and must be received within five days of the public comment period. Immediately after the planning commission's public hearing it will make a decision or decide on a later date if agreed with an applicant. Approval criteria for conditional use permits are that it must be consistent with the standards and policies of the North Slope Borough Comprehensive Plan, NSB Coastal Program and Title 19 and can occur harmoniously with the other activities allowed in the district and must not disrupt the character of the neighborhood.

There are 15 standards for analysis of consistency with the requirements, including village policies, economic development policies, and coastal management and areawide policies.

Areawide policies include the need to develop a mitigation plan when extensive adverse impacts to the subsistence resource are likely and cannot be avoided or mitigated. Also, development shall not deplete subsistence resources below the subsistence needs of local residents of the borough. Another example is development shall not preclude reasonable subsistence user access to the subsistence resource.

Over the last five years, we have approved 1,500 permit applications with no delays. If a delay happens, it is usually the applicant's fault for not providing adequate information or not understanding procedures. We encourage potential applicants to meet with the staff when they are

planning exploration or development so they can understand the intent of the standards and policies.

### Rezoning process

The rezoning process is the most misunderstood process by applicants, even BP and ConocoPhillips, who are long-time operators on the North Slope. To rezone means to change an area from a conservation district to a resource district, a land status or land classification change.

Developers often think that once they get approval for rezoning an area, that it includes approval of construction permits. Administrator, developer, and any member of the commission, city council or North Slope Borough Assembly can initiate the rezoning to resource district that includes a Master Plan. The commission shall approve or disapprove the application or return it to the developer for modification or corrections, based on the requirement of Title 19 procedures and policies.

The review takes 60 days and if the commission fails to act within 60 days period, the recommendation will be considered approved, unless the developer consents to an extension.

The Master Plan requirement includes maps, estimate of schedule for development, analysis of impact of the proposed development in accordance to NSBMC Title 19.70 applicable policies, an analysis of the cumulative impact of proposed development, and other information the commission by rule may prescribe. The commission further may request periodic updates of the Master Plan.

Village policies include that an applicant cannot grossly violate guidelines on the rate of growth adopted by the village; the proposed activity or development must be consistent with relevant adopted village comprehensive development plans, such as Nuiqsut Paisangich; contribute to lowering the energy cost and power; and provide for village employment. Economic policies encourage the use of local and private businesses, regional, or village corporations; utilization of flexible employment procedures to allow for subsistence; encourage development of job training programs; use of Inupiat arts and crafts; utilization of obtained energy source for local use; and encourage generation of tax revenues over demand of expenditures.

### Best technologies

Other policies that require careful



PETROLEUM NEWS, WEEK OF APRIL 29, 2007

# BIF out for 2008-17 North Slope lease sales

*Two substantive changes in mitigation measures: bear interaction plans required; pipelines must be elevated minimum of seven feet*

By KAY CASHMAN  
Petroleum News

In order to hold areawide oil and gas lease sales the State of Alaska's Division of Oil and Gas director has to make a best interest finding every 10 years for each of the geographical areas in which the division holds sales — the North Slope, Cook Inlet, Alaska Peninsula, North Slope Foothills and Beaufort Sea. The division has just released for public comment the first of five preliminary BIFs; this one for the North Slope region. It includes an Alaska Coastal Management Program consistency analysis and can be found online at [www.dog.dnr.state.ak.us/oil/products/publications/northslope/nsaw08-ff\\_toc.html](http://www.dog.dnr.state.ak.us/oil/products/publications/northslope/nsaw08-ff_toc.html).

The purpose of the finding, which is expected to be issued with the ACMP analysis in September, is to determine whether the sales are in the best interest of the state and should be conducted.

To facilitate this, the division collected agency comments and socio-economic and environmental information to consider the potential effects of lease sales in the North Slope region, which consists of all unleased, state-owned lands lying between the National Petroleum Reserve-Alaska on the west and the Arctic National Wildlife Refuge on the east, and from the Beaufort Sea on the north to the Umiat Meridian Baseline in the south.

## Sale terms not yet determined

Allison Iversen, a natural resource specialist with the division, told Petroleum News April 25 that there were "no substantive changes" from the first areawide BIF in 1998, although bidding methods, minimum bid and sale terms have not yet been determined.

"Chapter 8 states that the sale terms will be determined annually, prior to issuing the notice of sale. Sale terms are always based on the pre-sale analysis of economic, engineering, geological and geophysical data, including the petroleum potential of available acreage," Iversen said.

The sale area boundaries have not changed, she said.

When asked if the Point Thomson leases would be included in the 2008 sale, Iversen deferred to Nan Thompson, petroleum manager in charge of units.

Thompson said, "Those leases have not currently been designated for the 2008 North Slope sale. DNR has not made a final decision about when or how that acreage will be sold."

The largest changes in the BIF, Iversen said, "are in the mitigation measures and lessee advisories," but "these changes are more in format than substance. The mitigation measures have been completely re-formatted to make them easier to add — and/or delete — measures as necessary without re-numbering all of the measures."

In the new BIF, the mitigation measures are organized into seven major topics, identified by Iversen as: facilities and operations; fish and wildlife habitat; subsistence, commercial and sport harvest activities; fuel, hazardous substances and waste; access; prehistoric, historic and archeological sites; and local hire, communication and training.

"Because the division will be updating all of the areawide findings in the near future, we took the opportunity to standardize mitigation measures statewide, where appropriate," Iversen said.

"Obviously, some measures applicable in Cook Inlet or the Alaska Peninsula will not be applicable to the North Slope. Regardless, standardizing the mitigation measures will assist in permitting for both the state and industry."

## Error in Chapter 5

That said, "at first blush" the mitigation measures appear to have undergone massive changes, but Iversen said only two major substantive changes have been made.

The first is, all pipelines "must now be elevated a minimum of seven feet — mitigation measure 1.h."

And, second, bear interaction plans are now required — mitigation measure 2.e.iii.

"The mitigation measure printed in the finding is in error — it states that the plans are rec-

see BIF next page



## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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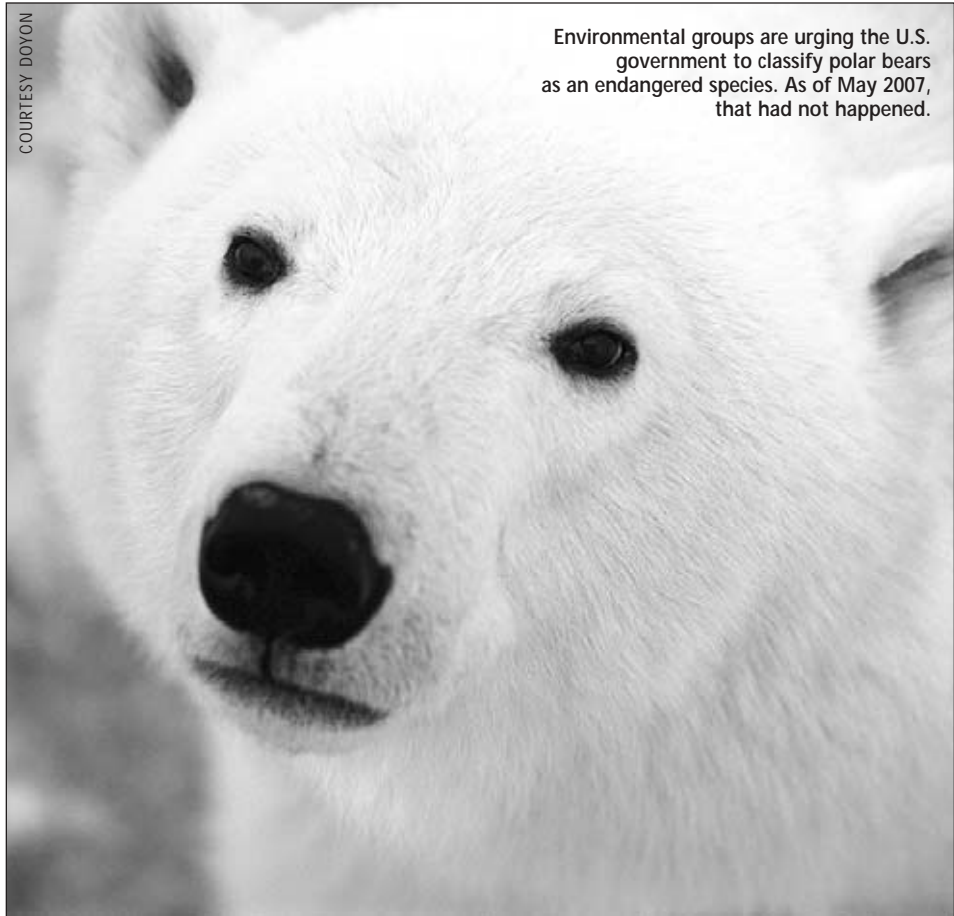


continued from page 9.14

# PROJECTS

analysis are coastal management and areawide policies. For instance, when extensive adverse impacts to a subsistence resource are likely and cannot be avoided or mitigated, development shall not deplete subsistence resources below the subsistence needs of local residents of the borough. Development shall not preclude reasonable subsistence user access to the subsistence resource. The developer shall take all feasible and prudent steps to avoid the adverse impacts that the policies are intended to prevent. These require several meetings with planning staff and other borough departments to prevent delays and misunderstandings.

The new developers that are just coming into the North Slope seem to be more willing to look at best available technologies as they plan for their exploration and development. They try harder to be good neighbors and work with the local communities most affected by proposed development. The older oil and gas companies still operate by confrontation and challenges that create animosity with the governments, residents and communities. ■



COURTESY DOYON

Environmental groups are urging the U.S. government to classify polar bears as an endangered species. As of May 2007, that had not happened.

continued from previous page

# BIF

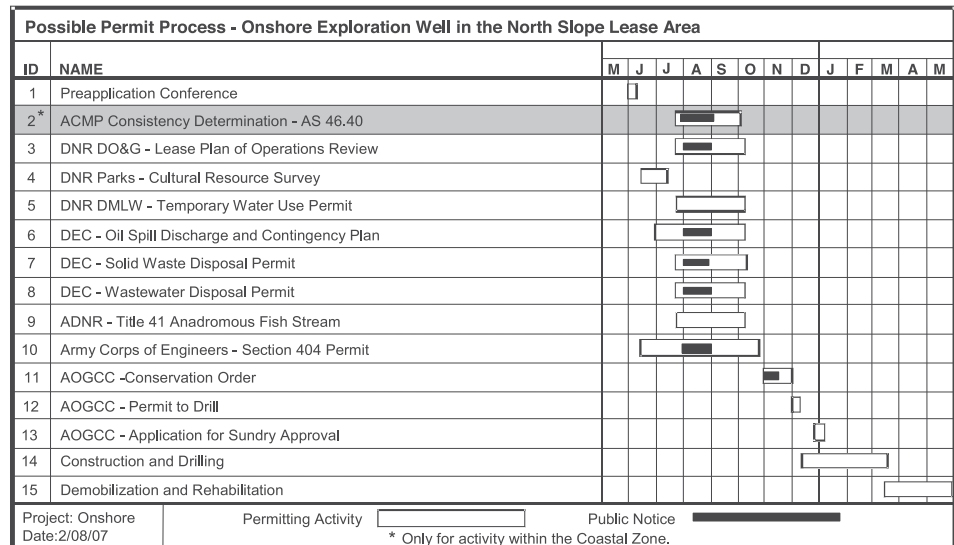
ommended,” but the division “does intend to require the bear interaction plans and will make this edit for the final finding,” Iversen said.

In Chapter 5, which discusses the potential impacts and mitigation measures, she said there are “several references to the plans as recommended, not required. I apologize for the error and any confusion. The bear interaction plans will be submitted at the plan of operation stage and will be reviewed by OHMP staff.”

As for the rest of the finding, “new wildlife, habitat, subsistence, economic and other pertinent information has been incorporated,” Iversen said.

Once a finding has been completed, the division can conduct lease sales in the area for 10 years. However, annually, before holding a sale, the agency, which is part of the Alaska Department of Natural Resources, “must determine whether a supplement to the finding is required by issuing a call for comments,” Iversen said.

**Table 1.1 Possible Permit Process**



Based on the comments received, the division then issues either a finding of no new substantial information or a supplement to the finding. Additionally, the agency has to issue a notice of lease sale at least 45 days prior to the sale, detailing the sale terms.

The public comment period for the North Slope areawide lease sale to be

held this fall just closed. Iversen said the comments the division receives will be compared to the 1998 finding and mitigation measures, not the new one.

“Similarly, comments submitted on this preliminary finding will be incorporated into the final finding, but will not necessarily impact the 2007 sale scheduled for October,” she said. ■



# Alaska Clean Seas: World Class Spill Response

## *Proven Leader in Arctic Oil Spill Response*

**A**laska Clean Seas (ACS) is a non-profit oil spill response cooperative whose current membership includes oil and pipeline companies that engage in or intend to undertake oil and gas exploration, development, production or pipeline transport activities on the North Slope of Alaska.

The purpose and mission of ACS is to provide personnel, material, equipment and training to its members for responding to oil spills on the North Slope. When authorized by the Board of Directors, ACS may also respond to non-member spills.

Originally formed in 1979, ACS was restructured in 1990 from an equipment cooperative into a full-response organization. ACS is now organized to respond, like a fire brigade, to an emergency with both trained people and response equipment.



ACS maintains approximately 70 full-time staff, including contractors, all of who are available for response operations. About half of these employees are located within the fields and perform daily spill response and environmental duties under the immediate direction of the member companies.

Our area of operation includes Alaska's North Slope and selected areas of the Alaskan Outer Continental Shelf and adjacent shorelines and the TransAlaska Pipeline from pump station one to milepost 167.

A primary objective for ACS is safety. We are very proud to acknowledge there were no Recordable Injuries or Days Away From Work in

2005 for ACS employees and contractors. A continuous effort to maintain safety focus and awareness contributed to this success.

Each member of Alaska Clean Seas enters into a Mutual Aid Agreement. This agreement provides members with efficiencies and cost savings from sharing of resources among all the members in the



Alaska Clean Seas West Dock Mooring Facility



Visit the company online

[www.alaskacleanseas.org](http://www.alaskacleanseas.org)

event of an oil spill. It outlines the terms and conditions under which each member company can make available their employees, contractors, equipment, materials and supplies to each other in the event of an oil spill.

ACS owns equipment totaling over \$25,000,000. The member companies also own approximately \$25,000,000 of equipment that is maintained by ACS and available through the mutual aid agreement. The inventory includes: over 287,000 feet of oil containment boom (including approximately 17,450 feet of fire boom), 160 skimmers, eight helitorch aerial ignition systems, 94 vessels, two 128 barrel and twelve 249 barrel mini-barges, various sizes of storage tanks and bladders and wildlife hazing and stabilization equipment. This includes an extensive offshore marine response capability.

ACS Base in Deadhorse contains a Emergency Operations Center for use by the member companies. Emergency

Operations Centers are also located at Alpine, Kuparuk, Milne Point, and Prudhoe Bay and are available through the Mutual Aid Agreement. Mobile facilities are also available, such as the Bird Stabilization Center, and Command and Staging Area Trailers.

The Training Staff at Alaska Clean Seas provide continuous oil spill training support to the member companies. This support includes classroom presentations, field practicals, tabletop exercises, and actual deployment drills. With an average of over 2,000 instructor hours per year, hundreds of training development hours, and extensive oil spill response experience, their expertise radiates throughout their lessons.

ACS also participates annually in numerous tabletop and equipment deployment exercises. This includes the annual North Slope Mutual Aid Drill (MAD) which is a major manpower and equipment deployment drill. ■



Airboat Operations are critical for travel on North Slope Rivers

### Current Membership:

Alyeska Pipeline Service Company, Anadarko Petroleum Corporation, BP Exploration (Alaska) Inc., ConocoPhillips Alaska Inc., ExxonMobil Production Company, FEX L.P. and Pioneer Natural Resources (USA)



# American Marine Corporation

**A**s Alaska's oil and gas infrastructure continues to grow, American Marine Corporation (AMC) stands ready to assist companies with their installation, inspection, repair and maintenance needs. As a bonded, fullservice specialty marine contractor with offices in Anchorage, Honolulu and Los Angeles, AMC has vast experience in marine construction, pipeline and platform installations and repair, dredging, marine salvage, underwater certified welding, vessel support as well as underwater inspections and photography.

A company diverse as its clientele, American Marine takes pride in its ability to provide businesses in the public and private sector with single-source, innovative solutions for their most complex projects. Working in challenging environments under stringent time schedules is routine for the management, divers, welders and administrators at AMC.

"Our abilities are unquestionable, but what makes this company stand out is our attention to safety and compliance issues while getting the job completed quickly, efficiently and in the most cost-effective manner possible," says Tom Ulrich, Regional Manager for Alaska operations.

American Marine Corporation was presented with the 2005 & 2006 Specialty Contractor of the Year Awards by the Association of General Contractors. In 2005, AMC was recognized for their exceptional work on the Tesoro 10" Pipeline Replacement project at Point Possession in Cook Inlet, Alaska. The



An AMC North Slope Diver (above), the Sitka Blue Lake Project (top) and the Tesoro Pipeline Replacement Project (right).



Visit the company online

[www.amarinecorp.com](http://www.amarinecorp.com)

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unusually challenging project called for the replacement of 1960-ft of a sub-sea products pipeline that had been damaged by external corrosion. The underwater work site was in an active tidal zone in Cook Inlet which required the skills and resources of numerous skilled professionals carefully choreographed to not interfere with the pipeline's delivery schedule.

In 2006, the AGC recognized American Marine for their outstanding work on the Sitka Blue Lake dredging and restoration project. Battling extreme and unseasonable weather conditions, the AMC divers and crews were able to remove 7,000 cubic yards of debris from Blue Lake dam and perform necessary maintenance on the lake level control system which was restricting water flow by as much as 66%. This system provides the main water and



electrical supply for the Sitka area.

American Marine strives for excellence by providing safe, compliant and cost-effective operations while maintaining the highest level of productivity. ■



# Pacific Environmental Corporation

*Providing leading edge technology for operations execution and project management*

**P**acific Environmental Corporation (PENCO) maintains the philosophy that the key to a healthy environment is ensuring proper training, practicing proper safety precautions and taking preventative steps to avoid disaster.

However, when necessary to clean up after an oil spill, a leaking storage tank or any one of the several potential mishaps to Alaska's environment, PENCO employs leading edge technology for operations execution and project management.

Pacific Environmental Corporation works hand in hand with oil and pipeline companies by providing valuable assistance in their daily operations.

PENCO provides drill rig spill technicians to support drill operations from the Kenai Peninsula to the North Slope. These specially trained spill technicians contribute to a safe working environment on drilling rigs while being available to respond to any spill emergency that may arise during production. Technicians are also on standby to provide fuel transfer supervision at the Anchorage port as well as other fuel transfer sites across Alaska.

Proper tank and fuel line inspection and maintenance is another way PENCO



assists companies in their preventative programs. Early corrosion detection not only helps in the prevention of an oil leak, but also ensures the highest quality product can confidently be stored in a bulk storage facility. PENCO has a team of highly skilled inspectors and tank cleaners on hand ready to support routine



cleaning and maintenance as well as provide certified tank inspections.

Should a company find itself at the responsible end of a fuel discharge, Pacific Environmental stands ready 24 hours a day to respond to a spill—large or small. With over 100 highly trained spill responders on staff, PENCO is one of the largest response companies in the State of Alaska. PENCO's high standards of training ensure personnel responding to any spill are versed in the latest and most effective spill clean-up techniques.

During the Selendang Ayu spill response in Dutch Harbor, Alaska (December 2004 – September 2005), PENCO had positions on the initial Incident Command Team and provided fully crewed vessels with responders to provide beach clean up assistance throughout the duration of the project. During March and April 2006, PENCO was the major spill response provider for the GC1/GC2 flowline spill on the North Slope making available field



supervisors, team leaders, heavy equipment operators, decon and staging personnel as well as numerous spill technicians.

With offices in Alaska and Hawaii, PENCO is an environmental response company that has built its reputation on providing innovative solutions at an affordable price across the Pacific Basin. Pacific Environmental is affiliated with American Marine Corporation, a specialty marine construction and diving contractor that focuses on pipeline and platform inspection and maintenance, dredging, crew boat services, barge towing and construction vessel support. ■

#### CONTACT:

Pacific Environmental  
6000 A Street • Anchorage, AK 99518  
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# Cruz Construction: Innovation in the Arctic

**W**e're geared up for remote arctic work. We offer more options, the latest equipment, competitive pricing and quality personalized service. We pay attention to detail, stay on top of agency requirements, and attend to customer needs," says Dave Cruz, President of Cruz Construction, Inc "I'm up front and solutions oriented," continues Cruz, who co-owns the business with his wife, Dana.

Cruz Construction has three offices, Palmer, Fairbanks and Deadhorse. The company specializes in exploration support, winter ice roads, ice pads, off-highway transport, remote fuel transportation, and heavy civil construction.

Recognizing the importance of timely start up in a short construction season and minimal disturbance in environmentally sensitive areas, Cruz Construction uses innovative, customized equipment to get the job done.

## Amazingly mobile

"Few, if any, companies can match our ability to mobilize quickly to virtually any location in Alaska. We bring all necessary equipment, including camps, temporary bridges, and all-terrain vehicles to the project. And by keeping a self-contained man camp where the work is, valuable man hours are spent working on your project, not traveling to and from the job-site."

"One big advantage is that our fleet, including the low ground pressure vehicles, is sized for transport in a C-130 HERC aircraft," says Cruz.

## Boosting the business

When Western GECO discontinued work in Alaska, Cruz purchased its assets, including two shops and a pad in Deadhorse, and the fuel transfer and storage facilities at Lonely. Tundra-approved low ground pressure (LGP) power units and trailers capable of hauling 30-ton loads, LGP fuel tankers, and Tucker Sno-cats, top the list of acquired equipment. Cruz also owns a hydrocarbon recovery and disposal system unit, on-site cleanup for small spills. The company's portable self-contained man-camp is equipped with a snow melter and incinerator. "If your site is 100 miles from a road, we will pioneer a winter trail to your lease, build an ice pad, transport the drill rig and sup-



*Cruz Construction has three offices, Palmer, Fairbanks and Deadhorse. The company specializes in exploration support, winter ice roads, ice pads, off-highway transport, remote fuel transportation, and heavy civil construction.*

plies, support your operations with water and fuel for the duration and then demobe for you."

## Well-earned recognition

In 2004, the 47-mile Teck-Pogo winter road built by Cruz crews in less than 30 days did not go without accolades.

A post-project letter to the company praised its work:

"Now that the winter road is but a memory we have had time to take a moment and reflect on just what an amazing feat was accomplished. In the course of less than a month, your crews successfully built 47 miles of meandering ice road in rugged terrain and maintained that road for two months in such superb condition that we had virtually no problems in bringing over 600 loads of freight, including a Cat 385 excavator and 88-foot bridge, to the Pogo mine site...



your ingenuity toward the unexpected problems that surfaced virtually daily is much appreciated ... and we are particularly pleased with the success of this project in the eyes of both the federal and state regulators." (From Peter Olson, PE, Construction Manager, AMEC E& C Services Ltd.).

"Like our saying goes, 'where the road ends, our work begins.' says Cruz. ■



# ENSR: A trusted environmental partner

*Providing comprehensive energy and resource development environmental services for Alaska industry since 1977*

**E**NSR is a global provider of environmental and energy development services to industry and government with 1,700 employees and 70 worldwide offices. As an AECOM company since 2005, ENSR is now part of a global design and management company with 24,000 employees worldwide serving the energy, transportation, facilities, and environmental markets. ENSR and AECOM operate under a common philosophy of one seamless company delivering high quality, responsive, and consistent client services.

ENSR has served oil and gas and other resource-based industries in Alaska for the past 29 years, performing environmental planning and permitting, environmental health and safety (EHS) compliance management, property transfer assessment, and contaminated site closure. "We grew up with the oil and gas industry in Alaska and have a long history of developing proven solutions and innovative approaches for our clients," says Chris Humphrey, ENSR Alaska General Manager. "Likewise, oil and gas is ENSR's single largest market sector, and we are working across the globe on the full spectrum of upstream, midstream, and downstream project activities."

## Environmental Planning and Permitting

Our in-depth knowledge of the oil and gas industry and its associated regulatory, social, and political requirements has enabled ENSR to become a leader in environmental planning and permitting services, spanning all areas of exploration, development, and production activities, from NEPA assessments and environmental impact statements to operational permits for air, water, and waste. Through team permitting, ENSR is able to anticipate and address permit requirements early on to help our clients with a comprehensive and time-critical permitting strategy.

In Alaska, our recent planning activities included the Northeast National Petroleum



Reserve-Alaska (NPR-A) Amended Integrated Activity Plan/Environmental Impact Statement (IAP/EIS); Yukon Flats National Wildlife Refuge Land Exchange EIS; Environmental Social Impact Assessment for Shell's Offshore Seismic Program; and TAPS Valdez Marine Terminal Strategic Reconfiguration Environmental Assessment. "Our 29 years of North Slope experience combined with our company-wide NEPA and oil and gas experience puts ENSR at the forefront for NEPA projects such as these," says Steve Ellsworth, ENSR's planning and permitting program manager for Alaska.

ENSR has specialized in addressing the public participation requirements of NEPA by creating and finding the right tools to compile, analyze, and report large volumes of data. For the Northeast NPR-A EIS, ENSR designed unique database management and web-based tools to process and respond to over 220,000 public comments.

ENSR remains a leader in large oil and gas energy development projects and has completed nearly 75 permitting, certification, and inspections projects for gas pipelines and LNG terminals throughout the United States and internationally since 2001.

## Environmental, Health, and Safety Compliance Management

ENSR offers a wide umbrella of EHS management services for industry and

government clients, including audits, environmental management system implementation support, planning documents, oil spill contingency plans, and training. Jane Thomas, ENSR Alaska's EHS lead, is one of a handful of certified environmental auditors in the state, and the compliance management team has experience with a wide range of industries, such as oil and gas production, oilfield support, maritime, military, retail, and manufacturing.

## Integrated Site Closure

For contaminated sites, ENSR provides a risk-based, integrated approach that combines assessment and remediation expertise in a comprehensive site closure strategy. Using our approach, we can quickly engage our multidisciplinary team to attain regulatory site closures in a more timely and cost-effective manner.

Innovation is also key to ENSR's site closure methodology. "We work with our clients and regulatory agencies using risk-based approaches to reach mutual agreements on closing sites," says Humphrey. "For example, our development of an effective ecological risk assessment tool evaluating residual petroleum sheen on water – a major ADEC compliance point – was key for allowing risk-based closure decisions that to date resulted in closure approvals for over 150 reserve pits at 41 drill sites on the North Slope."

## Award Winner

A winner of the Environmental Business Journal 2005 Business Achievement Gold, ENSR has also been cited as a top environmental supplier in multiple countries, including the United States, and has received the BP HSSE Diamond Award.

At ENSR, everything we do in Alaska and worldwide is designed to build trust and enduring business relationships. We do this through our high performance service teams; commitment to health, safety, and environmental excellence; innovative technical solutions; and responsible corporate citizenship. ■

ENSR | AECOM

# Perkins Coie: Your partner in project development

**O**il and gas exploration in Alaska requires a strategic balance between the search for new opportunities and protecting the environment. At Perkins Coie, we offer local, Alaska-based knowledge and the depth of a full-service law firm. We represent many of Alaska's largest industrial operations as well as companies who are new to the state.



Visit the company online  
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## On the Ground in Alaska

Perkins Coie is a national law firm with experienced environmental and natural resources lawyers based in Anchorage. Our core practice area is project development for the oil and gas, mining, timber and heavy construction industries. We know the local players and issues and what it takes to move an Alaskan project forward. Because decisions concerning Alaska are often made by officials located Outside, we have a deep bench of environmental and natural resources lawyers in the Pacific Northwest and Washington, D.C. with active practices focused on Alaska.

## Experience in Alaska Projects and Issues

Perkins Coie has an experienced, diverse team of environmental and natural resources lawyers, including a former Commissioner of the Alaska Department of Natural Resources, a former General Counsel of the U.S. Marine Mammal Commission, and the former chief lawyer for NEAP litigation at the U.S. Department of Justice. We have the resources and experience to ensure that projects are planned to minimize legal risks and to defend our clients' interests before administrative agencies, the courts and legislative bodies. ■

Perkins  
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Legal Counsel to Great Companies



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# SGS Environmental: Alaska's lab for 40 years

**S**GS Environmental has been supporting the oil industry for as long as there has been an oil industry.

Anywhere there is oil exploration happening, SGS is there. As the world's largest environmental service provider, SGS brings considerable resources to bear to any project on the globe. From on or off site compliance testing and monitoring to ISO certification, SGS has continually performed for the largest companies in the field. SGS has the expertise to get the job done on time and on budget.

## Forty years in Alaska

SGS Alaska began by supporting the Kenai oil fields in the late 60's. At that time we deployed on-site technicians and equipment to perform

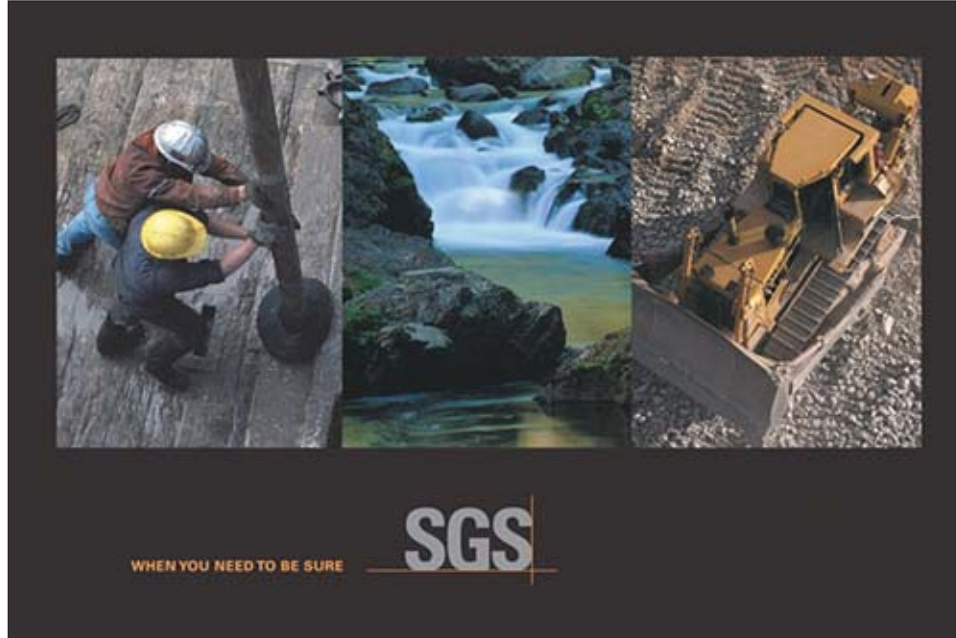
analysis on a rapid turn around basis. Analytical support twenty four hours a day seven days a

week expedited the permitting and compliance process and reduced the risk of sending samples out of state for analysis. Today SGS occupies a state of the art facility in Anchorage with a service center in Fairbanks. Our staff of 60-plus professionals perform over 100,000 analyses a year. SGS has multiple service offerings ranging from quick turn hydrocarbon and compliance analysis to full service on-site support. Our global network insures that SGS can bring the expertise and manpower to any size project in remote Alaska. When you need to be sure the job is going to be done right, SGS is there. ■



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*Today SGS occupies a state of the art facility in Anchorage with a service center in Fairbanks. Our staff of 60-plus professionals perform over 100,000 analyses a year*



**SGS**

### SGS Services:

Full Service Analytical Testing  
On-Site Lab Services  
Process Control Monitoring  
Microbiological Assessments  
Compliance Monitoring  
ISO Certification  
Ad-Hoc Support Personnel

### Proven Benefits:

Legally Defensible Data  
Rapid Turn Around  
Customer Focused Service  
Reduced Risk with Local Service  
Technical Analytical Support



Above: Sable Project, Nova Scotia.

- Analytical Services
- Offshore Chemists
- Consultancy/ R&D

# Carlile keeps freight moving in and out of Alaska

*New routes deliver more options for Alaska commerce*

**A**s we draw near the 30th Anniversary of T.A.P.S., Carlile is proud to have played a part in supporting Alaska's transportation needs.

A new terminal was opened in January 2006 in Tacoma, Washington, featuring cutting edge technology and 65,000 square feet of cross dock space. "The new facility positions Carlile to stay ahead of growing



demand," said Harry McDonald, Carlile president. "It's part of our ongoing commitment to building the infrastructure that will keep Alaska shipments moving seamlessly."

Providing the best equipment and transportation network has been at the core of Carlile's success over the past 30 years. Harry and John McDonald, brothers, started Harry McDonald Trucking, their first trucking company in 1975.

"We saw an opportunity to move Alaska forward. It's been an amazing trip," said Harry McDonald.

The McDonalds landed their first major contract in 1980 hauling urea from Agrium's Nikiski plant. By then, their fleet included three trucks. They renamed their company Carlile - John's

Staff outside the new Tacoma facility. January, 2006



Visit the company online  
[www.carlile.biz](http://www.carlile.biz)

middle name - and opened their first office in Anchorage.

The oil and gas industry became an increasingly important customer. In 1987 Carlile hauled its first shipment to Prudhoe Bay and secured a contract with ARCO, now ConocoPhillips. Its first North Slope terminal opened in 1988.

Carlile added a hazardous waste divi-

*"We saw an opportunity to move Alaska forward. It's been an amazing trip,"*

—Harry McDonald

sion in 1990 and purchased a new Fairbanks facility the following year. Several acquisitions enabled the company to expand its services. Carlile became an interstate hauler in 1994 when it purchased K&W trucking and opened its Federal Way office in Tacoma, WA. In 1996 Carlile began offering heavy haul and increased services in 2001 when it acquired Asay Trucking.

Carlile purchased Markair's North Slope facility in 1991 and developed a bulk storage yard to help service its new account with Alyeska Pipeline Service Co. It added a logistics division in 1996 to better service TRW, Alyeska and Unocal.

In Anchorage, Carlile outgrew its original Ship Creek facility in 1998 and moved to a much larger headquarters and terminal on First Avenue. Additional offices and terminals support interstate logistics in Seward, along with Houston, Texas, and Edmonton, Alberta.

In April 2006, Carlile opened for business in Minnesota with expanded freight services and customer shipping to and from Alaska. The new routes allow Carlile to service the Midwest and East Coast through the Minnesota or Tacoma gateway, with expedited highway or water service. Also during the spring of 2006 Carlile acquired the assets of Alaska-based Keytrans, Inc, a transportation company with a 30-year history serving Alaska and the Pacific Northwest.

From consumer goods to construction materials, Carlile is a fully integrated transportation and logistics company that can get your goods across North America to Alaska.

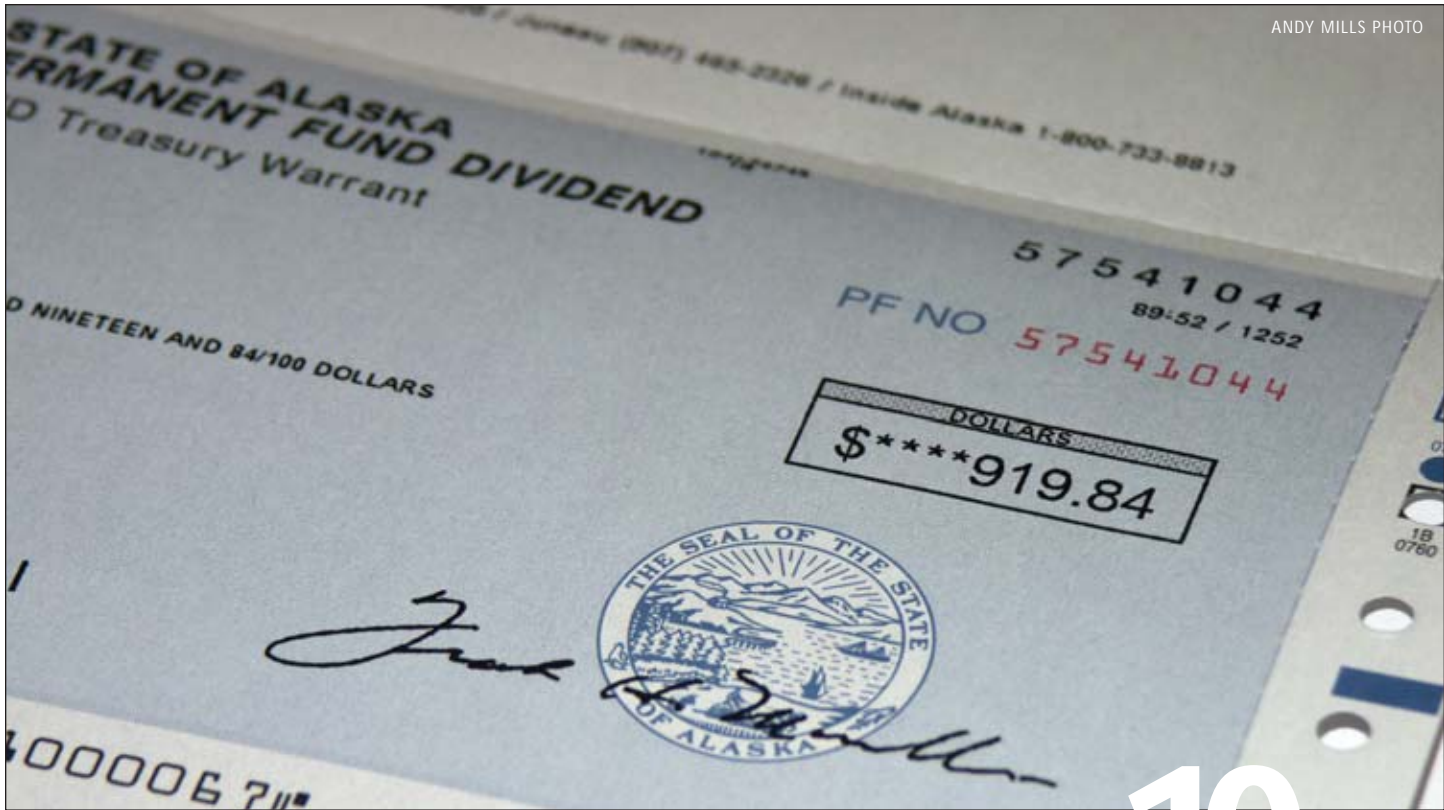
Carlile: customer committed for the long-haul. ■

Carlile on the North Slope



Alpine heavy haul project





# CHAPTER 10

*Royalties, taxes, access and other fees*

## PPT notice to readers

*Alaska's new production tax might be changed by a special session of the Alaska Legislature in late 2007 or during the regular 2008 session.*

*Watch for updates in Petroleum News ([www.PetroleumNews.com](http://www.PetroleumNews.com)) about the state's petroleum profits tax, commonly referred to as PPT. See Petroleum News reprint about PPT from the May 20, 2007 issue on page 10.7.)*

## CHAPTER 10

# Royalties, taxes, access and other fees

## Introduction

**A**s in other parts of the United States, oil and gas companies operating in Alaska have to pay royalties and rents to landowners, while government entities also collect various forms of severance, property and other taxes.

Royalties and taxes differ fundamentally. Royalties form part of a contractual agreement between the landowner and the lessee. So, changes to royalties are almost always made by mutual agreement. On the other hand, governments possess the sovereign right to raise taxes and can change taxes at will.

In Alaska, the federal and state governments own the majority of the subsurface mineral rights, so that federal agencies and the state collect most of the royalties. The Native regional corporations also own significant subsurface property rights. The Alaska Mental Health Trust and the University of Alaska own land under trust arrangements.

The State of Alaska collects the bulk of the revenues associated with oil and gas production in Alaska, although local municipal governments also collect substantial taxes, mainly in the form of property taxes. As well as collecting federal corporate income tax, the federal government has collected substantial sums from leasing revenues, but far less than the state in terms of production-related revenues.

The royalty system and especially the tax system in Alaska are quite complex. Many of the provisions that exist today are the result of long, complicated and often contentious negotiation and litigation. A thorough knowledge of these systems is essential to doing business in Alaska. What follows is just a brief overview.

## State of Alaska

Jurisdiction for state taxes extends across the whole of Alaska, including off-

**Table 10.1: State of Alaska PPT tax floor as a percentage of total wellhead value of production**

Oil price Alaska North Slope, West Coast spot	PPT tax floor
More than \$25 per barrel	4 percent
More than \$20 to \$25 per barrel	3 percent
\$17.50 to \$20 per barrel	2 percent
More than \$15 to \$17.50 per barrel	1 percent
Less than or equal to \$15 per barrel	0 percent

shore areas within three miles of the coastline. The state also collects royalties from oil and gas leases on state lands and collects a share from production on some federal lands.

You can find useful information about state taxes in Alaska Department of Revenue annual reports at <http://www.tax.state.ak.us/reports.asp> and revenue sources books at <http://www.tax.state.ak.us/sourcesbook/index.asp>. Information about state royalties can be found at <http://www.dog.dnr.state.ak.us/oil/programs/royalty/royalty.htm>.

The following sections provide an overview of the state taxes and royalties. We've also included a discussion of wellhead value, a critical parameter in the calculation of state royalties and petroleum profits tax.

### Wellhead value

Alaska royalties are calculated as percentages of the wellhead value of produced oil and gas, while the wellhead value also forms the starting point in the calculation of petroleum profits tax on oil and gas production.

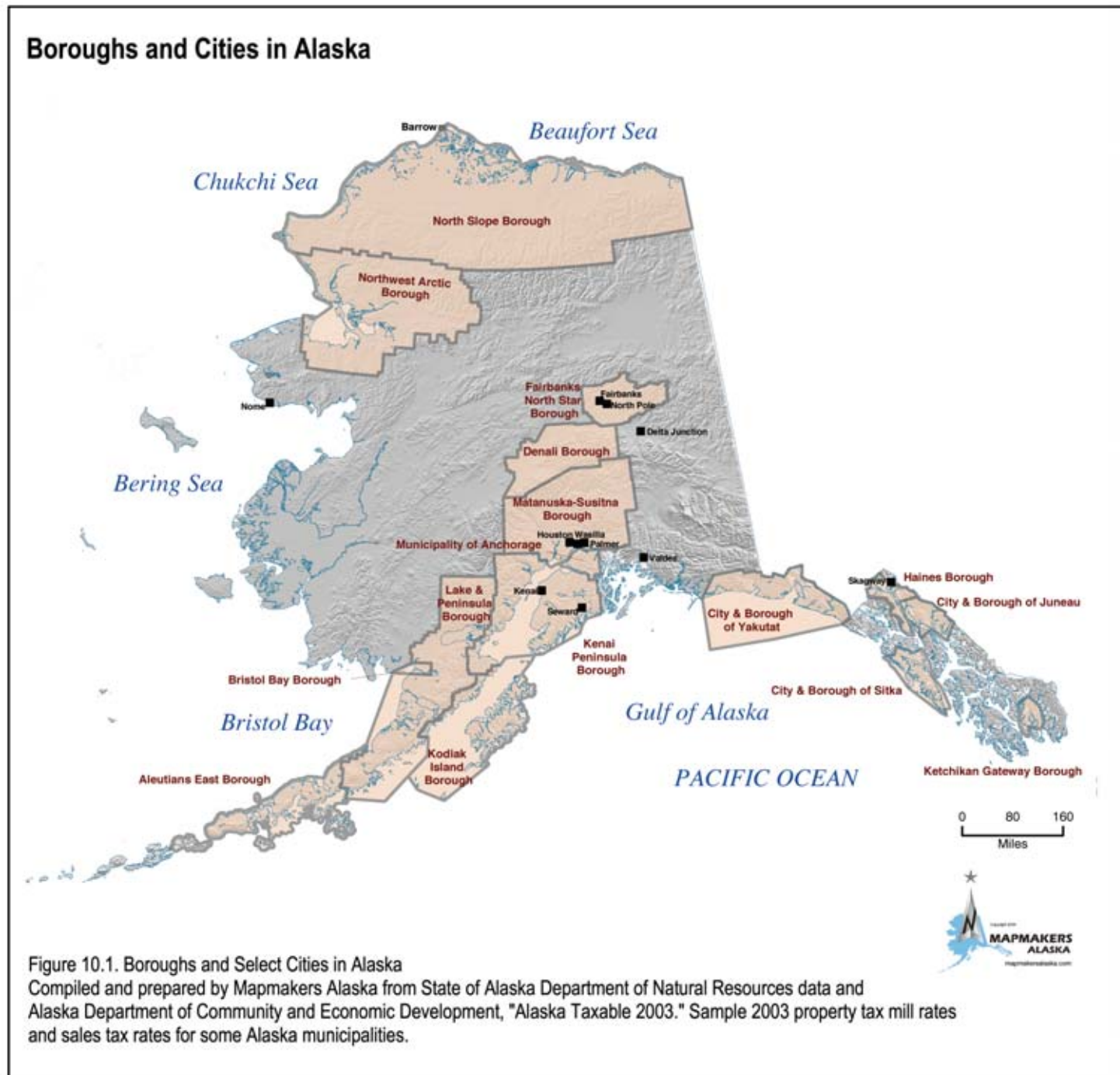
In general, the wellhead value of oil or gas consists of the netback value of the product at the wellhead — the price of the oil or gas at market less eligible transportation costs for moving the product from the oil or gas field to the point of sale.

The state carefully scrutinizes oil and gas transportation costs, including the cost of pipeline usage — it's in the state's interests to ensure that these costs are kept as low as possible. In the past the state has challenged the costs and there is a methodology for resolving disputes. For example in December 2004 the state challenged a tariff increase proposed by the owners of the trans-Alaska oil pipeline.

In some situations the state sets the wellhead value at what it terms the "prevailing value" of the oil or gas. This type of value determination particularly applies to natural gas produced from the Cook Inlet Basin, where the prevailing value of the gas depends on what the gas is used for. The value of gas sold to the Nikiski fertilizer plant is indexed to the current market price of anhydrous ammonia. The prevailing value of utility gas for local use in Southcentral Alaska is the weighted average sales prices for all utility gas sold in the region each month. The Alaska Department of Revenue determines the prevailing value of gas exported from Alaska as LNG.

The assessment of taxes and royalties for Cook Inlet utility gas using the prevailing value can cause problems for a producer with relatively low contract utility gas prices, because the effective tax and royalty rates become higher than what the producer would pay based on just the price of its gas.





## Royalties

State revenues from oil and gas royalties derive from oil and gas leases on state lands. Revenues from the leases come in three forms:

1. Bonus bids received from lease sales.
2. The annual rental on leases. Rental rates are typically \$1 per acre in the first year, progressively increasing to \$3 in the fifth and subsequent years.
3. The retained royalties from oil and gas production from leases. Royalties are calculated as a percentage of wellhead

value. Royalty rates are generally between 12.5 percent and 20 percent, depending, in part, on the location of the lease. The state may take its royalties in value or in kind.

The state has on occasion issued leases with net profit share royalty arrangements in which the royalties are calculated as a percentage of the net profits on oil production.

Although the legal minimum royalty rate for a state lease at a lease sale is 12.5 percent, the state operates three royalty reduction programs to encourage oil and gas production. The programs can

result in royalties as low as 3 percent.

1. Royalty reduction law in Alaska enables the commissioner of the Alaska Department of Natural Resources to adjust state royalties, based on a showing of need, to encourage production from an otherwise uneconomic oil or gas field or pool. If a field or pool has not previously produced the commissioner can reduce the royalty rate to 5 percent. The commissioner can reduce the royalty rate to as little as 3 percent to prolong the life of a producing or previously producing field or pool. State statutes specify the procedure by which the commis-

sioner may make this determination.

2. Discovery royalty for most of Alaska was repealed many years ago. However, discovery royalty may be established at a rate of 5 percent for 10 years following discovery of a new oil or gas pool in the Cook Inlet Basin only, if wells are capable of producing from the pool in paying quantities.

3. Another Cook Inlet royalty reduction grants a 5 percent temporary royalty rate on the first 25 million barrels of oil and the first 35 billion cubic feet of gas produced in the first 10 years of production from six specified fields in the Cook Inlet Basin. Production from these fields had to begin before Jan. 1, 2004, to be eligible for this royalty reduction.

### Petroleum profits tax

Until 2006 the State of Alaska assessed oil and gas production taxes as a percentage of the wellhead value of the petroleum products. An “economic limit factor” adjustment then reduced the tax take from small fields or from fields where production had declined significantly.

But the production tax, combined with royalties and property tax on oil and gas facilities, proved regressive: As the price of oil increased, the state’s percentage of the value of oil production dropped.

Following negotiations with the North Slope oil producers regarding the construction of a North Slope gas export pipeline, the state decided to move from its traditional production tax to a new petroleum profits tax, or PPT, in which the tax would be assessed as a percentage of profits from petroleum production, rather than as a percentage of petroleum revenue. Following enactment of the PPT statutes, the state completed its first phase of development of PPT regulations in early 2007 and expected to complete further refinement of the new regulations by later in that year.

The move to a progressive revenue raising mechanism matched a trend to similar tax regimes seen in petroleum provinces outside the United States.

Under PPT, the tax is calculated, essentially, as 22.5 percent of the production tax value of the oil or gas. The production tax value consists of the wellhead value of the product (termed the “gross value” in state tax statutes and regulations), less upstream costs, termed “leases expenditures.” State law defines

Nordic Calista Rig 3 drilling the Nikaitchuq No. 4 appraisal well.



PHOTO BY JUDY PATRICK/COURTESY KERR-MCGEE

lease expenditures as “ordinary and necessary costs . . . that are direct costs of exploring for, developing, or producing oil or gas deposits.” Direct costs include operating and capital costs relating to the production of oil or gas, an allowance for overhead, and payments in lieu of property taxes, sales and use, motor fuel, and excise taxes.

The law specifically disallows as lease expenditures certain costs, such as depreciation, depletion, and amortization; interest or financing charges; lease acquisition costs; costs of arbitration or

litigation; costs arising from gross negligence; and facility abandonment, removal, or restoration costs. The legislature may make additional changes in the future to further clarify the deductibility of certain maintenance and other costs.

PPT allows a credit for capital expenditures at a rate of 20 percent. This, combined with the tax deduction of 22.5 percent as part of lease expenditures, results in a total tax reduction of 42.5 percent of companies’ allowable capital expenditures (22.5 percent deduction plus 20 percent credit). And, unlike



basic accounting rules that require companies to expense capital assets through depreciation over time, PPT allows companies to expense all the cost of a capital expenditure in the year that the cost occurred.

The state included this favorable treatment for capital expenditure to encourage oil and gas exploration and development, in recognition of the fact that major capital expenditure often precedes petroleum production — the state expects that the deduction of capital expenditures early in projects will provide cash flow benefits and increase project net present values. In fact, under PPT, companies can deduct expenses for unsuccessful exploration wells against profits from successful finds. Companies can also offset exploration costs by selling tax credits to profitable producers or by applying for cash refunds from the state (the state is in effect sharing the risk and expense of drilling dry holes).

The PPT approach to taxation also results in more operating cost deductions when costs are high. This may encourage development of unconventional resources, such as the substantial deposits of heavy and viscous oil known to exist on the North Slope.

PPT includes a tax floor that only applies to production on the North Slope. The tax floor is calculated as a percentage of the wellhead value of the oil or gas, and is graduated between 0 and 4 percent, depending on the price of oil (see table 10.1). However, the tax floor only applies if the PPT liability calculated prior to applying tax credits falls lower than the floor — after applying tax credits it is possible for the eventual PPT liability to be lower than the floor.

A progressive surcharge enables the collection of additional tax revenues when the profits from oil production are especially high. The progressive surcharge rate ranges from 0.25 percent per dollar on production tax values exceeding \$40 per barrel, up to a progressive surcharge ceiling of 25 percent at \$140 per barrel. When combined with the PPT tax rate of 22.5 percent, the maximum total tax a company could pay is 47.5 percent of production tax value.

As a support for small producers and to encourage the development of small oil and gas fields, the PPT statutes include a provision for a \$12 million tax base allowance credit per year for a company with operations having production volumes of less than 50,000 barrels per

**Table 10.2: Sample 2006 property tax mill rates and sales tax rates for some Alaska municipalities**

Municipality	Property tax mil rate	Sales tax rate
North Slope Borough	19.05	Payment in lieu of taxes
City of Barrow	North Slope Borough levy only	None reported
City of Nome	11.00	5%
City of Delta Junction	None	None
City of Fairbanks	19.623	None
City of North Pole	17.073	4%
City of Valdez	20.00	None
Municipality of Anchorage	15.28	None
Matanuska-Susitna Borough	11.415	None
City of Palmer	13.645 (including borough levy)	3%
City of Houston	14.755 (including borough levy)	2%
Kenai Peninsula Borough	6.50	2%
City of Kenai	12.10 (including borough levy)	3%
City of Seward	10.22	4%
Bristol Bay Borough	13.0	None
City and Borough of Juneau	10.17	5%
Haines Borough	13.13	5.5%
City of Skagway	8.48	4%

**Table 10.1: Sample 2006 property tax mill rates and sales tax rates for some Alaska municipalities (for guidance only – contact the municipality for precise information)**

Source: Alaska Taxable 2006, Alaska Department of Community and Economic Development

day. Companies with production of more than 50,000 barrels but less than 100,000 barrels per day, receive a smaller credit based on a sliding scale. The base allowance credit is not transferable, nor can it be carried forward; it is scheduled to sunset in 2016.

A separate base allowance of \$6 million per year, with no upper level production limit, applies to operations outside the North Slope and Cook Inlet producing areas.

And, in recognition of the challenging economics of oil and gas production in the Cook Inlet area, companies operating in Cook Inlet will pay the lesser of the PPT and the economic limit factor-adjusted production tax, as that tax would have been assessed prior to the enactment of PPT (the economic limit factors had resulted in very low production tax

rates for Cook Inlet fields). The special Cook Inlet provisions will sunset in 2022.

### Conservation surcharge

A conservation surcharge of 1 cent per barrel applies to all oil production in Alaska, if the state's oil and hazardous substance release prevention and response fund falls below \$50 million. Another conservation surcharge of 4 cents per barrel is levied on all oil produced in Alaska, with no fund balance contingency. Neither of the surcharges applies to state or federal royalty oil.

### Corporate income tax

All corporations with nexus in Alaska have to pay state corporate tax, but special tax rules apply to oil and gas produc-

ers and to pipeline owners. For these types of corporation, income tax is levied on the amount of corporate income oil companies earn through their operations worldwide as apportioned to Alaska through an apportionment factor. Federal tax codes govern the calculation of taxable income, although some special rules apply to income not covered by the federal codes.

Rates for corporate income tax brackets range from 1 percent to 9.4 percent, although the effective rate may be reduced through allowable deductions and credits.

### Regulatory cost charges

Operators of pipelines regulated by the Regulatory Commission of Alaska have to pay a regulatory cost charge that is calculated as a percentage of adjusted gross regulated pipeline revenue. The rates vary from year to year (in the 2007 financial year they were 0.789 percent for pipeline carriers).

### Property tax

The state charges property tax on all oil and gas exploration, production and pipeline equipment and facilities in the state. The tax is calculated as a percentage of the assessed value of the property and the current rate is 2 percent. Because the state collects this tax, the property becomes exempt from municipal property tax. However, the state reimburses each municipality for any property tax that the municipality would have collected without the tax exemption.

Tax credits can be deducted for a portion of contributions for educational purposes at Alaska universities or colleges.

### Exploration incentives

The State of Alaska offers several incentive programs designed to encourage exploration on its lands and to provide state access to drilling and seismic data. The information below is only intended as a general overview of the credits — in some instances there are sunset dates and special conditions that apply to different regions of the state. For specific information refer to the appropriate state statutes and contact Alaska's Division of Oil and Gas.

1. Exploration incentive credits under AS 38.05.180(i) may enable a lessee of state land to earn credits for footage drilled on a state lease. Prior to a lease

sale the commissioner of the Alaska Department of Natural Resources decides whether to grant this exploration incentive credit for leases in the sale. Companies can also obtain credits for geophysical work on state land, if that work is carried out on land in a lease sale area within the two field seasons prior to the announcement of the sale. If a tax credit is taken, drilling data generally must become public after two years and geophysical data must become public after the lease sale. The credits may be applied against state royalties, rental payments or taxes, or they may be assigned to another company.

2. Exploration incentive credits under AS 41.09.010 may be granted by the commissioner of the Alaska Department of Natural Resources to encourage oil and gas exploration in remote areas. These credits consist of a percentage of eligible costs for drilling an exploration well, drilling a stratigraphic test well or carrying out geophysical work on any land in the state, regardless of whether the minerals in the land are state owned.

The percentage of cost that may be taken as a credit depends on factors such as whether the work is on state land.

Drilling data must become public after two years and the state may show copies of the geophysical data to interested parties. The credits may be applied against state royalties, rental payments or taxes, or they may be assigned to another company.

3. Oil and gas exploration tax credits under AS 43.55.025 allow a production tax credit of 20 percent of the cost of an exploration well that is drilled more than three miles from a previous well or, in the Cook Inlet Basin, is drilled to a distinct exploration target. A credit of 40 percent of drilling costs applies to a well more than 25 miles from the boundary of a unit under a plan of development as of July 1, 2003. A credit of 40 percent of eligible costs also applies to seismic exploration outside a unit that is under a development or exploration plan — seismic data will be held confidential for 10 years and 30 days.

4. Gas exploration and development tax credits under AS 43.20.043 apply to the exploration for and development of gas resources south of the North Slope and the Beaufort Sea. The credit is calculated as 10 percent of qualified capital investments and activity costs in the state but may not exceed 50 percent of

the taxpayer's total tax liability. Unused tax credits may be carried forward for up to five years.

## Federal government

The federal government assesses corporation income tax and obtains revenues from retained oil and gas royalties from production on federal land, as well as from bonus bids and rentals on federal oil and gas leases.

By law, the State of Alaska is entitled to about 27 percent of revenues from certain federal waters adjacent to state offshore land, called the 8(g) lands, and is further entitled to 50 percent of all revenues from federal lands in the National Petroleum Reserve-Alaska. Outside of NPR-A the state is entitled to 90 percent of revenues on most onshore federal lands. In the Arctic National Wildlife Refuge the state and federal governments have agreed to a 50-50 split of revenues — this agreement is still awaiting congressional action and approval.

### Corporate income tax

The federal government assesses corporate income tax on all corporations with nexus in the United States. Income tax is calculated as a percentage of taxable income, as defined under federal tax codes. Rates for tax brackets range from 15 percent to 35 percent. Although most oil and gas companies have incomes in the top bracket, allowable deductions and credits lower the effective tax rate.

### Royalties

The federal government collects oil and gas revenues from federal lands in Alaska through oil and gas leasing. In a similar fashion to the state, revenues derive from bonus bids from lease sales, annual rental on leases and retained royalties from oil and gas production.

The Bureau of Land Management administers oil and gas leasing on federal lands onshore and the Minerals Management Service administers offshore oil and gas leasing on the outer continental shelf. Both agencies conduct competitive lease sales and approximately 30 federal lease sales have been held in Alaska since 1976.

Annual rental rates for federal leases in NPR-A are \$3 per acre or \$5 per acre. Annual rental rates for federal land outside NPR-A are \$1.50 per acre for the first five years and \$2 per acres for the remain-



ing five years of a lease. Royalty rates in NPR-A are 16.67 percent for designated high potential leases and 12.5 percent otherwise. Royalties are usually 12.5 percent for federal leases outside NPR-A but can vary from sale to sale.

Rental rates for federal offshore leases administered by MMS have historically been \$5 per acre or higher. Recently, MMS has introduced a new system of accelerated rental rates, where initial rates start at \$7.50 per hectare (\$3 per acre) in the first year and increase to \$30 per hectare (\$12 per acre) in the 10th year of a lease. Royalties are generally either 16.67 percent or 12.5 percent, although the lower rate has been more common in recent sales. Since 2003, royalty suspension volumes have been offered as incentives — depending on the size and location of the block, royalty suspension volumes of up to 45 million barrels per lease have been granted in Beaufort Sea lease sales. Subject to several conditions, a field in the Beaufort Sea would not pay any royalties on the prescribed suspension volume if oil prices fall below a defined level. A detailed explanation of royalty suspension provisions can be found in lease sale announcements on the MMS website (<http://www.mms.gov/alaska/>).

## Local governments

Property and sales taxes provide the main sources of income for local governments in Alaska and become significant cost factors for companies operating in the state. The North Slope Borough, for example, collected \$192 million dollars in oil and gas property tax in fiscal year 2006.

Alaska's constitution recognizes two types of local government — cities and organized boroughs. Both cities and boroughs consist of municipal corporations that form political subdivisions of the state and can be described as municipalities. Boroughs are somewhat analogous to counties elsewhere in the United States. There are 16 boroughs and 149 incorporated cities in the state.

A city can exist within a borough. For example the City of Kenai is within the Kenai Peninsula Borough. Anchorage, Juneau and Sitka consist of unified municipalities, in which the cities within a borough have merged with the borough.

There are different classes of municipalities with different powers and

responsibilities. However, all municipalities in Alaska can levy property taxes and sales taxes, although not all municipalities levy both of these taxes. Some municipalities levy hotel bed tax and tobacco tax.

### Property tax

Municipalities that collect property tax calculate the tax as a percentage of assessed real and personal property values. Most types of property are taxable, although there are some exemptions.

Oil and gas exploration, production and pipeline property is exempt from municipal property tax but is taxed by the state. The state reimburses each municipality for any municipal property tax that becomes exempt in this way.

### Sales tax

Sales tax is assessed as a percentage of sale price and may be subject to an upper limit. There is no state sales tax.

However, the North Slope Borough in which many of the major oil fields are located assesses a “payment in lieu of taxes” instead of a sales tax. The borough negotiated this payment with the oil companies to avoid complex sales tax assessments. The agreement was scheduled for renewal in 2006, although at the time of going to press with this publication the borough was still discussing future arrangements with the companies.

### Tax rates

The municipal tax liability for a business operating in Alaska will obviously depend on the municipality or municipalities within which the business is located. Table 10.2 shows the 2006 tax rates for some Alaska municipalities. Note different property tax mill rates may apply to different municipal service areas. Also, mill rates can vary significantly from one year to the next.

Figure 10.1 contains a map showing the locations of these municipalities.

For further information about local government taxes see an Alaska state publication titled “Alaska Taxable 2006”, available at <http://www.dced.state.ak.us/dca/osa/assessor.cfm>.

In addition to taxes, a company carrying out a project that involves working on municipal lands or municipal rights of way may have to pay some minor permitting fees. The North Slope Borough also assesses fees for permits to do certain types of work within the area of the borough's jurisdiction.

## Alaska Native regional and village corporations

The regional corporations are the only Alaska Native corporations that own subsurface land — the village corporations generally own surface lands around rural villages.

Regional corporations negotiate terms for individual oil and gas leases within their lands. However, companies can generally expect oil and gas royalty rates and other terms similar to those on adjacent government-owned land. Arctic Slope Regional Corp. favors lease terms based on work commitment. In the past Chugach Alaska Corp. has negotiated exploration options on its lands.

A village corporation may charge some form of land access fee for access to and use of its surface land.

## The Alaska Mental Health Trust and University of Alaska

The Alaska Mental Health Trust owns about 300,000 acres of land around the Cook Inlet and Kenai Peninsula. The Trust Land Office has held competitive lease sales annually for the last five years, with leases awarded based on bonus bids. Lease terms and conditions resemble those of the state, with leases issued for five years and rentals escalating from \$1 per acre in the first year to \$3 per acre in the final year. Royalties typically begin at 10.5 percent for production in the primary term and increase to 12.5 percent after that.

Any oil and gas exploration and development on University of Alaska lands will also involve leases with rental and royalty agreements. In January 2005 the State of Alaska transferred some additional land to the university, including a tract of 90,000 acres inside the Nenana Basin. ■

### Credits

Cherie Nienhuis, Mark Edwards and others of the Alaska Department of Revenue. Dan Dickinson of the Alaska Department of Revenue, oil and gas consultant Ken Boyd, Mark Hermon of the North Slope Borough and Bill Popp of Kenai Peninsula Borough all contributed information for this chapter.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.

PETROLEUM NEWS, WEEK OF MAY 20, 2007

# Governor looking at special session for PPT

By KRISTEN NELSON  
Petroleum News

**A**n attempt to amend last year's petroleum profits tax moved in both House and Senate, passing in the Senate, but never reached a final vote in the House.

The bills would have added costs resulting from improper maintenance or lack of maintenance to the list of items companies cannot claim as lease expenditures in calculating taxes due under PPT.

House Democrats called for a floor vote May 16 to move Senate Bill 80, the PPT amendment, out of House Finance. The vote failed on party lines, 16 yeas to 23 nays.

House Bill 128, which passed House Oil and Gas, Resources and Judiciary, is also in House Finance.

In the Senate, Tom Wagoner, R-Kenai, moved that the Legislature extend the session by 10 days to deal with remaining issues including PPT. Wagoner, the Senate sponsor of SB 80, is a member of the five-member Republican minority; the vote failed 5 yeas to 14 nays.

SB 80 cleared Senate Finance May 8 and passed the Senate 20 to 0 May 10. The bill was referred to House Finance May 11; a hearing scheduled for May 12 was postponed.

HB 128 was introduced Feb. 12, heard and passed out of Oil and Gas; it went to House Resources early in April where it was heard, held and finally assigned to a subcommittee. A vote to move the bill out of Resources failed in early May; then members agreed to move the bill if a Judiciary Committee referral was added. Judiciary heard the bill and moved it May 8; it has been in Finance since. No hearing has been held.

## Special session likely this fall

Gov. Sarah Palin said May 17 that she thought SB 80 should have passed.

The subject will likely be taken up in a special session, the governor said.



GOV. SARAH PALIN

JUDY PATRICK



DAVID HOUSEKNECHT

David Lepain stands on an outcrop of Lower Cretaceous Nanushuk Formation sandstone at Tuktuk Bluff in the Brooks Range Foothills.

***The best way to revisit PPT is a special session, the governor said. "It should be in the fall after we have time to fully evaluate the PPT rates ... (and) we can present facts, figures, data to the lawmakers."***

"We need to revisit PPT. I think we shouldn't have to ask for anymore evidence to surface that explains why we have to revisit oil taxes. Our oil tax formula was changed under a dark cloud of suspicion. We're going to clear it up. And the FBI is already clearing some of it up for us."

The best way to revisit PPT is a special session, the governor said. "It should be in the fall after we have time to fully evaluate the PPT rates ... (and) we can present facts, figures, data to the lawmakers."

Time is also needed to debate a gross tax vs. PPT, she said.

Palin said she's been told fall is the best time for a special session, "after fishing season but before hunting season." ■



## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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Information about subscribing and the story archives can be found at this Web address: [www.PetroleumNews.com](http://www.PetroleumNews.com).





# ASTAC: Expanding telecommunications frontiers on Alaska's North Slope

**A**rctic Slope Telephone Cooperative's mission statement is to expand opportunities to the North Slope region of Alaska with the provision, improvement, and expansion of quality competitively priced, and reliable state-of-the-art telecommunications through professional integrity, dedication, and superior customer service.

## Service territory

We provide local telephone service to eight communities on the North Slope and the petroleum industry complex at Prudhoe Bay.

## About ASTAC

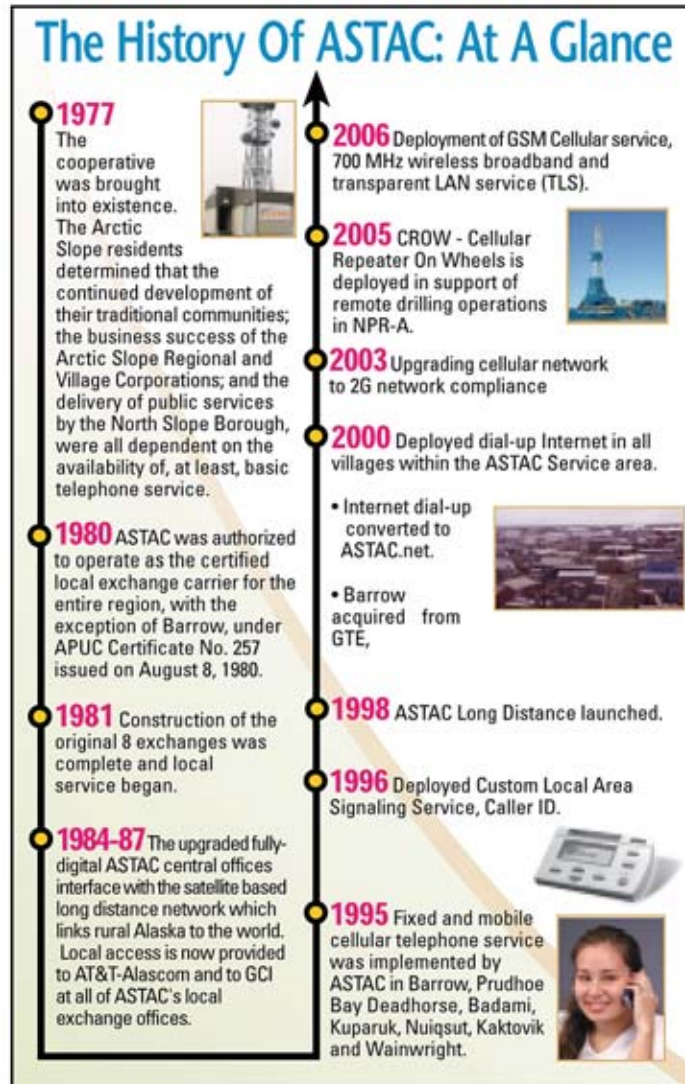
ASTAC has a service territory of approximately 90,000 square miles, an area larger than Minnesota. The cooperative consists of approximately 5,126 access lines located in eight of the regions' traditional villages and at the petroleum industry exploration complex at Prudhoe Bay. Barrow is the largest community served, with a population of 4,469 in 2002. ASTAC acquired the Barrow exchange in August of 2000.

## ASTAC cellular service

We provide cellular service as an affiliate of the national Cellular One group. Cellular coverage is provided at Wainwright, Barrow, and Kaktovik with seamless coverage from Deadhorse, through the oil field to Nuiqsut-Alpine. With deployment of a cellular repeater on wheels (CROW), wireless service now extends westward into NPR-A.

## Facilities mapping service

ASTAC is an authorized Cadtel engineering (ACE) firm, which specializes in implementing GIS technology in the telecommunications industry. Whether you need assistance in data conversions,



As a member owned cooperative, we have a primary mission and desire to offer high quality service at a low cost. We have a team of quality employees who know the difficult nature of providing service in the Arctic and have done it successfully for more than twenty-five years. We provide service to residential, small business, large business, and government, including oil companies, oil field supply companies, federal, state, and local government, the North Slope Borough and the North Slope Borough School District.

## New technologies and expansion

ASTAC now provides both dedicated wireline and licensed 700 MHz wireless broadband for business local area networks (LANS), supervisory control and data acquisition (SCADA), virtual private networks, transparent LAN service (TLS) and Internet access. We will continue to provide telecommunications services in the support of oil exploration as it migrates further west into NPR-A.

ASTAC is proud of its long standing practice of providing high quality service at a low cost. In addition, we have given back to the communities we serve through financial sponsorship of Public Radio programming, traditional culture programs and scholarships. As a cooperative, patronage capital credits are provided to our member-owners.

We welcome opportunities to provide existing and new customers with telecommunications services and to work with all individuals and businesses in our arctic neighborhood in developing reliable, cost-effective solutions to telecommunications needs. ■



or a complete turnkey solution, ASTAC/fm has the expertise and experience to provide services tailored to your needs.

## Member owned and operated

ASTAC is a member owned telephone cooperative offering local and long distance service, cellular service and sales, custom calling features, CLASS features, key system and PBX sales and service, dedicated and dial-up Internet access, and data services.

# Computing Alternatives: The information technology professionals

**C**omputing Alternatives, Inc. (CAI), a leading information technology company has been delivering business solutions to both - state governments and oil and gas industries. Since the formation of CAI in 1998, the company has developed automated taxation and royalty systems for leading mineral producing states such as Alaska and Wyoming.

## CAI Services

CAI offers a wide range of IT services including:

- Accurate Requirements Analysis
- Software Design and Data Modeling
- Superior IT Staffing
- Unmatched Custom Client-Server

## Software Development

• Website Design and Development including e-commerce and database-rich web applications

Computing Alternatives uses proven technologies and methodologies to a large spectrum of clients, from small businesses to State Governments to the Enterprise. No matter what your project size, CAI prides itself in providing its clients results that work.

## Alaska oil & gas experience

### Taxation

After successfully delivering a \$1.4 million dollar Mineral Tax System for the Wyoming Department of Revenue, CAI opened an Alaska office in 2001 when the Tax Division of Alaska Department of Revenue hired CAI to customize Wyoming's system for Alaska Corporate and Motor Fuel tax systems. CAI provided the initial requirements analysis, design including data modeling, and development of the data entry and examination systems. These systems are live and have improved the department's efficiency in processing tax returns. Prior to the PPT legislation, CAI also contributed in rewriting the ELF based production tax system to a newer Microsoft .NET based technology.

### Royalties

In July 2004, CAI contracted with the



Sunil Sethi, founder and president



Vice president Keith Watt

Alaska Department of Natural Resources, Division of Oil & Gas (DO&G) to complete a data requirements assessment, division-wide data model, and develop several business applications for leasing, units, permitting, and collecting royalties on oil and gas leases. Most recently CAI delivered an automated Royalty-in-kind (RIK) application that allows DO&G to track ANS oil-prices, TAPS tariffs, run ticket volumes, and Quality Bank information in order to invoice the RIK purchaser. CAI is currently in the process of completing final tasks for an automated Royalty-in-value (RIV) royalty accounting system and Net Profit Share Leases (NPSL) accounting

which will also provide the oil & gas companies a web-based vehicle to validate and upload their royalty reports on a real time basis.

CAI is also very proud of its contribution as the original author of the State of Alaska's Credit Card payment processing web service as well as the original author of the State of Alaska's ACH transactions web service.

CAI has experience with developing taxation and royalty systems that account for 98.5 percent of the State of Alaska's Unrestricted Oil revenue. With taxes and royalties being a major contributor to the State's income, CAI has several years of experience with developing applications that benefit State governments by improving their revenue mechanism to ensure proper collections.

### Diversifying in Alaska

On one hand CAI develops some of the

most complex systems in today's world; on the other hand we are coming up with fresh ideas in areas such as the food services industry. CAI's founder, Sunil Sethi is also the owner of Bombay Deluxe Indian Restaurant ([www.BombayDeluxe.com](http://www.BombayDeluxe.com)). With a background in IT, he and his partner, Keith Watt tremendously improved the efficiency of the restaurant operations by developing a point of sale (POS) system as well as a web-based online ordering application. Sunil, Keith, and Tej Kohli, another CAI senior consultant are venturing to build Food on the Way ([www.FoodOnTheWay.com](http://www.FoodOnTheWay.com)) web application which will allow consumers to easily order different cuisines from many local restaurants in Alaska.

See a recent article in ADN:

<http://www.adn.com/play/dining/chefs/story/8786910p-8688302c.html>

### Officer profiles

Mr. Sunil Sethi, founder and president of CAI, has been providing Information Technology Professional Services for more than twenty years, with the last ten years specifically to the US State governments.

Sunil was the Project Lead for Mineral Tax System for Wyoming Department of Revenue that was implemented in March 2000. CAI developed and integrated Motor Fuel and Corporate Tax Systems for the Alaska Department of Revenue (DOR). Currently CAI is providing consulting services for DO&G's Division of Oil and Gas Management Application (DOGMA).

Vice president Keith Watt began his career with CAI's inception after graduating from CDI of Business & Technology in Vancouver, Canada in 1998. He started out programming back in the Windows DNA and classic ASP days, the predecessors of .NET, and now handles software architectural design and development.

Keith was responsible for designing and implementing the architecture for DOGMA and also designed the authentication component of this system.

Keith has extensive experience and expertise with Microsoft based applications such as .NET and SQL Server. ■



# Michael Baker Jr., Inc.

*We view challenges as invitations to innovate*

**M**ichael Baker, Jr., Inc. has been a part of Alaska's development since World War II. For the last 30 of those years, Baker has been providing arctic engineering services for oil & gas pipelines and infrastructure.

## Our Impressive Pipeline Record

We have been on many of the professional teams assembled for concept development and design of major energy development in Alaska including TAPS, Alpine, Kuparuk, Milne Point, Endicott,

**Baker**

**ChallengeUs.**

and Badami, as well as the recently proposed Oooguruk and Gwydyr Bay developments.

Baker has also been on most of the Trans-Alaska/North Slope Gas pipeline proposal teams beginning as far back as the late 1970s.

## Optimization

Baker optimizations and innovations during the Alpine Development project helped to dispel some long-held arctic fear factors.

The Colville River crossing was the first horizontal directionally drilled (HDD) pipeline river crossing in the arc-



Baker conducts bi-monthly water quality monitoring at the Colville River Ice Bridge. A water resource team member is shown above collecting water velocity measurements under approximately 4.5 feet of ice on the Colville River in February 2005.



Alpine Pipeline Vertical Loop. Vertical loops create artificial terrain breaks and form a terrace structure. They work by creating hydraulic break points in the pipeline, performing a spill isolation function superior to valves. The design breakthrough not only saved money, it set a new standard for pipeline integrity. Vertical loops were reviewed and approved under a waiver granted by DOT.



tic. Baker was awarded an Outstanding Civil Engineering Achievement Honorable Mention by the National American Society of Civil Engineers in 2000.

Our improvement of aboveground pipeline configurations resulted in reductions in overall construction costs.

The vertical loop concept eliminated block valves at river crossings (see image).

Our development of the Colville River Delta 2-dimensional surface water model was instrumental in designing the Alpine facilities to withstand the typical extreme high water flows and massive ice during spring break-up. Hydrology of the delta was one of the critical challenges to development.

Baker's knowledge of the regulatory, environmental, and design issues related to cold region pipelines is world-renown and sought after by many of the Energy market's leading exploration and production companies.

## Innovation

We have consistently provided innovative techniques to address arctic chal-

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lenges, such as our pipeline foundation and support solutions to limit heave and thaw settlement in Alaska permafrost.

Our strengths include understanding pipeline design requirements and challenges related to:

- Seismic-induced ground motions
- Fault displacements
- Frost heave and thaw settlement
- Ice forces

We have extensive experience in geotechnical explorations and assessments, slope stability evaluations and repairs, erosion control, and floodplain mapping and monitoring.

Leveraging our experience, innovation, and customer focus, we are hard at work to mitigate the arctic challenges and dispel the Alaska fear factors. ■

# Unitech of Alaska

*Pallets, pails and pumps, shovels, sand and sorbent, containers, cans and kits — Unitech supplies it all, with a steady stream of good cheer*

**T**ucked away at the end of East Dimond Boulevard in Anchorage is Unitech of Alaska, a warehouse filled with environmental equipment and industrial supplies, along with good cheer.

"We've worked hard during the last few years of turmoil to keep things going smoothly and continue building the business," says General Manager Debbie Hawley. "We're like a family, a little family who takes care of each other, backs each other up — everything a family does."

Unitech, founded in 1985, went through a crisis a few years ago, after the death of a major shareholder. Then Don Rogahn of North Star Wiper and Absorbent bought the company in early 2001.

"Now we're doing great! Don saved the company, paid off old debts and renewed contracts," says Hawley. "He's been in the industry for 35 years and has holdings all across the country. With his help we have stabilized and added lines, especially in sampling and filtration supplies."

## Small staff

But employment also dropped from more than a dozen to just four workers: There's Hawley and sales manager Curly Arndt. Dave Herrell is the outside sales representative. Garrett Miller serves as warehouseman and custom designer as well.

Curly and Dave are an ideal sales duo: Dave is a former environmental business owner and Curly, a company veteran, has been called a "walking catalog."

From her office in the depths of the warehouse, Hawley runs a tight ship and dispenses good cheer. Garrett, an employee since 1996, designs and fabricates custom containment berms and liners using geotextiles that protect the ground under tanks and vehicles. Unitech also fabricates custom filtration systems.

Trained in responding to spills of oil and other hazardous material, Unitech workers help customers figure out the best approach for cleanup and remediation.

## Service is king

"We put the customer first, by providing attentive customer service, which obviously keeps people coming back. We're a



Garrett Miller displays a small, under vehicle containment berm. Miller is a warehouseman, designer and fabricator.



one-stop shop available 24 hours a day," says Hawley. "We always have somebody on call after hours. Once, to help a customer make a deadline, we got the order ready, staged it, and would have even had it delivered for them if we needed to — we really do go the extra mile!"

Unitech is the only stocking distributor in the state with a full line of Oil Spill; Remediation; Environmental and safety supplies. "With United Sorbents, LLC coming online this past year in Kent, Washington, we are able to provide faster turns on orders," Hawley said. "Unitech's network of over 200 manufacturers makes it possible to continually provide new products to our customers."

From the days of only stocking Sorbents and various, Unitech stocks a wide variety of rags; bags; box's; cans; drums in all sizes in both steel and poly. Spill Kits; geomembrane liners and the list

goes on and on.

Winter doesn't pass unnoticed around this Alaska warehouse, for sure. Unitech goes through four truckloads, or 296,000 pounds of Snow 'n Ice, an environmentally friendly form of ice melter popular with management companies, hospitals and other public facilities.

## Growth

2004 brought a new sorbent manufacturer to Unitech, United Sorbents, LLC. United has over 100 years combined experience within the sorbent industry. Don Rogahn along with others formed the partnership as a way to provide quality product at a affordable price

"As the company continues to grow, we will outgrow our current location as well," Hawley said.

"With the continued increases the industry as a whole are still dealing out to the distributors. We are constantly striving to provide our customers with the best pricing and customer service available!" ■



# CHAPTER

*Infrastructure and access*

# 11



## CHAPTER 11

# Infrastructure and access

## Introduction

**A**laska's vast areas of roadless wilderness bring some unique challenges when it comes to petroleum exploration and development. Even a straightforward surface geological investigation requires air transportation and a supply route for food and fuel. Drilling at a location many miles from the nearest permanent road will entail a major logistical operation. And the dramatic contrasts in weather and ground conditions between winter and summer control the timeframes within which different types of work can be done.

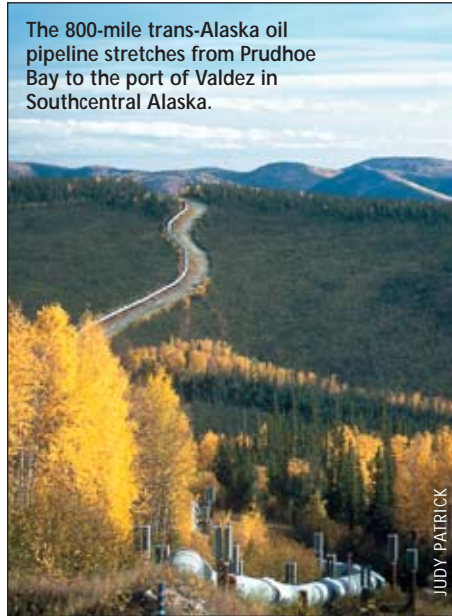
But Alaska's flourishing oil and gas business proves that people can overcome the access challenges and develop highly profitable oil and gas fields. There is now a vast wealth of experience in all aspects of oil industry activities in the state. Service companies in Alaska provide expertise in operating at remote locations. And the existing oil and gas infrastructure is starting to open up to newcomers to the state.

### The cost of remoteness

However, it is vital to realize that distances from transportation facilities and the existing oil and gas infrastructure become major cost factors in any Alaska oil and gas project. The need to build a production facility and export pipeline many miles from a permanent road will push up the minimum economic size for a hydrocarbon accumulation. And, given the high costs of facility construction in Alaska, the ability to make use of an existing production facility or pipeline can turn a marginal prospect into a profitable development.

So investigate access, logistical and transportation issues as early as possible in your project planning and evaluation. Seek advice from people with Alaska experience on the practicalities of working in a particular part of the state and on the potential costs associated with logistics and transportation. Find out how the weather and ground conditions at different times of the year will impact your work plans.

The 800-mile trans-Alaska oil pipeline stretches from Prudhoe Bay to the port of Valdez in Southcentral Alaska.



If you expect to need access to existing production facilities or pipelines, contact the facility operators to check on the feasibility of what you propose doing and to initiate negotiations on terms of use for the facilities. You'll at least need to know the available capacity of the facilities that you want to use; the likely terms and conditions for facility use; and the potential economic impact of your operation on the facilities.

### Look for win-win situations

All facilities and pipelines in Alaska were built to support existing oil or gas fields. So if you want to use the existing infrastructure to support a new development, you may find that either the design capacity or the processing capabilities don't fully match what you are trying to do. For example, there may be insufficient capacity in a pipeline to carry your oil. Or the gas or water content of your production may mismatch the mix that's originating from the facility owners' wells.

However, as production in the existing fields declines spare capacity in the production facilities and pipelines will become available. And owners of production facilities seek maximum use from the investments they have made in their plant. Pipeline operators want to maximize throughput.

So look for win-win situations that

benefit both you and the existing operators. And be willing to negotiate terms.

In a 2004 North Slope facility sharing report for Alaska's Division of Oil and Gas, Petrotechnical Resources of Alaska Inc., also known as PRA, listed the following guidelines for achieving mutual benefit in a facility sharing arrangement.

The facility sharing process must:

- be fair, equitable, and understandable to all parties;
- result in net increase in production, improve resource conservation, and reduce waste;
- not result in any new government regulation;
- preserve and promote operational integrity;
- preserve the integrity of unit rights/obligations, and tax partnerships;
- reduce financial and operational risk;
- introduce no significant adverse impact to existing production;
- provide timely access to indicative fee structure for bona fide inquirers;
- create a level playing field for all producers, where the "best" barrels are produced;
- allow for resolution of conflicts;
- compensate the facility owners for their historical capital costs and lost or deferred production; and
- provide equitable sharing of ongoing costs among all users.

## Regulated pipelines in Alaska

Pipelines are critical components in moving oil and gas to market. Anyone developing a new oil or gas field in Alaska will have to construct a pipeline or share the use of existing pipelines. A network of pipelines in Alaska already connects existing oil and gas fields and facilities to various market outlets. Many of these pipelines consist of regulated lines that have to offer oil and gas transportation services to anyone able to make an appropriate pipeline connection.

The information presented below provides a general introduction to the regulation of pipeline operations in Alaska. Note that we're only considering here the regu-



lation of the commercial operation of pipelines — there's a whole other set of regulations that apply to pipeline permitting and safety. Pipeline regulation is very complex and anyone considering using or building a pipeline should seek appropriate professional guidance.

### Common carrier pipelines

The mode of operation of a common carrier pipeline in Alaska is, in general, the same as elsewhere in the United States.

1. A pipeline is subject to specific construction codes and permitting requirements.

2. The pipeline carrier has to offer non-discriminatory service to anyone who needs to use the pipeline and who has products that meet the quality specifications for transportation within the pipeline.

In the case of an oil pipeline, the nondiscriminatory service normally involves the pipeline carrier inviting monthly nominations of oil volumes to be carried for oil shippers at a published tariff. In the event of required usage of the pipeline exceeding the capacity of the pipeline, the throughput oil volume of each shipper is prorated downward so that the total throughput matches the capacity.

Non-discriminatory service for a gas pipeline generally involves the holding of an open season prior to pipeline construction, to establish how much gas each shipper wants to ship. Shippers then make long-term contractual commitments to pay for the pipeline capacity that they have requested, and the pipeline is designed with sufficient capacity to carry the committed gas volumes.

In all cases pipeline tariffs and other aspects of pipeline commercial operation are subject to regulatory oversight.

However, the trans-Alaska oil pipeline, the common carrier pipeline that transports crude oil from the North Slope to Valdez, does have one unusual feature — each owner of the pipeline manages its own percentage of the pipeline capacity as if it were a separate pipeline. Each owner separately posts its own tariffs, requests nominations for oil from oil shippers and bills shippers for oil throughput.

Also, under Alaska statutes, a gas pipeline owner can post separate tariffs for firm transportation services and interruptible transportation service. The owner can also levy a reservation fee to reserve capacity for the firm service.

Gas utility lines operate in a somewhat similar fashion to common carrier pipelines but these lines can give preference to gas utility usage.

### Federal regulations

Depending on the location and use of a pipeline, the pipeline commercial operations may be regulated by the state, by the federal government or by both. However, the government regulation of pipeline operations does not normally apply to gathering lines within the operation of an oil field or a gas field.

In general, the Mineral Leasing Act mandates that pipelines crossing federal lands must operate as common carrier pipelines. However, the trans-Alaska oil pipeline comes under the terms of the Trans-Alaska Pipeline Authorization Act — the terms of this act are very similar to the Mineral Leasing Act. Also, gas lines that carry gas for interstate transportation do not need to become common carrier lines. Instead, FERC regulates these lines under the terms of the Natural Gas Act.

A future gas line for exporting gas from the North Slope will

**Table 11.1: RCA regulated pipeline**

PIPELINE	OWNER	Certified	Substance Carried
Enstar pipelines (regulated under AS 42.05) [from east and west sides of Cook Inlet to Anchorage]	Alaska Pipeline Co. a wholly owned subsidiary of Semco Energy Inc.	1970	Natural Gas
TAPS (trans-Alaska pipeline system) [Prudhoe Bay to Valdez]	BP Pipelines (Alaska) ConocoPhillips Transportation Alaska ExxonMobil Pipeline Co. Koch Alaska Pipeline Co. Unocal Pipeline Co.	1974	Oil
Kenai Pipeline [from Swanson River oil field and onshore facility of Middle Ground Shoals field to Nikiski, including marine terminal]	Kenai Pipeline Co. (Tesoro)	1975	Oil and Refined Petroleum Products
Cook Inlet Pipeline [West Side of Cook Inlet, Granite Point to Drift River]	Cook Inlet Pipeline Co.	1975	Oil
Tesoro Pipeline [Nikiski to Anchorage]	Tesoro Alaska Pipeline Co.	1976	Refined Petroleum Products
GVEA Pipeline [North Pole refineries to TAPS]	Golden Valley Electric Association	1977	Oil
Kuparuk Pipeline [North Slope]	Kuparuk Transportation Co.	1980	Oil
Milne Point Pipeline [North Slope]	Milne Point Pipeline Co. LLC	1984	Oil
Oliktok Pipeline [North Slope]	Oliktok Pipeline Co.	1985	Natural Gas Liquids
Endicott Pipeline [North Slope]	Endicott Pipeline Co. (BP)	1987	Oil
Beluga Pipeline (regulated under AS 42.05) [West Side of Cook Inlet, CIGGS to Enstar pipelines]	Beluga Pipe Line Co.	1993	Natural Gas
Badami Oil Pipeline (not operating; shipments suspended by producers) [North Slope]	BP Transportation (Alaska) Inc.	1997	Oil
Badami Gas and Products Pipeline (not operating; shipments suspended by producers) [North Slope]	BP Transportation (Alaska) Inc.	1997	Natural Gas Liquids
Alpine Pipeline [North Slope]	Alpine Transportation Co.	1998	Oil
Northstar Oil Pipeline [North Slope]	BP Transportation (Alaska) Inc.	1999	Oil
Northstar Gas Pipeline [North Slope]	BP Transportation (Alaska) Inc.	1999	Natural Gas
Milne Point Products Pipeline [North Slope]	Milne Point Pipeline Co., LLC	2001	Natural Gas Liquids
Kenai Kachemak Pipeline [Kenai Peninsula]	Kenai Kachemak Pipeline, LLC	2002	Natural Gas
Kenai Nikiski Pipeline [Nikiski]	Marathon Oil Co. and Union Oil Company of California (Certificate in the name of Marathon Oil Co. d/b/a/ Kenai Nikiski Pipeline)	2003	Natural Gas
Kasilof pipeline	Temporary certificate under Kenai Kachemak Pipeline, LLC during construction in 2006	2006	Natural Gas

Table 11.1: RCA regulated pipeline. All pipelines are regulated under AS 42.06, unless otherwise noted  
Source: Regulatory Commission of Alaska



JUDY PATRICK

Prudhoe Bay is the largest producing oil field in North America. Pictured is the first drill site. The buildings in background are at the Deadhorse location.

be regulated under the terms of the federal Alaska Natural Gas Pipeline Act and the federal Alaska Natural Gas Transportation Act.

BLM administers the pipeline rights of way for pipelines crossing BLM land or crossing land involving several federal agencies. Pipeline rights of way on land administered by a single agency other than BLM are administered by that agency.

Pipelines on the outer continental shelf are regulated under the terms of the federal Outer Continental Shelf Lands Act. Pipelines within contiguous or unitized leases on the outer continental shelf are called lease term pipelines and are not regulated. All other pipelines are called rights-of-way pipelines and are regulated in an analogous way to common carrier pipelines. A rights-of-way pipeline owner must post a bond with MMS and pay annual rental fees. FERC regulates tariffs on rights-of-way pipelines, although there is a current legal dispute regarding the relative regulatory roles of FERC and the U.S. Department of the Interior.

### State regulations

The Alaska Right-of-Way Leasing Act (AS 38.35) mandates that pipelines crossing state lands or passing under state waters operate as common carrier pipelines, unless the pipelines are regulated under the Alaska Public Utilities Act

(AS 42.05) or the federal Natural Gas Act. However, a grandfathering provision within the Right-of-Way Leasing Act exempts pipelines built prior to May 20, 1972, from regulation "within the scope of their existing operations, normal expansions and extensions thereof so long as their original or present purpose and function remains unchanged." The Alaska Pipeline Coordinator's Office administers the pipeline rights of way on state lands.

The Regulatory Commission of Alaska oversees regulated pipelines carrying intrastate oil or gas in Alaska. Regulation occurs under the terms of the Regulatory Commission of Alaska (AS 42.04), the Alaska Public Utilities Act (AS 42.05) and the Pipeline Act (AS 42.06). RCA regulates a pipeline's interface with the shippers, the shippers' access to the pipeline, pipeline tariffs and the rules under which the pipeline provides service to intrastate shippers.

A pipeline regulated under the Pipeline Act requires a certificate for pipeline operation and for construction of pipeline facilities. A pipeline regulated under the Alaska Public Utilities Act only requires a certificate to operate. RCA is considering simplification of the certification requirement for the construction of non-utility pipelines.

All regulated oil pipelines carrying intrastate oil are regulated under the terms of the Pipeline Act. Gas pipelines,

on the other hand, have tended in the past to be regulated under the Alaska Public Utilities Act. But, more recently, gas pipelines have mostly been regulated under the Pipeline Act, especially since the Pipeline Act was amended to allow carriers to offer both firm and interruptible transportation.

If a pipeline transports products for export from Alaska, FERC regulates the commercial operation of the pipeline under the Interstate Commerce Act. However, because many oil pipelines in Alaska contain both intrastate and interstate oil, RCA and FERC jointly regulate all oil pipelines except the Cook Inlet Pipeline and the GVEA pipeline.

Table 11.1 contains a list of all of the regulated pipelines in Alaska.

The Alaska statutes that apply to the operation of pipelines can be found at [www.legis.state.ak.us/folhome.htm](http://www.legis.state.ak.us/folhome.htm) — click on "The current Alaska statutes" and then find the statutes under the appropriate AS number.

The Mineral Leasing Act can be found at <http://uscode.house.gov/download/pls/30C3A.txt>. Section 185 of the act applies to oil and gas pipelines.

The Alaska Natural Gas Transportation Act can be found at <http://uscode.house.gov/download/pls/15C15C.txt>.

The Natural Gas Act may be found at



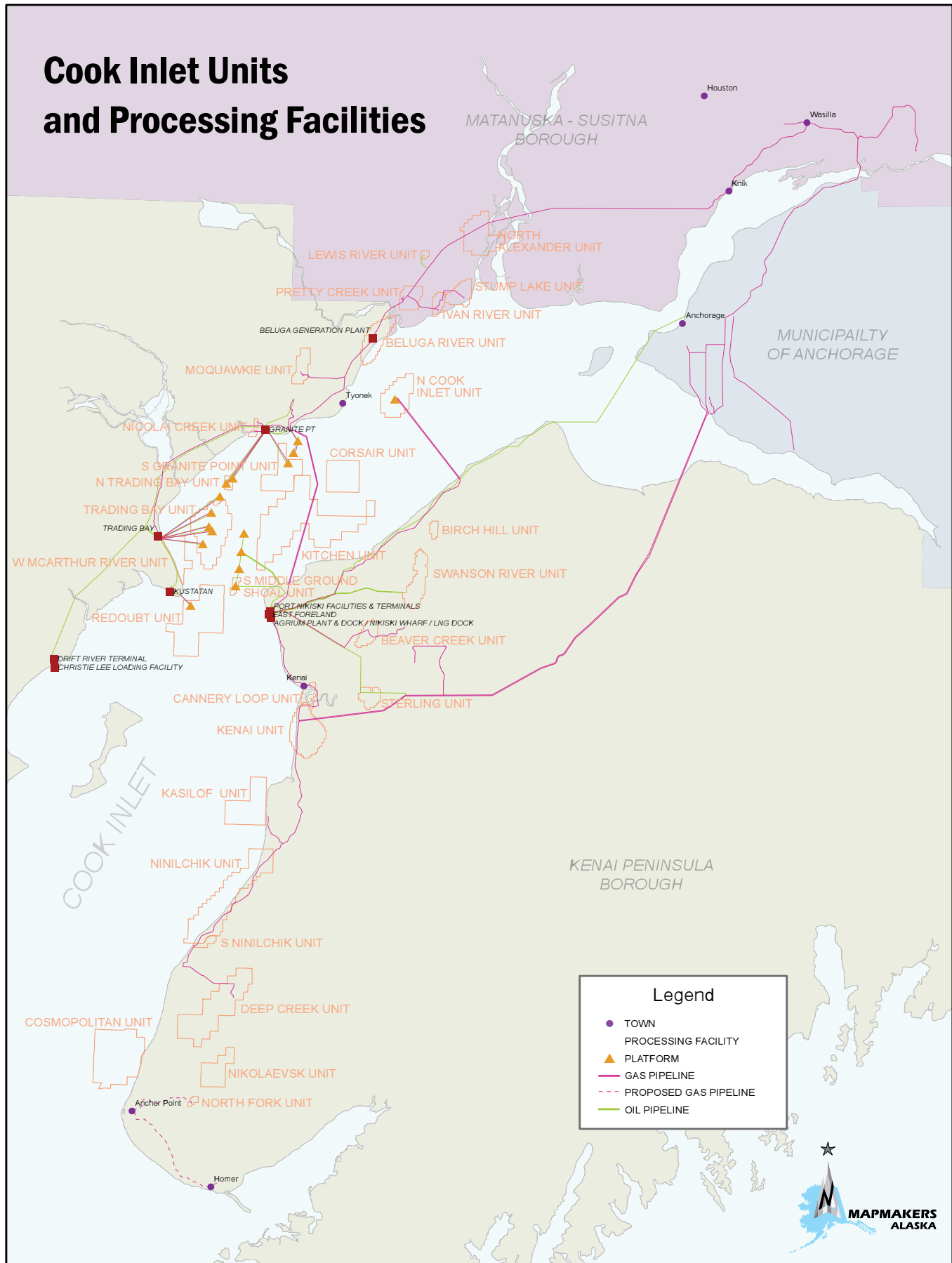


Figure 11.1 Cook Inlet units and processing facilities. Mapmakers Alaska, March 2007.

<http://uscode.house.gov/download/pls/15C15B.txt>.

The section of the Outer Continental Shelf Lands Act that deals with pipelines may be found in subchapter III at <http://uscode.house.gov/download/pls/43C29.txt>.

## The Charter for Development of the Alaskan North Slope

Any company planning to explore for oil and gas on the North Slope needs to be aware of a document entitled "The Charter for Development of the Alaskan North Slope." This document dates back to BP's purchase of Atlantic Richfield Co., or ARCO.

On April 1, 1999, BP Amoco PLC announced that it was buying ARCO in a merger that would result in a combined company that would control 74 percent of North Slope oil production, 72 percent of the trans-Alaska oil pipeline system and 80 percent of the available tanker capacity from Valdez. The prospect of one company in such a dominant position on the North Slope caused great concern in the state of Alaska. As a result, the state negotiated with BP and ARCO to establish ways to ensure competition, diversity and balance in the exploration, development and production of North Slope resources.

On Dec. 2, 1999, the state, BP and ARCO completed their negotiations and signed the "The Charter for Development of the Alaskan North Slope." This legally binding document addressed the state's concerns through the following provisions:

1. BP and ARCO would divest some of their working interests in operational oil fields on the North Slope. The companies would also sell some of their acreage in undeveloped leases.

2. The companies would make seismic and well data available for purchase.

3. BP and ARCO would provide access for nearby satellite fields to existing oil-field facilities "on reasonable commercial terms." There was a provision for binding arbitration subject to a 90-day advance notice, in the event of a failure in negotiations for facility access.

4. BP and ARCO would agree to purchase up to a total of 30,000 barrels per day of oil production from producers with total assets of less than \$1 billion

and North Slope production of not more than 10,000 barrels per day.

5. BP and ARCO would sell some of their interests in the trans-Alaska and Oliktok pipelines in proportion to the working interest divested from operational oil fields. There was also provision for selling additional interests in the trans-Alaska oil pipeline.

6. BP and ARCO would be required to sell any Jones Act ships that become surplus to requirements for shipping oil from Valdez. Other North Slope producers would have the option to buy these ships on reasonable commercial terms.

7. Until Dec. 31, 2003, BP and ARCO would be required to negotiate to sell North Slope natural gas at a fair market price and transportation charge, and in sufficient quantity to support a "qualified treatment and transmission project to domestic and/or international markets."

8. BP and ARCO would make some commitments regarding various North Slope environmental issues, including the cleanup of sites, the cleanup of empty barrels, the closure of inactive reserve pits and support for oil spill response arrangements.

9. BP and ARCO would make some commitments relating to the performance and modernization of the tanker fleet used for shipping oil from Valdez.

10. BP and ARCO would make a continuing commitment to Alaska hire.

11. BP and ARCO would establish and fund a charitable entity "dedicated to funding organizations and causes within Alaska." The University of Alaska Foundation would be one of the beneficiaries of this entity.

The full text of the charter is available on the Web at <http://www.gov.state.ak.us/bparco/FinalCharter1202.html>

Less than two months after the signing of the charter the Federal Trade Commission sought a preliminary court injunction to prevent the merger of BP and ARCO. The FTC argued that the merger violated U.S. antitrust laws. However, a few days before the hearing on the FTC case BP and ARCO announced that BP would sell all of ARCO's Alaska assets to Phillips Petroleum Co. Following the sale of the ARCO Alaska assets the FTC approved the merger between BP and ARCO.

In 2002 Phillips merged with Conoco to become ConocoPhillips.

ConocoPhillips, BP and the state of Alaska continue to be subject to the

terms of the charter. However, the charter requirements for BP and ARCO to divest of some North Slope production and exploration acreage became defunct when BP sold ARCO's Alaska assets. And the commitments regarding the sale of natural gas have expired.

### Provisions remain useful

But other provisions include features that can really help companies wishing to explore or develop production on the North Slope.

Jim Weeks, CEO of Winstar Petroleum, says without the charter his company would not be exploring on the Slope. Winstar is a small company that has bought some leases on the Slope and that has already drilled one exploration well.

"Without the charter we wouldn't even be here," Weeks says.

Weeks cites four provisions within the charter that make it possible for small companies like Winstar to work on the North Slope:

1. The obligation for BP and ConocoPhillips to license proprietary seismic data makes exploration of relatively small areas possible. It is uneconomic for a small company to shoot 3-D seismic over a small lease area, Weeks says.

2. The necessity for BP and ConocoPhillips to negotiate use of their production facilities provides a mechanism for establishing production arrangements for a new oil field. When Winstar drilled its first exploration well on the Slope the company successfully negotiated use of the Kuparuk production facilities.

3. The provision for binding arbitration in the event of an impasse over negotiations for facility usage gives impetus to completing the negotiations.

4. The right to sell production to BP or ConocoPhillips avoids the complex and expensive issues involved in making arrangements for shipping and marketing oil from Valdez.

There are several owner companies involved on the Slope that are not signatories to the charter. ExxonMobil, for example, owns substantial interests in North Slope fields and facilities. However, Weeks has found that the charter sets a useful precedent for licensing seismic data and for negotiating facility access — the agreement for Winstar's use of the Kuparuk facilities included several owner companies in addition to ConocoPhillips and BP.



However, BP and ConocoPhillips are likely to remain major players on the North Slope for the foreseeable future. So the provisions of Charter for the Development of the Alaskan North Slope continue to be important for small oil companies.

## Existing facilities

### Cook Inlet

A well-developed oil and gas infrastructure plays an important role in improving the economics of new field development in the upper Cook Inlet region. The inherent costs and business risks associated with constructing pipelines for new fields make the use of the existing network of oil and gas pipelines particularly advantageous.

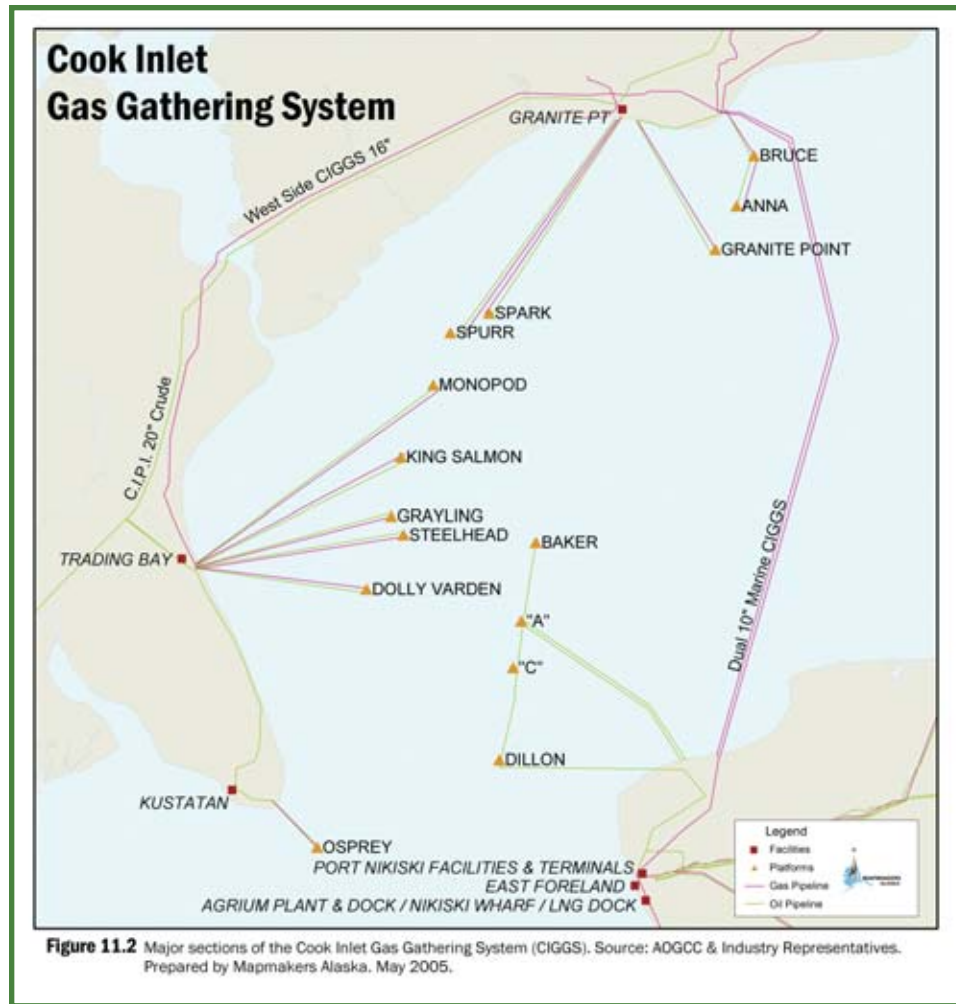
Most of the operational oil and gas fields in the Cook Inlet date back to the 1960s. At that time the companies that developed these fields constructed an infrastructure of platforms, production facilities and pipelines that remains largely unaltered to the present day.

Figure 11.1 shows the current infrastructure around the Cook Inlet.

The first field to be developed in the Cook Inlet area, the Swanson River field, uses its own production facilities and ships its produced crude oil through a relatively short common-carrier pipeline to a refinery at Nikiski, on the northwest coast of the Kenai Peninsula. The other 1960s oil fields all operate from offshore platforms in Cook Inlet. These platforms connect through private gathering lines to three onshore production facilities. The owners of the oil fields share ownership of the production facilities — the facilities have continued to operate since the 1960s under the terms of contracts for their shared use.

Two of the shared production facilities are on the west side of the Inlet, at Trading Bay and Granite Point. The third facility is at East Foreland, on the east side of the Inlet.

The production facilities at Trading Bay and Granite Point connect to the Cook Inlet pipeline, a common carrier oil pipeline that runs down the west side of the Cook Inlet to an oil terminal at Drift River. The Drift River terminal loads oil into tankers and operates on a common carrier basis. The Cook Inlet pipeline and Drift River terminal currently operate well below capacity and could provide a



convenient export route for suitably located new oil fields.

Two oil fields, the West McArthur River field and Redoubt Shoals field, have come onstream on the west side of the Inlet since the 1960s. Both of these fields have their own production facilities that export into the Cook Inlet pipeline.

The facility at East Foreland on the east side of the Inlet connects to the Nikiski refinery through a short common carrier pipeline.

### Gas storage

In recent years gas supplies from the Cook Inlet region have started to fall short of demand. The difficulties have become particularly acute in severely cold winter conditions, when residential and commercial heating demand peaks. As a consequence, Unocal and Marathon have both established gas storage facilities in old oil and gas fields, to stockpile gas during periods of low demand to help meet peak demand.

Unocal has established gas storage facilities in the Swanson River field on the

Kenai Peninsula and in the Pretty Creek field on the west side of the Cook Inlet. Marathon has established a storage facility in the Kenai field on the east side of the Cook Inlet.

Unocal and Marathon only use these facilities to store their own gas.

### Cook Inlet gas pipelines

The first gas line from the Kenai Peninsula was built in the early 1960s to supply gas as domestic fuel for Anchorage. Then the Cook Inlet Gas Gathering System, or CIGGS, was built to move gas to Nikiski from the oil fields on the west side of the Cook Inlet. A liquefied natural gas plant and a fertilizer plant were built at Nikiski to use the excess gas from the oil and gas fields.

CIGGS is jointly owned by Marathon and Unocal and operated for many years as a private, unregulated system. However, in September 2005 the owners agreed with several companies involved in the Cook Inlet oil and gas industry on a formula whereby the system would become regulated, with a minimum capacity of 40

million cubic feet per day available for common-carrier service for third party shippers. In January 2007 the Regulatory Commission of Alaska approved that settlement.

A map of CIGGS can be found in a back issue of Petroleum News at this web address:

<http://www.petroleumnews.com/pdfarch/363998029.pdf#page=2>

A private gathering line, owned by ConocoPhillips, connects the offshore North Cook Inlet gas field to Nikiski — the North Cook Inlet field primarily supplies gas for the LNG plant at Nikiski. A private gas pipeline owned by Unocal connects the Swanson River field to Nikiski. This pipeline was constructed in the mid-1960s to transport gas from Kenai gas fields to the Swanson River field, for use in producing oil by maintaining the pressure in oil reservoirs. Unocal has indicated a willingness to convert this pipeline to a common-carrier pipeline should new gas fields be discovered around the Swanson River Field. A common carrier pipeline called the Kenai Nikiski pipeline connects the Kenai gas field north to Nikiski.

A recently constructed common carrier line, the Kenai Kachemak pipeline, connects some newly developed gas fields south of Kenai to the Kenai Nikiski line. And the short Kasilof pipeline connects the Kasilof field near the coast south of Kenai with the Kenai Kachemak pipeline. Enstar has proposed the construction of a pipeline connecting the Kenai Kachemak pipeline with Homer in the southern Kenai Peninsula, either by an inland route or around the Cook Inlet coast.

On the west side of the Inlet, the Beluga utility pipeline carries gas north from CIGGS at Granite Point to Beluga, on the north side of the Inlet almost due west of Anchorage. A gas-fired power station at Beluga supplies electricity for Anchorage but mainly uses gas from the surrounding Beluga River gas field. And in 2005 the Regulatory Commission of Alaska approved bidirectional flow on the Beluga line, thus opening up the possibility of gas fields north of Granite Point shipping gas through CIGGS to Nikiski.

A gas utility pipeline, owned by Enstar Natural Gas Co. and built in 1983-84, carries gas from Beluga northeast to Wasilla in the Matanuska-Susitna Borough and, thence, down to Anchorage. Enstar's Anchorage-Kenai line that originally brought gas from Kenai to Anchorage now supports bidirectional flow. Apart

from a spur line to Nikiski from the Anchorage-Kenai line, the Enstar lines generally have available capacity.

The utility pipelines operate in a fashion similar to common carrier pipelines, with access available to anyone who needs to transport gas. However, utility lines give priority to gas utilities. Enstar also offers interruptible and noninterruptible services at different rates. In the past Enstar has established individual contracts with shippers of gas on its lines but the company is converting to an arrangement involving published tariffs rather than contracts.

Because some sections of the Enstar pipelines pass through residential areas and supply residential fuel gas, Enstar has to add mercaptans to the gas — mercaptans cause the distinctive odor of domestic gas. The company adds mercaptans at several places, including mile 39 of the line from Beluga to the Matanuska and Susitna valleys.

Mercaptans render the gas unusable for the process systems of industrial applications such as LNG or fertilizer production, although the industrial plants can still use substantial amounts of the gas as fuel. There are new technologies for removing mercaptans but the practicalities and economics of using these technologies in the Cook Inlet situation would have to be established.

Companies have commonly “moved” gas across the Inlet by exchanging production. For example company A with excess production on the east side of the Inlet can exchange production volumes with company B on the west side of the Inlet. That enables company B to sell some of its gas on the east side, while company A sells the exchanged gas to a customer on the west side, although neither company has physically moved any of its gas across the Inlet. However, successful operation of this procedure does depend on the supply and demand for gas on each side of the Inlet as well as the cooperation of two willing commercial parties.

It's also possible for small gas producers to sell gas to the larger producers, depending on the overall demand for gas relative to the deliverability of supply. However, in the past the Regulatory Commission of Alaska has applied limits on the extent to which a large producer can aggregate third-party gas in a contract to supply a utility customer.

Almost all gas produced from the Cook Inlet basin consists of dry gas of consis-

tent composition, requiring relatively simple processing before delivery to a pipeline transportation system. So, connecting a new gas field to any of the common carrier or utility pipelines ought to prove fairly straightforward.

And the oil and gas infrastructure in and around the Cook Inlet is mostly underused. As a result, opportunities exist for new fields to use the infrastructure — it's in the interest of everyone to make maximum use of past infrastructure investments. It's also in everyone's interest to produce as much oil and gas as possible in the Cook Inlet area.

The determining factors for successful facility sharing around the Inlet will be business economics that work for all involved, regulatory approval of any necessary infrastructure changes and the demonstration by newcomers that they can meet required standards for safe operation and the protection of the environment.

## North Slope

Any company exploring for oil and gas on Alaska's North Slope needs to consider the eventual use of existing oil industry facilities for the processing and transportation of hydrocarbon products from new fields. The use of existing production facilities may present the only way to make a small or medium sized field economic. And even if you build your own production facilities you will need to hook up to the existing pipeline infrastructure to move your products to market.

If you're considering entering the North Slope oil and gas industry, PRA's excellent and comprehensive report entitled “North Slope of Alaska Facility Sharing Study” provides a detailed analysis of the status of facility sharing. This report also presents recommendations on how to approach facility sharing and an overview of the issues involved. You can obtain the report at <http://www.dog.dnr.state.ak.us/oil/products/publications/otherreports/nsfacility/share.htm>

The PRA report lists eight primary facilities on the North Slope: Alpine, Badami, Endicott, Kuparuk, Milne Point, Northstar, Point McIntyre/Lisburne and Prudhoe Bay. A series of pipelines transport oil from these facilities to pump station 1 of the trans-Alaska oil pipeline. The trans-Alaska pipeline carries the oil to the Valdez Marine Terminal in Southcentral Alaska. Oil tankers load oil from the



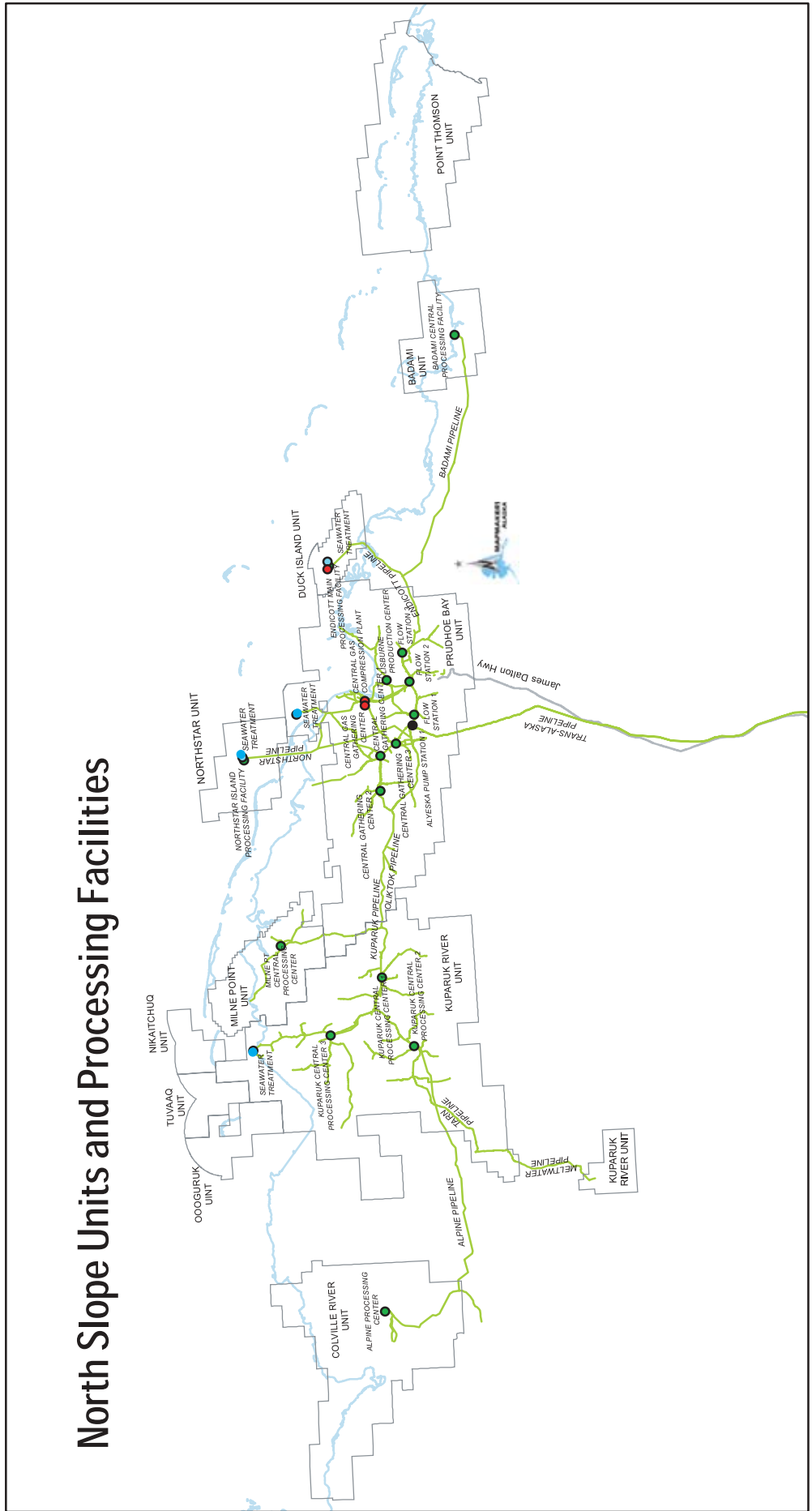


Figure 11.3 The units and processing facilities of Alaska's North Slope

Valdez Marine Terminal for transportation to markets, primarily on the West Coast of the United States.

Figure 11.3 shows a map of the main North Slope facilities and pipelines.

The existing facilities support oil fields that have reached varying stages of development and depletion. So a company thinking of exploring for an oil field that will require use of any of these facilities will need to find out the projected excess processing capacity of the appropriate facility. The PRA report includes processing capacity data and future projections that were current in 2004.

It is important to consider the facility's capacity to process water and gas as well as oil. Exceeding the capacity of any fluid that passes through a facility will cause the owners of the facility to back up a volume of their own production. These backup volumes will trigger backup fees to the third-party producer. Small amounts of backup may not cause a big problem but excessive amounts of backup could render a third-party field uneconomic.

### Most pipelines common carriers

Most of the pipelines connecting the facilities to the trans-Alaska pipeline are common carrier pipelines. Owners of the common carrier pipelines have to accommodate anyone who wants to ship oil on the pipelines, provided that the oil meets the quality specifications for the pipeline. However, it is necessary to negotiate a connection to a pipeline — constructing and maintaining a connection can prove expensive. However, if there is a breakdown in negotiations regarding a pipeline connection the Regulatory Commission of Alaska can intervene and arbitrate.

If a common carrier pipeline is running at capacity, a request to ship additional oil will result in all shippers, including the new shipper, moving less oil than they wish. So it is essential to find out whether a pipeline that you plan to use has available capacity — the PRA report includes throughput and capacity projections from 2004.

The trans-Alaska oil pipeline is currently operating below its maximum capacity. However, a company wishing to ship oil through it needs to ensure that oil delivered to the pipeline meets certain specifications for properties such as temperature and sediment content.

### Likely facility sharing costs

It is impossible to say exactly what

In 2001, Crowley transported the largest modules ever made in Alaska from Anchorage to BP Exploration (Alaska) Inc.'s Northstar Island and oil field on the North Slope.



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costs will be associated with any specific arrangement to use oil and gas facilities on the North Slope. However, the following list includes most of the likely cost components of a facility sharing agreement:

1. A capital access fee to compensate the facility owners for past capital investment in the facility;
2. Capital access surcharge fee to compensate the facility owners for capital costs incurred after third party sharing of the facility starts;

3. An abandonment fee to compensate the facility owners for future abandonment costs;

4. Oil and gas processing fees that pay a share of the facility operation and maintenance costs and that are normally charged on a basis of dollars per unit volume of oil or gas processed;

5. Common drill site fees that pay a share of drill site operation and maintenance costs and that are normally charged on a basis of dollars per unit volume of fluid processed;



Exploration drilling on the North Slope that takes place during the winter often requires temporary ice roads and ice pads to enable massive drilling rigs to move and operate without marking the delicate tundra.



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6. Ad valorem tax fees to pay for the third-party share of ad valorem taxes and normally calculated in proportion to the third-party's gross fluid production through the facility;

7. Backout charges associated with any deferred production of the owners' oil as a result of the third-party fluid processing in the production facility; and

8. Fees for the use of water for water injection in excess of water produced by the third party.

Normally there will also be a quality compensation arrangement to allow for differences in oil quality between the facility owners' oil and the third-party oil. The owner of the lower quality oil will compensate for quality by transferring a calculated number of barrels of oil to the owner of the higher quality oil.

Connecting third-party oil production into an existing pipeline will also incur pipeline connection fees and pipeline tariffs.

### State wants more certainty

Experience to date in establishing facility-sharing agreements on the North Slope has shown that these agreements can be

reached. However, the state of Alaska has been trying to ensure more certainty in the commercial terms for facility sharing — at present a potential third-party producer may experience difficulty in establishing commercial terms for facility sharing in time to make decisions about carrying out exploration work.

Potential third-party producers also tend to feel uncomfortable about the access, processing and backout fees that may be calculated by the facility owners — there may be a lack of transparency in the calculation of these fees. There also may be contention regarding whether backout volumes should be accounted for as deferred production or lost production.

The PRA report makes the following recommendations for facility sharing on the North Slope:

1. Nearly all existing facilities have potential for facility sharing. Independent producers should expect to negotiate an acceptable agreement for facility sharing but should start negotiating as early as possible.

2. Lack of trust is the biggest obstacle — good communications are essential.

3. Independent producers need to provide operators with a well thought out development plan that includes as many crude oil characteristics as possible.

4. The most critical technical issue is the calculation of backout volumes. Operators need to communicate backout methodologies and provide timely responses to requests for information.

5. Independent producers need to accept backout as a valid concept that represents real lost or deferred production to facility owners.

6. Both parties need to be ready to compromise on the backout methodology and to simplify the calculations for fields without a detailed dynamic plant model.

7. The state of Alaska should continue to investigate methods to defray the backout impacts to independent producers.

8. Investigation and communication of facility sharing issues should continue through reports such as the one prepared by PRA.

### Seasonal access

For a newcomer to Alaska the extreme contrast between summer and winter

may be one of the most striking aspects of the state. The Interior of Alaska experiences temperatures ranging from below minus 50 degrees Fahrenheit in the depths of the winter to more than plus 80 degrees F at the height of the summer. Seemingly perpetual dark in midwinter gives way to endless daylight in summer. During the winter, snow carpets virtually the whole of the land surface.

These contrasts between summer and winter exert a profound impact on activity in the oil and gas industry. Activities that require lengthy daylight, access to the ground surface or the use of open water need to occur in the summer. Other activities involving the movement of heavy equipment across roadless ground take place during the winter.

Project plans need to allow for this seasonal impact — certain activities simply have to take place at certain times of the year. And the short time spans within which some work has to be done drive the need for meticulous project planning and work preparation — the overrun of a critical task could delay the whole project until the following year.

But, even with meticulous planning, the need to do drilling and construction, for example, in the winter often extends the exploration or development work in an area over several years, thus increasing project costs and uncertainties.

### Sea lifts

The timing of sea lifts for the transportation of oil and gas facility modules to the North Slope exemplifies the seasonality of industrial activity in Alaska.

Ocean barges provide the primary means of transporting these huge modules to construction sites on the Slope. But sea ice only retreats from the Beaufort Sea coastline for a couple of months during the summer. Miss that access window and you'll have to wait until the following summer or try to freight things by road.

The convoy of barges used for a sea lift normally passes through the Bering and Chukchi Seas to reach Point Barrow at the extreme northwest of Alaska in July. The ice typically clears from the Beaufort Sea coast during July, although the convoy may have to wait at Point Barrow until the route along the coast clears sufficiently.

Barges also come from the Mackenzie River, to the east, in the summer. These barges deliver anything from buildings to fuel along the Beaufort Sea coast — they may be able to start deliveries earlier in

July than barges coming from the west.

Normally the open water season along the Beaufort Sea coast ends around mid-September.

Even in areas a long way south of the Arctic ice pack, sea ice can prove problematic. For example, broken ice forms in the Cook Inlet in the winter. Generally ships can navigate the inlet to the Port of Anchorage throughout the winter, although a heavy pack ice can cause problems in a severe winter. However, the ice pack and shoreline ice generally prohibit the use of barges for the transportation of equipment and materials to the west side of the inlet from early December to some time in April.

The Port of Valdez remains ice-free throughout the winter.

Sea ice obviously limits the season within which offshore seismic surveys can take place. Surveys in the Beaufort and Chukchi Seas have to be carried out during the summer open-water season. The timing of offshore surveys in these seas also needs to take into account concerns about the impact of seismic activities on wildlife, especially migrating whales.

### Geology field seasons

With snow cloaking many rock exposures during the winter, summer is the time for geological surveys on land.

On the North Slope and in the Brooks Range Foothills, geological fieldwork normally starts in mid-June and lasts until around the end of the first week of August. On the higher ground of the Brooks Range the snow cover doesn't normally melt sufficiently for fieldwork until the beginning of July, but the field season ends at about the same time as on the North Slope.

In the Interior of Alaska, south of the Brooks Range, the summer field season lasts much longer, normally starting in the second week of May and extending through to the second week of September. There's a similar situation on the Alaska Peninsula, with a field season lasting from early May to early September.

However, the high elevations of the Talkeetna and Chugach mountains result in a snow cover that doesn't usually melt sufficiently for geological fieldwork until mid-June. Fieldwork in these mountains usually lasts until the end of August.

Along the coast of Southeast Alaska geologists can usually conduct field studies at any time between April and October.

### Working in the winter

At first sight it might be tempting to think that much exploration and development activity would stop during the frigid winter months. In fact, almost the opposite is true.

Vast areas of Alaska consist of wetlands, dotted by lakes and crossed by rivers. The freezing of the water and the blanketing of everything by snow open the possibility of off-road travel through much of the state. Snow machines can drive along winter trails and ice roads provide routes for more conventional vehicles — even in Southcentral Alaska people plow roads across frozen lakes to enable car access to isolated cabins.

In the winter it's possible to open an ice road to connect the Alaska highway system near Point MacKenzie, north of Anchorage, with the oil industry road system on the west side of the Cook Inlet.

The winter snow and ice cover also protects the land surface, thus enabling industrial activities that would damage the ground and vegetation during the summer. Winter on the North Slope provides a window of opportunity to do land seismic surveys without damaging the tundra. Winter is also the time to drill exploration wells, move equipment to development sites, build roads and construct pipelines.

Years of oil industry experience on the North Slope and increasing environmental awareness have led to progressively improved ways of working on the tundra in the winter — the days of allowing cat trains to plow their way across the surface have long gone. Nowadays ice pads and ice roads provide the prime means of working and traveling off the gravel road system — the ice structures provide effective support for heavy equipment but leave no trace of their presence after the ice melts in the summer. Sometimes companies insulate ice pads at the end of a winter season, to preserve the ice over the summer and thus enable drilling to start early the following season.

Access to work sites on the nearshore sea ice of the Beaufort Sea also requires ice roads. Construction of offshore ice roads is more complex than construction on the tundra because of factors such as the variability of the sea ice thickness.

### Ice road limitations

The trend toward exploration at sites increasingly distant from the established gravel road system has brought some new



issues for tundra travel. It normally takes about a day to construct one mile of ice road. So, for example, the construction of an ice road to a drilling site 80 miles from the nearest gravel road might require 80 days out of a 120-day tundra season, thus leaving little time for drilling. And at a cost of \$50,000 to \$55,000 per mile, a long ice road becomes an expensive proposition.

It took 18 months of elapsed time to drill just one well at ConocoPhillips' Puviaq site in NPR-A south of Smith Bay. The company moved equipment by Rolligon from both Deadhorse and Barrow. A rig moved to the site one season was stored on an insulated ice pad and the company returned to drill the well the next winter. The drilling operation raised another issue — without an ice road you can't move test equipment quickly to a well in the event of an oil discovery. That may prevent you from conducting well tests.

Talisman Energy's Alaska subsidiary, FEX, established a major staging area at Cape Simpson on the Beaufort Sea coast, to facilitate the logistics of moving equipment to the company's exploration drilling sites in northwest NPR-A.

When planning exploration in the Brooks Range Foothills, Anadarko Petroleum identified some other ice road issues. Anadarko has determined that it's impractical to construct ice roads in hilly country with grades exceeding 6 percent — water simply runs off the road surface before it has time to freeze. And even if you succeed in constructing a road on a Slope, the ice gradient may prove too slippery for heavy vehicles to negotiate.

The construction of ice roads requires fairly large quantities of water. That's not generally a problem on the North Slope where lakes abound. But with relatively few lakes in the foothills the water supply becomes a difficult issue.

### Alternatives

Companies are now looking for alternatives to ice roads for access to remote exploration drilling sites.

Anadarko has tried drilling from a new type of lightweight platform that sits on legs on the tundra and thus eliminates the need for ice pads — the platform can be moved from prospect to prospect and, if necessary, can stay on location over the summer.

New designs of all-terrain vehicles such as Rolligons are appearing. People are evaluating options such as light-



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There is a network of roads connecting many of the oil installations on the North Slope.

weight, self-propelled drilling rigs. Other options include barging all-terrain vehicles to remote sites during the summer or using heavy-lift helicopters.

Doyon Drilling, in conjunction with Akita Drilling and Pioneer Natural Resources, has started operating two new truckable exploration rigs, the Arctic Fox and the Arctic Wolf, on the North Slope. These relatively lightweight rigs can be more easily mobilized across the winter

tundra than traditional, heavyweight Arctic rigs.

The State of Alaska has proposed constructing gravel roads to improve access to remote areas. These roads are discussed in the "Roads" section of this chapter. The state has also proposed building some staging areas at remote locations — companies could over-summer equipment at these staging areas.

# Alaska Road System

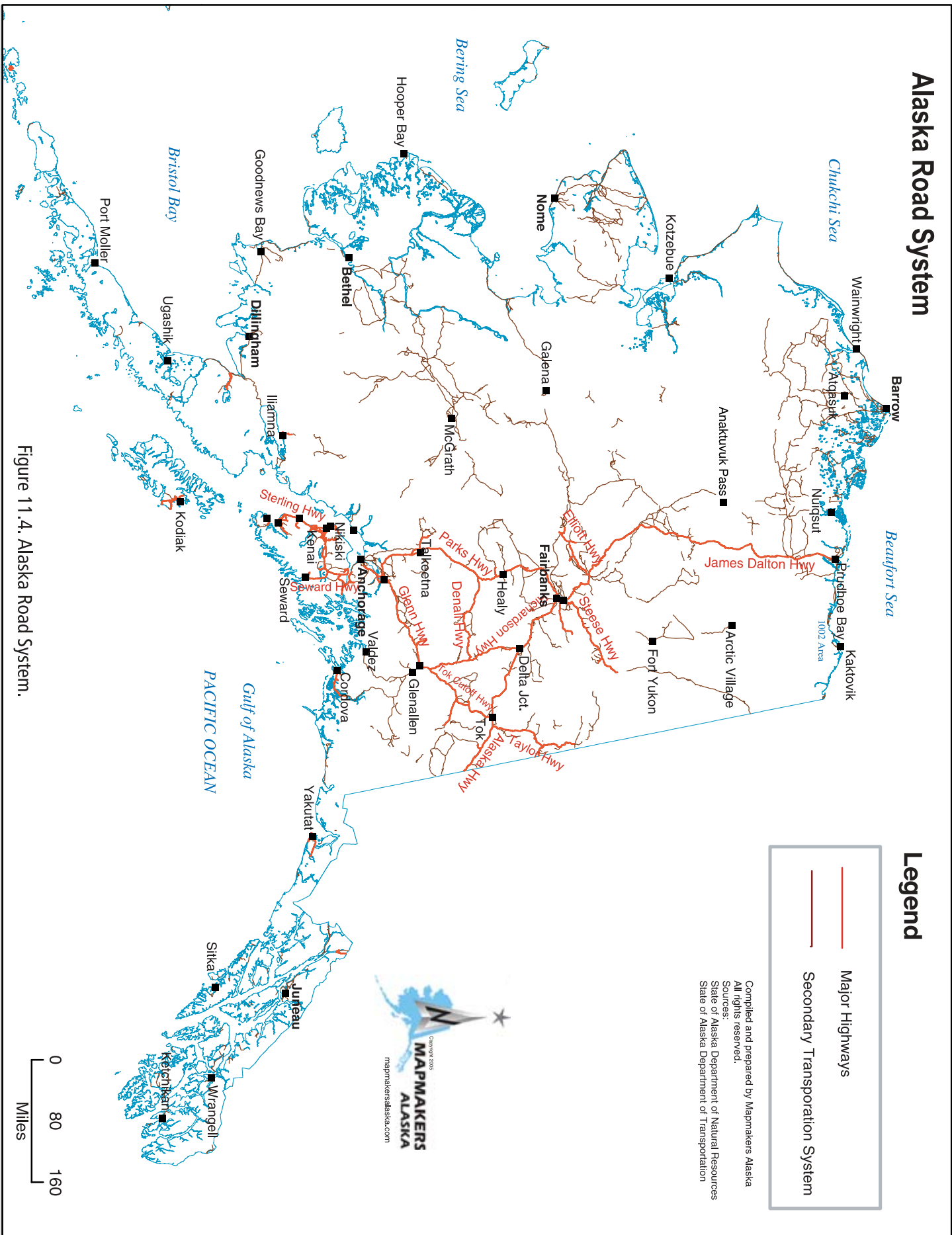


Figure 11.4. Alaska Road System.

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 Sources:  
 State of Alaska Department of Natural Resources  
 State of Alaska Department of Transportation



## Tundra travel

Because of the environmental sensitivity of the tundra of northern Alaska, the Alaska Department of Natural Resources regulates industrial travel off the permanent road system on the North Slope. DNR permits certain specialized, low-impact vehicles to travel on the tundra in the summer after July 15 each year. All other vehicles are restricted to winter travel during what is known as the tundra travel season.

And each winter DNR determines the opening and closing dates for that winter season.

The timing and length of this tundra travel season have become critical factors in the practicalities and economics of oil and gas exploration or development on the North Slope.

And, recognizing the fact that areas along the northern coast may freeze earlier than areas such as the Brooks Range Foothills, DNR has since 2002 determined different opening and closing dates for four tundra opening areas — the eastern coastal, western coastal, lower foothills and upper foothills areas.

The start of the season in an area where companies have planned construction or exploration drilling marks a flurry of activity, building ice roads to construction and drilling sites. As the end of the season approaches, people have to close down their operations, so that they can move equipment back across the ice roads before the ice melts.

Seismic crews conduct land surveys on the North Slope during the tundra travel season. However, the operation of seismic equipment across frozen lakes and rivers critically depends on the depth of the ice. So the seismic surveys don't usually start until temperatures have remained very low for long enough for thick ice to form. Typically the seismic surveys start sometime after the opening of tundra travel and continue to early May.

The Bureau of Land Management includes tundra travel stipulations in its activity plans for NPR-A. These stipulations specify the conditions under which BLM allows travel on the tundra during the winter and operates in a somewhat similar fashion to the DNR rules. The stipulation for the northeast NPR-A activity plan uses the 12-and-6 standard (described in the next section) while the northwest NPR-A activity plan stipulates that ground operations can only start when snow and frost are at sufficient

depth to protect the tundra. The stipulation for northeast NPR-A may change as part of current proposals to extend the area available for oil and gas leasing.

For opening tundra travel, BLM monitors North Slope conditions through remote weather stations that transmit data through a satellite system. When the opening seems imminent, BLM scientists conduct field tests to determine whether the depth of the freezing level and the snow cover can protect the tundra in areas where people are going to work. BLM determines the closing date for tundra travel by anticipating when snow disintegration will occur.

## Criteria for the opening

For many years DNR applied what's known as the "12-and-6 standard" to decide when to open tundra travel. This standard required a 12-inch depth of hard frozen ground and a 6-inch depth of snow, criteria that derive from personal judgment about the amount of protection needed for the ground surface.

Application of the 12-and-6 standard resulted in a substantial long-term decline in the length of the tundra travel season, mainly because the season has tended to start at progressively later dates — the season dwindled from 200 days in the 1970s to about 120 days in recent years. It is unclear to what extent this decline resulted from global warming and to what extent it has resulted from changes in the measurement methods for assessing the 12-and-6 criteria.

However, the shortening of the tundra travel season has become a major concern for companies operating on the North Slope.

The State of Alaska has mitigated some of the impact of the shortened season by allowing pre-packing of ice roads prior to the season opening. Other DNR approved techniques, such as side casting from summer-approved equipment, have allowed ice road construction to begin early.

In 2004 DNR and the U.S. Department of Energy undertook a study to establish a more scientific basis for determining the opening and closing of the season — a prime purpose of this study was to determine whether it would be possible to open the season earlier without damaging the tundra. The study formulated new criteria for tundra travel, based on ground hardness rather than the depth of frozen ground. The study also determined different snow depth and ground hardness criteria for different types of tundra.

DNR now bases the opening of tundra travel on the depth of the snow cover and the temperature of the ground at a depth of 12 inches. Devices known as thermistors at a series of permanent recording stations measure the subsurface temperatures. The travel season on the coastal plain now opens with 6 inches of snow cover and a subsurface temperature of minus 5 degrees C. The corresponding criteria for the Brooks Range Foothills are 9 inches of snow and minus 5 degrees C.

The continuous temperature readings also enable a level of predictability in when the season will open. For example, it typically takes about 10 days for the subsurface temperature to drop from minus 1 degrees C to minus 5 degrees C.

Using the new criteria, the 2005-2006 tundra travel season opened on December 6 on the coastal plain, on December 14 in the lower foothills and on December 21 in the upper foothills. All areas closed on May 12. In the winter of 2006-2007, a shortage of snow delayed the opening. The coastal plain opened on Dec. 19, while the upper foothill did not open until Jan. 18.

## Roads

A glance at a roadmap of Alaska makes it clear why the state boasts the highest percentage of licensed pilots in the United States — almost the entire connected road system lies in the southeast quarter of the state. Try to go just about anywhere else and you'll need to fly there.

Roads do exist in and around all the villages and towns of Alaska. Sometimes these roads connect adjacent communities. But rarely do local roads extend for any distance or connect one part of the state with another.

A network of paved, all-weather highways does connect Anchorage, Kenai and Fairbanks, the main commercial centers of Southcentral and Interior Alaska. The Dalton Highway connects this road network to the North Slope oil installations. The Alaska Highway connects the Alaska road system with Canada and the U.S. Lower 48 states.

The road network connects with many of the oil and gas facilities and installations on the Kenai Peninsula, on the east side of the Cook Inlet. However, roads associated with oil and gas facilities on the west side of the Cook Inlet do not link to the Alaska highway system, other

than by ice road construction in the winter. Highways that form part of the road system pass through or near some of Alaska's Interior oil and gas basins, including the Nenana basin, the Copper River basin and the Yukon Flats basin.

There is a network of roads connecting many of the oil installations on the North Slope. However, the North Slope roads are privately managed — permission is required to drive on them.

### Major highways

The following is a list of the major highways in Alaska — figure 11.4 shows a highway map. Nowadays all of the highways listed below are paved, except for the Dalton Highway.

1. The Alaska Highway, often termed the Alcan Highway, provides the only road connection between Alaska and the rest of North America. The highway starts in Fairbanks, crosses into the Yukon Territory southeast of Tok and eventually connects with roads to Edmonton and Calgary. Vehicles ranging from private cars to freight trucks regularly ply this route to and from Alaska.

2. The George Parks Highway provides the most direct connection between Fairbanks and Anchorage. Major improvements in recent years have created a fast, modern highway. The highway passes through the Nenana and Susitna basins, two areas with oil and gas exploration potential. A spur road connects the Parks Highway with Point MacKenzie, on the north side of the Knik Arm from Anchorage. There's a deep-draft sea dock at Point MacKenzie.

3. The Glenn Highway connects Anchorage to the Alaska Highway through the Chugach Mountains and the Copper River Valley. This highway passes through part of the Copper River basin, an area with oil and gas potential.

4. The Richardson Highway connects the port of Valdez to the Glenn Highway and the Alaska Highway. Valdez is the site of the Valdez Marine Terminal, where oil is transferred from the trans-Alaska oil pipeline to tankers. The Richardson Highway passes through part of the Copper River basin.

5. The Seward Highway connects Anchorage with the port of Seward on the Kenai Peninsula.

6. The Sterling Highway connects the Seward Highway with the cities of Soldotna, Kenai and Homer on the Kenai Peninsula. The Sterling Highway runs through part of the Cook Inlet basin and

provides a road route to the oil and gas installations of the Kenai Peninsula. A spur road from Kenai leads to major oil and gas facilities at Nikiski.

7. The Elliott Highway connects Fairbanks with the Dalton Highway.

8. The Dalton Highway, also known as the haul road, connects Fairbanks and the Elliott Highway with the private road network around the North Slope oil installations. The Dalton Highway is mostly unpaved. The scarcity of filling stations, rough road conditions and extremely remote route necessitate thorough planning before driving on this road.

### Industrial road program

As part of a state industrial roads program, the State of Alaska has proposed constructing several gravel roads to simplify access to prospective state lands north of the Brooks Range.

The main focus of this road program has become what is known as the Bullen Point Road, east from Prudhoe Bay to the Point Thomson unit. DNR and the Alaska Department of Transportation have done some field engineering studies, some preliminary engineering and the identification of potential routes for this road. Road construction would probably require a federal environmental impact statement, because the potential routes will need U.S. Army Corps of Engineers wetlands permits.

On the North Slope the state has also considered a westward extension, across the Colville River, of the Spine Road that connects the existing oil facilities on the slope.

The state has considered building roads through the Brooks Range Foothills, west and east from the Dalton Highway. The road to the west would continue north to connect with the Colville River delta area on the North Slope.

As an alternative to building roads in the foothills, the state is considering building a series of staging areas, perhaps based on some old landing strips. Staging areas would enable companies to stockpile supplies at convenient locations in the foothills when doing multiyear exploration in the area.

### Summer and winter driving

Summer driving on Alaska highways is generally straightforward. However, it is necessary to plan fuel usage more careful-

ly than elsewhere in the United States because there can be long stretches of road devoid of filling stations. Fuel planning becomes particularly critical on the Dalton Highway. Reduced visibility caused by dust thrown up by other vehicles can also prove problematic on the Dalton.

Road crews keep all of the highways that we've listed open during the winter months — road transportation in the state continues right through the winter.

However, winter brings several difficulties and potential dangers to Alaska driving. Snow and ice make road surfaces slick. And a winter storm on a remote road can create a life-threatening situation. So it's vital to use a vehicle that's properly equipped with winter tires or chains and to pay careful attention to weather forecasts.

Extreme low temperatures, especially in Interior Alaska, probably present the biggest winter hazard if you break down, slide off the road or get into a wreck. It's essential to carry Arctic-caliber warm clothing and sleeping bags, just in case. However, since there's regular traffic along most highways, help is usually at hand if you do get into difficulties.

In general road transportation provides a good means of freighting foods into the state and between major centers on the road system at any time of the year. And several trucking companies have amassed years of experience of driving in Alaska.

But given the sparse roads and huge distances, air is the preferred transportation mode for most personal business travel in Alaska. Off the road system, air and water transportation become the only options for shipping freight or people. ■

### Credits

Harry Bader of the Alaska Department of Natural Resources, John Barnes of Marathon Oil Co., David Boelens of Aurora Gas, Robin Cacy of the Minerals Management Service, Dan Dieckgraef of Enstar Natural Gas Co., Richard Downey of Agrim, Bill Van Dyke of Alaska's Division of Oil and Gas, Richard Foley of the Federal Energy Regulatory Commission, Nolan Heath of the Joint Pipeline Office, Scott Pexton of the Joint Pipeline Office, Rocky Reifensstuhl of Alaska Division of Geological and Geophysical Surveys, Grace Salazar of the Regulatory Commission of Alaska, Dan Thomas of Unocal Corp., Craig Tornaga of Crowley Marine Services Inc., Paul Weeditz of Marathon Oil Co., Jim Weeks of Winstar Petroleum and Harold Heinze contributed information for this chapter.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.





## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, *Dispelling the Alaska Fear Factor*.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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PETROLEUM NEWS, WEEK OF APRIL 29, 2007

# Palin signs PSIO administrative order

By KRISTEN NELSON  
Petroleum News

**A**laska Gov. Sarah Palin signed an administrative order April 18 creating the Petroleum Systems Integrity Office and repealing the administrative order signed by former Gov. Frank Murkowski in October which established the Lease Monitoring and Engineering Integrity Office modeled on the Joint Pipeline Office.

The governor said that the "signing of administrative order number 234 ... creates an office that will ensure the integrity of oil and gas systems in Alaska."

"PSIO coordinates the state's permitting and compliance functions into an independent office within the Division of Oil and Gas, with specific responsibilities and authorities for interagency coordination," she said. PSIO doesn't replace existing authorities but "provides enhanced and more flexible oversight with the goal of ensuring the integrity of oil and gas systems and infrastructure," Palin said.

"The goal here is to search for any gaps in laws or regulations and agency or industry practices that threaten systems integrity. If existing authorities can't step up to the plate — won't step up to the plate — we'll exercise appropriate oversight using our authority" as landowner through our leases, the governor said.

The order names the commissioner of the Department of Natural Resources as coordinator "of oversight of facilities, equipment, infrastructure and activities" used to explore for, produce and transport oil and natural gas "from, across or within state oil and natural gas units or leases."

Both houses of the Legislature have already approved \$1.5 million for the PSIO in the



Alaska Gov.  
Sarah Palin



DNR Commissioner  
Tom Irwin

JUDY PATRICK

*The order names the commissioner of the Department of Natural Resources as coordinator "of oversight of facilities, equipment, infrastructure and activities" used to explore for, produce and transport oil and natural gas "from, across or within state oil and natural gas units or leases."*

operating budget.

**Irwin: enlightened self interest didn't work**

DNR Commissioner Tom Irwin said that in the past the state relied on the enlightened self interest of field operators to ensure prudent maintenance practices.

"History shows us that didn't work," Irwin said, and some watershed events have hurt the state with production reduction.

He said the LMEICO model under the previous administration included DNR doing consolidated budgeting and that isn't included in PSIO. Individual departments are much better at doing their own budgets, he said.

The PSIO is a more cost-effective way of establishing this oversight by ensuring that state agencies work together, he said.

Irwin said a gap analysis is already under way to make sure all areas of oversight are covered — and to make sure there is no overlap.

The next step, he said, is requirement for state approval of quality assurance programs at Prudhoe Bay; that will be followed by compliance inspections for the quality assurance programs.

Irwin said Alaska is "the only state in the nation that has taken it this far."

Department of Environmental Conservation Commissioner Larry Hartig said the state's oil and gas development and transportation systems are complex and events in one area affect others, "so a fragmented regulatory approach to oversight of these systems is not the way to go.

"PSIO fixes that problem," he said. There are two important elements: "a systematic, integrated and thorough approach to the agencies' oversight of a pipeline facility and it requires a mandate that the agencies talk with each other and that they share their information and that they do this through one entity, the PSIO." ■

PETROLEUM NEWS, WEEK OF MAY 20, 2007

# State, feds agree on pipeline oversight

*Alaska's Petroleum Systems Integrity Office, U.S. DOT agency to coordinate enhanced oversight; first of its kind for PHMSA in state*

By KRISTEN NELSON  
Petroleum News

Enhanced regulation of Alaska oil and gas infrastructure following last August's transit-line corrosion discovery at Prudhoe Bay took another step forward in mid-May when the State of Alaska and the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration signed a letter of intent to provide enhanced and coordinated oversight of oil and natural gas production and transportation facilities in the state.

In the letter, signed May 14, the Alaska Department of Natural Resources agreed to partner with PHMSA to enhance the protection of public safety, the environment and the reliability of energy supply through more effective coordination of oversight of oil and gas production and transportation.

PHMSA said this is the first agreement of its kind in Alaska. It is designed to close gaps in inspection coverage between Alaska production and transmission systems, improve risk assessment and oversight of unique and aging infrastructure, advance development of design and construction standards for future Arctic pipelines and increase timely data exchange about Arctic maintenance and corrosion management.

PHMSA has jurisdiction over oil and gas transmission pipelines in Alaska, including approximately 200 miles of pipelines on Alaska's North Slope and the 800-mile trans-Alaska oil pipeline, which is jointly shared with DNR and the Alaska Department of Environmental Coordination. PHMSA said there are more than 4,600 miles of pipelines in Alaska.

## PSIO will coordinate

Alaska Gov. Sarah Palin said in a statement that "the uninterrupted flow of oil and natural gas on state lands" is crucial

for the state's economic wellbeing, the protection of the environment and the safety of oil and gas workers. "I am pleased that Alaska, via the newly created Petroleum Systems Integrity Office, will be coordinating efforts and exchanging important systems integrity data with our federal partners to assure safe, continued operations," she said.

DOT Acting Deputy Secretary and PHMSA Administrator Thomas Barrett said protecting transportation of energy from Alaska is essential for energy independence. "This partnership will help us to identify, assess and address potential risks to the oil and gas transportation infrastructure — allowing us to prevent system failures before they occur," he said.

Recent significant events in Alaska, including pipeline failures on the North Slope, have highlighted the need for the state's oversight agencies and PHMSA to implement a more comprehensive and effective "system of systems" approach, Barrett said.

The state said that as part of the agreement PSIO and PHMSA will delineate clear jurisdictional roles and develop a strategic plan for the oversight of oil and gas production and transportation, including risk assessment, standards and inspections.

"The Petroleum Systems Integrity Office is committed to maximizing the safe and stable flow of oil and gas resources to market by ensuring oversight and maintenance of oil and gas equipment, facilities and infrastructures," said PSIO Acting Coordinator Jonne Slemons. "Working with our federal partners is one of the most effective ways to accomplish this job.

"Our integrated approach will identify, assess and address potential risks to the oil and gas transportation infrastructure, thereby allowing us to prevent system failures before they occur," she said.

## PSIO already coordinates state agencies

PSIO, which is in DNR's Division of Oil and Gas, was created by the governor in April; it already coordinates among state agencies.

When she signed the administrative order Palin said PSIO has "specific responsibilities and authorities for interagency coordination." It doesn't replace existing authorities, she said, but "provides enhanced and more flexible oversight with the goal of ensuring the integrity of oil and gas systems and infrastructure."

"The goal here is to search for any gaps in laws or regulations and agency or industry practices that threaten systems integrity. If existing authorities can't step up to the plate — won't step up to the plate — we'll exercise appropriate oversight using our authority" as landowner through our leases, the governor said.

Slemons told the Alaska Senate Resources Committee in February that in addition to identifying and filling gaps in regulations, PSIO will also "review, approve and enforce operator quality assurance programs," following the model used by the state pipeline coordinator's office. In conjunction with the pipeline coordinator's office, PSIO will also coordinate enforcement actions.

And PSIO "will periodically report both to the governor and to the legislature on the health of our oil and gas infrastructure."

Slemons said quality assurance program work will begin at Prudhoe Bay and proceed to other units. The original concept was to do all of the North Slope units first, but Slemons told the committee she believes that should be reconsidered and priority based on age of infrastructure, production volumes and past maintenance and performance history.

"Cook Inlet frankly concerns me greatly because of the age of the infrastructure there," Slemons said. ■



# Crowley: Serving the oil industry in Alaska since 1957

**C**rowley entered the Alaska market in 1953 when a Crowley company pioneered the use of barges to transport rail cars between Ketchikan and Prince Rupert, British Columbia. A few years later Crowley began supplying the Distant Early Warning (DEW) Line radar installations for the U.S. Air Force in the Aleution chain and across the northern coast. It was this early experience with Arctic transportation by tug and barge that positioned Crowley to work with the oil industry in Alaska.

When oil was discovered in Cook Inlet, first in the Swanson River onshore in 1957 and later offshore at McArthur River, oil industry officials called on Crowley. The huge tidal variations made it difficult to set platforms without the high-horsepower tugs of today, nor was there a marine support structure available. Crowley responded by pioneering a rafting technique to achieve the necessary horsepower. Then they set up a supply and crew boat company near Kenai and built six ice-strengthened tug supply boats.

Ten years later when oil was discovered at Prudhoe Bay, the industry turned to Crowley again. Beginning in 1968 using Arctic transportation experience gained in the 50's, Crowley began summer sealifts to Prudhoe. Since then 334 barges carrying nearly 1.3 million tons of cargo have been successfully delivered – some as large as 10-story buildings weighing nearly 6,000 tons.

In 1975 the Crowley sealift faced the worst Arctic ice conditions of the century. The fleet, comprised of 47 vessels carrying 154,420 tons of cargo stood by for nearly two months waiting for the ice to retreat. Finally in late September it moved back as Crowley tugs and barges lined up for the slow haul to Prudhoe Bay. Then the ice closed again and it took as many as four tugs to push the barges through, one at a time.

Today, Crowley tugs, barges, cranes, and personnel continue to support North Slope oil development and the protection of the environment. Crowley is the marine contractor for Alaska Clean Seas, an industry oil spill response cooperative funded by North



Slope producers and the Alyeska Pipeline Service Company. In the summer the company moves equipment and supplies over water, and provides crew boat shuttle service for major producers.

In the winter Crowley provides logistics support with CATCO all-terrain vehicles.



These heavy lift units have large bag tires designed to work on the frozen tundra without damaging the delicate Arctic ecosystem. These vehicles are used with drills and pumps to make ice roads and ice islands for oil exploration.

At the southern terminus of the pipeline, Crowley provides tanker escort and docking services in Valdez harbor for the Alyeska Pipeline Service Co. using some of the most technologically advanced and powerful tugs

in the world. During tanker escorts Crowley tugs are tethered to, or shadow tankers in the event braking or steering assistance is needed.

Crowley has positioned other vessels in the area to provide the world's largest comprehensive spill prevention and response capability to Alyeska and its member companies. This program formed with Alyeska is known as SERVS (Ship Escort Response Vessel System). Its mission is to escort laden tankers through Prince William Sound and Hinchinbrook Entrance to Seal Rocks, to assist tankers in emergencies, and to provide initial oil spill response.

Crowley Alaska is part of the Crowley Maritime Corporation family of companies. The corporation formed in 1892 and has been serving customers in Alaska since 1953. Headquartered in Oakland California, Crowley is one of the largest and most diverse companies of its kind, with operations in worldwide logistics, liner shipping, energy support, project management, ocean towing and transportation, ship assist and escort, salvage and emergency response, petroleum and chemical transportation, fuel sales and distribution, ship management and vessel design-build technical services.

Over the past half-century its unique expertise and equipment have propelled Crowley into a position as a leader of quality, reliable and environmentally sound services for the petroleum industry in Alaska. People who know Crowley rely on Crowley to get the job done right. ■

# Alaska's good luck charm: Petrotechnical Resources Alaska

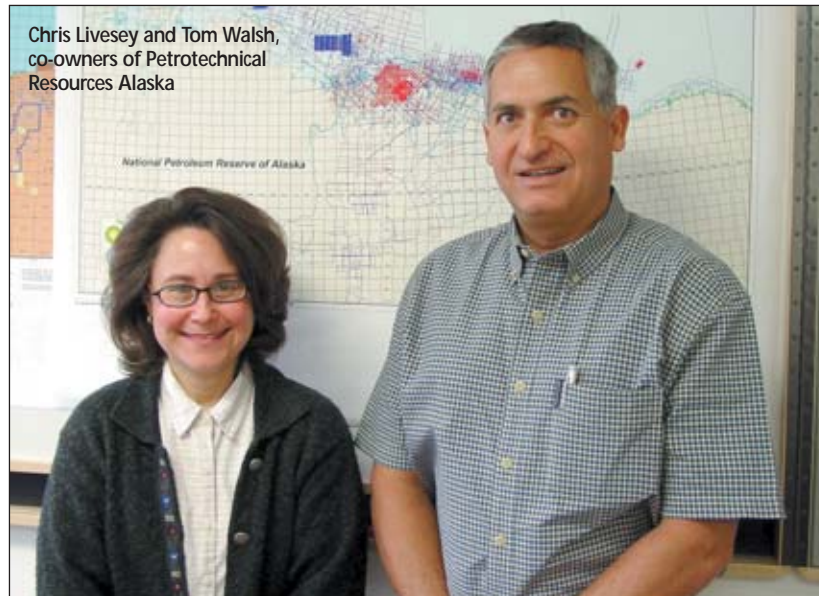
**M**r. Tom Walsh and Dr. Chris Livesey, co-owners of Petrotechnical Resources Alaska (PRA), will tell you that at least some of their achievements in Alaska's petroleum industry arise from fortunate coincidences. If unexpected luck truly has something to do with PRA's success, consider spending more time in close proximity to this first-class team—if some of it rubs off the results might be impressive.

## One lucky firm

Take for instance the original formation of this consulting firm. In 1997, five independent consultants in the Alaska petroleum industry, including Walsh, understood that their marketplace needed to change to meet client needs. Industry demands "forced us to create this company, basically," says Walsh. "It just turns out that the model we landed upon seems to be very accommodating to a lot of very talented people." The chosen model supports a firm that has enormous depth and breadth of technical expertise but has minimal overhead costs. Its efficient design allows the real assets of the company, the people, to shine.

Two of those brilliant assets are Tom Walsh and Chris Livesey. Walsh has worked for twenty-four years in Alaska's petroleum industry in almost every aspect of exploration and production. His local knowledge and technical expertise cross the state. Livesey's work as a professional geologist spans fifteen years. In addition to working for Chevron, she taught geology classes at the University of Alaska as an adjunct professor.

Progressing from five original partners to seventy employees in seven years has resulted from an array of elements, including PRA's knack for luck. "People with broad skill bases and great depth of knowledge tend to gravitate toward PRA. The word is out, the reputation is there—there's a strong pull", says Walsh. Part of the attraction lies in



Chris Livesey and Tom Walsh, co-owners of Petrotechnical Resources Alaska



Visit the company online

[www.petroak.com](http://www.petroak.com)

the high ethical standards at PRA. The firm "takes great care to protect our clients' data and ideas, and our reputation in the community," Walsh elaborates.

A combination of talents old and new promotes an all-around vitality. Walsh says that the partners "feel very fortunate to work with a great team of people. I think we've got some of the most talented people in the oil industry."

## Fortunate clients

A consulting firm that magnetically draws top-notch petroleum experts will naturally attract any organization in the industry as clientele. Oil and gas companies are lucky to have PRA as a resource. The firm caters to the geoscience, engineering and project management needs of corporate clients of every shape and size. The company also offers valuable services to government agencies. All of PRA's offerings hinge on a common theme. According to Walsh, "we feel we're here to very strongly promote the growth of the oil and gas industry in Alaska."



Chantal Walsh, right, one of the company's certified professional engineers.

## Impressive services

The large oil producers that hold the major existing stakes in Alaska's petroleum industry tend to call upon PRA to extend the life of oil fields. From Prudhoe Bay expansion and advancement projects to Cook Inlet gas storage and development jobs, PRA professionals in every field of expertise work with companies such as BP, Unocal, and Conoco Phillips to keep petroleum products flowing from wells that naturally decline in productivity over time.

As part of a natural market cycle, smaller oil companies continue to emerge in Alaska. These new stakeholders encounter barriers in their transition to this market that PRA helps ease. For instance, PRA facilitates land access by "supporting these companies' review of lease-sale activity, helping state and federal agencies put together lease sales, and working with Native corporations on the management of their lands," Walsh explains.

Livesey and Walsh present one recent accomplishment as PRA's favorite new offering—a facilities sharing study. Any stakeholder in the Alaskan oilfields can see the capacity and current usage of existing petroleum processing and storage facilities by accessing the report at

Alaska's Division of Oil and Gas website at: <http://www.dog.dnr.state.ak.us/oil/products/publications/othereports>.

## The good luck charm

Perhaps the Roman philosopher Seneca thought about the workings of a company like PRA when he stated, "Luck is what happens when preparation meets opportunity." The skill, ethics, and experience of the professionals at Petrotechnical Resources Alaska foster its capacity for successful ventures. ■



# Alaska Telecom: The only name you need to know for remote communications

**A**laska Telecom's story is the stuff of Alaska legends. CEO Lloyd Morris started the fledgling company at his dining room table in Anchorage in 1981 and has built it into a communications company providing technical and wireless communications services around the world, often under demanding logistic and environmental constraints.

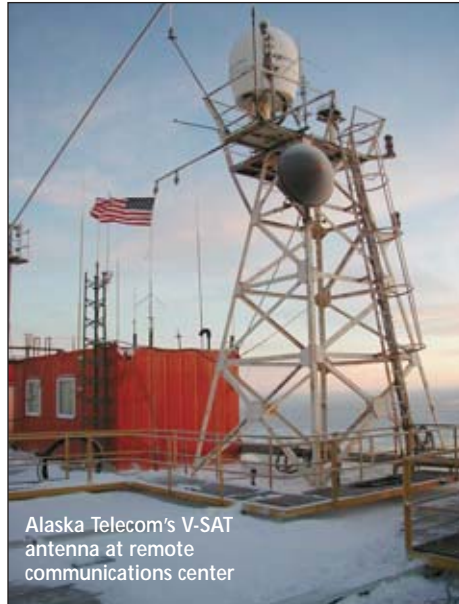
Morris, a veteran of the broadcast industry, came to Alaska when satellite communications were changing the face of the state's telecommunication infrastructure.

As the oil industry began to boom in the early '80s Alaska Telecom was instrumental in bringing telecommunication services to Prudhoe Bay and other remote locations.

Years of providing communications in hazardous, remote or otherwise demanding assignments have transcended into international work. The company's crack team of technicians and engineers, sometimes called the communications SWAT team from Alaska, has provided NBC with intricate radio links for the Summer Olympic games in Seoul, Korea, and Barcelona, Spain; an emergency post-war radio system for the Kuwait government reconstruction effort; and various telecommunication systems in Dubai, the South China Sea, Singapore, Mainland China, Indonesia and Azerbaijan. In Alaska, the company regularly installs and maintains communications sites and towers across the state. The company owns some sites and manages others for clients.

Alaska Telecom, according to company materials, is an experienced and progressive company specializing in the engineering, implementation and service of sophisticated communications networks to support public and private needs.

"We're the only name you need to know in remote communications," says Morris, recalling one of his favorite company stories: "On an early project for Shell Oil in Deadhorse, my brother Bill climbed down the 100 foot tower we had just finished constructing after a long cold day, dog tired and chilled to the bone. The Shell company man said chidingly, 'could you move that tower 20 feet to the left?' Bill held back for a moment and replied, 'you just tell us where you want it and get to hell out of



Alaska Telecom's V-SAT antenna at remote communications center



the way!' Thank goodness the company man had a good sense of humor! He later told me 'that's what I like about your people, they will do whatever it takes.' The point here is that we listen closely to what is required by our customer and figure out how to provide it."

## Services

Engineering services — project management, site surveys, telecommunication systems design, communications path design, equipment evaluation, generations of specifications, emergency response communications plans, systems test and acceptance documentation.

Construction and installation — expertise in logistically supporting construction and installation of the following technologies under difficult and isolated conditions: communications towers, shelters, power generation plants, voice, facsimile and data encryption equipment, navigational aids, terrestrial microwave, cellular and trunked radio networks.

Design and integration — Alaska Telecom has designed, procured, and integrated a variety of complex systems, typically within critically compressed time frames. These systems have consistently

provided high quality service with reliable operations. Some systems profiles include: private communications systems for support of remote sites; portable electronics shelters housing communications systems and monitoring equipment; cellular and trunked radio networks, including transportable equipment modules; specialty radio systems, linking for multi-event television broadcasting.

In the early '80s multiple contractors were used to provide a complete communications system. "In contrast," says Morris, "we had engineers and technicians who could design, construct and turn up and test a total system. Our team had good primary and secondary skills with some level of expertise in multiple areas. Take Joe King, for example; here is a guy who is a master electrician, diesel mechanic and can erect towers and troubleshoot equipment — what more could you ask for? We reasoned if we could put multi-talented people in the field who could handle the necessary tasks, we could cut the number of bodies and also become a central point for solving problems. Our mantra has become 'if you design it, you have to be able to install it, turn it up and make it work!'"

## Leveraging logistics

The company's expertise in logistics has been a natural outgrowth of remote projects in demanding conditions.

"We go in totally self-sufficient," says Morris. "You have to be prepared. Supplies are far away, so in-depth planning is necessary. We got good at logistics, and learned a lot of tricks. For instance, we use bright red packing boxes to make our shipment easy to find, always bring extra 'widgets,' and just think logistically. We have identified an efficient way of doing business."

## Experience counts

For more than 22 years, Alaska Telecom has operated worldwide, often under demanding logistical and environmental constraints.

"We have developed a well-deserved reputation for quality workmanship, timely response, high standards of safety, and respect for budgetary considerations," adds Gray. ■

# Flowline Alaska: Providing pipeline protection in the Far North

**F**lowline Alaska is a Fairbanks-based pipe insulation and fabrication company providing custom-built components for pipeline projects throughout Alaska.

## More than 25 years of North Slope work

More than 25 years ago Flowline Alaska cut its teeth in the state's booming oil industry, providing insulated pipe for North Slope projects. Since then Flowline has applied more than 25 million pounds of polyurethane insulation around more than 2000 miles of pipe. Initially, the company began operations in the Fairbanks area to pre-insulate steel pipe bound for the North Slope, developing and refining a polyurethane insulation process that withstands the harsh Arctic climate.

Flowline has branched out in recent years in an effort to maintain the company through slack times in the oil and gas industry. Now, Flowline also provides specialized welding services on pipe, applies corrosion coatings, fabricates truckable modules, and provides insulated plastic water and sewer pipe for rural Alaska projects.

## Pipe insulating service is mainstay of business

Flowline is known throughout the state and in other Arctic climates for producing insulated pipe that can withstand the frigid cold temperatures found in the far north.

But it's not just straight sections of pipe that need protection from Arctic conditions. Flowline insulates specialized components, such as pipe fittings, fabricated pipe assemblies, and pipeline anchors.

Equipment at the company's 35,000 square foot facility on Phillips Field Road, nested on 46 acres in the heart of the railroad industrial area in Fairbanks, is designed to insulate pipe ranging up to 80 feet in length and 60 inches in diameter. Operating at full capacity, Flowline can insulate up to 10,000 feet of steel pipe per shift, producing a large amount of insulated pipe in a short time to meet tight North Slope



JUDY PATRICK



Coatings that are frequently applied include single and dual layer fusion bonded epoxies and inorganic zinc. The company's Quality Assurance program monitors all aspects of the powder and liquid coatings applications, following conventional testing procedures. The production line for blasting and applying corrosion coatings is inside the Flowline facility, allowing for year round application.

## Specialized welding service grows out of insulating work

In addition to insulating and applying protective coatings on pipe, Flowline offers a variety of steel fabrication services, for both pipe and structural projects. That work came as a result of the company looking to expand, in order to provide more year-round work for its employees.

The plant can handle custom fabrication on pipe ranging in size from three-quarters of an inch to 60 inches in diameter in any wall thickness. Both manual and semi-automatic welding processes are used on a variety of materials, such as carbon steel, corrosion resistant alloys, aluminum, and high-density polyethylene. A third party inspection company monitors all welding and NDE processes.

A double joint rack is used to join double random length pipe into 80-foot lengths, significantly reducing North Slope installation time. Flowline also produces insulated conductors to support drilling operations, essentially fabricating an insulated pipe-in-pipe assembly.

## Water and septic pipe produced at Flowline

For nearly 10 years Flowline has been insulating plastic pipe for water and sewer systems in rural Alaska. Arctic water and sewer pipe is produced in 20-foot lengths, enabling cost-effective transportation to remote areas throughout Alaska. ■



construction schedules.

Polyurethane is purchased in railcar quantities and delivered to their facility by the Alaska Railroad. The insulation components are stored in six 17,000 gallon heated tanks.

Using the company's specially designed production equipment, the density of the pipe insulation can be modified, ranging from two to six pounds per cubic foot.

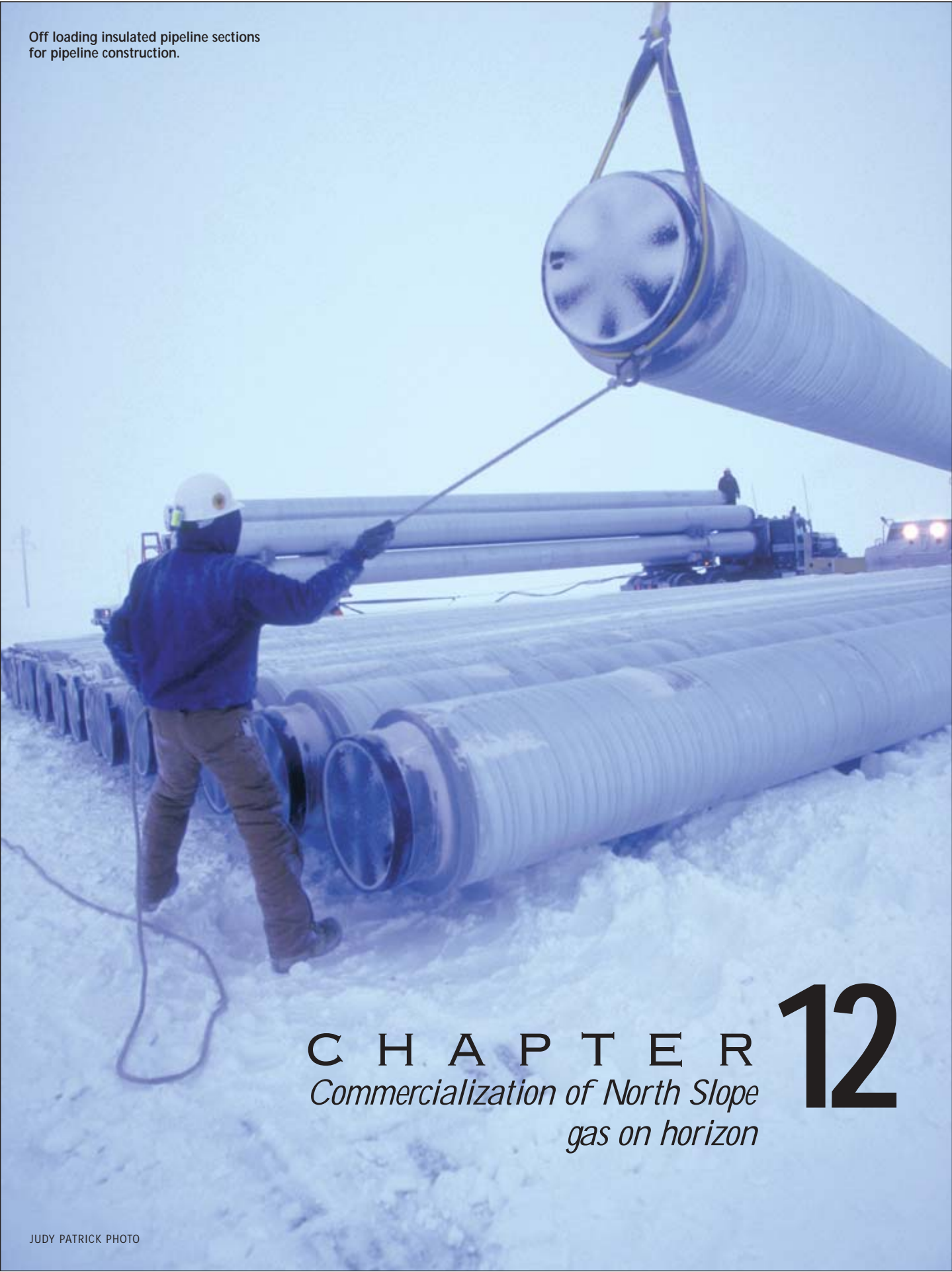
Operating one of the state's most complete polyurethane testing laboratories, Flowline provides assurance that the insulation system will statistically exceed design requirements 99.99 percent of the time.

## Corrosion coatings also applied at Flowline

In addition to applying insulation to the exterior of steel pipe, Flowline also offers corrosion coatings, which extend the life of the oil and gas transportation system.



Off loading insulated pipeline sections  
for pipeline construction.



CHAPTER **12**  
*Commercialization of North Slope  
gas on horizon*

## CHAPTER 12

# Commercialization of North Slope gas on horizon

**C**ommercializing Alaska North Slope natural gas has been a dream in the state since the 1970s and in recent years three state administrations have tried to get a project moving — so far without success.

The problem has been finding a plan on which the North Slope producers — who hold oil and gas leases for known natural gas reserves — and the state can agree.

The problem, in a nutshell, is location, location, location.

The modern search for oil in Alaska, starting in the 1950s and accelerating through the 1960s and 1970s, also resulted in natural gas discoveries.

Those in Southcentral Alaska, at tidewater and near Anchorage, the state's largest city, were commercialized beginning in the 1960s for home heating and electric generation and for export as fertilizer and liquefied natural gas.

But the Prudhoe Bay oil and gas discoveries in the late 1960s were some 800 miles from the nearest all-weather port and pipelines were required. The oil was developed and the trans-Alaska oil pipeline constructed in the 1970s. Both Prudhoe Bay oil and gas leaseholders and the State of Alaska, the resource owner, expected natural gas to be developed immediately following oil development.

The Alaska Oil and Gas Conservation Commission established an offtake rate for gas from the field.

The federal government selected a project, a gas pipeline paralleling the oil pipeline to Interior Alaska and then along the Alaska Highway into Canada, to move North Slope gas to fill a perceived gas shortage in the Lower 48.

But the Lower 48 didn't lack natural gas supplies, it lacked drilling. Exploration and development hadn't kept up with use because beginning in the late 1930s

## State of Alaska's new gas line team



Gov. Sarah Palin

DNR Commissioner  
Tom IrwinDeputy DNR  
Commissioner  
Marty RutherfordRevenue  
Commissioner  
Pat Galvin

## AGIA update

This chapter was written in April 2007. The Alaska Gasline Inducement Act passed in May. See reprint of Petroleum News article on page 12.5.

the federal government regulated the price of gas at a low enough rate that drilling for gas wasn't attractive.

Because of the regulated price, supplies tightened and there was a perceived gas shortage.

That drove the federal government to support development of North Slope gas, but in the late 1970s, just after it selected a North Slope gas project, the federal government began the deregulation of natural gas prices.

Drilling increased in the Lower 48 and supply was developed. There were also imports of natural gas from Mexico, but particularly from Canada, where new suppliers were discovered.

North Slope gas was no longer needed in the Lower 48. And with natural gas prices ranging from \$2 to \$4 per million British thermal units, the shipping cost for the gas would have been greater than the price it would have brought in Lower 48 markets.

Prices continued low through the 1980s and 1990s. The North Slope producers continued to reinject the gas, using it to produce more and more oil.

That was where ANS gas commercialization stood at the turn of the century.

Then gas prices started to rise and the Prudhoe Bay leaseholders — today BP, ConocoPhillips and ExxonMobil; then BP, ARCO and ExxonMobil — began to look at gas commercialization options.

The gas could be shipped via pipeline along the trans-Alaska oil pipeline corridor and then along the Alaska

Highway into Canada to markets in the Lower 48; the gas could be moved east across the North Slope into Canada via pipeline and taken south through Canada; or the gas could be brought by pipeline to tidewater in Southcentral Alaska and turned into liquefied natural gas for shipment by tanker.

The State of Alaska and the federal government both banned the route across northern Alaska into Canada, which — like the other two options, was one of the competitors for federal government approval in the 1970s. Alaskans want the opportunity to take gas off a line for in-state use, and also the ability to put gas into the line, should it be found in Interior basins. A line across the North Slope, or under the Beaufort Sea into Canada, would deny Alaska the benefits of in-state use of gas as well as possible future shipping options.

The LNG option is still alive in the Alaska Gasline Port Authority plan to take gas via pipeline to Valdez, paralleling the trans-Alaska oil pipeline, and liquefy the gas for shipment to the Lower 48. This plan has access to permits obtained by Yukon Pacific, which championed an LNG project out of Valdez in the 1980s and 1990s, and for a long time actively sought customers in the Far East.

The North Slope producers looked at the options and said a line south through Alaska and then into Canada — the so-called highway route — was the best



option for the producers and for the state because the netback, the value of the gas on the North Slope, would be the highest with the connection to U.S. midcontinent markets.

### The Alaska tax tangle

The North Slope producers did a cost study for a highway project in 2001-02 and said a line to Chicago — if there was insufficient pipeline space out of Alberta and a line had to be built all the way to the U.S. midcontinent — would cost some \$20 billion.

The producers said government cooperation would be required — enabling legislation from the federal government and fiscal stability from the State of Alaska, as well as an efficient regulatory process in Canada.

In October 2004 Congress passed Alaska gas pipeline enabling provisions, loan guarantees for up to 80 percent of the cost of the project, a seven-year pipeline depreciation tax credit and an enhanced oil recovery tax credit. The Federal Energy Regulatory Commission was directed to quickly permit the pipeline once certain requirements had been made and to establish regulations for an open season for an Alaska gas line project.

FERC established open season rules for the project in 2005 and also adopted a rebuttable presumption in favor of rolled-in rates, a measure the state and explorers wanted to ensure access to the line for later discoveries at a reasonable cost.

### No success on state end

But in spite of efforts by the administration of Gov. Frank Murkowski, in the spring of 2007 there is no movement on a project.

Murkowski, governor of Alaska from 2002-06, signed a contract with the North Slope producers in early 2006 based on negotiations conducted under the Alaska Stranded Gas Development Act.

The agreement struck by the Murkowski administration and the North Slope producers included state ownership of a portion of the pipeline to match the volume of the state's royalty gas and the value of its gas production taxes, taken in-kind, as gas. The state would also have taken a long-term take-or-pay shipping commitment for its gas on the line, and would have shipped and sold its own gas.

Portions of the agreement related to the limited liability corporation to operate

the gas pipeline were never completed, and after extensive public hearings and three special legislative sessions in 2006, the contract was not approved by the Legislature.

Among concerns raised about the contract were: whether the producers had gained too much from the state in negotiating the contract; lack of commitment in the contract to advance the project; state participation in ownership vs. the state's role as a regulator; whether a contract-set rate for taxes would pass constitutional muster; and the state's ability to compete effectively in selling its gas.

### A fresh attempt

Republican Sarah Palin was elected governor in November 2006 after defeating Murkowski in the Republican primary and former Democratic Gov. Tony Knowles in the general election.

The gas line contract played a prominent role in the campaign.

Distrust over the result of negotiations between the Murkowski administration and the North Slope producers — BP, ConocoPhillips and ExxonMobil — played a role in the defeat of Murkowski and his contract.

In an interesting twist, two of a group of senior state officials who were fired or quit in the fall of 2005 over how negotiations with the producers were being handled by the Murkowski administration under the Stranded Gas Development Act are working on the gas line for the Palin administration: Tom Irwin, former and present commissioner of Natural Resources, and Marty Rutherford, former DNR deputy commissioner, now acting deputy DNR commissioner.

Pat Galvin, commissioner of Revenue, and Marcia Davis, deputy commissioner of Revenue, head up the effort for Revenue.

Under the Alaska Gasline Inducement Act or AGIA, introduced by the Palin administration in early 2007, the commissioners of DNR and Revenue have to agree on a gas pipeline project. Under the Stranded Gas Development Act, the commissioner of Revenue made the decision; the DNR commissioner had a consulting role.

The goal of the Palin administration is to get AGIA passed by the Legislature before the adjournment of the 2007 session on May 16, get out a request for applications, close that request in October, hold a public comment period and have a commissioners' decision to the

Legislature in January which would be approved in time for the state's licensee to begin field work in the summer of 2008.

AGIA is being amended by the Legislature and descriptions here reflect the status of the proposal in mid-April 2007.

### Open and transparent

The Palin administration has characterized AGIA as an open and transparent process, in contrast to the SGDA procedure which involved negotiations with the North Slope producers.

Officials have been at pains to explain that AGIA does not involve negotiations, but is a competitive bidding process. There are elements which the state requires in an application — such as in-state offtake points for the gas — and there are elements which are bid variables.

Once the commissioners have determined that the bid packets are complete all but confidential information will be released for public review. Officials have said applicants will have to justify requests for confidentiality of portions of an application; in the event the commissioners do not agree that an item should be held confidential the applicant will have the opportunity to withdraw it.

Legislators will be able to sign confidentiality agreements and will have access to all information.

Once an applicant is selected, any confidential information that was part of that application will become public.

### The inducements

The inducements in AGIA include up to \$500 million in matching funds from the state for up to 50 percent of the work required to get to an open season and up to 80 percent matching funds for work between an open season and submittal of an application for a certificate to either FERC or the Regulatory Commission of Alaska.

The amount of match would be one of the bid variables.

The \$500 million would be an inducement to the pipeline builder — the mid-stream portion of the project.

AGIA also proposes inducements for the upstream — inducements designed to get the North Slope producers to commit their known gas reserves in an initial open season.

For gas submitted in the initial open

season the production tax rate would be fixed for 10 years at the rate existing at the time the open season is held.

Royalty terms in leases would also be amended. Those terms now allow the state to change from taking its royalty in-kind (actually taking possession of the gas) to taking its royalty in-value (having the producers sell the gas and pay the state). The state and the producers have worked with this arrangement for oil shipped on the trans-Alaska oil pipeline, but oil shipping contracts are of short duration.

Gas shipping commitments, as well as gas sales contracts, will be of long duration.

The royalty changes would be spelled out in regulations but the idea is to eliminate the risk of the state frequently changing how it takes its gas and either leaving a producer with excess shipping capacity (if the state changed from in-value, shipped and sold by the producer, to in-kind) and insufficient gas to meet contractual obligations or insufficient shipping capacity (if the state changed from in-kind to in-value) forcing a producer to strand some of its own gas to make room for its obligation to ship and sell state royalty in-value gas.

### What AGIA can't completely solve

AGIA also requires the state's licensee to argue in favor of rolled-in rates before FERC.

FERC has already established a rebuttable presumption in favor of rolled-in rates for the Alaska gas pipeline which is different than the way it treats gas pipelines in the Lower 48, where it does not allow any subsidy at all, i.e. no existing shipper would be required to pay a higher toll because of expansion provided for another shipper.

Rolled-in rates are an expansion issue, and expansion is important to a number of parties: to a pipeline owner because the known 35 trillion cubic feet of reserves at Prudhoe Bay and Point Thomson are not enough to keep a pipeline full over its expected life; to explorers because they will likely not have known resources to commit to a pipeline during an initial open season; and to the state because it wants to see a



Central gas processing facility at Prudhoe Bay

gas exploration and production industry developed on the North Slope.

Some producers, such as ConocoPhillips which is an active explorer, are also likely to have gas that will require pipeline expansions.

The issue is whether and when the toll changes from the toll initial shippers pay for shipping their gas.

Initial gas pipeline expansions typically add compression, which is inexpensive expansion — and with rolled-in rates the toll could go down for initial shippers. At some point, however, new pipe has to be added, looping the line, eventually resulting in a complete parallel line. This type of expansion is more expensive and may result in increased rates with a rolled-in methodology.

Rates are determined by FERC, or RCA, and the state cannot set them.

However, AGIA requires that the state's licensee argue in front of FERC in favor of rolled-in tariffs up to a 15 percent increase over the original rate. The administration's original bill also required shippers committing gas in an initial open season to argue for the rolled-in rate, but that provision has been changed by the

Legislature in committee substitutes being considered in mid-April.

The provision now reads that as long as FERC has a rebuttable presumption in favor of rolled-in rates, initial shippers — even though they receive inducements from the state — are not required to argue in favor of rolled-in rates.

State fiscal certainty is still an issue.

Representatives of the North Slope producers have told legislators that they cannot even determine if the project is economic without knowing what the tax rate will be for the gas over the life of the project.

The issue is durability.

This was a sticking point in the Murkowski contract, as legislators were not convinced that the state could fix a tax rate in a contract without running up against constitutional prohibitions against giving away the state's taxing authority.

AGIA deals with this by saying that if a company commits gas at an initial open season, and the production tax is increased in the first 10 years of the gas pipeline's operation, the state will reimburse the difference between the initial tax rate and any increase.

The North Slope producers have argued that 10 years is not long enough for a project expected to have a life of many decades.

They are also concerned that if only the production tax on gas is included in AGIA, the state could effectively find other ways to increase the tax on gas, making present-day economic evaluations of a project meaningless.

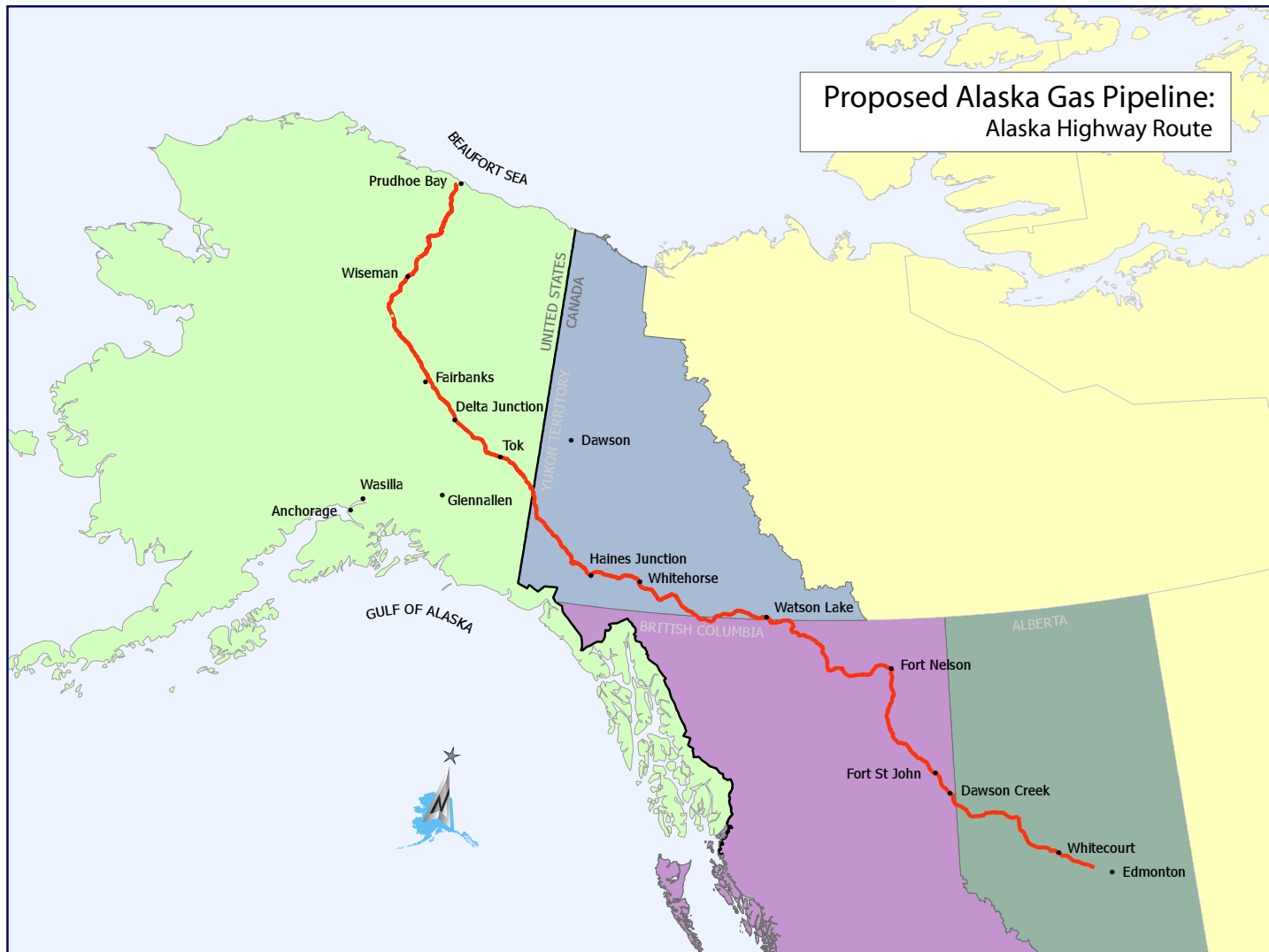
### Cost overruns

AGIA opens up the bidding for state inducements for a gas pipeline project, although the state cannot dictate who actually builds a line: Projects could be advanced through a FERC open season process and request for FERC certification without reference to AGIA.

The North Slope producers have long argued that they are the only ones who should build a North Slope gas pipeline because they — and the state — are the ones motivated to keep the costs and the resulting tariff as low as possible.

While legislators have noted that this





**Figure 12.1** Alaska Highway route for the proposed Alaska Gas Pipeline.

does not comport with the state's experience on the trans-Alaska oil pipeline, where there has been continuing litigation over the tariff rate for the producer-built and producer-owned line, the producers argue it is the shippers of the gas who pay for the line through the toll. The state also pays for the pipeline through tolls because a higher toll reduces the value of the gas on the North Slope, reducing the value on which taxes are paid; the state also is affected directly because of its royalty interest.

Producers have said pipeline companies do not have the motivation to keep the costs — and the resulting tariff — as low as possible.

Not so, pipeline companies say.

They have told legislators that because they have to justify all of the costs of a pipeline to FERC or RCA, and because they want to encourage shippers, they are well motivated to keep construction costs low.

A provision of AGIA requires applicants to explain how they will control cost over-

runs on a line

### The Canadian issue

The state will also be asking applicants how they plan to handle the Canadian segment of the line, which has permitting issues which appear likely to be litigated.

Native land issues in Canada are being litigated for the Mackenzie line and will have to be resolved for an Alaska Highway project.

Then there is the issue of whether TransCanada, a Canadian pipeline company, has exclusive rights — it believes it does — to build the Canadian portion of an Alaska Highway gas pipeline project. The Canadian Northern Pipeline Act designated Foothills Pipe Lines to build the Canadian portion of the project and the company is also named in a U.S.-Canadian treaty on the project; TransCanada now owns all of Foothills. Foothills built what is called the “pre-build” segment in the 1980s, pipelines taking natu-

ral gas from Canada into the Lower 48, and has expanded those lines, most recently in 1998. TransCanada also holds the federal right of way on the Alaska side of the border; a state right of way, filed in 2004, is pending.

Enbridge, a competing Canadian pipeline company, favors a greenfield approach subject to National Energy Board and Canadian Environmental Assessment Act oversight, rather than reliance on the Northern Pipeline Act, and argues that TransCanada has a right to build the Canadian portion of the line, but not the exclusive right.

The Canadian government has not said which approach it will back.

Canadian officials have said that based on their experience with the Mackenzie gas pipeline review they now know what information will be needed to review an Alaska line, and say that review — once a complete application package is in hand — should take 18 to 20 months. ■

PETROLEUM NEWS, WEEK OF MAY 20, 2007

# Governor gets AGIA

*More than 2 months of work culminate  
in Alaska Legislature's approval*

By KRISTEN NELSON  
Petroleum News

**T**he administration and legislators celebrated May 11 after House and Senate passed separate versions of Gov. Sarah Palin's Alaska Gasline Inducement Act.

AGIA offers inducements in exchange for gas pipeline proposals which meet the state's requirements. A request for applications will be issued this summer and the administration hopes to have a licensee selected and approved by the Legislature so that field work for a gas pipeline from the North Slope to market can begin next summer.

Final passage, of a Senate Finance substitute for the House version, occurred May 15 in the Senate and May 16 in the House.



GOV. SARAH PALIN

The administration had worked since introduction of the bills in early March to keep House and Senate versions as similar as possible, thus avoiding a conference committee to resolve differences between the bills.

Last year it took three tries — in the regular session and two special sessions — before conference committees could sufficiently resolve differences between the big oil and gas bill at the time, the petroleum profits tax, such that both bodies could agree to accept it.

A Senate Finance substitute for a House bill worked out the differences between the Senate and House bills and both bodies approved the Senate substitute for House Bill 177, the Senate the day before the session ended and the House about 10:40 p.m. on the final day.

Sen. Bert Stedman, R-Sitka, co-chair of Senate Finance, said on the Senate floor that most of the issues where the House version was chosen involved wordsmithing.

On more substantive issues the Senate version was selected, Stedman said. Qualified expenditures of the \$500 million state matching monies was expanded to include "pursuing firm transportation commitments in a binding open season, to securing financing for the project." The House version said the money could be used to obtain a certificate from the Federal Energy Regulatory Commission or the Regulatory Commission of

Alaska. Stedman said the change would allow an AGIA licensee that didn't obtain sufficient firm transportation commitments at an initial binding season to spend more time trying to hold a successful open season while pursuing a FERC certificate. Another Senate change excluded lobbying costs from qualified expenditures which the state would match.

Finance Co-Chair Mike Chenault, R-Nikiski, said on the House floor May 16 that the final bill contained 16 items from the House version and six from the Senate, including making all applications — incomplete as well as complete — available to the public. Chenault said this was in the interest of "transparency and openness and fairness to all applicants."

"I think that we've done our job," he said. "I think we've put together a package that hopefully allows the governor and her people to go out and get a pipeline project."

The Senate passed the bill 20 to 0; the House vote was 37 to 1.

## PLA changed on House floor

In the May 11 floor votes approving the original bills, the House amended a section dealing with project labor agreements.

Public hearing comments on the bill were heavily in favor of requiring a project labor agreement as part of AGIA.

The goal is to maximize Alaska hire on the project, a goal which typically conflicts with federal law. Rep. Harry Crawford, D-Anchorage, argued in committee and on the floor that a PLA wasn't enough, that only by requiring agreements with labor could local hire be maximized, both for union and non-union labor. That view won out in a House floor amendment with 23 sponsors, which passed 25 yeas to 13 nays.

The amended section requires a PLA and defines that as "a comprehensive collective bargaining agreement between the licensee or its agent and the appropriate labor representatives to ensure expedited construction with labor stability for the project by qualified residents of the state."

## 'A great day for Alaska'

"This is a great day for Alaska," the governor said May 11 after the original bills passed the House and Senate. She thanked legislators for their work on the bill and said "this was the right way to progress this bill."



## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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Among legislators commenting at the May 11 press conference, Stedman called it "a historic day," and said both House and Senate worked with the administration to move the bill forward.

Chenault, asked about concerns some legislators had expressed about the bill, said he thought some members were concerned that AGIA might not be an open enough

process for all entities to participate. But, he said, "I don't believe the votes were there to make any major changes."

"I think what we have before us today is our best chance of moving forward on a gas line," Chenault said.

On the issue of what's next, Deputy Commissioner of Natural Resources Marty Rutherford said the administration would

get right to work on a request for applications, and is shooting to have the RFA out July 1.

Commissioner of Revenue Pat Galvin said the administration's goal was to have Alaska speak with one voice on how to move a gas line forward. Today, he said, "is the day when the state is speaking in one clear voice." ■

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Cat trains — North Slope, Alaska



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# Lounsbury and Associates has history in Alaska oil fields

*Pioneer firm handles wide variety of design, surveying and engineering projects throughout Alaska*

Lounsbury and Associates Inc. has planned and designed roads, commercial developments and residential neighborhoods in Alaska since 1949. The company's surveyors and engineers have built an extensive history of operating in Alaska's challenging climate.

Lounsbury and Associates started as a surveying firm and later grew to offer civil engineering as well as planning and project management services. Today Lounsbury and Associates has offices in Wasilla and Anchorage.

Through the years, Lounsbury and Associates has designed road improvement projects throughout the Anchorage area, as well as carrying out comprehensive permitting, planning, platting, utility, and drainage projects statewide.

Lounsbury and Associates has been designing oilfield infrastructure since the early days of the industry in Alaska. The company worked at the Swanson River field on the Kenai Peninsula in the 1950s, and then when development came to Prudhoe Bay, the company pioneered surveying and infrastructure design in the North Slope's extreme arctic conditions.

Lounsbury and Associates' professional surveying and engineering services have enhanced many roads on the North Slope and statewide. The company's experience extends well beyond road construction and design. Before oil exploration could proceed on any scale in Prudhoe Bay, an all-weather airport was needed. Lounsbury and Associates was called to work on the Deadhorse airport which remains today as the vital air freight and passenger hub for North Slope oil and gas exploration and development.

In recent years, Lounsbury and Associates has provided road and pad



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design for the satellite fields at Kuparuk, as well as work on the Colville Delta North, Palm and Tarn developments.

## Collaboration

Lounsbury and Associates collaborates with oil company reservoir engineers to identify suitable locations for surface infrastructure in the oil field. Reservoir engineers choose an optimal well site based on geology, and then Lounsbury and Associates analyzes surface features to find viable sites to locate roads and drilling pads.

Lounsbury and Associates has identified the concerns of the oilfield client and responds to offer solutions. In a project requiring road access, road routing may impact the location of the drilling site. A difficult river crossing could rule out an otherwise suitable well site.

In the end, it boils down to cost — Lounsbury and Associates must balance the road and pad costs with the drilling costs to find the ideal drilling site.

After Lounsbury and Associates finds the optimum site for a pad or the best routing for a road, the company delivers a detailed design for surface improvements. Ponds, rivers, and poor soils can be expensive to overcome, justifying a meandering route or alternate location to take advantage of attractive surface characteristics.

The Alaska experience of Lounsbury and Associates also pays dividends in the construction phase. During construction — this occurs in winter on the North Slope —

Lounsbury and Associates monitors the progress as gravel is laid. High ice content in North Slope gravel can result in 20 percent to 30 percent settlement during spring thaw, so a road that looks fine during the winter may become impassable if its ice content melts. Working the gravel — to get it thawed, drained, healed up and passable — is a challenging process, but one Lounsbury and Associates pays stringent attention to.

Gravel pit quality control must be maintained in working conditions that are dark and frigid. Once the gravel thaws and drains, the contractor can compact and grade it. The roads made of that gravel carry drilling rigs and other heavy loads, so proper compaction of the roadbed is vital to insure a solid base. Lounsbury and Associates works with the construction contractor to ensure the completed project meets required standards.

## The horizon

Recent years for Lounsbury and Associates have been busy due to robust construction seasons in Alaska, and the company sees a bright future for projects in the state. In 2005 a joint venture was formed between Lounsbury and Associates and Nunamiut Corp., the village corporation for Anaktuvuk Pass. The joint venture brings together a unique blend of professional and Alaska experience. Nunamiut/Lounsbury LLC is currently seeking engineering and surveying contracts in support of oil and gas exploration and development on the North Slope.

After five decades in Alaska oil fields, including surveying services in support of the design and construction of the trans-Alaska oil pipeline, Lounsbury and Associates looks to the future of Alaska to find opportunities for the company's future growth. Lounsbury and Associates expects a wealth of opportunities arising from construction of the proposed North Slope natural gas line project as well as extensive new infrastructure that will be needed to support construction and operation of the line. ■



Jim Sawhill, president of Lounsbury and Associates.

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lated on the Kenai Peninsula.

Results have been impressive with a 110% improvement in production compared to prior completions and a 28% reduction in reserve development cost.

BJ Services has been supporting Alaska oil and gas operators and the communities in which we reside for many years. We offer our clients the most technologically advanced products and services available in the oil and gas industry and look forward to working with our customers to improve performance. ■

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# CHAPTER 13

*Energy opportunities  
in rural Alaska communities*



The Red Dog zinc mine, Northwest Alaska

PHOTO COURTESY TECK COMINCO

## CHAPTER 13

# Energy opportunities in rural Alaska communities

## Introduction

**M**uch of the attention of companies involved in the Alaska oil and gas industry tends to revolve around developing medium to large oil and gas fields in major provinces such as the North Slope and Cook Inlet basin. However, there are also development opportunities in some of the smaller sedimentary basins around the state.

Many of the smaller basins are thought to be gas prone. So, it's likely that a development in one of these basins would involve producing natural gas for generation of electricity or for heating. This type of development would have to provide energy to one of the three internal energy supply systems in Alaska:

1. A major electrical power grid extends along the Alaska Railbelt from the Fairbanks area, south through the Matanuska and Susitna valleys, through Anchorage and down through the Kenai Peninsula. A series of gas, coal and hydroelectric power stations supply power to this grid. A network of gas pipelines distributes gas for domestic heating in Southcentral Alaska and for industrial applications on the Kenai Peninsula.

2. Hydroelectric power stations feed small grids that supply local communities in the Copper River Valley, Kodiak and some parts of Southeast Alaska. These communities tend to use fuel oil for domestic heating.

3. One hundred and eighty-seven rural villages and towns, mainly populated by Native Alaskans, obtain electrical power mainly from diesel generators. Many people living in these communities use fuel oil for domestic heating.

Declining gas supplies from Cook Inlet have opened up opportunities for developing new gas fields along the Railbelt — the Railbelt crosses the Cook Inlet, Susitna and Nenana basins. And there is potential for developing oil and gas for heating and electricity generation in the areas served primarily by hydroelectric power.

However, in this chapter we'll focus on

opportunities for the development of small-scale gas fields in support of the third energy system — the network of small rural communities across the state.

## Rural communities

Most rural communities in Alaska are located off the road system, many miles from the nearest major electrical grid. Consequently, rural villages have to generate their own electricity using diesel generators. Diesel fuel and heating oil need to be freighted to the villages by air, sea or river.

The use of expensive diesel fuel freighted over large distances escalates electricity costs to three to five times the costs in the urban areas of the Alaska Railbelt.

And relatively few people share the cost of building and maintaining the power supply infrastructure — most rural communities consist of just a few hundred people. Bethel, the largest rural town, has a population of less than 6,000 and some villages have just a few dozen inhabitants.

Over the years village powerhouses have become outdated and somewhat dilapidated, thus further increasing the cost of power generation. However, the Denali Commission and the Alaska Energy Authority have been successfully helping villages upgrade their power generation facilities.

The village of Kotzebue in western Alaska has successfully pioneered the use of wind power as an alternative to diesel generators as a source of electricity. However, although wind power can reduce rural energy costs, it cannot completely replace other forms of electricity generation.

Galena, on the Yukon River, has been evaluating the use of a small nuclear reactor to generate electricity. However, the Galena nuclear proposal has economics based on free installation of the nuclear plant by the plant vendor — the full-cost operation of even a small nuclear reactor in rural Alaska is probably uneconomic.

## Challenging economics

There may be opportunities to enable rural communities to obtain cheaper energy through the development of local gas supplies. However, the low population and difficulty of access to remote areas make the economics of developing local energy supplies very challenging.

But it is likely that stranded rural gas would be sold at significantly higher prices than gas sold on the open market. That's because the gas would be competing in price with diesel fuel rather than other sources of gas. On an energy-equivalent basis, diesel fuel is much more expensive than market-traded natural gas and the cost of diesel fuel has been escalating.

However, a state program called Power Cost Equalization, or PCE, may alter the economics for some communities. PCE assists domestic electricity users and community facilities, such as water and sewer, in rural Alaska by attempting to equalize rural electricity rates with the rates that apply in the urban Railbelt. PCE doesn't fully equalize rural rates with urban rates and the amount of PCE adjustment to rates varies considerably from one place to another. Additionally, the PCE program is subject to annual legislative appropriation.

A state and federal consortium, including at various times Alaska's Division of Geological and Geophysical Surveys, the Bureau of Land Management, the U.S. Geological Survey and the Arctic Slope Regional Corp. has been conducting a study into the development of coalbed methane to meet the energy needs of some rural communities. It may be possible to produce local coalbed methane relatively cheaply from shallow wells and use short, small-diameter distribution pipelines. However, drilling the wells involves significant expense and requires some knowledge of the local geology.

DGGS identified three areas where enough geological information exists to justify geophysical testing and exploratory drilling. These areas consist of Wainwright on the western North Slope, Fort Yukon on the Yukon Flats and the Chignik area on



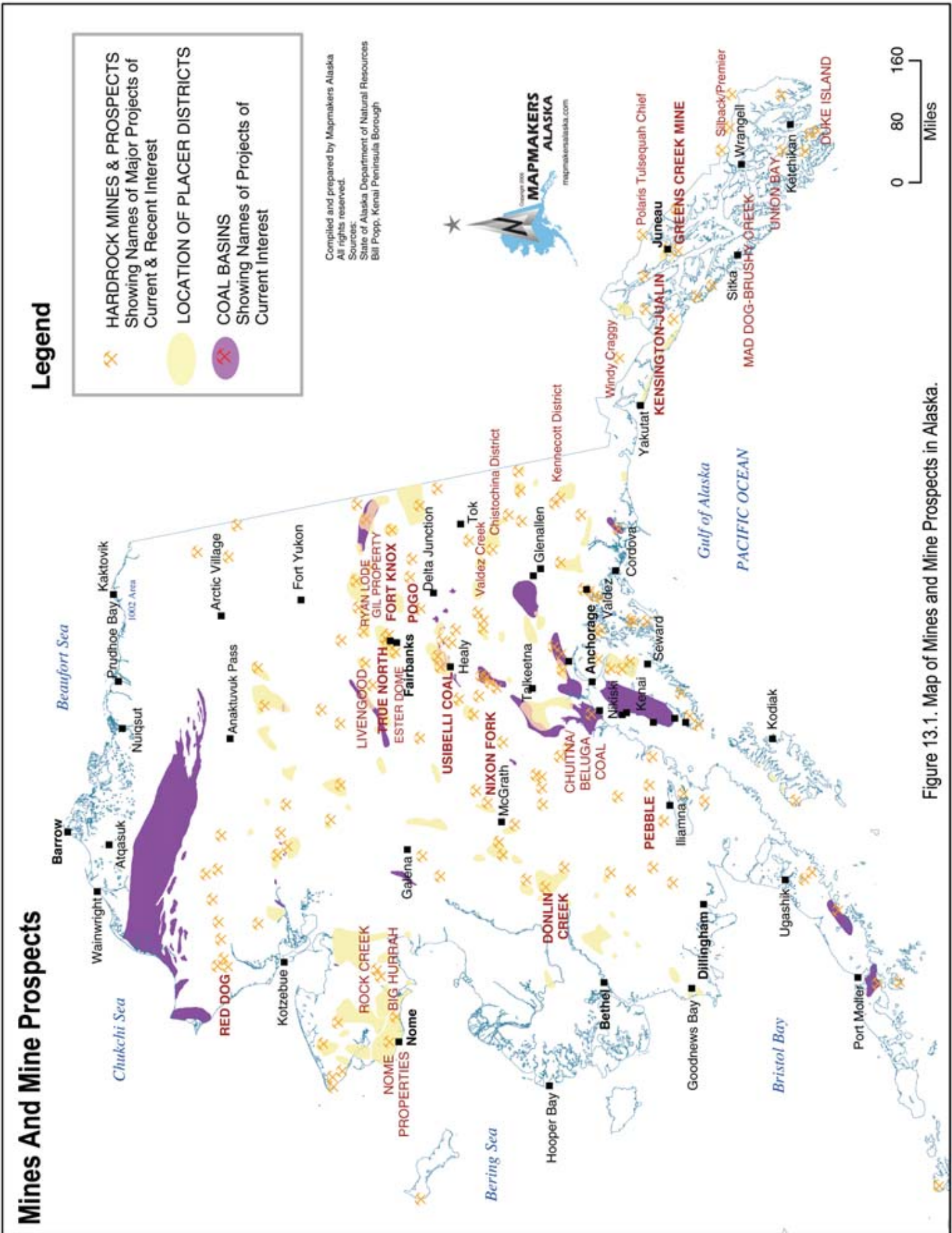


Figure 13.1. Map of Mines and Mine Prospects in Alaska.

the Alaska Peninsula. The consortium drilled at the village of Fort Yukon in 2004. They found two coal seams under the village but the gas content in the coal appears to be too low for economic gas production with current technology.

In 2005 the consortium drilled a test well through the permafrost on the North Slope. That well confirmed a widely held view that natural gas does not tend to be preserved in permafrost. However, the consortium plans to test for coalbed methane at Wainwright in the summer of 2007. (See Petroleum News reprint at the end of this chapter.)

### Propane from a pipeline

The Alaska Natural Gas Development Authority, known as ANGDA, has suggested extracting propane from gas flowing through a future gas export line from the North Slope. In support of this concept, ANGDA commissioned vendor cost estimates for the construction of plants to extract propane or to extract both propane and utility gas from a gas transmission pipeline.

Harold Heinze, the chief executive officer for ANGDA, has told Petroleum News that preliminary analysis has suggested that these types of arrangement could prove viable for the supply of gas or propane for some Alaska communities. Heinze sees several possible scenarios for extracting propane or utility gas from a pipeline:

1. It might be possible to extract propane at the point where the gas line from the North Slope crosses the Yukon River. Propane could then be shipped by river to a number of rural communities.
2. Compressor stations for a future gas pipeline should include capabilities to extract propane for use by local communities. This type of arrangement would be particularly cost-effective because a compressor plant would already contain some elements of a propane extraction plant.
3. Propane and utility gas could be pulled from the gas line near sizable communities such as Tok for use by these communities.
4. A gas line to tidewater at Valdez or on the Cook Inlet could provide a source of propane for barging to communities around the coast.

### Local industry

The use of gas by local industry, especially mining, might make the development of gas wells economic. In fact the most favorable situation for rural gas develop-

ment would be an area in which a gas-fueled power plant can supply electricity to several communities and mines. That scale of operation could tip the economic balance toward a viable development.

So, in the next section we'll look at some rural areas where there seem to be possibilities for synergy between gas development and mining operations.

## Energy for mining

Large-scale mining operations in Alaska today consist of the Red Dog mine north of Kotzebue, the world's largest producer of zinc concentrate; the Greens Creek mine in southeast Alaska, a large silver producer; the Usibelli Coal mine, Alaska's sole coal producer and coal exporter; the Fort Knox gold mine northeast of Fairbanks; and the Pogo gold mine near Delta Junction. Other mining prospects exist at various stages of exploration and development at various locations around the state.

Mines typically require large quantities of electrical power. And at remote Alaska locations many miles from the nearest power grid the need to generate electricity from relatively expensive diesel fuel becomes a major cost factor. The development of alternative, cheaper sources of electrical power could make a huge difference to mine economics and could turn some marginal mining prospects into viable projects.

So, given the wide distribution of gas-prone sedimentary basins across the state, there are real opportunities to develop gas for marketing to local mining operations.

The economics of gas development in this type of market will depend on being able to deliver electricity at a price below or comparable to the cost of electricity from diesel-fueled generators. However, energy will also have to be priced at a level that makes mining viable. And mines may be able to develop alternative electricity sources such as wind power or hydroelectric power.

The following sections outline some areas of the state where there seem to be solid possibilities for this type of synergy between gas and mining development. In preparing these sections we've only included mines that are in production, or prospects that could go into production in the foreseeable future. We've excluded mines and prospects that could conveniently connect into an existing major power grid. And we've included some information about the transportation infra-

structure, a major factor for both mine and gas field development.

Figure 13.1 is a map of the locations of mines and mining prospects in Alaska.

### Northwest Alaska

Teck Cominco Alaska Inc.'s Red Dog lead and zinc mine north of Kotzebue currently uses major quantities of diesel fuel to power its electrical generators. An alternative fuel supply that is cheaper than diesel would have a huge impact on the economics of the mine. There is a deposit of shale gas fairly near the mine and Teck Cominco is engaged in a drilling program to test the viability of extracting this gas for electricity generation.

Kennecott Exploration and joint venture partner NovaGold Resources have four large copper prospects in the Ambler area east of Kotzebue. One or more of these prospects could become a major mining operation with a need for substantial amounts of energy — NovaGold has been considering the use of wind power or hydroelectric power in that area.

The Hope basin lies under the Chukchi Sea, west of the Red Dog mine. Kotzebue sits at the northern edge of the Kotzebue basin to the southeast of Red Dog and southwest of Ambler; the Selawik trough extends inland from the eastern end of Kotzebue Sound. All of these basins are thought to be gas-prone and might become sources of gas for mining operations in the area.

The very limited transportation infrastructure in the area would present an issue for gas development.

However, there is air access to the Red Dog mine — the airfield at the mine can accommodate aircraft as large as a 727 jet, but is not always open. The nearby village of Noatak has an airport with a 4,000-foot gravel runway. A 52-mile haul road connects the Red Dog mine to a port on the Chukchi Sea. But the port is only open during the ice-free summer months.

The Ambler area is very isolated. There's no road system, although the airport at Ambler has a 3,000-foot gravel runway. The City of Kotzebue has a larger airport with a 5,900-foot asphalt runway and an instrument landing system.

### Nome area of Western Alaska

The city of Nome gained fame during the gold rush era as a major location for gold mining. Geologists believe that plenty of gold remains in the area and NovaGold Resources Inc. has been investigating the





A proposed gold mine at Donlin Creek, pictured above, lies near the gas-prone Holitna basin and will require large amounts of power.

feasibility of building and operating the Rock Creek mine north of the city. If successful, Rock Creek would be the region's first hard rock gold mine in more than half a century.

Any new mining operation near Nome could connect into the city's electrical grid. However, the city's electricity supply uses expensive diesel generators, so there's a major opportunity to develop cheaper energy sources — Nome sits on the north side of the gas-prone Norton basin that lies under Norton Sound.

The Nome area does have a good transportation infrastructure to support industrial development. The Nome harbor can handle boats with drafts up to 18 feet and is currently undergoing expansion. Highways extend more than 70 miles to the west, north and east of the city but do not connect to any other road system. The main airport at Nome is equipped with an instrument landing system and has 5,576-foot and 6,001-foot asphalt runways.

### Western Interior

Like Nome, the area around Flat and Iditarod, southwest of McGrath, enjoys a long history of gold mining and still contains significant gold prospects. Barrick Gold and NovaGold hope to develop a world-class gold prospect at Donlin Creek in the Kuskokwim Mountains south of Iditarod — a proposed gold mine at Donlin Creek will require large amounts of electrical energy but currently there are no nearby commercial electrical grids to supply this power. Barrick has been considering the use of wind power or peat as an energy source at Donlin Creek.

Donlin Creek lies quite near the Holitna basin, a sedimentary basin that geologists believe to be gas prone. Holitna Energy and its partner, TKC (the Native village corporation for the Kuskokwim Delta), had planned to drill for gas in the Holitna basin but in 2006 the state turned down an exploration license application for gas exploration in the basin.

Near McGrath, about 80 miles northeast

of Donlin Creek, the medium-sized Nixon Fork gold mine has recently been reopened by St. Andrew Goldfields.

The lack of a transportation infrastructure in the area presents a major challenge for any industrial development. However, the Kuskokwim River is navigable in the summer and flows just 14 miles from Donlin Creek. The city of McGrath sits at the most northerly point navigable by barge on the Kuskokwim. The McGrath airport has a 5,435-foot asphalt runway. Villages in the area to the southwest of McGrath, toward Flat, have airports with gravel runways ranging in length from 1,700 feet to 4,000 feet.

### Iliamna area

Northern Dynasty Minerals' world-class gold, copper and molybdenum Pebble prospect north of Lake Iliamna in southwest Alaska is an advanced-stage exploration project. A mine at this prospect would require large amounts of power. In addition there are other prospects in the



same general area as Pebble, so there's a possibility of constructing an electrical power supply that would later be expanded to service several mines.

It would be possible to construct an electrical power line connecting into the main Southcentral Alaska power grid at Homer, on the east side of the Cook Inlet, to supply power for Pebble. And Northern Dynasty is considering the possibility of generating electricity from LNG that might be imported at Nikiski on the west coast of the Kenai Peninsula.

However, given the length of a power line connection across the Cook Inlet and the estimated construction and operating costs, Northern Dynasty is evaluating several alternative power sources. Pebble is located quite close to Bristol Bay, so gas from future gas fields in the Bristol Bay area is a potential source of energy for electrical power generation. A gas pipeline from the Cook Inlet is another possibility.

The existing transportation infrastructure in the Iliamna area is very limited and will require expansion to support a major mining development.

The only significant road runs from Williamsport on the west side of Cook Inlet to the village of Pile Bay on Lake Iliamna. Northern Dynasty would need to upgrade and extend this road, to enable freight to reach Pebble from a Cook Inlet port at the entrance to Iliamna Bay and to enable copper-gold-molybdenum concentrates to reach tidewater for shipment to smelters on the Pacific Rim. The port of Homer could act as staging area for the Pebble project.

The village of Iliamna not far from Pebble has a good-sized airport with 4,800-foot and 5,087-foot asphalt runways.

### Paxson area

Pure Nickel's MAN copper, nickel and PGE prospect, immediately northwest of Paxson on the Richardson Highway, could become a major mining development if drilling proves successful. The prospect lies next to the route of the trans-Alaska oil pipeline, so a major mine development could impact the economics of a gas line along the same pipeline route. Paxson is about 50 miles north of the Copper River basin, with its potential for oil and gas.

One attraction of industrial development in this area is the relative ease of access to the Alaska road system. The Richardson Highway, which runs adjacent to the prospects, connects with Canada and the Lower 48 states, as well as to the



Northern Dynasty Minerals' world-class gold, copper and molybdenum Pebble prospect north of Lake Iliamna in southwest Alaska has reached the pre-permitting, feasibility study stage. A mine at this prospect would require large amounts of power. In addition there are other prospects in the same general area as Pebble, so there's a possibility of constructing a power supply that would later be expanded to service several mines.

COURTESY NORTHERN DYNASTY MINERALS

major Alaska centers of Anchorage and Fairbanks. Paxson has a small airport with a 2,800-foot gravel runway.

### Southeast part of state

Mines and mine prospects in Southeast Alaska are mainly situated in remote locations a long distance southeast of the areas with oil and gas potential along the northern Gulf of Alaska coast. However, there could be some innovative ways of meeting the energy needs of the mines — the supply of LNG or propane, for example.

Greens Creek mine on Admiralty Island produces silver, zinc, gold and lead, although this mine has been connected to the power grid at Juneau. A potential gold, silver and zinc mine on Woewodski Island would require large amounts of power. The

Kensington gold mine, under development north of Juneau, will require power.

Air and sea are about the only modes of transportation in Southeast Alaska, so any inland industrial development will require road construction. However, the sea remains ice-free all year round and there are several harbors, including a port at the Alaska capital city of Juneau. Skagway has a seaport and is located at the end of the Klondike Highway, connecting to the Alaska Highway and the lower 48 states. There is a large airport at Juneau.

## Potential local partnerships

Rural energy projects in Alaska bring great opportunities for companies to part-



ner and work with the rural communities. In fact, the involvement of the local community forms a vital component of any rural development project. This involvement can include anything from liaising with local municipalities to forming joint venture companies with Native corporations.

In general, the rural communities in Alaska respond positively to proposals that can improve living standards without damaging traditional cultures and values. Both regional and village Native corporations generally welcome proposals to form joint venture companies.

Past examples of joint ventures with Native corporations cover the gamut of the oil and gas industry. However, success usually depends on a business arrangement that makes sense in terms of shared objectives, risks and rewards.

A joint venture arrangement can bring substantial benefits to an external company that wants to do business in rural Alaska. In particular, a local partnership brings community commitment and involvement to a project. In addition, a Native corporation can bring invaluable local knowledge and expertise to a project. And, if the project involves constructing facilities, a Native corporation may be able to provide access to land.

However, it's important to look for win-win situations when considering some form of local partnership.

In particular, communities will be looking for opportunities for employment and will look very favorably on local-hire commitments. And when forming joint ventures a Native corporation will seek ways to increase shareholder dividends, especially by developing the corporation's portfolio of subsidiary companies. A Native corporation will become especially motivated to form a joint venture if a company can bring specific expertise for a needed project or service. Or an external company may be able to help with investment in an activity that a rural community wants to carry out.

Depending on what you are doing and where you propose to work, you could initiate a discussion on local partnerships by contacting a local municipality, a regional corporation or a village corporation. And you may start with a specific proposal or you may simply want to initiate a discussion about partnering possibilities. Whatever approach you take, it's essential to think creatively and to be willing to look for opportunities for mutual benefits with partners.

## State and federal incentives, assistance available

The state and federal governments both take an interest in improving the rural power supply situation in Alaska. As a result there are some ways in which government entities help with initiatives that result in reducing the cost of rural energy.

In 1976 the Alaska Legislature created the Alaska Power Authority, which evolved into what is now known as the Alaska Energy Authority, or AEA. AEA's original mission was to construct, acquire, finance, and operate power projects and facilities that use Alaska's natural resources to produce electricity and heat. AEA is now responsible for several rural energy programs and operates under the Alaska Industrial Development and Export Authority, or AIDEA. AIDEA is a public corporation with a mission to "encourage economic growth and diversification in Alaska."

AEA's Power Project Loan Fund provides loans to local utilities, local governments or independent power producers for the development or upgrade of electric power facilities. Another AEA program, the Alternative Energy and Energy Efficiency Program, provides grants for projects that will reduce the cost of power and heat for rural communities.

The AEA Web site can be found at [www.aidea.org/aea.htm](http://www.aidea.org/aea.htm).

In 1998 Congress established the Denali Commission, a federal-state partnership that channels federal funds into improving the rural infrastructure in Alaska. A primary focus of the Denali Commission has been the upgrading and consolidation of bulk fuel storage facilities and the upgrading of rural power generation facilities. The Denali Commission Web site is at [www.denali.gov](http://www.denali.gov).

The U.S. Department of Energy's Arctic Energy Office is based in Fairbanks and works with the University of Alaska, among others, on projects associated with fossil fuels. Depending on the availability of funding, the Arctic Energy Office may be able to help determine the practicalities and economics of a rural energy concept. The office has been involved in projects such as research into new coalbed methane exploration and production technologies. The Arctic Energy Office's Web site is at <http://www.netl.doe.gov/technologies/oil-gas/AEO/main.html>.

Geologists and petroleum economists from Alaska's Division of Oil and Gas and Division of Geological and Geophysical

Surveys can provide a wealth of knowledge and expertise on the oil and gas geology of Alaska's basins. DGGs conducts fieldwork and research in areas of the state with coal, geothermal and hydrocarbon potential — the results of this research become publicly available and can be of considerable help to companies interested in Alaska exploration. The divisions' Web sites are at [www.dog.dnr.state.ak.us/oil/](http://www.dog.dnr.state.ak.us/oil/) and <http://www.dggs.dnr.state.ak.us/>.

The U.S. Geological Survey also conducts research in Alaska. A number of USGS geologists specialize in Alaska and can provide expertise in Alaska oil and gas basins. The USGS has published numerous reports on Alaska oil and gas geology. The USGS Web site is at [www.usgs.gov](http://www.usgs.gov).

Geologists and petroleum economists at the Minerals Management Service provide expertise in Alaska petroleum geology and specialize in offshore basins such as the Norton basin and the Hope basin. The MMS Alaska region Web site is at [www.mms.gov/alaska/](http://www.mms.gov/alaska/).

A Web portal at <http://akgeology.info> contains links to most government and some private Alaska geology sites.

It's also important to find any possible royalty or tax incentives that may apply to gas production in rural situations. MMS often offers incentives such as royalty suspensions or reductions for oil and gas development in frontier basins. The State of Alaska offers exploration incentives in the form of tax credits for certain exploration incentives in remote areas. Also, section 29 of the U.S. Internal Revenue Code allows tax credits for producing fuel from nonconventional sources. ■

### Credits

Greg Beischer of Bristol Environmental and Engineering, Steven Borell of the Alaska Miners Association, James Clough of Alaska's Division of Geological and Geophysical Surveys, Curt Freeman of Avalon Development Corp., Becky Gay of the Alaska Industrial Development and Export Authority, Terri Harper of the Alaska Energy Authority, Harold Heinze of the Alaska Natural Gas Development Authority, Ken Johns of Ahtna Inc., June McAtee of Calista Corp., the Mayor of Nome Denise Michels, Kathy Prentki of the Denali Commission, Cameron Reitmeier of the Mineral Management Service, Brent Sheets of the U.S. Department of Energy Arctic Energy Center and Tiel Smith of Bristol Bay Native Corp. have all contributed information for this chapter.

Note: Some of the individuals credited here might have moved on to other positions since they assisted Petroleum News in providing information for this guide from mid-2004 to early 2007.

PETROLEUM DIRECTORY, 3RD QUARTER 2006

# Wanted: Bush entrepreneurs

*New public-private venture seeks to spur economic development, create jobs in rural Alaska with annual business competition*

By ROSE RAGSDALE  
For Petroleum Directory

**D**esigner cosmetics made in Nunataat? Anti-cancer treatments from Nuiqsut? A biodiesel plant in Delta Junction? A cross-cultural learning institute on St. George Island? Winter eco-tours in Deering? A high-speed visitor ferry in Metlakatla?

Yes, these innovative concepts could soon become reality thanks to the Alaska Marketplace, a new program aimed at spurring economic development in the state's smallest communities.

Inspired by The World Bank Development Marketplace, the Alaska version got its start last year when the Denali Commission, Alaska Federation of Natives, BP Exploration (Alaska) Inc., Telecommunications Development Fund, Alaska Growth Capital Inc. and ConocoPhillips Alaska Inc. came together to underwrite the project. Other partners include the Alaska Manufacturing Extension Partnership, College of Rural Alaska, University of Alaska Fairbanks and Alaska Village Initiatives.

Managed by the Alaska Federation of Natives, the Alaska Marketplace process runs 18 months. The first cycle began with a call for proposals in October, climaxed with monetary awards this spring, and is set to end in the spring of 2007 after the winning business ideas have been implemented.

## Call for ideas

Like the international marketplace, the Alaska Marketplace focuses on finding the best ideas and turning them into action. The theme for 2006 is "Culture and Development."

The program invited rural Alaskans with innovative ideas about how to create jobs and stimulate rural Alaska economies to compete for startup funds. Winners use their awards to develop and implement their ideas with the help of seasoned business professionals.

In the first competition, held earlier this year, 170 ideas were evaluated based on their innovation, sustainability and profitability, poverty reduction/job creation and cultural heritage.

Innovators with the 22 most promising proposals — as determined by a world-class jury of 23 private and public sector professionals — won a portion of \$500,000, in seed money



Finalist Brian Ashton shares his idea for salmon egg incubators and planters.

awards ranging from \$8,000 to \$50,000, and all 43 finalists received an honorable mention prize of \$1,000. The judges also presented three People's Choice awards of \$1,000.

Some of the winning ideas are practical notions inspired by the needs of the local community, such as the arts and crafts cooperative planned for Mekoryuk. Others seek to capitalize on the economic strength of nearby markets such as the energy-efficient four-season greenhouse planned for Chickaloon, about 70 miles northeast of Anchorage. Still others aim to capture global markets with products created from raw materials unique to Alaska, such as health products from Southeast Alaska forests to be produced in Wrangell.

Impressed with the success of the 2006 competition, BP committed \$200,000 on May 18 to kick off next year's contest. The Alaska Federation of Natives' board of directors has set a goal of raising \$2 million to award in the 2007 competition.

For a complete list and description of the 2006 winning projects, visit [www.alaskamarketplace.org](http://www.alaskamarketplace.org). ■



## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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PETROLEUM NEWS, WEEK OF MARCH 18, 2007

# Testing for shallow gas at Wainwright

*Well to be drilled in the early summer will test for gas in coal seams under the Chukchi coast village*

By ALAN BAILEY  
Petroleum News Staff Writer

**A**fter a pause of a couple of years, the project to test the potential to use coalbed natural gas as an energy source in rural Alaska is under way again, this time in Wainwright on the Chukchi Sea coast. Drilling should start right after Memorial Day.

The multi-year project involving the U.S. Bureau of Land Management and the U.S. Geological Survey, and at various times Alaska's Division of Geological and Geophysical Surveys and the U.S. Department of Energy, started out by drilling a coalbed methane test well in 2004 at Fort Yukon in Alaska's Interior.

That well encountered coal seams but did not find viable quantities of gas. In 2005 a well at Franklin Bluffs, just off the Haul Road in the central North Slope, tested the potential to drill for coalbed gas in an area of deep permafrost, prior to drilling in the less accessible Wainwright area. Wainwright has permafrost to a depth of about 1,000 feet.

BLM, USGS and the Arctic Slope Regional Corp. are involved in the Wainwright phase of the project, Art Clark, the co-project chief from USGS told Petroleum News March 13. The team is also talking to other potential participants, to increase the available funding, Clark said.

"We have the funding for sure to start the drilling," Clark said. "We are still in the process of finalizing all the funding."

## Lightweight rig

The project team will use the lightweight CS 1000 rig that it used at Fort Yukon and Franklin Bluffs to drill into shallow coal-bearing strata of the Tertiary Nanushuk formation.

"We are thinking of a total (well) depth somewhere in the region of 2,000 feet, possibly as deep as 2,500 feet," Clark

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*"There's a lot more interest in this than just the assessment of the coalbed potential there. It's also going to be a continuous-core data point."*

—Art Clark, co-project chief, USGS

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said.

The coal-bearing strata probably extend down to somewhere between 1,500 and 2,000 feet, he said. However, conventional opinion, confirmed somewhat by the results from Franklin Bluffs, suggests that coal gas is unlikely within the 1,000-foot thick permafrost zone near the surface.

"If we do encounter coal gas in the permafrost, it will be interesting to determine whether it's thermogenic gas, which would indicate migration from a deeper source, or biogenic gas, which would indicate in-situ microbial generation," Clark said.

Depending on the funding available, the drillers may take core all the way down the well from the bottom of the surface casing. Or, if funds are short, they may open-hole drill to the bottom of the permafrost and then core below there.

## Test for gas

Whenever the well encounters a coal seam, the team will bring a coal sample to the surface to conduct a gas desorption test. If that test indicates the presence of significant gas in the coal, the drillers will ream out the well to a diameter just under 6 inches, down to the base of the coal seam. Then, using a pneumatic packer to seal the well bore at the top of the coal seam, the drillers will use the hollow drill rod, in effect, as a temporary well that is only open to the coal seam at the bottom of the well bore.

"Then we'll go in and flush out all of the drill mud and everything ... from the inside," Clark said.

The team will then draw down the

pressure by pumping water out of bore, while monitoring the pressure with a transducer. By then turning the pump off and monitoring the time taken for the well pressure to come back up it will be possible to determine parameters such as the permeability and storage capabilities of the coal.

"What that tells you is how quickly the fluids flow through that seam. That's what we want to know — as goes the water, so goes the gas," Clark said.

The team will also collect a water sample from the coal — the water chemistry becomes especially important for determining water disposal options, if the coal proves suitable for gas production.

The team will repeat the coal sampling and testing procedure for each coal seam that the well encounters, although it may curtail some of the testing if there are an especially large number of coal seams.

Upon completion of the drilling, if there appears to be a viable gas resource, the drillers would set a 2.5-inch PVC well targeting a specific coal seam. That well would then be used to monitor the pressure and temperature in the coal over the winter.

And the next step in evaluating a promising coal seam might be another drilling program in 2008. That program would likely create a pattern of four wells, including the 2007 well, to test the production characteristics of the coal. But the open-hole drilling needed for that would require a larger rig than the lightweight rig being used in 2007, Clark said.

## Most equipment in Wainwright

The CS 1000 rig being used for the 2007 drilling is already in Wainwright.

"We barged it from Deadhorse last August," Clark said. "So, most of the equipment is already in Wainwright and we

The lightweight CS 1000 rig in operation at Fort Yukon in 2004



stored it there over the winter.”

The team will probably use a transport airplane to fly in materials such as cement and the drilling mud, so that drilling can start promptly at the end of May.

“We’re thinking that the whole project should take somewhere in the neighborhood of five to six weeks,” Clark said.

That should enable completion of the drilling by July 4, in time to make decisions about moving equipment in or out of Wainwright during the summer barging season.

“That way we could either bring more equipment in or take equipment out via the barges that run in July and August,” Clark said. “So we’re pushing (the drilling) a little bit earlier than what we might normally want to do.”

The biggest time constraint involves any equipment that the team might decide to have barged up to Wainwright in 2007, because the barge departs from

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*And the next step in evaluating a promising coal seam might be another drilling program in 2008. That program would likely create a pattern of four wells, including the 2007 well, to test the production characteristics of the coal. But the open-hole drilling needed for that would require a larger rig than the lightweight rig being used in 2007, Clark said.*

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Seattle for Alaska in mid to late-July.

“We want to at least have a rough preliminary idea of what our information is telling us by middle to end of July at the very latest,” Clark said.

#### Multiple benefits

Although the purpose of the well is to test for a potential natural gas resource for use in the village of Wainwright, the team is anxious to obtain as much bene-

fit from the drilling as possible.

“We talk to as many people as we can and try to maximize the scientific value of whatever it is we’re doing, because these opportunities don’t come along very often,” Clark said.

In particular, the well core will provide valuable information about the subsurface geology — the nearest previous well to Wainwright is about 25 miles away, Clark said.

“There’s a lot more interest in this than just the assessment of the coalbed potential there,” Clark said. “It’s also going to be a continuous-core data point.”

Another possibility is the future use of the Wainwright well for long-term temperature monitoring.

And the team will publish its findings from the drilling at Wainwright.

“We are hoping to present preliminary results in mid-October in Anchorage during the Arctic Energy Summit,” Clark said. ■



PETROLEUM NEWS, WEEK OF MAY 13, 2007

# Tapping into Alaska's volcanoes

*Alaska's geothermal lease offerings reflect interest in harnessing underground heat, want applications next to Augustine, Mt. Spurr*

By ALAN BAILEY  
Petroleum News

Living next to a volcano might not fit into everyone's comfort zone. But, as most Icelanders would probably testify, it's a situation that can keep down the energy bills. In the right situation, geothermal energy — heat from inside the Earth's crust — can provide seemingly endless quantities of hot water or electrical power.

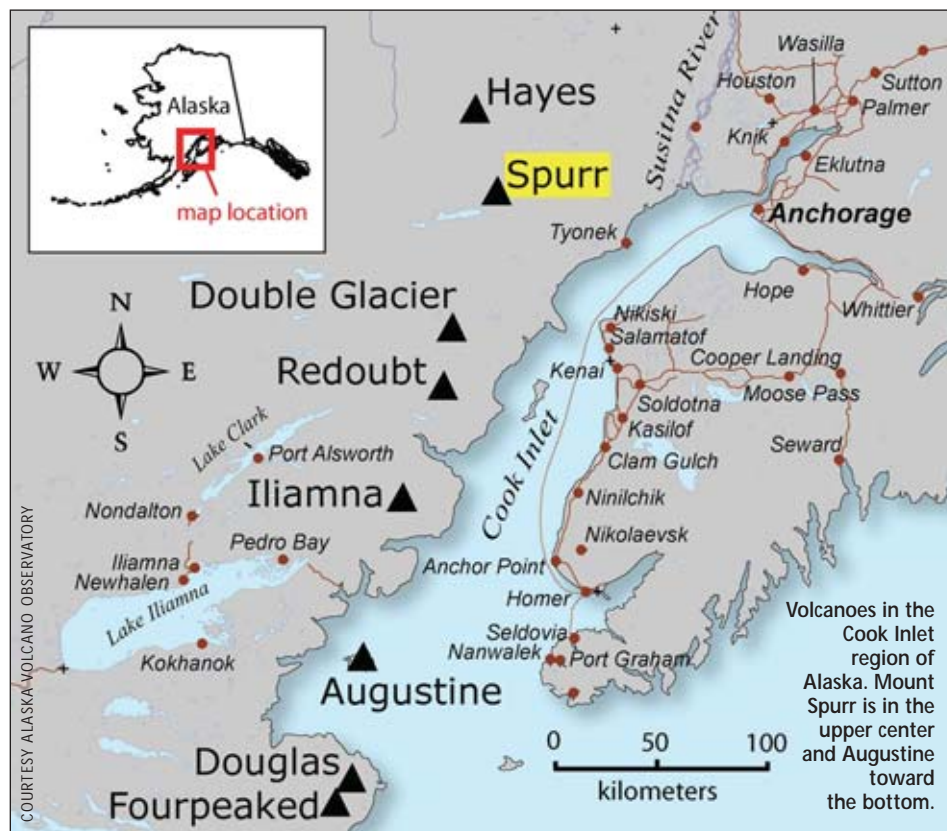
Alaska is well endowed with hot springs and volcanoes that might provide energy to replace at least some use of fossil fuels. For example, in 2006 Chena Hot Springs resort, 60 miles northeast of Fairbanks, spearheaded the use of geothermal energy by replacing expensive diesel generators with a 200-kilowatt power plant driven by hot spring water.

And people have long eyed the chain of volcanoes along the Aleutian Islands, the Alaska Peninsula and up toward the Alaska Range as a source of energy. Part of the Pacific "ring of fire," these volcanoes provide dramatic evidence of an upwelling of heat from deep inside the Earth. Unalaska in the Aleutians has been investigating the potential for a geothermal power plant tied into the Makushin Volcano near the town of Dutch Harbor. And the village of Naknek, on the Alaska Peninsula, plans to test drill for a geothermal energy source near the village.

## Call for applications

The Alaska Department of Natural Resources is now calling for applications for geothermal leases next to the Augustine Volcano in the lower Cook Inlet and Mount Spurr, an active volcano on the west side of the Inlet (see "Alaska offers geothermal acreage" in the April 15 edition of Petroleum News). The state is responding to continuing interest in geothermal energy, recognizing the fact that the department has not offered geothermal leases in the Cook Inlet area for about 20 years, DNR told Petroleum News May 7.

Interest in geothermal energy waxes



and wanes in response to the price of oil, Chris Nye, a geologist with Alaska Division of Geological and Geophysical Surveys, told Petroleum News on May 2 — the higher the price of oil the more viable alternative energy sources such as geothermal energy become.

Research more than two decades ago resulted in a 1986 University of Alaska Geophysical Institute report on the geothermal potential of Mount Spurr. But with the oil price crash in the mid-1980s interest in geothermal energy in Alaska evaporated. Now, with buoyant oil prices, interest in geothermal energy is likely making a resurgence.

Nye explained that a viable use of geothermal energy requires some form of underground heat flow anomaly, such as a volcano or hot spring.

"Anywhere you go the Earth gets hotter as you go deeper but you need something anomalous to be going on in order to make that heat at depth to be econom-

ically achievable," Nye said.

## Needs a market

And economic viability also depends on access to a market for the sale of the geothermal energy. Mount Spurr, for example, sits relatively near a good-sized market for electricity in Southcentral Alaska. On the other hand, some well-known hot springs in the remoter Aleutian Islands seem very promising as geothermal energy sources but have no obvious energy market.

Nye explained that there is a series of different types of geothermal application, depending on the type of underground heat source that is available. At the top of the totem pole sit dry steam systems, in which the rocks are hot enough to dispel any underground water. In that situation, power can be generated by pumping water into the rocks and then using the resulting steam generation to power a turbine electrical generator.



COURTESY ALASKA VOLCANO OBSERVATORY

Mount Spurr from the south, with Crater Peak in the foreground. There may be an underground geothermal brine layer to the south of Crater Peak.

More likely in a situation such as Mount Spurr or Augustine is a source of underground water hot enough to boil when it reaches the surface.

“The best we can hope to have is a good, robust geothermal system,” Nye said.

Again, the boiling water would drive a steam turbine.

### Boil refrigerant

At lower temperatures, the warm underground water might be used to boil some other low boiling point fluid such as a refrigerant. The boiling of that secondary fluid would drive a turbine in a process known as an organic Rankine cycle. The technology of this type of application has improved over the years, to the point where remarkably low temperature sources can viably generate electricity. The Chena power plant, for example, uses spring water at just 165 degrees Fahrenheit in an organic Rankine cycle system.

“Chena is producing hundreds of kilowatts from the lowest temperature fluid in use anywhere in the world,” Nye said.

However, lower temperature geothermal water can also be used to simply heat buildings, rather than generate electricity. The space heating of buildings might seem an improbable application in remote locations such as Mounts Spurr or Augustine but, according to a report by Alaska’s Division of Geological and Geophysical Surveys, in 1993 DNR had leased two tracts near Mount Spurr to a

company interested in developing a geothermal hydroponic garden facility.

### Mount Spurr potential

So, what are the prospects of finding a geothermal energy source at Mount Spurr?

“There is a small zone of tepid hot springs that occurs on the south flank of Crater Peak. It’s not really a robust geothermal spring system,” Nye said (Crater Peak is an active volcanic cone on the south flank of the mountain). Because the springs include water from snow melt or rain, the chemical content of the water does not help in determining the possible existence of a geothermal source at depth.

But a geophysical survey in the 1980s provided tantalizing indications of a possible layer of warm or hot brine 2,000 feet below the plateau at the entrance to the pass on the south side of the mountain. Some soil geochemistry anomalies also pointed to the existence of geothermal water in the area.

“What that (research) program did was identify various geophysical anomalies of which geothermal brine is a reasonable explanation,” Nye said. There are other possible explanations for the anomalies, he said.

If the geophysical anomalies do represent geothermal brine, the brine is perched as a layer within the rocks. It’s likely that the geothermal fluids would have flowed up from a deeper level through a crack in the rocks, and then

spread out to form a layer rather like a thunderhead, Nye said. In that case, the source of the fluid would be the logical target for an exploration program, either through further geophysical work or through drilling.

“What you really want to find is the feeder zone,” Nye said. “... If all you have is the wing of the thing, you know that you’re not looking at the hottest part of whatever it is and you’ve got the danger of having a reduced volume of reservoir.”

### Augustine unknown

Although there is some indication of geothermal potential at Mount Spurr, nothing is known about the potential of Augustine, other than the fact that it is a volcano. And unfortunately there are no hot springs on the flanks of the volcano to provide evidence of water transferring heat toward the surface.

“Mount Augustine is a volcano and it recently erupted,” Nye said. “Therefore, material at many hundred degrees centigrade has moved from somewhere at depth to the surface and has undoubtedly lost some heat. Some of it may be parked somewhere and is still actively losing heat. Whether or not that’s enough extra heat in the shallow crust to make a geothermal resource or not, we don’t know.”

So, does anyone want to find out more about the geothermal potential at Mount Spurr or to go prospecting for a geothermal resource on Augustine Island? We’ll presumably find out after May 14, DNR’s closing date for geothermal lease applications. ■



# NANA/Colt Engineering offers full array of services

*People; passion; skills; and right tools are right stuff for engineering success in oilfield, and other sectors*

**P**assion and creative skills are required to design and build any major industrial facility. NANA/Colt Engineering LLC boasts a skilled and energetic engineering team with the right tools and freedom to innovate.

It's a good philosophy for the Anchorage-based engineering company. NANA/Colt mastered challenges of designing North Slope oilfield facilities, and grew into a full service resource for new players in Alaska's oil and gas industry. NANA/Colt offers pre-feasibility studies, detailed facilities engineering, and operations and maintenance engineering.

"We are a very people-oriented company," John Minier, president and general manager of NANA/Colt Engineering, told PNA. "We sell brains per minute — to do that you have to have motivated people, you have to have energetic people."

## Beneficial partnership

NANA/Colt was formed in 1997 as a 50/50 partnership between NANA Development Corp. and Colt Engineering Corp., evolving from NANA Technical Services.

Colt Engineering, a large Canadian oil and gas contractor, has broad experience of Arctic engineering and is a world-renowned pipeline company. NANA/Colt benefits from access to the expertise of Colt's 4,000-person staff.

NANA/Colt has multiple Anchorage offices. Its Kenai office supports Cook Inlet producers and the Tesoro Refinery. NANA/Colt also has staff assigned to client offices on the North Slope.

## Array of services

NANA/Colt's services span the engineering life cycle, from conceptual engineering through detailed design to final commissioning. The company knows engineering disciplines, including process, mechanical, civil, electrical and instrumentation engineering, and pipeline design.

NANA/Colt offers construction management oversight, including project management, startup support, functional checkout

support and commissioning.

"We do procurement for projects as well, if the client requests buying and supplier quality surveillance," Minier said.

NANA/Colt supports current North Slope and Cook Inlet producers, new development, and ongoing operations.

## Choreography

A challenge for construction management is coordination of contractors involved in a project. Each contractor contributes its specialty, but successful project completion requires close synchronization of contract work. NANA/Colt excels in this challenge.

"It's really a multi-company, multi-discipline road that we work with the client," Minier said. "You have to work with a fabricator in Anchorage or Fairbanks or Nikiski. ... you have to coordinate with the North Slope ... on the installation of the new facility ... and you may have to work with another crew on the functional check out and commissioning."

## Oilfield experience

Before partnership with Colt, NANA Technical Services provided engineering services for ARCO in Prudhoe Bay.

NANA/Colt has a tradition at Prudhoe Bay — BP has continued to be a prime customer since the establishment of a single field operatorship. Success has led to more customers and a variety of industry projects.

"Currently about 90 percent of our work is in support of the oil and gas industry — we have done work for all of the producing fields on the slope," Minier said. "We're now an alliance partner for engineering — we have an evergreen contract with Conoco Phillips to support its Alpine field as well as to do work on all of their fields."

NANA/Colt's oil industry work experience is extensive, however, partnership with Colt brings particular advantages in projects involving pipeline construction.

"Our goal is to be the number one pipeline engineering contractor in Alaska," Minier said. The company engineered many recent pipeline jobs bid in the state, he said.

"So we do the pipelines, the on-pad facili-

ties," Minier said. "We also do the operation and maintenance engineering support of ongoing operations in operating plants."

Minier is proud success in high-profile North Slope projects such as new satellite developments.

Minier noted BP's Milne Point S Pad project and Drill Site 3S for Kuparuk.

"These are projects that came in ... on schedule and on budget," he said.

## Beyond oil

NANA/Colt's oil and gas success has brought business in industry sectors such as electrical power generation.

"We would like to have about 30 percent of our business in the non-oil sector — as an Alaska engineering company you have to be less dependent on the price of a barrel of oil," Minier said.

For example, the company tackled a major project for Golden Valley Electric Corp.

"They were looking at adding some additional power generation at their North Pole plant," Minier said. "We conducted the conceptual and preliminary engineering and assisted them in going out for bid for design build." In addition to work for Golden Valley, NANA/Colt has done projects for Matanuska Electric and Alaska Village Electric Coop.

## To the future...

With NANA/Colt's oil and gas industry accomplishments and burgeoning non-oil business, Minier sees a bright future.

"We've been in a fairly steady growth mode," Minier said. "We're expecting continued growth in 2006 and we're well poised for the future."

Minier says NANA/Colt people drive success. Core values — honesty, honoring commitments and treating individuals with dignity and respect — drive employee motivation.

"We have a very involved workforce. ... they're decision-makers, they know the business," Minier said. "We create an environment they enjoy working in ...and we have a long waiting list of people who would like to come and work for us." ■

# Great Northwest gains stellar reputation in the industry

*Contractor enjoys a high level of acceptance as a leader in heavy 'earthwork' construction*

**G**reat Northwest, Inc. is in its 33rd year of the earthmoving business! Headquartered in Fairbanks since their inception in May of 1976 Great Northwest works across the state from Valdez to Prudhoe Bay and from the Canadian Border to Cantwell.

Great Northwest has a wide variety of clients ranging from small privately held companies to the oil industry, from the Village of Minto to the State of Alaska Department of Transportation to the Corps of Engineers.

A huge part of our companies success has been our ability to attract and retain qualified employees, maintain a strong safety record, care for the environment and a genuine concern for the quality and timeliness of our clients projects.

Besides its reputation for excellent contract performance Great Northwest continually focuses on improving its safety performance.

"We are a union company and put a lot of time and energy into making sure our employees are properly trained and have the safety equipment they need to do the job," Otis said. "We have an excellent working relationship with labor."



Storm drain improvements along a section of the Steese Highway

"One of Great Northwest's biggest contributions to the petroleum industry is to host the pipeline training classes put together by the operators, laborers, pipefitters, and teamsters unions. We offer our 300 acre site to train apprentices in the basics of pipeline construction, from job safety, environmental standards, to the actual laying of pipe. In the past many of these apprentices would arrive on a pipeline spread with little actual field experience. The unions recognized the potential risks associated with new hands to the job site and were proactive in seeking a



A large excavator places armor stone around the Kuparuk bridge to protect its slope from erosion.



solution. The pipeline class offers an intensive two weeks of training, specifically for oil field work, and has been very well received both by industry and the hands." "Everyone has benefited as a result of these classes and that really exemplifies what Great Northwest is all about," Otis said. "Our focus, since our humble beginnings back in 1976, has been to build win/win relationships, built to last over the long haul."

Otis has been active in both local and state efforts to make Alaska a better place to do business. "I try to lead by example," he said, crediting his ability to participate in public affairs to having excellent managers, employees, and partners. "It allows me to get deeply involved in public service, which, I hope, benefits our whole industry."

Elected to the Fairbanks North Star Assembly in 1982 Buzz served through 1988. Since then he has served on numerous boards and commissions, most notably, the executive committee's of the Support Industry Alliance, which is an advocate for the oil and gas industry, the Fairbanks Chamber and the Fairbanks Economic Development Corporation.

In 2002 Great Northwest was named by the Alaska State Chamber as its "Small Business of the Year".

Great Northwest manufactures a variety of rock and aggregate products, including

graded aggregates, gravel, and rip rap, either at its central 300 acre yard, which is a designated foreign trade zone with rail access, or out near the job sites.

In 2006 Great Northwest was awarded the prestigious Sentinels of Safety award from the United States Department of Labor for our outstanding accident free record achieved through the Mining, Safety, and Health Administration.

In the last few years the company has done extensive road upgrades and culvert replacement on the major haul road to the North Slope, the Dalton Highway. One of its most significant projects was an upgrade of 30 miles of the Dalton between Jim River and Coldfoot, which required excavation to place 12 foot diameter culvert, mining and placement of a million yards of gravel and crushing of 100,000 cu. yds. of gravel into a product called D-1 for base course, prior to placement of a chip seal finish. All while maintaining through traffic.

Great Northwest has successfully completed projects for both BP and Conoco Phillips on the North Slope in recent years. In 2004, they finished a dam raise at the Ft. Knox gold mine, north of Fairbanks, with a partner from British Columbia called TERCON. This partnership was formed to address opportunities that require huge rock trucks, excavators, and drill rigs. "Even with over 400 pieces of iron we find ourselves needing specialized tools from time to time," Otis said. "We will do whatever it takes to address the needs of our clients in a professional manner." ■



# CHAPTER 14

*Oil and gas companies  
active in Alaska*



JUDY PATRICK

A CATCO rollagon transports part of a rig on Alaska's North Slope



## CHAPTER 14

# Oil and gas companies active in Alaska

## Introduction

The first part of this chapter consists of some basic information about the oil and gas companies that are active in Alaska. To qualify as active the company has to have done at least one of the following in the last year:

- Have operated exploration and/or production units in Alaska;
- Have acquired significant seismic data;
- Have filed exploration plans; or
- Have applied for exploration-related permits.

Excluded are some partners of these operators and companies holding leases that have not yet been unitized, many of which are profiled in an annual publication from Petroleum News, "The Explorers 2006: Oil and gas companies investing in Alaska's future" at

[www.petroleumnews.com/products.shtml](http://www.petroleumnews.com/products.shtml).

This chapter was compiled just before **Total E&P USA** returned to Alaska and before Forest Oil sold all its Alaska assets to newcomer **Pacific Energy Resources**, so Total and Pacific Energy are not included in the companies covered in the main part of this chapter, but Petroleum News stories that feature the two companies are at the back of this chapter.

## Oil and gas companies in Alaska

### Alaskan Crude Corp.

The story of tiny oil and gas company Alaskan Crude Corp. goes back at least a couple of decades. In 1984-85 the company drilled the Burglin No. 33-1 well, on the

North Slope just south of the Prudhoe Bay unit. And in 1985-86 Alaskan Crude drilled a dry hole at Katalla, the site of Alaska's first oil field in Southeast Alaska west of the Copper River Delta.

But the company went out of business in the early 1990s.

Long-time Alaska oil and gas investor and explorer James "Jim" W. White of San Antonio, Texas, subsequently bought the company and became company president. Alaskan Crude repurchased the three state leases associated with the Burglin well and in 2006 successfully applied to form the leases into the Arctic Fortitude unit. The company's plan of exploration includes re-entering and testing the Burglin well (by Oct. 1, 2007) drilling two new wells, one on each of the other leases, and shooting 3-D seismic over the entire unit by July 1, 2010. One of the new wells or the seismic program must be completed by Nov. 1,



2009.

In 2007 the company also plans to re-enter the Moose Point No. 1 well in a state lease in the northwest of the Kenai Peninsula, using a drilling rig that White owns.

Alaskan Crude is the operator, but not the owner, of acreage near the old Katalla oil field in Southcentral Alaska, but as of April 2007, White said development of that acreage is uneconomic under current federal regulations. Katalla, the site of Alaska's first commercial oil production in 1902, is 56 miles southeast of Cordova. The field was shut in following a refinery fire in 1933.

### Anadarko Petroleum Corp.

[www.anadarko.com](http://www.anadarko.com)

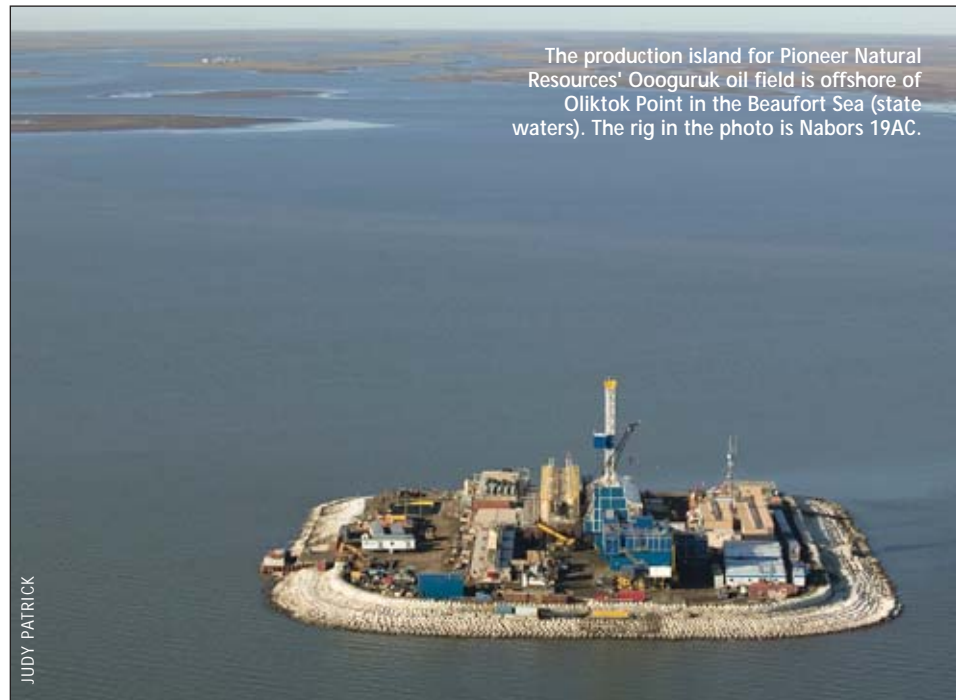
Houston-based independent Anadarko Petroleum first entered Alaska in the 1990s because company CEO Bob Allison believed the North Slope held opportunity for major new finds. The company has focused on finding large "anchor" petroleum accumulations distant from the existing oil and gas infrastructure.

Anadarko is an active exploration partner with operator ConocoPhillips in the Alpine field (Colville River unit) and in the National Petroleum Reserve-Alaska. It also holds leases in the gas-prone Brooks Range Foothills (often also referred to as the North Slope Foothills) where it has established a partnership with the Alaska subsidiaries of Petro-Canada and BG Group, and in the eastern North Slope, where it has formed a partnership with BG and Arctic Slope Regional Corp.

In June 2006 Anadarko took over Kerr-McGee Corp., acquiring Kerr-McGee's central North Slope acreage, including the Nikaitchuq field in the Beaufort Sea just northwest of the Kuparuk River unit. Following the Kerr-McGee takeover Anadarko proceeded with development drilling at Nikaitchuq.

But in early 2006, Anadarko received an offer it couldn't refuse from Eni Petroleum and sold its interest in Nikaitchuq and nearby acreage.

Anadarko has always said it was interested in operating its own production in Alaska, and while continuing to add to its Alaska lease portfolio, shoot seismic and work its prospects from a G&G perspective, the company has been in a holding pattern on gas prospects in the state. It was primarily waiting on news that a North Slope gas pipeline would be built and that reasonable access to that line would be available to explorers. The company says it



The production island for Pioneer Natural Resources' Oooguruk oil field is offshore of Oliktok Point in the Beaufort Sea (state waters). The rig in the photo is Nabors 19AC.

will likely drill its first gas targets in the winter of 2007-08. Partners Anadarko, and Petro-Canada said in early 2007 that they ordered a new rig and remote camp from Nabors Alaska Drilling for a multi-year drilling program on their shared acreage in the Brooks Range Foothills. The rig and camp will be delivered to the North Slope by December 2007, in time for the drilling season.

The partnership's Foothills well could be the first gas exploration well drilled on the North Slope — one that is actually targeting natural gas instead of oil.

Several years ago Anadarko operated an oil exploration well in NPR-A followed by a "hot ice" well in 2004. In the winter of 2006-07, Anadarko drilled its eastern North Slope Jacob's Ladder oil prospect.

Anadarko has an office in Anchorage. Its top official in the state is Mark Hanley.

### Andex Resources

Andex Resources, which has offices in Houston and Denver, is hoping to find commercial quantities of natural gas on its 500,000-plus acres in Interior Alaska's Nenana basin for delivery to Fairbanks and possibly Anchorage. In December 2004, the company took on investment partners Usibelli Energy, an affiliate of Usibelli Coal Mine of Healy, Alaska, and two Native regional corporations — Fairbanks-based Doyon Ltd. and Barrow-based Arctic Slope Regional Corp.

While Andex has not yet drilled a well on its acreage, it says it is assessing the

commerciality of doing so.

Its acreage is a combination of an exploration license and leases from the State of Alaska, the Mental Health Lands Trust and Doyon.

PGS Onshore completed an initial 2-D seismic survey for Andex in an area west of the town of Nenana in the spring of 2005.

Bob Mason, vice president exploration for the company's Northern Division, is in Andex's Denver office and oversees the Nenana project.

### Aurora Gas

[www.aurorapower.com/auroragas.htm](http://www.aurorapower.com/auroragas.htm)

Aurora Gas LLC is an independent oil and gas exploration and production company with operations in Cook Inlet, Alaska. The company was formed in early 2000 to seek natural gas related opportunities in Alaska and has tended to focus on relatively shallow gas prospects in or near known oil or gas fields. However, the company also has interests in some oil prospects and has drilled one unsuccessful wildcat oil well on the Kenai Peninsula.

Aurora Gas has more than 120,000 acres of leasehold and a sizable inventory of developmental and exploratory prospects in the Cook Inlet basin. The company is the operator of the Kaloa, Lone Creek, Moquawkie, Three Mile Creek and Nicolai Creek gas fields on the west side of Cook Inlet.

In March 2006 Aurora formed a joint venture with Swift Energy Co. for oil and gas exploration in Aurora's leases.

Aurora Gas has offices and staff in Houston and Anchorage that manage its Cook Inlet operations.

### BG Alaska E&P Inc.

[www.bg-group.com/international/canada\\_alaska.htm](http://www.bg-group.com/international/canada_alaska.htm)

London-based BG Group, a 1986 spinoff from the privatization of the British government-owned gas monopoly British Gas, entered Alaska on Jan. 26, 2006, when its Brooks Range Foothills "participation agreement" with Anadarko Petroleum and Petro-Canada went into effect. That agreement gave the company a 33.33 percent equity share in 2.1 million acres of Anadarko-operated land in the foothills area on the southern edge of Alaska's North Slope.

In May 2006 BG announced an exploration agreement with Anadarko to acquire a 40 percent equity share in 208,000 acres of land, including a piece of the Jacob's Ladder prospect and a swath of tracts south of BP's Badami unit.

BG began bidding in Alaska lease sales with Anadarko and Petro-Canada in May 2006.

Glenn McNamara manages BG's Alaska subsidiary from Calgary. He is former president of ExxonMobil's operations in Western Canada, including the company's Mackenzie Delta assets.

For more details about BG's plans, see the information in this chapter about its operating partner in Alaska, Anadarko.

### BP Exploration (Alaska) Inc.

[www.bp.com](http://www.bp.com)

While no longer an exploration player on Alaska's North Slope, BP Exploration (Alaska) Inc., the operator of the giant Prudhoe Bay field, remains a dominant North Slope developer as it targets known light oil accumulations around its existing infrastructure, and puts what it calls "risk dollars" into technology development aimed at producing at least a portion of the Slope's 23 billion barrel heavy (viscous) oil resource.

The London-based company, which has its Alaska headquarters in Anchorage, sold off what it could of its exploration acreage in 2003 to Anadarko Petroleum, Armstrong Alaska and ConocoPhillips and dropped the remainder, with the exception of that in the 1002 area of the Arctic National Wildlife Refuge, which was never put up for sale.

BP's acreage in the National Petroleum Reserve-Alaska was part of the acreage it sold.

However, BP is moving forward with its plans to develop the 100 million-barrel

Liberty field, five miles offshore in the Beaufort Sea, between Endicott and Badami. The company plans to drill its Liberty wells from the Endicott field satellite island using extended reach drilling.

BP is the second largest oil producer on the North Slope after ConocoPhillips.

BP also has significant ownership in the trans-Alaska oil pipeline and spends more on oil and gas projects in Alaska than any other company.

Viscous oil accounts for one third of BP's North Slope resources and will bridge the gap to when North Slope natural gas can be sold via a pipeline from the North Slope to Canada and Lower 48 markets, the company has said. BP, ConocoPhillips and ExxonMobil have proposed building a gas pipeline through Canada.

Doug Suttles is president of BP Exploration (Alaska).

### Brooks Range Petroleum Group/ Alaska Venture Capital Group

[www.avcg-llc.com](http://www.avcg-llc.com)

Brooks Range Petroleum Group consists of a consortium of small, independent, privately held oil and gas producers brought together through the efforts of the legacy company AVCG LLC (Alaska Venture Capital Group LLC).

Apart from AVCG's operating subsidiary, Brooks Range Petroleum Corp., all of the companies in the consortium come from the midcontinent of the United States. Since its formation in 1999, AVCG has participated in annual lease sales on the North Slope and has accumulated more than 320,000 acres of lease tracts.

AVCG has multiple prospects in three acreage blocks: Gwydyr Bay, Colville River, and south Point Thomson.

In 2005 and 2006, AVCG and Brooks Range Petroleum formed joint venture partnerships with TG World Energy, Ramshorn Exploration (a subsidiary of Nabors Industries) and Bow Valley Alaska Corp. for the exploration and development of AVCG's North Slope acreage. The group is referred to as Brooks Range Petroleum Group – BRPG – and Brooks Range Petroleum serves as the operator for the partners.

In late 2006 BRPG announced a multi-year North Slope exploration program, including the drilling of several wells.

In April 2007 BRPG announced a North Slope oil discovery at its North Shore No. 1 exploration well in the central North Slope, which will be tested during the 2007-08 drilling season.

In the same announcement, BRPG said its Sag River No. 1 well, also drilled in the

2006-07 season, did not encounter hydrocarbons. The joint venture partners suspended the well, pending further evaluation, and the possibility of drilling an exploratory sidetrack during the 2007-08 drilling season.

Based in Anchorage, Ken Thompson, a former president and chairman of ARCO Alaska Inc., is managing director of AVCG. John Jay "Bo" Darrah is chairman, president and CEO of Brooks Range Petroleum.

### Chevron Corp.

[www.chevron.com](http://www.chevron.com)

Chevron, which has more than a hundred-year history in Alaska, has partnership interests in Alaska oil and gas properties such as Prudhoe Bay and Point Thomson on the North Slope, and the Beluga gas field in Cook Inlet and the trans-Alaska oil pipeline. It also has properties where it is listed as the operator, the most notable being the only privately leased acreage on the coastal plain of the Arctic National Wildlife Refuge where Chevron and BP hold 92,000 acres and where Chevron drilled the KIC well in 1985 and 1986.

Once a major explorer in many parts of the state, including the Alaska Beaufort Sea outer continental shelf, Chevron became quiet on the exploration front for a number of years. But although it pulled out of the National Petroleum Reserve-Alaska in 2002, the company did not make any other major divestitures of Alaska leases when it started doing so in other parts of North America in 2003.

In 2005 the company bought Unocal, including Unocal's Alaska interests in the Cook Inlet. Unocal had been involved in oil and gas exploration in Cook Inlet since the 1950s and was the operator of the Swanson River, Trading Bay and Granite Point oil fields.

Most of the gas from Unocal's older Cook Inlet fields was dedicated to supplying Agrium's fertilizer plant at Nikiski. However, newer developments targeted gas for Enstar Natural Gas, the local gas distribution company, for use by customers in Southcentral Alaska.

After much speculation about the future of Unocal's Cook Inlet interests, Chevron said in 2006 that it would keep the properties and embark on a multiyear investment plan. In addition, the company has announced plans to drill on its White Hills leases, south of the Kuparuk River field on the North Slope, in the drilling season of 2007-08. Chevron acquired some of those leases as part of the Unocal takeover and purchased more leases in the State of



Alaska's March 2006 North Slope areawide lease sale.

John Zager is Chevron's general manager in Alaska.

#### ConocoPhillips Alaska Inc.

[www.conocophillips.com](http://www.conocophillips.com)

ConocoPhillips Alaska is the state's largest oil and gas producer and its most active explorer. ConocoPhillips' heritage company, Phillips Petroleum, was the first oil company to establish offices in Alaska, and has been doing business in the state for more than 50 years.

The company's history in Alaska goes back to the discovery of the Swanson River field on the Kenai Peninsula in 1957 and the discovery of the Prudhoe Bay field in 1968.

Today ConocoPhillips holds major ownership positions in the Prudhoe Bay unit, the Kuparuk River unit and the Colville River unit — all producing units on Alaska's North Slope. The Colville unit includes the Alpine oil field.

The company operates the Kuparuk River field and its satellite fields; and the Alpine field and its satellites. In the Cook Inlet area ConocoPhillips operates the Beluga River gas field, the North Cook Inlet platform and the Kenai LNG (liquefied natural gas) plant it co-owns with Marathon Oil.

ConocoPhillips holds interest in about 3 million undeveloped gross acres in Alaska, including 1.9 million acres in the National Petroleum Reserve-Alaska. Since 1999 the company has participated in more than 60 exploration wells. Since NPR-A re-opened to leasing in 1999 ConocoPhillips has pursued prospects in NPR-A west of the Alpine field, often in partnership with Anadarko Petroleum and, most recently, Pioneer Natural Resources. ConocoPhillips has drilled 16 wells in NPR-A as the operator.

The company's current field development work includes Alpine satellite fields and the development of the West Sak heavy oil accumulations that overlay the conventional Kuparuk River reservoir.

ConocoPhillips invested in five new double-hulled tankers that are now in service for transporting Alaska crude oil. The company also sees as a top priority the construction of a gas pipeline to ship natural gas from the North Slope to the Lower 48.

Jim Bowles is president of ConocoPhillips Alaska, which is headquartered in Anchorage.

#### Devon Energy Corp.

[www.devonenergy.com](http://www.devonenergy.com)

Devon Energy has been active in Canada's Mackenzie Delta for several years and has been scouting for opportunities in Alaska since 2003.

The company sees possible synergies between its Mackenzie operations and potential natural-gas-related exploration and development on the North Slope should a gas pipeline project from the region move forward.

In Alaska's Cook Inlet basin Devon has a 17.5 percent working interest in the Pioneer Natural Resources-operated Cosmopolitan unit.

The company also owns a 100 percent interest in about 12,000 acres in state Beaufort Sea leases north of Gwydyr Bay, and had a small position in the Exxon-operated Point Thomson unit that was dissolved by the State of Alaska in late 2006.

#### Eni Petroleum

[www.enipetroleum.com](http://www.enipetroleum.com)

Houston-based Eni Petroleum, the U.S. affiliate of Italy's Eni SpA, signaled its interest in Alaska in 2005 by purchasing the assets of Armstrong Alaska, a subsidiary of Denver-based Armstrong Oil & Gas. Those assets consisted of 341,500 gross acres onshore and offshore the North Slope, including both state and federal waters. Some leases were 100 percent owned, while others involved minority working interests in leases operated by Pioneer Natural Resources and Kerr-McGee, which has since been acquired by Anadarko. The Pioneer and Kerr-McGee leases included the Ooguruk and Nikaitchuq prospects.

As a result of the acquisition of the Armstrong assets Eni became operator of the Rock Flour unit, adjacent to the southeast corner of the Kuparuk River unit. The company's primary exploration objective at Rock Flour is West/Sak Schrader Bluff viscous oil, with additional potential in Kuparuk C sands.

Eni said it acquired leases in Alaska after conducting an internal evaluation and regional studies that showed the North Slope and adjacent Beaufort Sea as areas with exploration potential for new oil and gas finds. It said its emphasis in Alaska would be consistent growth, and that it was particularly interested in the Beaufort Sea and adjacent Chukchi Sea.

Shortly after Eni entered Alaska the company indicated an interest in partnering with Shell in a Beaufort Sea 3-D seismic survey. And in November 2006 the company

said that it had reached an agreement with Shell to exchange working interest in 64 Eni and Shell leases offshore northern Alaska and begin joint exploration activities on the leases with Shell as the operator.

In the State of Alaska's March 2006 North Slope areawide lease sale Eni consolidated its North Slope position by purchasing leases on 11 tracts near its other holdings.

In the winter of 2006/2007 Eni began a drilling program at Rock Flour, and in the Maggiore prospect about four miles south of Rock Flour, drilling one well in each prospect.

Also in 2007, Eni acquired Kerr-McGee's 70 percent working interest in the Nikaitchuq prospect and surrounding area, giving Eni 100 percent working interest ownership and making it operator.

#### Escopeta Oil & Gas

[www.escopetaabbi.com](http://www.escopetaabbi.com)

Houston-based independent Escopeta Oil & Gas has identified what it and some seasoned inlet geologists think are two of Cook Inlet's missing giants in its Kitchen and East Kitchen prospects offshore in the Cook Inlet.

But drilling these prospects requires a jack-up rig, platform or drillship. Escopeta has been involved in a multiyear effort to try to get one of the three to Alaska, but to do that you need partners, and up until recently too few other companies have been willing to commit the dollars.

In early 2007, Escopeta President Danny Davis said he hoped to have a partnership or joint venture agreement that will finally see the company's Kitchen wells drilled in 2007.

Oil reserve estimates for the two Kitchen prospects, which have recently been unitized, fall between the North Slope's Alpine and Kuparuk fields, which would make the Kitchen the largest oil field in the Cook Inlet basin, and one of the largest in Alaska.

Anchorage resident Steve Sutherlin is Escopeta's contact in Alaska.

Escopeta also has North Alexander, a Cook Inlet basin onshore gas prospect, which was recently unitized and where the company proposes to drill a well in the winter of 2007-08.

#### Exxon Mobil Corp.

[www.exxonmobil.com](http://www.exxonmobil.com)

ExxonMobil is one of the largest oil and gas producers and reserve holders in the United States and one of the three largest

in Alaska. On the North Slope the company's primary asset is one-third of the BP-operated Prudhoe Bay field.

Exxon owned a 52 percent interest in the nonproducing Point Thomson unit and operated the unit. In November 2006 the State of Alaska terminated the unit because the unit owners had not developed it — Exxon and the other unit owners have appealed the state's decision in more than one venue.

Shortly after the 1989 Exxon Valdez oil spill in Prince William Sound, Exxon dropped its Alaska exploration program.

Exxon, like BP and ConocoPhillips, is involved in a major effort to commercialize Alaska North Slope natural gas.

Craig Haymes heads the company's Alaska office in Anchorage.

### Forest Oil Corp.

[www.forestoil.com](http://www.forestoil.com)

Denver-based Forest Oil is best known in Alaska for its valiant efforts in bringing on line the Redoubt Shoals field in Cook Inlet. Forest acquired Redoubt Shoals along with a number of Cook Inlet prospects when the company bought Forcenergy Inc. in 2000.

But the company's Alaska involvement is now set to end, following a January 2007 announcement that it would sell all of its Alaska assets.

In addition to producing Cook Inlet oil from its Osprey platform on the Redoubt Shoal field and from the onshore West McArthur River field, Forest also has owned working interests in Unocal-operated Cook Inlet oil properties, working interest in the ConocoPhillips-operated Cosmopolitan unit and a small working interest ownership position on the North Slope.

In 2004 Forest purchased leases on some 42,000 acres of Alaska Mental Health Trust land, on the west side of Cook Inlet west of Point MacKenzie. Forest also holds two exploration licenses in the Susitna basin and an interest in a lease in the Copper River basin, where operator Rutter and Wilbanks drilled a dry hole in 2005.

The company also has several offshore exploration prospects in Cook Inlet, the most notable being Corsair, which was recently unitized and which lies on the same anticline as ConocoPhillips' North Kenai gas field, the known oil pool in Renaissance Alaska's Northern Lights prospect and Escopeta's Kitchen prospects.

In 2003, Forest said that pre-drill analysis indicated Corsair could contain 137 million barrels of oil and as much as 480 bcf of natural gas.

On the west side of the Cook Inlet Forest operates the West Foreland and Kustatan gas fields and has a 30 percent working interest in the Aurora Gas-operated Three Mile Creek gas field. In addition the company has discovered gas in two wells at West Foreland.

Leonard Gurule has been heading Forest's operation in Alaska from the company's office in Anchorage.

Forest hoped to have its Alaska assets sold in 2007.

### Fowler Oil & Gas Corp.

[www.Fowleroilandgas.com](http://www.Fowleroilandgas.com)

Fowler Oil & Gas was formed in 2005 to leverage Alaska's oil and gas potential. Although the company eventually hopes to develop oil resources in the Cook Inlet basin, Fowler's initial focus is on coalbed methane in that basin. In the spring of 2007, Fowler was working on permits for an initial coalbed methane project on private land in the Mat-Su Valley between Wasilla and Palmer, and was also negotiating access to 10 other potential coalbed methane sites.

To minimize the surface impact of the coalbed methane development, Fowler proposes drilling multiple wells horizontally through coal seams, sidetracked from a single vertical well at each coalbed methane project. The wellhead and production facilities will be enclosed in a small barn-like building.

Patented technology will separate produced water from the gas downhole and pump the water into deep sandstone formations below the coal horizons.

Fowler is a sister company of Native American Energy Group, a company that develops oil and other minerals in Montana on Native American lands. The two firms share staff.

Robert "Bob" Fowler heads up Fowler Oil & Gas, which has an Alaska field office in the Wells Fargo Building in Palmer. His email is [Robert@Fowleroilandgas.com](mailto:Robert@Fowleroilandgas.com).

### Marathon Oil Corp.

[www.marathon.com](http://www.marathon.com)

Marathon Oil celebrated 50 years in Alaska in 2004. The company, which is based in Houston and has its Alaska headquarters in Anchorage, operates onshore in Alaska's Cook Inlet basin.

In its first years in Alaska Marathon was exploring for oil in Cook Inlet and, in the process, discovered a lot of gas. Finding a market for that gas was a challenge. Marathon began looking at opportunities

for liquefied natural gas, partnering with Phillips Petroleum (now ConocoPhillips) to build an LNG plant at Nikiski on the Kenai Peninsula. Completed in 1969, the facility exported the first LNG out of North America and the first LNG imported into Japan.

Marathon manages shipping to the Far East, while ConocoPhillips manages the plant.

In 1996 Marathon sold most of its oil production in Cook Inlet to focus on natural gas. In recent years it has been an aggressive natural gas explorer in Southcentral Alaska, with discoveries at Wolf Creek, Ninilchik and Kasilof.

Marathon had a truck-mounted drilling rig, Glacier Rig No. 1, specially built for drilling on the Kenai Peninsula. In the late 1990s, prior to the arrival of the Glacier rig, the company drilled a couple of wells a year but since they put their own rig to work in early 2000, the rig has worked almost nonstop doing some new well work and re-drills of old wells.

The company also had one or two Nabors rigs drilling for it over the last couple of years.

In addition to exploring for new sources of gas, Marathon is focused on maximizing production from its existing gas fields. It invented the EXcape completion technology for Beluga formation gas sands at its Kenai field, allowing it to produce gas not previously thought economic.

Marathon is operator and part owner of the Kenai-Kachemak Pipeline, which transports gas from as far south on the Kenai Peninsula as the Deep Creek unit (Happy Valley participating area) to the community of Kenai. In 2006 the company started operating part of its Kenai gas field as a gas storage facility.

John Barnes is Marathon's Alaska business unit manager.

### NorthStar Energy Group/Alliance Energy LLC/Gas-Pro LLC

[www.allianceenergy.us/index.html](http://www.allianceenergy.us/index.html)

In 2000, Tulsa, Okla.-based NorthStar Energy Group bought Gas-Pro Alaska LLC, the operator of the North Fork Unit, toward the southern end of the Kenai Peninsula. A well drilled at North Fork in 1965 discovered a gas accumulation in the unit.

And in 2004 Alliance Energy of Tulsa, Okla., agreed to fully fund the development of North Fork, including the possible drilling of a second well and the construction of a gas pipeline. But in early 2007 Gas-Pro said that it would produce compressed



natural gas from a single well at North Fork.

Alliance owns interests in a number of leases on the Kenai Peninsula.

Sam Nappi is president of Alliance and Northstar.

#### **Petro-Canada (Alaska) Inc.**

[www.petro-canada.ca](http://www.petro-canada.ca)

Petro-Canada's acreage, which it started to assemble in 2001, lies in the gas-prone Brooks Range Foothills and the oil- and gas-prone National Petroleum Reserve-Alaska.

By the end of 2006 the company had amassed about \$1.5 million net acres of leased and option land in NPR-A. And in early 2007 the company said that it had made a deal with Talisman Energy's Alaska subsidiary, FEX, in which the two companies would partner in all of Petro-Canada's NPR-A acreage, with FEX as operator.

In the Brooks Range Foothills, to the east of NPR-A, Petro-Canada has partnered as a working-interest owner with BG Group and Anadarko in Anadarko-operated acreage.

Derek Evoy, manager of frontier exploration for Petro-Canada, is in charge of the firm's Alaska assets. He is based in Calgary.

#### **Pioneer Natural Resources Alaska Inc.**

[www.pioneernc.com](http://www.pioneernc.com)

Dallas-based Pioneer Natural Resources entered Alaska in 2002, gaining a 70 percent working interest in 10 state leases on the North Slope covering approximately 14,000 undeveloped acres between the Kuparuk River unit and Thetis Island.

The acreage contained a prospect put together by Armstrong Alaska, which is currently part of the Oooguruk unit offshore the ConocoPhillips-operated Kuparuk unit in approximately 5-10 feet of water in the Beaufort Sea.

Early in 2003, Pioneer drilled three Oooguruk wells that established the existence of potentially commercial quantities of oil in Jurassic-aged sands. Pioneer has since farmed into 23,000 acres held by ConocoPhillips adjacent to that discovery and acquired 53 blocks in an Alaska lease sale covering three additional prospects.

Since then Pioneer has moved ahead with the development of Oooguruk, which is expected to be the first North Slope field operated by an independent, although its oil will be processed by ConocoPhillips at Kuparuk. August 2006 saw the completion of a gravel island for the production facilities, and work has continued on field development, with first production expected in 2008.

In March 2007 Alaska's Division of Oil and Gas expanded the Oooguruk unit from 20,394 acres to 50,883 acres, with the addition of seven state leases.

Pioneer also owns interests in substantial acreage elsewhere on the North Slope, including interests in 1.4 million acres in the National Petroleum Reserve-Alaska, where it has partnered with Anadarko Petroleum and operator ConocoPhillips. In the winter of 2005/2006 the company drilled dry holes in the Hailstorm No. 1 well, south of Prudhoe Bay, and the Cronus No. 1 well, southwest of Kuparuk. And in that same winter the ConocoPhillips-operated Antigua well, with Pioneer owning a 32 percent working interest, also proved dry, south of Kuparuk.

In 2004 Pioneer purchased Evergreen Resources, inheriting Evergreen's coalbed methane acreage in Southcentral Alaska as part of that deal. In 2005 Pioneer announced that it was dropping those leases, primarily because it wished to focus on its North Slope prospects.

But Pioneer is investigating the possibility of producing oil and gas from the Cosmopolitan unit, off the southwest coast of the Kenai Peninsula. The company took over operatorship of Cosmopolitan in June 2006 and has since increased its working interest in the unit to 62.5 percent.

Ken Sheffield, president of Pioneer's Alaska subsidiary, has repeatedly said that Alaska is one of four key exploration hot spots for Pioneer Natural Resources.

The company has offices in the ConocoPhillips building in Anchorage.

#### **Renaissance Alaska LLC**

In 2006 independent oil and gas company Renaissance Alaska LLC secured initial funding for the exploration and development of leases in Alaska from ARC Energy Fund 5, a private equity fund managed by Canadian company ARC Financial Corp.

The funding has enabled Renaissance to purchase oil and gas leases and commit to a program of Alaska exploration. The Renaissance leases are on the Kenai Peninsula, offshore in Cook Inlet and in the Umiat oil field at the eastern edge of the National Petroleum Reserve-Alaska. The company's Cook Inlet leases include the Northern Lights unit, with a known offshore oil pool.

In early 2007 Renaissance, in a partnership with Rutter and Wilbanks and Arctic Falcon, formed a company called Renaissance Umiat LLC to evaluate and possibly develop the Umiat oil field. The new company said that it hoped to do appraisal

drilling at the field during the winter of 2007-2008.

#### **Rutter and Wilbanks Corp.**

[www.rutterandwilbanks.com](http://www.rutterandwilbanks.com)

Despite disappointing results so far from its first Alaska exploration venture — the Ahtna No. 119 well near Glenallen — Rutter and Wilbanks Corp. has continued to invest in the state. The company acquired the Northern Lights prospect in the upper Cook Inlet from Prodigy Alaska in 2006. Northern Lights contains a known oil pool, but requires offshore drilling, possibly by a Rutter and Wilbanks partner in the prospect.

Rutter and Wilbanks confirmed an interest in the Cook Inlet by picking up eight tracts in the State of Alaska's May 2006 areawide Cook Inlet lease sale.

But the company has also forged ahead with establishing a position in the Umiat oil field in the Brooks Range Foothills, on the southeastern edge of the National Petroleum Reserve-Alaska. In 2006 the company, in partnership with Renaissance Resources, acquired an Umiat lease from Paul Craig and Pete Zamarello. And in early 2007 the company partnered with Renaissance and Arctic Falcon, another Umiat leaseholder, to form a new company, Renaissance Umiat LLC, to evaluate and possibly develop the Umiat field. Renaissance Umiat hopes to drill an appraisal well in the winter of 2007-2008.

Meantime, Rutter and Wilbanks still plans further testing for gas in the Ahtna well in the spring of 2007.

#### **Savant Resources LLC**

Savant Resources, a closely held limited liability company and an affiliate of Denver-based Shaw Resources, was in an unusual position for a small independent when it leased its first Alaska tracts in 2006, in that, according to its President Patterson 'Pat' Shaw, the company was "fully capitalized to go forward" with exploration.

The tracts Pat Shaw purchased in the State of Alaska's 2006 Beaufort Sea lease sale (and later transferred to Savant) were adjacent to BP's Liberty field and extending east toward the onshore Badami field.

The company subsequently moved ahead with the permitting to drill a well in its Kupcake prospect, about 8,000 feet west of the Liberty No. 1 discovery well, in the winter of 2006-07. But because of the lack of a suitable drilling rig, Savant had to postpone its drilling plans until the following winter season.

According to Savant's literature the company was founded in 1988 and has "a core producing oil and gas asset base, a diversified project leasehold inventory with interests in over 900,000 acres, and an expanding portfolio of high-quality new project opportunities in the Lower 48 states."

Greg Vigil, a former BP Exploration (Alaska) employee runs Savant's Alaska operations from Denver, Colo.

In April 2007, Savant hired EX. O'Keefe, the former head of BP's Alaska exploration department, as its director of business development.

### Shell Offshore Inc.

[www.shell.com](http://www.shell.com)

Shell first entered Alaska in the early days of exploration on the Alaska Peninsula in the 1950s and was active in the early exploration of the North Slope. The company developed the Middle Ground Shoal field in Cook Inlet in the 1960s and led some Chukchi Sea exploration in 1989 and 1990. In 1998 the company sold its interests in the Middle Ground Shoal field.

In 2005 the company made an emphatic return to northern Alaska when it purchased a swathe of leases in the Beaufort Sea outer continental shelf, along a trend stretching east from Harrison Bay to an area north of ANWR; in that same year the company also purchased some leases in the State of Alaska's areawide Alaska Peninsula lease sale.

Since 2005 Shell has forged ahead with its new Alaska exploration program. In the summer of 2006 the company acquired some 3-D seismic data in the Chukchi Sea, in preparation for a planned U.S. Minerals Service Chukchi lease sale. The company had planned to also shoot seismic in the Beaufort Sea, but difficult ice conditions prevented that operation. But in that same summer, Shell started surveying and preparation for drilling in its Beaufort Sea leases in the Camden Bay area, north of the eastern end of the North Slope.

Shell has purchased and is refurbishing the Kulluk drilling vessel for Beaufort Sea drilling. The company plans to use that drilling vessel and the drillship Frontier Discoverer to drill three wells at the Beaufort Sea Sivulliq prospect (formerly the Hammerhead prospect) in the summer of 2007, part of a plan to drill three to four wells per year in the Beaufort Sea between 2007 and 2009. The company also plans to continue a program of seismic surveying in the Chukchi and Beaufort Seas.

In November 2006 Shell and Eni Petroleum announced an agreement to



People "listening for oil" to come down the the trans-Alaska oil pipeline in 1977.

exchange working interest and conduct a joint exploration program on 64 leases in federal waters of the Beaufort Sea north of the Kuparuk, Nikaitchuk, Northstar and Kuparuk units, extending east to mid-way above the Prudhoe Bay unit.

Shell has opened an office in Anchorage as part of its burgeoning Alaska business and has stated that it wants Alaska to become a heartland for the company's operations.

Rick Fox is Shell's asset manager for Alaska.

### Storm Cat Energy Corp.

[www.stormcatenergy.com](http://www.stormcatenergy.com)

Storm Cat picked up two leases in the November 2004 Mental Health Trust Land Office lease sale and eight leases in the State of Alaska's May 2005 Cook Inlet state areawide lease sale. All of the leases lie in

the same general area of the Matanuska-Susitna Borough.

And in February and March 2006 the company drilled the Northern Dancer No. 1 gas exploration well near Big Lake. Storm Cat reported finding gas in the well but did not complete production testing.

The company is registered in British Columbia and has offices in Denver, Calgary and Ulaanbaatar, Mongolia. According to the company's Web site the company focuses on developing unconventional natural gas reserves.

### Talisman Energy Inc./FEX

[www.talisman-energy.com](http://www.talisman-energy.com)

FEX, a wholly owned subsidiary of Canadian independent, Talisman Energy first entered the Alaska oil and gas industry in 2003 when, as Fortuna Exploration, the company farmed into Total's Caribou explo-



ration prospect in the National Petroleum Reserve-Alaska.

Purchases in a series of lease sales between 2004 and 2006 have resulted in FEX acquiring a large swathe of leases along a fairway through northwestern NPR-A and offshore in Smith Bay; the company has also purchased leases in state Beaufort Sea acreage on the west side of Harrison's Bay, to the northeast of NPR-A. In early 2007 the company said that it had nearly 1.5 million gross acres under lease in NPR-A.

FEX has partnered with Petro-Canada for NPR-A exploration. As part of that partnership, FEX purchased some leases jointly with Petro-Canada in the September 2006 northwest NPR-A lease sale. The company has also acquired interests in some Petro-Canada NPR-A acreage.

In the State of Alaska's October 2006 North Slope areawide lease sale, FEX bought leases on seven onshore tracts, west of the trans-Alaska oil pipeline.

In the winter of 2005-2006 FEX, operating from a staging area that it had established at Cape Simpson, drilled the Aklaq 2 well and a sidetrack in northwest NPR-A. In the winter of 2006-2007 the company is using two rigs to continue its northwest NPR-A drilling program and planned to drill three wells during the winter season.

John t'Hart, Talisman's executive vice president of international exploration, is in charge of the company's Alaska exploration program. He is based in Calgary.

### Winstar Petroleum/UltraStar Exploration

Alaska-based UltraStar Exploration LLC has about 7,000 acres of state leases on the North Slope and in the nearshore Beaufort Sea, near Point McIntyre and on the northwest side of Gwydyr Bay. Sister company Winstar Petroleum's first North Slope well, the Oliktok Point State No. 1, came up dry in 2003. In preparing to drill that well Anchorage-based Jim Weeks, CEO of both Winstar and UltraStar, negotiated an agreement for the potential use of production facilities in the Kuparuk River field.

After the Oliktok Point well UltraStar assessed seismic data, to decide where to drill next, and located a new prospect called Dewline Deep, west of Point McIntyre. Negotiations with BP were still in progress in early 2007 to drill Dewline Deep from the Point McIntyre No. 1 drill pad and to use BP processing facilities in the event of an economic find at Dewline Deep.

UltraStar/Winstar also used to own some leases near the Badami field, toward the eastern end of the North Slope. UltraStar evaluated some seismic data for those leases, but subsequently disposed of the leases.

Weeks can be reached via email at [jweeks@winstarpetroleum.com](mailto:jweeks@winstarpetroleum.com)

### XTO Energy Inc.

[www.xtoenergy.com](http://www.xtoenergy.com)

XTO is not an exploration company. It's the kind of company that the majors look to when they are selling maturing assets that no longer fit their portfolios. XTO, based in Fort Worth, Texas, will do a lot of in-fill drilling and development with the goal of doubling the reserves at the properties it buys.

That is close to what has happened at Middle Ground Shoal in Alaska's Cook Inlet basin, and as a result, production from the A and C platforms has declined only a little since XTO acquired the platforms in 1998 from Shell. In 2006 XTO completed a remodel of the crew quarters on the C platform and upgraded the fire and gas detection systems on both platforms.

In its search for oil and gas properties, XTO, which employs 30 people on its platforms and in its Nikiski office on the Kenai Peninsula, looks for geologically complex reservoirs, an indicator that the previous operator likely missed something.

Kyle Hammond, vice president of operations for XTO's Permian division, oversees the company's Alaska operations.

## New to Alaska, looking to explore

### Benchmark Oil and Gas Co.

[www.benchmarkoilandgas.com](http://www.benchmarkoilandgas.com)  
(Most of the Web site is in Swedish, Houston, Texas, office phone number is (281) 558 8585)

Benchmark Oil and Gas Co. entered the Alaska oil and gas industry by buying 20 Kenai Peninsula tracts in the State of Alaska's May 2006 Cook Inlet basin areawide lease sale. The company has been obtaining existing seismic, well and field data with an intent to apply new technologies to identify prospects to drill. The company has a general strategy of exploring in emerging areas where there are opportunities to use state-of-the-art 3-D seismic technology.

Benchmark Oil and Gas has been a

Texas independent since 1976 and was bought by Swedish company Benchmark Oil and Gas AB in 2001. In 2006 the Swedish company raised capital by going public in the Nordic Growth Market exchange. The company has said that it plans on investing a substantial amount of that capital in Alaska.

Texas remains Benchmark's core area for drilling and development and the company also owns active properties in California. In addition to the company's new venture in Alaska, Benchmark is seeking new opportunities for business in both Argentina and North Africa.

Benchmark contacts are: Robert Pledger, president, email [rpledger@benchmarkoilandgas.com](mailto:rpledger@benchmarkoilandgas.com), and Denise Stone, exploration advisor, email [dmstone@pdq.net](mailto:dmstone@pdq.net)

### True North Energy Corp.

[www.tnecorp.com](http://www.tnecorp.com)

Houston-based True North Energy Corp. entered Alaska in April 2006 with the purchase of 22,917 acres onshore in the Cook Inlet basin and 10,000 acres onshore and offshore the North Slope. The leases were purchased from several small investors, including Dan Donkel, Samuel Cade and Monte Allen.

True North's strategy calls for putting together big plays in Alaska and partnering with others in low-risk drilling ventures in Louisiana, Texas and Oklahoma.

The company told the Securities and Exchange Commission in September 2006 that it intends to spend \$1.5 million during 2006 and 2007 on exploration and development activities such as seismic and lease acquisition, technical studies, and participating in joint venture exploration drilling. True North said no drilling was planned in Alaska for 12 months. Instead, the company would acquire more seismic and conduct additional technical evaluations in order to find compatible partners.

In late 2006, True North entered into an agreement with Savant Resources to pool leases and drill an exploration well at operator Savant's North Slope Kupcake prospect (see Savant in this chapter). The non-cash deal gave True North an 8.45 percent stake in Kupcake.

John Folnovic, a 25-year veteran of northwestern Canada's oil and gas industry, is True North Energy's president and CEO. ■

PETROLEUM NEWS, WEEK OF APRIL 22, 2007



Total plugged and abandoned its first Alaska exploratory well, the Caribou 26-11 No. 1, in 2004. The well was drilled in partnership with Talisman Energy's U.S. subsidiary Fortuna Energy (now called FEX).

# Total never lost Alaska focus

*Even though French major left Alaska in '04, it continued  
to study state's potential*

By KAY CASHMAN  
Petroleum News

**T**otal E&P USA Inc. is not new to Alaska. Prior to its winning bids in the April 18 Beaufort Sea oil and gas lease sale (see story page 1), the company's most recent foray into Alaska was in 2002 when it picked up leases in the National Petroleum Reserve-Alaska and later opened an Anchorage office.

Total drilled on the NPR-A acreage in the winter of 2003-04. Unhappy with the results, the Houston-based subsidiary of Paris-based Total S.A. closed its office and for all intents and purposes left the state.

But according to Tom Ryan, vice president of Total E&P USA's corporate division, the megamajor has continued to work on its geologic model of Alaska and remained interested in the state's oil and gas potential.

"It's never been an area that Total abandoned. When we closed our office we were, at that time, finished with our last project there and did not have anything to go after, but we didn't change our focus. Our geologists completed their analysis ... and continued to work on their model," Ryan said, which is an "evolving" effort.

"Alaska has never been off our agenda," he said.

## Open to other Alaska acreage

Since Total left Alaska in 2004, the company has sold or traded all its onshore acreage in the United States, concentrating instead on Gulf of Mexico deepwater plays.

But that's "not suggesting Total wouldn't look at onshore" in Alaska, Ryan said.

When asked if the company was interested in the Bristol Bay or Cook Inlet areas, Ryan said, "I'm not at liberty to say, but we've done a large regional model so it would cover other areas as well."

Total does not have any immediate plans to open an office in Alaska. Rather the company's exploration office in Houston, which is headed by Denis Francoise, will be in charge of its new Alaska assets.

"Denis Francoise will be in charge of refinement and further evaluation of those blocks. They have long-term implications. But we're not going to be opening an office in the near future or finding a replacement for someone like Jack Bergeron until we firm up our plans," Ryan said. Bergeron headed up Total's operations in the state from 2002 to 2004.

When asked if a seismic program was a possibility in the near future, Ryan said, "that's a good question."

"We're glad to be back and look forward to working with the people of Alaska on the North Slope and elsewhere. We look forward to establishing new relationships, and building on those we left behind," he said. ■

*Editor's note: To learn more about Total's history in Alaska, go to Petroleum News' archives for this story:*

<http://www.petroleumnews.com/pnads/212582081.shtml>



## Reprints from Petroleum News

Following are reprints from Petroleum News, a weekly oil and gas newspaper based in Anchorage, Alaska. Petroleum News is the publisher of this guide, Dispelling the Alaska Fear Factor.

There are numerous articles from Petroleum News that would be of use to someone learning about Alaska's geologic potential and about the history of oil and gas exploration and development in Alaska. The articles that follow are just a few of those.

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Information about subscribing and the story archives can be found at this Web address: [www.PetroleumNews.com](http://www.PetroleumNews.com).





PETROLEUM NEWS, WEEK OF JUNE 3, 2007

# Forest sells Alaska assets

*California independent Pacific Energy says Cook Inlet will be core area*

By KAY CASHMAN  
Petroleum News

**O**n May 29, Denver-based Forest Oil announced the sale of its remaining Alaska assets to Pacific Energy Resources for approximately \$464 million. Pacific Energy, a new player in the state, told Petroleum News its soon-to-be-acquired Alaska assets will "become a core area" for the Long Beach, Calif.-based independent.

Pacific Energy currently produces about 3,000 barrels of oil per day in California, two-thirds of which comes from three offshore platforms in the federal waters of San Pedro Bay. The Alaska assets it is buying from Forest are producing about 5,900 barrels of oil equivalent per day, Pacific Energy said.

Pacific Energy also has an agreement with Shell and Wolverine that entitles the group to explore and develop oil and gas interests in the Pacific Creek area of Wyoming's Green River basin.

## Plans to pour money into Alaska

In a May 29 interview with Petroleum News, Pacific Energy President Darren Katic said the Alaska acquisition fits his company's business model which is "looking at older fields that we perceive have lots of upside ... but are undercapitalized for various reasons, perhaps because they've been passed around in mergers, so they are non-core areas for larger companies. ... We see these Cook Inlet assets as fantastic assets that need to be somebody's core properties. Our intention is to pour a lot of money in the proven, undeveloped reserves."

The Alaska purchase, which includes Forest Oil's wholly owned subsidiary Forest Alaska Operating, will be retroactive to Jan. 1, 2007, and is expected to close June 30, "subject to customary closing conditions and adjustments," Forest said. The company's assets consist

of shares of nine Cook Inlet basin fields, a 40 percent interest in Cook Inlet Pipeline Co., and almost 1 million exploration acres in the Cook Inlet and Susitna basins of Southcentral Alaska. Forest's tiny interest in the North Slope Prudhoe Bay unit was also up for sale, but a Petroleum News source at the company said that asset was acquired earlier in the year by Forest's Prudhoe partners.

The \$464 million acquisition price Pacific Energy is paying includes \$380 million to repay Forest Alaska Operating's term loans, cash of about \$68 million to be paid to Forest, and 5.5 million shares of Pacific Energy common stock to be issued to Forest at its current value of approximately \$16 million.

## Expects to keep most Alaska employees

Katic told Petroleum News he expects to keep many of Forest's Alaska employees: "We don't have any infrastructure in Alaska, so we're looking at keeping the vast majority of the people who are interested in staying, particularly the people who work on the facilities themselves."

The company has not yet met with any Forest employees, he said.

When asked if Pacific Energy had selected a person to head its Alaska operation Katic said, "We have a couple of candidates we're looking at to run the operation," but he also said keeping Forest's top man in Alaska, Leonard Gurule, was something he was open to. As of May 29, he had not yet talked to Gurule.

Staffing in Alaska is "in its infancy stages," Katic said.

Katic and his people expect to make a visit to Alaska in the very near future — "probably within the week," he said.

Corsair a high-priority; will be talking to Escopeta

The Alaska acquisition includes "significant undeveloped acreage with multi-



"We see these Cook Inlet assets as fantastic assets that need to be somebody's core properties. Our intention is to pour a lot of money in the proven, undeveloped reserves." —Pacific Energy President Darren Katic



*The Alaska acquisition includes "significant undeveloped acreage with multiple high quality exploration targets, including Corsair, which alone has 200 million-barrel potential (and) provides large exploration upside," Katic said.*

ple high quality exploration targets, including Corsair, which alone has 200 million-barrel potential (and) provides large exploration upside," Katic said.

He said the offshore prospect was "a high-priority" drilling prospect for his company.

Corsair lies on the same anticline as ConocoPhillips' North Kenai gas field, the known oil pool in Renaissance Alaska's Northern Lights prospect and Escopeta Oil's Kitchen prospect.

In its Corsair unit application last year Forest told the state it had "identified large seismic amplitude anomalies located in the center of the Upper Cook Inlet approximately 12 miles southwest of the North Cook Inlet field." The prospect occurs in a feature some 2.5 miles wide and nine miles long that "lies on structural trend with the North Cook Inlet field."

In 2003 Forest said the prospect could contain as much as 480 billion cubic feet of natural gas.

The exploration of offshore prospects such as Corsair would require a jack-up rig, something Escopeta and Forest proposed in their 2006 unit exploration plans. Escopeta President Danny Davis has been working to bring a jack-up rig to Cook Inlet, and Katic told Petroleum News he expected to be talking to Davis in the near future.

When asked what Katic thought of the Redoubt Shoal field, which has proven to be a disappointment to Forest, he said his company "did not put a whole lot of value on it." ■

# Spill response on a statewide scale

*Alaska Chadux's huge service area, experience with spill logistics makes it a leader*

**T**he Alaska Chadux Corporation is a non-profit oil spill response organization specializing in response to members' spills throughout Alaska. With Headquarters in Anchorage and equipment stored at 10 sites throughout the state, Chadux provides spill response services over a larger area than any other spill responder in Alaska. Chadux is classified as an Oil Spill Removal Organization (OSRO) by the US Coast Guard and registered as a Primary Response Action Contractor (PRAC) and Non-tank Vessel Cleanup Contractor (NTVCC) with the State of Alaska.

In the aftermath of the Exxon Valdez oil spill, new state and federal regulations dramatically changed the requirements for oil spill prevention and response. The Alaska Chadux Corporation was formed as part of the effort of the noncrude oil transportation and distribution industry to conform to the new laws. Chadux was designed from its inception to be capable of responding to oil spills throughout the State of Alaska. Lighter airmobile equipment was stored in various hubs. This equipment could be quickly moved by aircraft to the site of a spill. This was in contrast to other oil spill organizations whose services are limited to specific geographic areas.

Chadux's huge service area and experience with spill response in Alaska has taught us that logistics is vital to the success of any oil spill. A complete compliment of equipment with trained personnel must be delivered and supported at the spill site, if the response is to succeed. To meet this vital need, Chadux has hired people with many years of experience in Alaska logistics. We have designed packages of response equipment for air mobilization to remote sites and developed the support systems required to maintain the response. We know that if you cannot provide the logistics to support the response, the operation cannot be sustained.

Over the last 12 years, Chadux's membership and services have grown. In the beginning Chadux served only the non-



crude oil transportation and marketing industry. The Corporation lived and operated by its core values of Competence, Teamwork, Integrity, and Stability. Its reputation grew and the US Coast Guard called on Chadux to respond to the largest oil spill since the Exxon Valdez – the M/V Kuroshima which went aground in Summers Bay on Unalaska Island in November 1997, spilling 48,000 gallons of bunker fuel. Similar spills from non-regulated vessels motivated the State of Alaska to regulate non-tank vessels. Chadux gained this new class of members and further increased its response capability throughout Alaska.

As exploration for oil moved further from the core operations on the North Slope, new independent exploration companies looked for more cost effective and more innovative ways to prepare for oil spill response. Chadux was able to provide the lower cost oil spill response compliance they wanted. Today Chadux continues to make available oil spill response services for exploration operations on the North Slope and elsewhere.

Starting as a small company with four

members attempting to meet state and federal compliance for non-crude oil transportation and distribution in Alaska, Chadux has grown to a company with over 40 members including transporters, terminals, tank vessels, non-tank vessels, exploration companies, the Alaska Railroad, and



other non-oil companies who have oil spill response compliance issues.

Created in 1993, Chadux has over 12 years experience in oil spill response throughout Alaska. Its expertise is respected and called upon by state and federal agencies to respond to any kind of oil spill in Alaska. In December 2004 the US Coast Guard called upon Chadux to respond to the M/V Selendang Ayu, a non-regulated foreign freighter making innocent passage through the Aleutian Islands which went aground on the north shore of Unalaska Island.

Chadux lives by its core values and recruits and retains superior people. Teamwork is held in high regard, and all employees work well together among themselves and with external groups. They are proud of their success and the reputation it has earned them. ■



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# Kakivik Asset Management, LLC

*Demonstrating that the convergence of culture, technology benefits the oil and gas industry*

**K**akivik Asset Management, LLC (Kakivik) is an Alaskan business owned by Bristol Bay Native Corporation and CH2M HILL, Inc.

Based in Anchorage, Kakivik employs nearly 200 technical and professional staff specializing in non-destructive testing (NDT), corrosion engineering, finite element analysis, cathodic protection, quality assurance and quality control inspections.

## Kakivik's I<sup>2</sup>Q Formula

During the past seven years Kakivik has established itself as an experienced and reliable service and solutions provider using their I<sup>2</sup>Q Formula. I<sup>2</sup>Q is the promise that Kakivik delivers to their clients and reflects Kakivik's core principles of Integrity, Innovation, and Quality. These three principles are the foundation of Kakivik's business philosophy.



## Integrity

Through inspection and testing, Kakivik provides the information necessary to increase the reliability of system components, minimize outages and shutdowns, and protect the environment. A quality program based on integrity is only as good as the technicians and inspectors who implement and benefit from its' concepts. Kakivik encourages an open and honest relationship between management, our clients, and our workforce. This trusting relationship results in higher productivity, lower operating costs, and improved reliability of all inspection results.



Visit the company online  
[www.kakivik.com](http://www.kakivik.com)



## Innovation

Kakivik's senior field staff manages inspection programs under a project delivery system which encourages innovation and a proactive approach to continuous program improvement. Kakivik empowers employees and gives them the tools necessary to enact change. In a time of increased fiscal responsibility, and increasing asset age, Kakivik's goal is to continuously improve inspection techniques and procedures for their clients.

## Quality

Kakivik's Quality Program is founded on the principles of the ISO 9001:2000

quality process. The Kakivik Quality Program begins with an outline of the core organization and encompasses every aspect of the inspection and management systems. The quality program provides a structure of accountability for Kakivik employees and clients, and ensures the delivery of quality data and service. Accountability of subcontractors and workers ensures data repeatability, safety, and professionalism.

Kakivik is a successful business model that has demonstrated that the convergence of culture and technology does benefit the oil and gas industry. Kakivik has established a solid foundation to nurture a bright future in which success is a reality shared by clients and employees. ■

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# NMS Employee Leasing: Creative solutions for today's dynamic workforce

**E**mployee leasing organizations are growing at a rate of over 30% per year.

Outsourcing non-productive employee administration responsibilities have become more and more popular. Employee Leasing has taken many forms, including PEO's (Professional Employer Organizations), ASO's (Administrative Service Organizations), Administrative Employers and more.

It is estimated that more than 2 million American workers are currently employed by professional employer organizations; NMS Employee Leasing is a growing member of this effective new human resource management group. The employees of leasing organizations represent every facet of the workforce, from receptionists to attorneys.

NMS Employee Leasing provides short-term and long-term personnel services throughout Alaska. We pride ourselves in meeting the needs of our clients through our ability to place skilled employees in administrative, professional, technical, mechanical and industrial positions on a contractual basis.

## The Employee Leasing Concept

Both small and large business owners are faced with limited time and resources. The Employee Leasing concept allows employers to outsource non-revenue generating employee administrative responsibilities to allow for greater time and focus on the core of their business.

An effective Employee Leasing organization is able to provide expert guidance in the areas of human resources, compliance, and safety as well as minimize employee turnover with enhanced employee benefits. In many cases, employer liability can be significantly reduced.

## Solutions for Today's Workplace

We provide innovative workforce solutions to companies of all sizes to meet the



challenges of today's changing business environment.

- Complete reference check, 10-year criminal background check,
- 5-panel drug screen and evaluation required for every employee
- Quality assessment, computer-based testing for virtually any type of job;

## Innovative Workforce Solutions

We place accomplished employees in professional, administrative, technical, mechanical and industrial positions on a contractual basis in every facet of the labor force, diminishing paperwork, ensuring compliance with state and federal laws and regulations, and providing better employee benefits packages and professional human resource services. To ensure our clients receive only well-trained, experience staff, our leasing program utilizes both traditional recruiting methods and proven computer-based testing programs to conduct pre-employment screening.

We never forget we are managing a finite budget; every recommendation and expenditure is scrutinized to ensure that we meet our commitment of fiscal responsibility.

## Our Commitment

We are dedicated to ensuring diversity in the work place through our human resource development; by contributing to the communities we work in and by training both our management and employees, we provide leadership in employee resource management.

## Our Business

NANA Management Services embodies the wisdom, strength and adventuresome spirit of its Alaskan roots. We bring a myriad of familiar services to our clients every day, enhancing daily operations through a silent backdrop of activity; we free our client's valuable time, enabling them to focus on the essence of their business.

Alaska Native owned, NANA Management Services, is continually seeking opportunities to expand services beyond Alaska. Our horizon

for conveying exceptional, value-based services to clients in and beyond Alaska is limitless; our ability to provide superior service in difficult climates and challenging geographic locations is second to none.

## Our Ownership

NANA Management Services is a limited liability corporation, owned by NANA Development Corporation and Sodexho, combining services unmatched by any other company. NANA Development Corporation brings to NMS the know-how of doing business in Alaska for over "ten thousand years." Sodexho is a \$14 billion international services firm that blends award winning employee training and knowledge together with cost reduction derived from economy of scale. NANA Management Services.

NMS Employee Leasing is proud to be Alaska's premier provider of professional contract employees. Our corporate offices are located at 5600 B Street in Anchorage.

NMS Employee Leasing is proud to deliver comprehensive solutions to the complex challenges facing business owner's everyday. ■



CHAPTER  
*Alaska-based oil and gas associations*

15



JUDY PATRICK PHOTO



# Resource Development Council celebrates 30 years

By CARL PORTMAN  
RDC Deputy Director

In 1975, Alaska was a young, struggling state. The “Haul Road,” now known as the Dalton Highway, had just been punched through to the newly discovered Prudhoe Bay oil field, but the trans-Alaska pipeline was still two years from completion. The state budget was a fraction of what it is today, Alaskans were paying a state income tax, and the Permanent Fund Dividend did not exist.

A young group of visionary Alaskans realized the potential of this vast land and were committed to helping Alaska achieve a rewarding, stable and diversified economy. In 1975 they formed the Organization for the Management of Alaska’s Resources, and within three years the organization grew into the Resource Development Council, RDC, a multidimensional, statewide force known



unions, all of the state’s 13 regional Native corporations, trade associations, and businesses from all resource and economic sectors.

Over the decades, RDC has been known for its ability to bring together diverse interests to advocate on behalf of each other. It has a proven track record of linking every resource sector to work for a common cause, to develop an attractive business climate in Alaska.

RDC’s purpose is to encourage a strong, diversified resource sector in Alaska and expand the state’s economic base through resource development. Its mission statement is simple: “Growing

Alaska through responsible resource development.”

RDC is a private, non-profit membership-funded organization composed entirely of volunteers, except for its staff. Members recognize that Alaska’s natural resources are the most fundamental element of Alaska’s economy.

Although RDC members in Alaska are spread out over an area one-fifth the size of the Lower 48 states, they share common business interests. Those common interests include infrastructure development, reasonable environmental regulations, land use policies, access across vast conservation system units to reach natural resource deposits and government policies which can drive up the cost of developing and producing natural resources.

The key to RDC’s reputation for being highly effective and successful is its membership. RDC’s organizational structure includes a 78-member board of directors, representing the broad interests under the RDC umbrella. Within the board of directors, there is the 22-member executive committee. This committee formulates policy and provides direction to a staff of four headed by an executive director. The general membership is invited to join the board in serving on special committees which address specific issues. The executive committee, however, has final authority on positions and



for its effectiveness and influence on a wide range of public policy and resource development issues.

More than 30 years later, RDC has become one of the largest statewide, pro-development organizations in Alaska. Its ranks include local communities, labor



*continued on next page*



actions taken by the organization.

The goals of the organization are to:

- Promote sound resource development in Alaska
- Link diverse interests on resource issues
- Sustain and expand a diverse membership, and
- Educate the public, policy makers and students on resource issues.

RDC advocates for all resource sectors, including mining, oil and gas, fisheries, timber and tourism. It provides forums for policy debate, and analysis to help guide Alaska in these areas, as well as in land use, transportation, and economic development.

In addition to its regular program efforts, RDC administers the Alaska Mineral and Energy Resource Education Fund, a popular partnership between the state and private sector to provide Alaska students with balanced information on Alaska's mineral, energy and forest resources and the role those resources play in everyday life. Education is a priority of RDC as Alaska's young people must understand the benefits of responsible development in order to make sound economic and policy choices for themselves and their families in the future.

Much of RDC's efforts are directed at improving the business climate for Alaska industries. A healthy business climate is essential if Alaska is to attract the capital investment necessary for the development of resources and expansion of the economy.

RDC works on issues which affect all resource sectors. For example, RDC spends considerable time working with state and federal government agencies to secure reasonable water quality standards that are economically feasible and based on good science. All industries — oil, gas, mining, timber and fisheries — must use water in their development and production operations and therefore must meet stringent state and federal water quality regulations.

Because of its broad diversity and statewide reach, RDC frequently coordinates efforts directed at reaching a consensus among diverse private sector interests on specific issues. When consensus is achieved, RDC will take the specific points of agreement on the issue to the appropriate state, federal or legislative body.

RDC's track record has also been enhanced by cooperative relationships within and outside the organization.



## Learn more about RDC

Visit RDC's Web site at [www.akrdc.org](http://www.akrdc.org) for a wealth of information on Alaska resources, current issues and upcoming events and meetings. For membership information, contact (907) 276-0700.

Within the organization itself, RDC has been very successful in forging relationships between industries to the point where one industry advocates for another. For example, members in the forest products industry have been called upon to advocate for oil and gas lease sales. Likewise, members in oil have advocated for the forest products industry, as well as fishermen supporting miners. This is RDC's true strength and value — demon-

strating widespread, multi-industry support for projects. And such support makes an impression on the regulating government authority.

Alaska has made a significant contribution to America in regard to the natural resources that are necessary in producing the products Americans consume. From Arctic oil and coal to the mineral wealth of the great Interior and the high quality timber of our coastal forests, RDC works hard to keep Alaska's resource development options open.

RDC pulls Alaskans together to make a strong impression on government agencies to strike a balance in an increasingly difficult regulatory environment. RDC is a major participant in the public process and will continue to advocate reasonable policies before state and national policy makers. ■



# The Alliance . . .

*Supporting sound development of Alaska's resources for the benefit of all Alaskans*

**T**hey're your local electricians and engineers. They're caterers and consultants. They're communications gurus, construction experts and computer whizzes. They're bankers, explorers, educators and more. They're the Alaska Support Industry Alliance.

The Alliance, a nonprofit trade organization, is made up of more than 400 members representing more than 30,000 Alaskans whose livelihoods are connected to the oil, gas and mineral industries. The mission of this organization is to advocate for safe, environmentally responsible development of Alaska's oil, gas and mineral resources for the benefit of all Alaskans.

A corner table of the Cattle Company restaurant hosted the first unofficial meeting of the Alliance in 1979. Three people were in attendance, and they all shared the same goal—form an association of businesses that could stand together and face challenges in the petroleum industry.

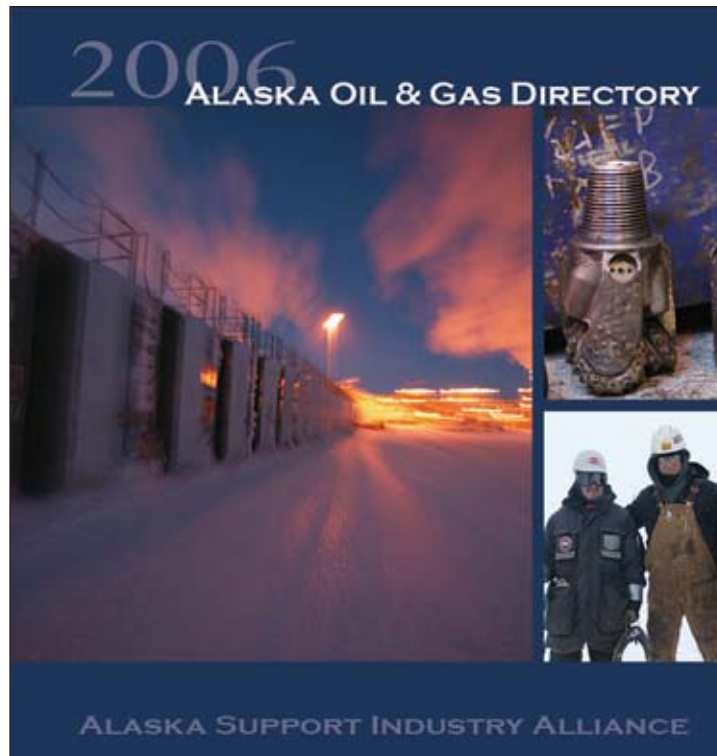
From this brainstorming session the organization was born, and enthusiasm began to build in the community.

The Alliance membership now reaches all over Alaska and the Lower 48, and has recently grown to include international members.

Becoming a member of the Alliance not only supports the organization's goals of fostering a positive business climate in Alaska, improving public awareness of industry issues and supporting the development of a well-equipped workforce, but members also gain a competitive edge in the market through many benefits.

## Member benefits: Advocacy, communications, networking

The Alliance frequently runs public awareness campaigns designed to educate residents and elected officials about industry needs and concerns. The Alliance also maintains a strong presence in Juneau, advocating for member interests with legislative vis-



its to Juneau and direct communication with elected officials.

Members receive free listings in the annual Alaska Oil & Gas Directory, considered the Yellow Pages of the oil and gas industry. These listings include descriptions

around the world.

Summers are busy for Alliance members, with events in Anchorage, Kenai and Fairbanks. These events are fund raisers for the Alliance, and fantastic networking opportunities.

## Alliance Health Plan

Members in good standing for at least one year have access to the Alliance Health Plan, underwritten by Premera Blue Cross Blue Shield. This plan offers more stable rates and lower rate increases over time than employers in other rate pools. Disability coverage was recently added to the list of benefits.

There are six medical options, and all medical plans include preventive benefits, prescription drug card, mental health, hearing, vision and life insurance benefits. Two dental options are also available.

Since its inception, the Alliance has cultivated strong relationships with the contractor community, oil and gas producers, government officials and peer organizations in Alaska and Canada, helping pave the way for a strong and vital future in Alaska. ■



## Learn more about The Alliance

For more information about The Alliance or to purchase an oil and gas directory, please visit Web site [www.alaskaalliance.com](http://www.alaskaalliance.com) or call (907) 563-2226.

of products and services, and multiple contacts. The directory also includes government contact information, Alaska maps, categorized listings and more. It is distributed annually to oil and gas executives and industry decision makers in Alaska, Canada, the Lower 48 and around the world.

Membership mailing labels are available, providing an exclusive way for members to market directly to other members. Online visibility is another benefit, with listings on [www.alaskaalliance.com](http://www.alaskaalliance.com) and free links to member Web sites.



# Alaska — A Realistic Look

By JUDY BRADY  
AOGA Executive Director

**A** Snapshot of Alaska: **Good rocks:** Estimated North Slope - recoverable oil reserves 7.3 billion bbls, National Petroleum Reserve-Alaska - oil reserves 5.9 to 13.2 billion bbls; Arctic National Wildlife Refuge- oil reserves 5.7 to 16 billion bbls.; Total estimated gas reserves in Alaska, including state and federal onshore and offshore is 262.74 tcf. **Costs Per Barrel:** Among the highest in the world, related in part to distance from market, high environmental standards, arctic-related technical challenges including short working seasons, maturing fields on state lands, frontier conditions on federal lands. **Permitting:** Complicated but doable. A key state permitting program, the Alaska Coastal Management Program, (ACMP), was revised by the Legislature in 2003 but there have been delays in implementation. Expect added mitigation measures on state, federal, local permits. Expect community-related requirements in negotiating Conflict Avoidance Agreements and Good Neighbor policies. **Returns:** Possibility of good returns for the risk at high prices, moderate returns at mid-range prices, tanked returns at lower prices. **Production:** Production from the maturing North Slope fields has fallen from 2.1 million barrels a day in 1989 to about 700,000 barrels a day and is expected to continue to decline. **Economy:** Alaska is the only state whose private sector economy is so dependent on oil revenues. Declining production jeopardizes the State's ability to support government services unless prices are high. **Future:** It is estimated that Alaska must attract over \$30 billion in new investments over the next 6 years to hold production steady and up to another \$30 plus billion to build a gas pipeline to commercialize Arctic gas. It is expected that new exploration will focus on federal onshore, National Petroleum Reserve-Alaska, (NPR-A) and state and federal offshore - Beaufort Sea, Chukchi Sea and Bristol Bay. **Fear Factor:** Because of Alaska's dependence on oil revenues, tax policy is always a critical and divisive



issue. When prices are high the State wants a larger share; when prices fall, the State needs more revenue to support services. In 2006 the Legislature adopted a unique petroleum production tax system (PPT), which combined a higher tax rate with credits for investment. It



appears there will be a special session in the fall of 2007 to review the PPT and determine whether to keep this system or return to a "gross" system. Alaska's state tax policy on oil and gas remains in limbo until this issue is settled. With the

PPT, royalties, state corporate income and property taxes, Alaska's combined "take" on oil and gas is the highest in the United States. **Dispelling the Fear Factor:** Only the State of Alaska can dispel this fear factor by clearly telling investors what they can expect and count on. The message needs to be unambiguous: "We want you to invest in Alaska. Our word to you is that if you do invest, your investments will not be threatened by new taxes".

Today new oil and gas company managers taking a look at Alaska are surprised, first by the "wow, are we glad to see you" reception from the governor on down; and second by the contradictory fiscal message:

"We really want you to invest in Alaska. It's high cost but with prices high we think your return will justify the risk. We will work with you all the way. Taxes? Well, with prices high like this we are thinking about increasing taxes. But we really want you to invest."

Both the "wow" welcome and the contradictory tax message can be explained by one number: 90%.

Oil revenues, taxes and royalties, make up about 90%, give or take, of Alaska's unrestricted general fund budget.

There is no state income tax. There is no state sales tax. Only oil and gas companies pay a statewide property tax.



[www.aoga.org](http://www.aoga.org)

## The Alaska Oil & Gas Association

Companies interested in Alaska *must* have a working relationship with state government, for just as the State is dependent on oil and gas revenues, so are the companies dependent on the State for access to land, permitting, royalty and taxation policy.

The Alaska Oil & Gas Association (AOGA) is the link between industry and the public, the communities, the state and federal agencies. The Association's committees reflect the resource issues: Environmental, Healthy and Safety, Lands, Exploration and Operations, Tax, State Legislative.

Companies new to Alaska are invited to contact the Association for information on all aspects of operating in the State.

AOGA is focused on the long-term viability of all branches of the oil and gas industry in Alaska. This includes promoting environmental excellence, providing a forum for discussion issues that affect the industry and communicating industry concerns and perspectives.

AOGA's member companies represent the majority of oil and gas exploration, production, transportation, refining and marketing activities in Alaska: Agrium Kenai Nitrogen Operations, Alyeska Pipeline Service Company, Anadarko Petroleum Corporation, BP Exploration (Alaska) Inc., Chevron, Eni Petroleum, ExxonMobil Production Company, Flint Hills Resources, Alaska, Forest Oil Corporation, Marathon Oil Company, Norsk Hydro, Petro-Canada (Alaska) Inc., Petro Star Inc, Pioneer Natural Resources Alaska, Inc. Shell Exploration & Production Inc., Tesoro Alaska Company, XTO Energy, Inc.



Oil and gas companies pay 80% of the state corporate income tax.

A percentage of Alaska's oil revenues are placed in a Permanent Fund that now totals over \$39 billion and every year every Alaskan man, woman and child, receives a Permanent Fund dividend of from \$900 to \$1300, depending on the Fund's earnings.

This incredible level of dependency on oil revenues drives the relationship between the oil and gas industry and the State of Alaska.

What will the Alaska State budget be next year - and every year into the foreseeable future? The Administration and Legislature base their next year's budget on the State's forecast of the price of oil and the volume Alaska companies will produce. There is no other significant source of private side revenue to pick up the slack, make up for over-spending, lower-than-forecasted oil prices, or declining production.

The relationship between the State and the industry is further complicated by the fact that 99% of production presently takes place on State-owned land, which makes the State of Alaska royalty owner, taxman and permitter.

The fact of doing business in Alaska is that the companies who operate here are as dependent on the good judgment and "word" of the State as the State is dependent of the good judgment and "word" of the companies.

Should companies invest in Alaska? The resource base here is healthy enough to be attractive on a worldwide basis. The history of successful Arctic operations is

real and the necessary information available to new entrants. New technologies in seismic, drilling, and producing mean lower risks. New areas are opening up in the OCS and in the NPR-A. The possibility of building an Alaska gas pipeline, of commercializing Arctic gas, will provide new opportunities in new areas of the Arctic and in Interior basins as well. There is a continuing possibility of opening a small portion of the Arctic National Wildlife Range that is estimated to have reserves in the billions of barrels.

The State of Alaska and the oil and gas industry have a long history of working together and, for the most part, working through their differences to solutions that benefit everyone. The future years should be no different. There is no question that right now the uncertainty of increased taxes and changing tax policy is the dominant "fear factor" for companies operating in Alaska and for companies taking their first look at Alaska. With Alaska's economy so dependent on oil revenues, the uncertainty of increased taxes is there whether prices stay high or fall. Only the State of Alaska can dispel this fear factor by clearly telling investors what they can expect and count on. Alaska needs to walk the talk for investors and commit to no new taxes on the industry.

By continuing to work together, Alaska can be a good place to invest, for the companies who have been operating in Alaska since the 1950s and 1960s, the companies who have recently invested, as well as for the new companies who are taking their first look at this great land. ■



CHAPTER  
*Living and working in Alaska*

16



## CHAPTER 16

# Living and working in Alaska

## Introduction

The crowds of tourists who flock to Alaska each summer marvel at the state's awe-inspiring landscapes and magnificent wildlife. Some tourists may also discover one of the state's best-kept secrets: Alaska is a great place to live and work.

People unfamiliar with Alaska tend to imagine the state in terms of snow-covered wilderness and frigid cold. And during the winter that image correctly represents large areas of the state. In fact, for people so inclined, it's still possible to experience a frontier, log-cabin way of life in Alaska.

But for those who enjoy the comforts of modern living, the major population centers of Alaska offer all of the amenities of any affluent region of the United States. Add to that the spectacular opportunities for winter sports such as skiing, and summer activities such as hiking and fishing, and you'd be pressed to find a better lifestyle anywhere in the world.

And, yes, the Alaska winters do last for a long time. But would you rather spend 15 minutes driving to work, seeing the occasional moose foraging in snow-covered trees, or sit frustrated in a rush hour traffic jam on a California highway?

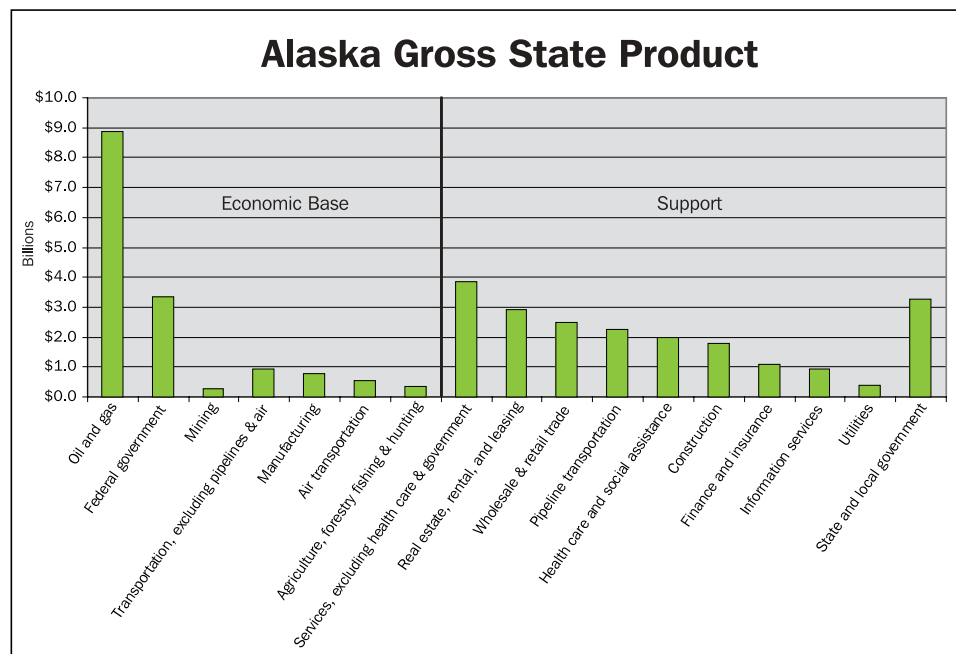
Then there are the endless hours of daylight during Alaska's warm (and sometimes hot) summers.

With a buoyant economy there have been plenty of job opportunities in recent years — a broad variety of industries provide work in many different types of occupations.

## Alaska's economy and cost of living

Ever since the days of the Russian fur trade and the gold rushes of the early U.S. era a series of booms interspersed by downturns have typified the Alaska economy. However, recent years have seen steady development and some economic diversification.

Figure 16.1 shows the gross state product for different industry categories in Alaska in 2004, with economic base indus-



**Figure 16.1** Alaska Gross State Product by Industry for 2004. US Department of Commerce Bureau of Economic Analysis. Prepared by Mapmakers Alaska, March 2007.

tries on the left side of the graph and support industries on the right side. The economic base consists of those industries that bring money into the state. Support industries provide services for other industries or for the general population.

Note, however, that the \$2.2 billion pipeline transportation industry on the support side of the graph entirely supports the oil and gas industry, while a significant proportion of the \$3.9 billion service industry also supports oil and gas. According to the University of Alaska Anchorage Institute of Social and Economic Research (or ISER), 36 percent of the state product was oil and gas related in 2004.

The gross state product data represent a view of the dollar value of industrial activities in the state and particularly highlight the economic importance of the oil and gas industry. Indeed this industry generates a major component of state income through wages, state revenues and local government revenues. However, interpreting the gross state product data requires considerable caution because a substantial portion of the value associated with oil and gas moves out of state — the oil and gas companies are almost all based out of state and most of the produced crude oil and gas leaves the state.

## Federal government

With a value of \$3.3 billion, federal government activities also have a major impact on the state. Much of this impact comes from military bases. However, large amounts of federal money come into the state to fund construction projects. There are also important, but less obvious, sources of federal funding, such as federal support for the U.S. Postal Service in Alaska.

The U.S. Bureau of Economic Analysis data presented in figure 16.1 don't distinguish Alaska's important tourist industry as a separate industry. Tourism probably forms a major component of the transportation industry, and smaller components of the air transportation and services industries. Air transportation includes major international airfreight operations, especially at Anchorage's Ted Stevens International Airport.

Alaska also has an important fishing industry. Figure 16.1 somewhat downplays the importance of this industry because much of the \$0.8 billion manufacturing industry consists of seafood processing.

Mining forms a relatively small but growing component of the state's economy.

Alaska Native corporations make significant contributions to the economic base through investments and out-of-state serv-



es that are not included in the gross state product data.

On the support side of the economy, wholesale and retail trade has become an important component of the economy. And the health care industry in the state has shown dramatic growth in recent years. The relatively high gross state product for real estate partly reflects the impact of owner-occupied housing data in the Bureau of Economic Analysis calculations.

Information about the gross state product is available at [www.bea.gov/regional/gsp/](http://www.bea.gov/regional/gsp/).

### State revenues

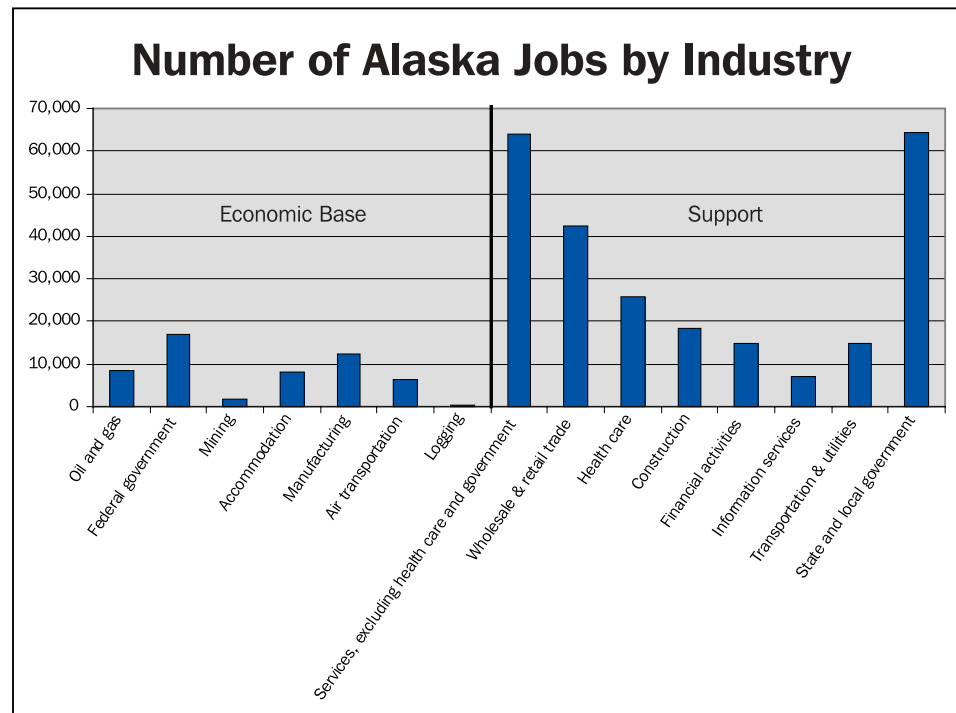
Although economic activity in Alaska has spread across a variety of industries, state government revenues heavily depend on oil and gas production. Oil and gas revenues of \$3.7 billion, including royalties, production tax, property tax and corporation income tax, accounted for 88 percent of the state's general fund unrestricted revenue in the 2006 financial year. And with a long, slow decline in oil production in the state, state revenues have started to lag expenditures in recent years. Recent high oil prices coupled with the increased tax take from the state's new petroleum production tax have relieved this problem, but the state's high level of dependence on oil and gas revenues remain a concern for the future.

Unrestricted government revenues not related to oil and gas mainly consist of a variety of taxes, including corporate income tax, mining license tax, fisheries business tax, motor fuel tax and tobacco tax.

Investment income and federal receipts form major components of state income and amounted to a total of \$5.1 billion in 2006, with \$1.9 billion of that coming from the federal government. However, most of the investment and federal income has restricted use and does not contribute to the state budget. The majority of the investment income comes from the Alaska Permanent Fund and is subject to the rules of that fund. Most of the federal receipts go to specific uses such as Medicaid payments, road improvements and aid to schools.

The three biggest items of expenditure in the state's operating budget consist of health and human services; education and the University of Alaska; and public protection, law and justice. Note in particular that the state provides substantial funding for public schools in Alaska—the state shares the cost of these schools with local municipal governments.

Other substantial state expenditure



**Figure 16.2** Number of Alaska Jobs by industry for 2005. Alaska Department of Labor and Workforce Development. Prepared by Mapmakers Alaska, March 2007.

includes transportation and natural resource management.

For information about state revenue sources see the state's publications at [www.tax.state.ak.us/sourcesbook/](http://www.tax.state.ak.us/sourcesbook/).

### Employment patterns

In recent years Alaska has seen a steady increase in employment in the state, with the total number of jobs increasing every year for the past couple of decades. The average unemployment rate statewide was 7.3 percent in February 2007. However, this average rate masks wide disparities in rates between rural and urban areas. The unemployment rate in Anchorage, for example, was 5.5 percent.

A significant change in work demographics has accompanied the employment growth. The maturing of the North Slope oil industry has led to a decline in oil industry jobs. However, an increase in service industry jobs has more than offset this decline. The healthcare industry has seen particularly rapid growth. The retail trade has grown, as has the leisure and hospitality industry. The construction industry has remained buoyant for the past few years.

Figure 16.2 illustrates the extent to which the service sector dominates the Alaska job market. Note, however, that many service jobs in industries such as business services and transportation directly support base industries such as oil and gas or

tourism. According to ISER 32 percent of jobs in Alaska were related to the oil and gas industry in 2004. It's also worth pointing out that more than 29,550 of the 64,400 state and local government jobs depicted in figure 16.2 relate to educational services.

For more detailed information about employment trends in Alaska see the July 2006 edition of Alaska Economic Trends at <http://labor.state.ak.us/trends/jul06.pdf>.

### Cost of living

For many years Alaska had a reputation for being one of the most expensive places in the United States to live. Transportation costs for goods and the small size of the Alaska market for goods and services both tended to push prices up.

However, living costs have dropped considerably. And when you take into account the low taxes in the state and the impact of Permanent Fund dividends, the economics of living in Alaska compare favorably with many places in the Lower 48 states.

Figure 16.3 shows a U.S. Department of Labor, Bureau of Labor Statistics, breakdown of the cost of living in Anchorage. Notable in this chart is the fact that housing constitutes a major component of the costs. Transportation also figures large, presumably because of Anchorage's remote location relative to the Lower 48 states and other parts of the world.

As in other parts of the United States,

healthcare costs have skyrocketed in recent years. But healthcare in Alaska is especially expensive compared with other places.

The Runzheimer cost of living survey for December 2004 for low-income families places the average cost of living in Alaska at 16.5 percent above the U.S. average. Costs in Anchorage are 15.3 percent above average, costs in Fairbanks are 8.3 percent above average, while costs in Juneau are 25.9 percent above average.

On that basis, the cost of living in Anchorage is a little higher than Bellingham, Wash. The cost of living in any of the major cities in Alaska is much less than in Los Angeles.

Data from ACCRA for the first quarter of 2006 for upper income families indicated that the cost of living in Anchorage was 117.4 percent of the national average, compared with Seattle, at 116.3 percent of average and San Francisco at 170.6 percent of average.

For a more complete discussion of the cost of living in Alaska see the July 2006 edition of Alaska Economic Trends at <http://labor.state.ak.us/trends/jul06.pdf>.

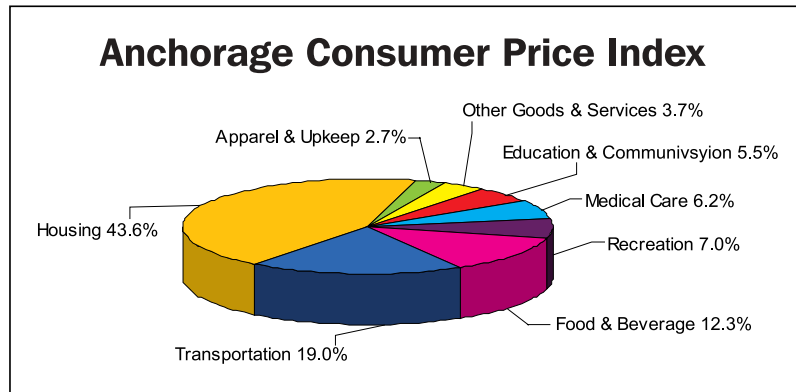
## Alaska's Permanent Fund

Each year most Alaska residents receive dividend payments from the Alaska Permanent fund. This Permanent Fund dividend acts as a reverse tax that offsets the Alaska cost of living.

Alaska voters brought the Permanent Fund into existence in 1976 by passing a constitutional amendment mandating that at least 25 percent of "mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue sharing payments and bonuses received by the state" be paid into a permanent fund. Under state statutes the purpose of the fund is to "provide a means of conserving a portion of the state's revenue from mineral resources to benefit all generations of Alaskans."

### Alaska Permanent Fund Corp.

In 1980 the Alaska Legislature set up the Alaska Permanent Fund Corp. to manage the fund and to invest the fund's assets. As a public corporation managed by a board of trustees the Alaska Permanent Fund



**Figure 16.3** Consumer Price Index Weighting (Dec 2005), *The Cost of Living in Alaska*. Fied & Robinson. Alaska Economic Trends, July 2006. US Department of Labor, Bureau of Labor Statistics. Prepared by Mapmakers Alaska, March 2007.

Corp.'s mission includes protecting the fund's principal while maximizing the total return over time.

By early April 2007 the total value of the Permanent Fund had grown to \$38.1 billion. Twenty-nine percent of this amount consisted of U.S. stocks, 24 percent consisted of U.S. bonds, 13 percent consisted of non-U.S. stocks, 10 percent consisted of real estate and the remainder consisted of other investments.

### Permanent fund dividends

Following a lengthy debate regarding how to use the Permanent Fund, the Alaska Legislature in 1980 under the leadership of Gov. Jay Hammond created the Permanent Fund dividend program. Under this program, each resident of Alaska would receive an annual dividend payment from the fund earnings — Alaska became the only place in the industrial world where the government sent checks to its residents simply because they are residents.

The dividend is still paid to every resident, regardless of age, and has ranged from \$331.29 in 1984 to \$1,963.86 in 2000.

Under the terms of the Alaska constitution, only realized earnings can be paid out from the fund — the fund principal cannot be tapped. Realized earnings consist of bond interest, real estate rental payments, stock dividends and profits from the sale of assets.

The Alaska Permanent Fund Dividend Division manages the payments of dividends from the fund earnings. By law, income available for distribution is calculated as 21 percent of the total earnings for the past five years. The Permanent Fund Division pays out 50 percent of this income as dividends, calculating individual dividend payments by dividing an adjusted

total dividend by the number of eligible dividend applicants. The remaining 50 percent of the fund income pays for inflation protection of the fund principal. Following inflation protection, any unused income remains invested and has in the past been used to top up the fund principal.

People who wish to find out if they qualify for an Alaska Permanent Fund dividend should contact the Alaska Permanent Fund Dividend Division.

Essentially, you need to have resided in the state as a U.S. citizen or permanent resident for at least a year and to have been physically present in the state for some of the time during the previous two years.

Given the state's looming fiscal gap there has been recent controversy regarding the potential use of some of the Permanent Fund earnings to pay for state government programs. There has also been discussion about whether to change the method of calculation of earnings to an endowment-style, percent-of-market-value approach.

You can obtain more information about the Alaska Permanent Fund at the Permanent Fund Corp. Web site at [www.apfc.org](http://www.apfc.org) and the Alaska Permanent Fund Dividend Division Web site at [www.pfd.state.ak.us](http://www.pfd.state.ak.us).

## Alaska's tax structure

In addition to receiving Permanent Fund dividends Alaska residents enjoy the benefits of relatively low taxation. The state of Alaska does not collect either personal income tax or sales tax.

As discussed in chapter 10, municipalities in Alaska can collect property tax and sales tax. However, not all municipalities have implemented both of these taxes. Anchorage, for example, collects property tax on real estate and business personal property but does not collect sales tax. Table 10.1 in chapter 10 lists tax rates for some Alaska municipalities.

For more detailed information about municipal taxes in Alaska see an Alaska state publication titled "Alaska Taxable 2006," available at <http://www.dced.state.ak.us/dca/osa/assessor.cfm> ■



# Images of Alaska

Alaska State Fair, Palmer



Snowmachining on miles of trail



Fourth of July in Seward



Kachemak Bay halibut



Pilebucks







Sled dog racing



Skeet shooting on a local range



Road construction, Southcentral Alaska



Youth soccer leagues abound in the state



Nordic skiing is a popular winter activity

*Photos courtesy of Judy Patrick*



# Cook Inlet and the Kenai Peninsula Borough: Significant reserves yet to be discovered

By JOHN J. WILLIAMS

Mayor of the Kenai Peninsula Borough

**W**ith over 100 year's of active oil and gas exploration and over 48 years of ongoing commercial oil and gas production, the Cook Inlet Basin is perhaps one of the most overlooked oil and gas provinces in North America today. In particular the Kenai Peninsula Borough, encompassing over 24,000 square miles, offers a great setting for oil and gas companies looking for new opportunities. With our long history of oil and natural gas exploration and development, we know the needs of industry and actively work to support and promote new exploration efforts to develop the vast resource potential of the Cook Inlet Basin.



JOHN WILLIAMS

1.31 billion barrels of oil and 6.8 trillion cubic feet of natural gas have been produced in the Cook Inlet Basin, on and offshore, since 1957 when Alaska's first commercial oil reserve was discovered in the Swanson River Field. Looking to the future, the Cook Inlet Basin is estimated to have undiscovered reserves in excess of 12 trillion cubic feet of conventional natural gas



and over 1.0 billion barrels of recoverable oil. These undiscovered reserves lie within several million acres owned by the Federal and State governments and Alaska native corporations, all of which are available for lease through scheduled, predictable lease sales and through direct negotiated sales.

What makes the Kenai Peninsula Borough so attractive to companies looking for new exploration opportunities is that, unlike many other regions of Alaska, the Kenai Peninsula Borough offers a much more affordable location to do business.

Excellent existing transportation systems, a strong support industry network, high quality communications systems, world class training facilities and trained workforce and an outstanding quality of life setting for company employees and their families all combine to make the Kenai Peninsula Borough an attractive setting for doing business in.

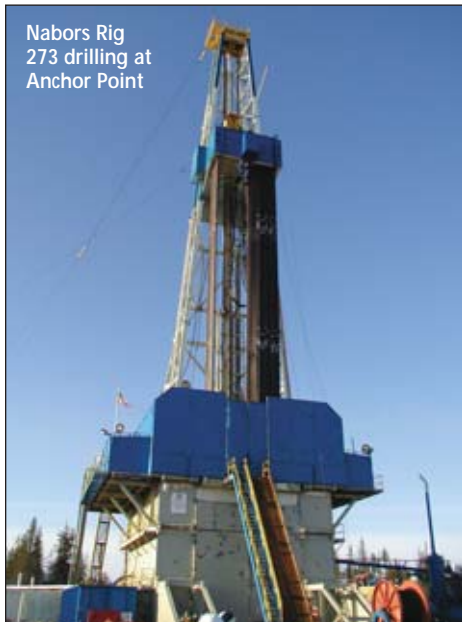
The majority of lands available for lease are comparatively easy to access by road, plane and ship. The Kenai Peninsula Borough boasts two significant airports in the cities of Kenai and Homer and large scale dock facilities in Homer, Seward, Nikiski and Tyonek that can all serve medium to large size support vessels. The Alaska Railroad connects the port facilities in Seward to Anchorage. The Kenai Peninsula is also served by an extensive, well maintained road network that interconnects the entire western Kenai Peninsula as well as Anchorage.

Support industry services available within the Kenai Peninsula Borough offer a wide range of capabilities to any company looking to explore and develop oil and natural gas. These services include drilling, geological and geophysical, communications, project management, ASME, environmental, well testing and stimulation, engineering, supplies, operations, maintenance, fabrication, wireline and other services.

Almost the entire Cook Inlet Basin is







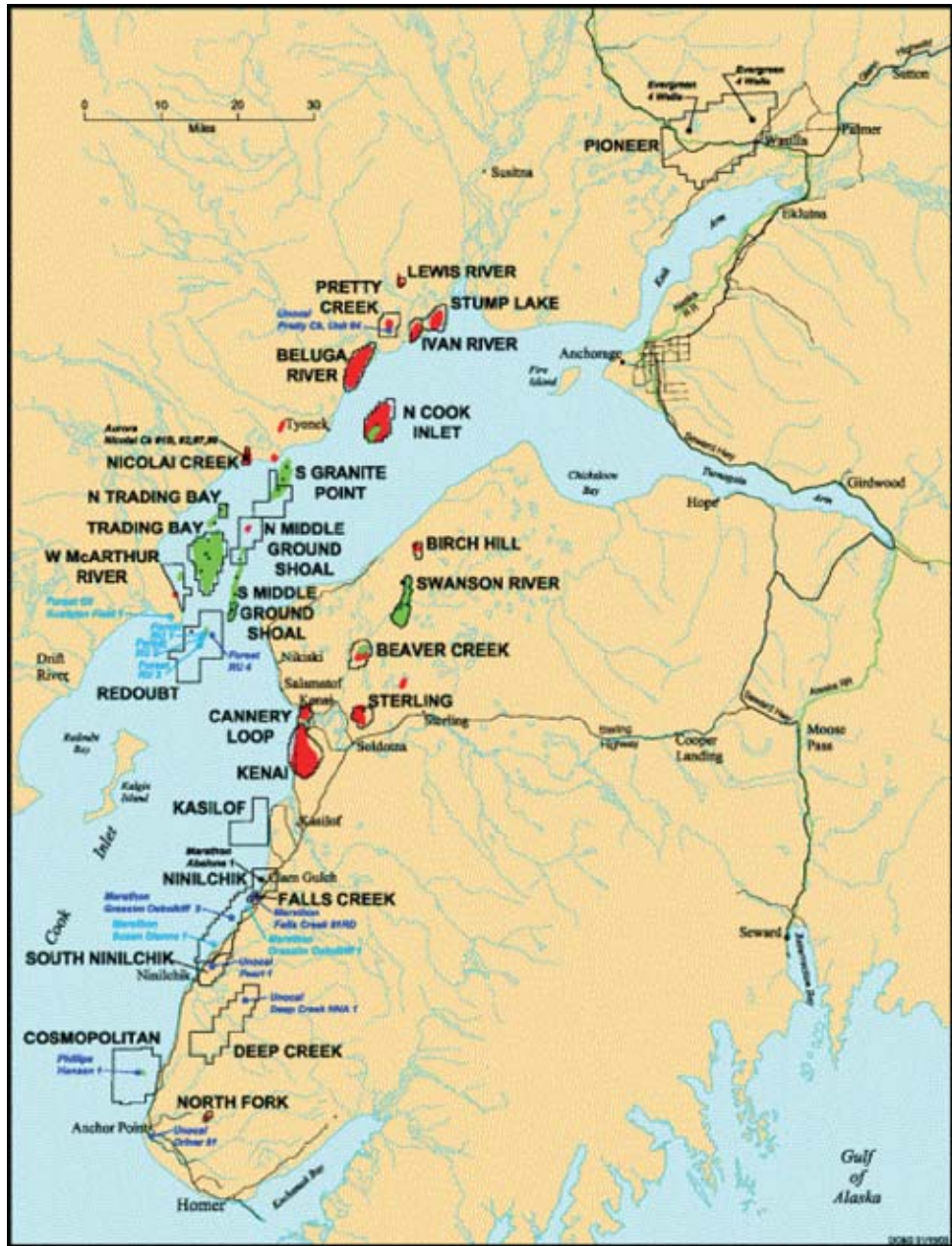
Nabors Rig  
273 drilling at  
Anchor Point



The Osprey platform in Cook Inlet

served by an extensive telecommunications and Internet network. Structured around a robust system of fiber optic cable and microwave transmission systems, the Kenai Peninsula Borough offers excellent communications capabilities through both land line and wireless communications systems. This includes a wireless data transmission system that serves any client within the extensive cellular network that covers the Cook Inlet Basin.

The Kenai Peninsula Borough boasts an extensive set of training facilities and programs that continues to produce highly skilled and flexible workers to meet the workforce needs of existing and new oil and gas exploration companies. These facilities include the Kenai Peninsula College, the Mining and Petroleum Training Service, the Alaska Vocational Technical Center and the Alaska Regional Fire Training Center. All of these facilities, supported by a solid K-12 program through the Kenai Peninsula Borough School District, produce highly skilled workers who are ready to go to work.



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Our communities and the variety of life styles they offer are a unique microcosm of Alaska. From the amenities offered by our cities of Kenai, Soldotna, Homer and Seward to the rustic rural lifestyle offered outside our cities, there is a way of life to fit almost any taste. This unique blend of city and rural lifestyles offers an outstanding quality of life to the employees of any company choosing

to set up operations in the Cook Inlet Basin. Only in the Kenai Peninsula Borough can you step into your car and within 20 minutes be fishing, hiking, hunting or otherwise enjoying Alaska at its best. Tourism, commercial fishing and oil and gas industries have coexisted and grown in harmony within the Kenai Peninsula Borough for over 40 years.

The Kenai Peninsula Borough has it all. A strong oil and gas resource potential waiting to be explored and developed, the infrastructure necessary to support exploration and development, and a unique history and community setting that makes the Kenai Peninsula Borough an outstanding prospect for your company to explore. Learn more by visiting our websites at [www.cookinletoilandgas.org](http://www.cookinletoilandgas.org) or [www.borough.kenai.ak.us](http://www.borough.kenai.ak.us). ■



# Wasilla: Offering the best of Alaska

By DIANNE M. KELLER  
Mayor, City of Wasilla

welcome the opportunity to persuade your company to do business in the best location in the nation! A progressive community, Wasilla offers the best of Alaska. A thriving crossroads with a robust and growing economy, this rapidly growing city is at the heart of a dynamic and growing region.

Wasilla is the commercial and retail center for the Matanuska-Susitna Borough in South-central Alaska. Statistics for population, employment, housing, in-migration, and highway travel all indicate that this inviting region is developing and growing faster than any other area of Alaska.

Wasilla's advantageous location along the George Parks Highway and the Alaska Railroad make it a strategic link between Anchorage and Fairbanks, the largest population hubs and transportation centers of South-central Alaska. Located 12 miles north of Knik Arm on Cook Inlet, Wasilla is Alaska's fastest growing area. The Matanuska-Susitna Borough (Mat-Su) encompasses 24,000 square miles. Wasilla is 30 air miles north of Anchorage and encompasses about 11 square miles of land and 1 square mile of water.

Surrounded by majesty, Wasilla sits between two river valleys carved by glaciers. The city is sheltered from extreme weather by the Talkeetna Mountains and nestled between two beautiful lakes. The unique locale appeals to those who seek the Alaskan lifestyle while raising a family, or, taking advantage of our economic prospects.

In July, 2000, Alaska Economic Trends focused on the vigorous economic growth occurring in the Mat-Su Borough, stating that "an increasing number of developers, investors, and others are eyeballing the area with increasing interest because of its standing as a strong economic performer." In the January, 2003 edition of Alaska Economic Trends, the article highlighted the vigorous growth occurring in the Mat-Su Valley, stating that the unmatched growth in the valley



JUDY PATRICK

has "attracted special attention from Alaska, and national retailers, service providers, developers, and others seeking business opportunities."

The people of Wasilla enjoy open land and good housing, unparalleled recreational opportunities, breathtaking mountain views, a thriving and growing local economy, and responsive local government committed to assisting private sector development while maintaining a good quality of life for our residents.

Alaska Department of Labor population estimates for 2005 indicate that the population of Wasilla and the Borough has increased by 59% and 86% respectively, since 1990. Wasilla's current annual growth is more than double Alaska's current annual statewide growth rate of 1.4%. And the growth continues!

Alaska ties with Minnesota for first among all 50 states in the percentage of citizens 25 or older who are high school graduates, with 92.2 percent compared to a national average of 84.1 percent.

In Alaska, our tourism and recreational services are an important aspect of our communities. Every year, thousands of visitors vacation in our area. Flight services (general aviation, air taxis, air cargo) and aircraft support is available at Wasilla's public general aviation airport with its 3,500 runway, lease lots, and Thangars.

Home of the Iditarod headquarters, the Iditarod race is Wasilla's most notable claim to fame. Every March, mushers from around the globe converge on our community to begin the famous thousand-mile trek across Alaska. Wasilla is also home to the Tesoro Iron Dog, the world's longest extreme snowmobile race, and home of the Wasilla Spirit, a national junior hockey team.

Wasilla would make an ideal base for your business operations, and provide a high quality of life for you and your family. If you would like more information about our city, please visit our website at [www.cityofwasilla.com](http://www.cityofwasilla.com). ■



Multi-use sports complex

# The opportunities in Anchorage — Alaska's largest city

By MARK BEGICH  
Mayor of Anchorage

**A** company considering the opportunity to do business in Alaska will find many reasons why it is a good decision. Anchorage, the largest city in Alaska, sits poised as a crossroads to the world. Located just nine hours by air to 95 percent of the world's industrial population, Anchorage is quickly becoming one of the world's preeminent cargo hubs.

The Ted Stevens Anchorage International Airport, which just completed a \$240 million renovation of its South Terminal, sees 90 percent of the cargo between North America and Asia. Five million domestic and international passengers a year use the airport — an average of nearly 14,000 a day. There is so much activity involving tourists, international air cargo and Alaskans living out-



MARK BEGICH



ANCHORAGE CONVENTION & VISITORS BUREAU

geographic area of the state. The Port is the major gateway for Alaska's waterborne commerce and plays a vital role in the economy, generating more than \$750 million each year in direct economic activity. Growth is expected to continue, and the Port is embarking on a \$250 million expansion project to accommodate the state's growing economy, accommodate more cruise ships, and fulfill Alaska's vital military security role as the U.S. Army's Stryker brigade moves in to nearby Fort Richardson.

United Parcel Service, FedEx, Atlas Air, Northwest Cargo, and the United States Postal Service have already seen the advantages in Anchorage and have established international cargo sorting and

distribution hubs in the city. There is convenient access to the airport, railroad, port and highway system. And while airports in some cities, such as Los Angeles, are as much as 20 miles from rail and sea connections, the Alaska Railroad's main terminal and the Port of Anchorage are a short seven miles from the airport.

Anchorage is fortunate to be able to boast steady job growth for the past 16

years. Our economy is diversifying as we are the health care center for the state; our retail and tourism sectors are strong; Native corporations generate billions of dollars annually in revenues and assets for the state; taxes are low; and Alaska is No. 1 in per-capita federal spending.



ANCHORAGE CONVENTION & VISITORS BUREAU

side of Anchorage, the airport has about three times the passenger arrivals and nearly 50 times the cargo arrivals of airports in cities with a similar population. The landing fees and terminal rates are also attractive; the lowest among major cargo airports in the United States.

The Port of Anchorage is another jewel in the city. It serves 90 percent of the people of Alaska and 80 percent of the



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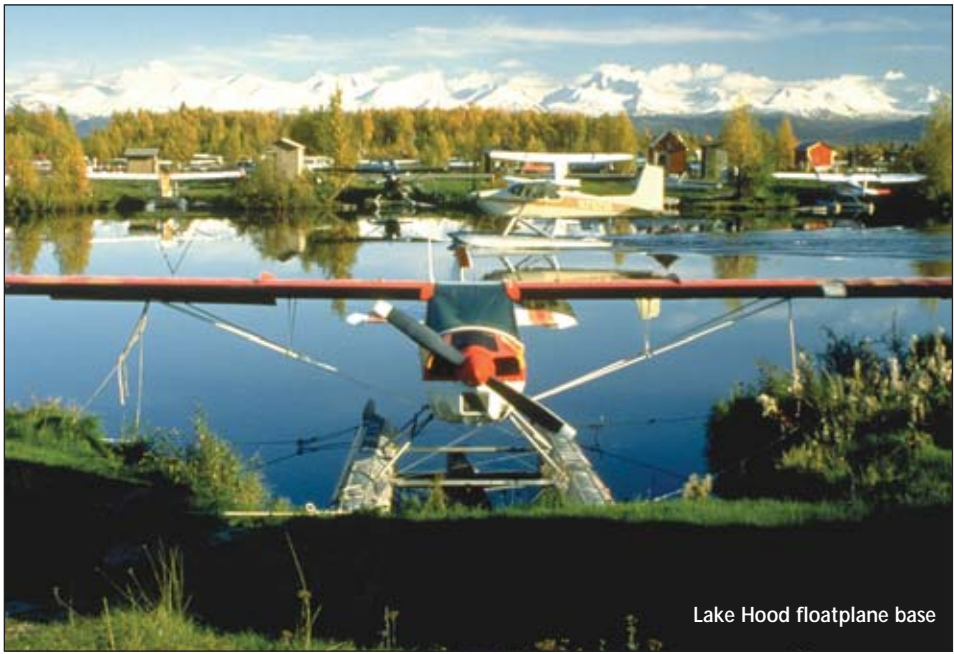


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Mount McKinley

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Lake Hood floatplane base

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Add to this impressive list a quality of life envied by cities around the world. Anchorage has 127 miles of paved trails and sidewalks that spread through the city's urban center, wrap around coastline neighborhoods and stretch into the foothills of nearby state parks. The city itself has more than 225 parks for the enjoyment of residents and visitors. Our downtown area is home to a world-class museum, performing arts center, and construction is under way on a new Anchorage civic and convention center.

Imagine being able to do business with just about any part of the world during the day, then head home to have dinner with your family, hike in the nearby mountains, take in a Broadway play, or catch a King Salmon in our downtown's own Ship Creek. Few cities with the business and logistical opportunities Anchorage presents can offer

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that type of quality of life.

Residents and the business community have recognized the impact of globalization and the role transportation and logistics are playing as Anchorage and Alaska develop future economic growth. The access to the rest of the world, and the speed at which supplies can be moved through, in and out of the state is incredible. The days of assuming Alaska is in the middle of nowhere are quickly ending, as people around the globe realize the state known as The Last Frontier is actually in the middle of everywhere. ■



ANCHORAGE CONVENTION & VISITORS BUREAU

# Images for industry

*Judy Patrick's experience helps her adapt to the changing oil and gas scene*

Photographer Judy Patrick's evocative images depict the beautiful but challenging world of Alaska oil exploration and production. Through her photographs of environmentally sensitive development, Patrick has become something of a champion of the oil industry as well as providing a valuable service for her clients.

Patrick's career in industrial photography stretches back more than 15 years, since then Patrick has established a busy industrial photography service and has expanded her business interests into graphic design and advertising.

## North Slope photography

Patrick loves photographing winter exploration on Alaska's North Slope — especially the opportunity to capture images of a world that few people see.

"That's the thing I like to do most," Patrick says "It's exciting because you're out there and it's beautiful and it's cold and it's remote."

## New customers

In recent years Patrick has seen changes in her portfolio of clients, with several of the smaller independent oil companies entering the Alaska oil industry. "The dynamics are changing permanently on the North Slope," Patrick said. "They're excited — and it's a big deal ... they've never seen anything like this."

Along with a sense of excitement, these entrants to the Alaska oil scene are bringing a new emphasis to Patrick's work. For example, she sometimes finds that she has to highlight in pictures the cost factors in North Slope development — the ice roads, the big drilling rigs and all the other challenges of working in the Arctic.



Winter pipeline construction



Visit the company online  
[www.judypatrickphotography.com](http://www.judypatrickphotography.com)

"In some cases they're trying to justify cost and so they need to show the difficult logistics," Patrick said. "I try to show things, so that they can clearly illustrate to their investors that the money was not unwisely spent."

## Experience counts

Although hiring a professional photographer might seem expensive, the cost of the photography more than pays off in the quality of the images. Plus, Patrick's depth of experience gives her a good

sense of what her clients are looking for.

"There's a balance that you have to strike between the beauty shots, the people shots, and the technical/industrial nature of it," Patrick said. "The photos have to represent all those things."

## Advertising services

Patrick's business is located in downtown Anchorage, where she shares an office suite with Salt + Light Creative, her graphic design business, and with Lyford Strategy and Communications, owned by Willis Lyford.

Salt + Light designs and publishes printed material such as brochures and advertisements. Lyford, Strategy and Communications is an advertising agency that works in a wide range of advertising media — Willis Lyford is a talented writer. Together, the three businesses enjoy considerable synergy.

"Willis and I collaborate on several projects and he employs my design business as well," Patrick said.

With low office overhead and a wide breadth of skills,

the three businesses produce high quality advertising material at very competitive prices.

"There are a lot of graphic design businesses out there but they don't have the depth and the knowledge we get with the combination of people that we have," Patrick says. "And with our built-in photo library we can operate super quick."

But it's still the beauty of the North Slope that forms the core of Patrick's work.

"I do constantly think how what's in front of my camera is going to be viewed and how I want it to be viewed and it's always with some beauty," Patrick says. ■