Big new North Slope play

Independent Armstrong to develop Nanushuk reservoir, oil from unanticipated source to the north

BY KAY CASHMAN
Petroleum News

Referred to as Armstrong and Repsol’s huge North Slope discovery, Mark Myers told Petroleum News on Feb. 14, 2016, “the proven contiguous oil reserve number makes the discovery the largest since the Alpine field, the proven contiguous reserve number, the largest since the Kuparuk field, and the possible contiguous number makes the discovery the largest since Prudhoe Bay, with one caveat: Armstrong and partner Repsol’s “discovery” was in “multiple different reservoirs, not just one major reservoir as in the case of the original Kuparuk and Alpine discoveries.”

Myers, who at the time was commissioner of the Alaska Department of Natural Resources, called the Armstrong-operated Pikka unit find “amazing” and was “very excited” to see the development moving forward.

The Nanushuk pool had a 650-foot-plus oil column, good porosity and 150-foot thick net pay, he said.

More than 15 years earlier Myers had worked in the area as an exploration geologist for ARCO Alaska (today ConocoPhillips), and had come across the Nanushuk play. “We saw very good evidence for the Nanushuk oil that Armstrong and Repsol have identified and delineated. At that time we had no idea of the size of the accumulation,” Myers said.

Shortly later ARCO Alaska exited the area. Myers remained intrigued by what he’d seen, but did not suspect that the Nanushuk reservoir was sourced from the north, from under the Brooks Arch, unlike the North Slope’s producing fields such as Prudhoe Bay, Kuparuk and others, which had been sourced from the south.

The leases ARCO dropped were eventually picked up by independent oil man Bill Armstrong of Denver who had entered Alaska in late 2000 (see Armstrong’s Alaska story on page 12) with a small staff of experts and a determination to pick up a chunk of the millions of barrels of North Slope reserves largely ignored by the majors operating there.

Armstrong had a reputation for identifying promising oil deposits, then planning and permitting exploration before bringing in a larger partner to finance and operate them. The independent had already had several successes in Alaska, before acquiring the leases that would one day be in the 650,000-acre Pikka unit.

Drilled less than 10% leasehold

In 2011, Armstrong brought in mega-major Repsol and embarked on an aggressive $1 billion exploration program that put down 16 wells in seven scint winter exploration seasons, drilling less than 10 percent of the total 750,000 leasehold acres it held with Repsol and a smaller partner.

First oil 2021

By February 2016, Bill Armstrong had formally announced his intention of moving forward with development of the 120,000 barrel-a-day Pikka project, hoping to be in production by 2021 due to a two-year delay instigated by requesting an environmental impact statement be done by the U.S. Corps of Army Engineers.

The project is also referred to as Nanushuk because that reservoir was the largest of those discovered and represented a new play in northern Alaska.

Armstrong’s partners include mega-major Repsol and Denver independent GML Exploration.

Armstrong had brought in Repsol in 2011, largely to finance a $1 billion-plus 16-well exploration and appraisal program and operate their shared 750,000 barrels of oil, but by early 2016 had convinced Repsol to relinquish operatorship in favor of Armstrong taking over to move the project into development and production.

State Commissioner of Natural Resources Mark Myers said of Pikka in a Feb. 14, 2016, email to Petroleum News, “a production rate of 120,000 barrels of oil per day is not unreasonable under the probable contingent reserves reported, with a peak see page 21

Another big find

ConocoPhillips announces Willow oil discovery west of Mooses Tooth 2, in Nanushuk horizon

BY ALAN BAILEY
Petroleum News

ConocoPhillips has announced a new Nanushuk oil find in the Greater Mooses Tooth unit in the northeastern National Petroleum Reserve-Alaska. Discovered by the Timniaq Ns. 2 and 6 exploration wells drilled in early 2016, the find, called the Willow discovery, could hold 300 million barrels of recoverable oil, the company said in a Jan. 13 press release. Depending on the results of further appraisal drilling and the chosen development scenario, the field could produce at a rate of up to 100,000 barrels per day, the company said. ConocoPhillips has a 78 percent interest and Anadarko Petroleum a 22 percent interest in the find.

A test using the Timniaq No. 2 well showed a flow rate of 3,200 barrels per day of light 44 degree API oil over a 12-hour period, ConocoPhillips said. The company said that it will further appraise the discovery through a 3-D seismic survey commencing in January 2017. The find lies west and slightly north of the company’s Mooses Tooth 2 development.

“This discovery is tremendously exciting not only for ConocoPhillips, but also for the state of Alaska,” said Joe Marushack, president of ConocoPhillips Alaska. “Willow’s proximity to existing infrastructure improves the economic viability of the discovery. Development of Willow, a potential multibillion-dollar investment, could provide thousands of jobs during construction and could generate $36.6 million in bids

State of Alaska, BLM, attract bids on more than 1 million acres across North Slope, Beaufort Sea

BY KRISTEN NELSON
Petroleum News

The state of Alaska had one of the largest lease sales on Dec. 14, 2016, since it went to the areawide sale system in the late 1990s, with offerings released both for the North Slope and the Beaufort Sea sales. On the same day the federal Bureau of Land Management, in its 13th National Petroleum Reserve-Alaska sale since 1999, brought in almost as much as the state in apparent high bids, some $36.6 million between state and federal sales.

The state received no bids for the Arctic Slope North Slope Fields sale, but received 42 bids on 384 tracts from six bidder groups in the North Slope areawide sale and eight bids on seven tracts from three bidder groups in the Beaufort Sea sale.

BLM received 92 bids on 67 tracts, with five companies or bidding groups participating and all but one having at least one apparent high bid.

Apparent high bids totaled $16.9 million for the state’s North Slope sale and $870,431 in the Beaufort Sea sale. BLM apparent high bids totaled $18.8 million.

The division said that by acreage the 2016 North Slope sale was the second largest of its kind since 1998, when areawide oil and gas leasing began, while by dollar amount the sale was the third largest since 1998.

North Slope

The state received the most bids, 402 for 384 tracts, in the North Slope areawide lease sale, with almost 600,000 acres receiving bids and $16,909,490 in apparent high bids.

Initial bidder group data from the division lists acreage on which bidders or bidder groups bid: Alliance Exploration Inc., 12,800 acres; Accumulate Energy Alaska Inc. and Burgundy Exploration LLC, 142,560 acres; Armstrong Energy LLC
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Welcome to Inside Alaska Exploration

BY KAY CASHMAN
Publisher & Executive Editor of Petroleum News

The purpose of this publication is to introduce you to company projects on Alaska’s North Slope that were moving forward at $40 oil and continue to move ahead with planning and development at $50 to $55 per barrel oil, with the express purpose of identifying opportunities for profit in Alaska’s new oil boom.

That prerequisite keeps the projects onshore or in near-shore state waters, not in federal waters, which begin about three miles offshore.

Thus, I have included contact information for the fire companies I see as most likely to sanction oil fields at current oil prices.

Although few northern Alaska oil fields become a reality without partners, none of these companies appear to be actively seeking investors or partners for their projects, although ConocoPhillips Alaska’s parent always has shares of stock available on the New York Stock Exchange.

My advice: Approach the following people at these companies to determine their level of interest.

And by all means, subscribe to Petroleum News, a weekly oil and gas newspaper based in Anchorage, by signing up here: http://bit.ly/2AxWSP or email our circulation director Renee Garbutt at rs@g@petroleumnews.com or call 281-978-2771 (Houston) or 907-522-9469 (Anchorage).

I hope you enjoy this special publication from Petroleum News. Please feel free to contact me with questions or comments.

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February 8, 2017

publisher@petroleumnews.com

Covering the industry EVERY DAY, EVERY WEEK
ConocoPhillips: The march west
Stepping out incrementally from existing infrastructure and the road system reduces risk, increases returns on Alaska North Slope, most profitable area in North America for major

BY STEVE SUTHELIN
Petroleum News

In January 2017, when ConocoPhillips Alaska announced the Willow discovery at its Greater Mooses Tooth unit in the National Petroleum Reserve-Alaska, it was a large dose of validation for the company's strategy to step out incrementally westward from its North Slope infrastructure, which has made Alaska the most profitable place the major does business in North America.

Rather than casting about to the far horizons in search of mammoth fields, the company is exploring closer to existing infrastructure so that discoveries like Willow can be produced quickly and economically. A decade ago ConocoPhillips was on a different course, drilling wildcard exploration wells in distant corners of NPR-A and assembling an expensive portfolio of leases in the Beaufort Sea and Chukchi Sea.

The roots of the stepping-out strategy in Alaska reach back to 2000, when ConocoPhillips utilized a staged development scheme for developing the Alpine field in the Colville River unit. The program allowed the company to bring satellites into production every few years without expanding pipeline and processing capacity.

The strategy led most recently to production from the CD-5 pad in the Colville River unit. From CD-5, ConocoPhillips is stepping out farther west with a gravel road and pipelines into the NPR-A with the Greater Mooses Tooth 1 development project. The company is permitting Greater Mooses Tooth 2, which will be linked to GMT-1. Production from all three of the pads will flow to the central processing facility of the Alpine field, then onward through the company's Kuparuk River unit lines to the Trans Alaska Pipeline System.

Willow is big

The Willow find was discovered by the Timniaq 2 and Timniaq 6 wells, drilled some 4 miles apart to vertical depths of just over 4,200 feet in early 2016. The Timniaq wells — the westernmost wells in the Greater Mooses Tooth unit — encountered a Brookian Nanushuk accumulation which could be in excess of 300 million barrels of recoverable resource. The Brookian is the youngest and shallowest of the major petroleum bearing rock systems on the North Slope.

The size of the Willow discovery presents ConocoPhillips with a tantalizing decision which could result in a deviation from its strategy to feed existing processing facilities directly from satellites.

If the new field is developed as a satellite of the Alpine field, production would probably be limited to some 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day. If the field is developed with its own standalone production facilities, a level of 40,000 or 50,000 barrels per day.

The new field could be developed as a standalone satellite to serve existing infrastructure or on its own.

The Willow field presents ConocoPhillips with a tantalizing decision which could result in a deviation from its strategy to feed existing processing facilities directly from satellites.

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The Willow field presents ConocoPhillips with a tantalizing decision which could result in a deviation from its strategy to feed existing processing facilities directly from satellites.

New exploration

ConocoPhillips plans to explore this winter (2016-17) near the village of Nuvuk on newly acquired leases previously associated with the Tofitak unit. The company plans to drill one well and one sidetrack in the area south of the Colville River unit. According to permitting filings, the proposed Putu exploration project Putu No. 1 would be a directional well on ADL 390674 targeting a bottomhole location on ADL 390153. Putu No. 1A would be a vertical sidetrack from the same starting location.

“The Putu 1 well will provide additional reservoir information in the area and narrow uncertainty around reservoir description parameters including oil-water contact, sand quality and thickness, and oil viscosity,” the company wrote in filings.

In April 2017, ConocoPhillips plans to explore this winter (2016-17) near the village of Nuvuk on newly acquired leases previously associated with the Tofitak unit. The company plans to drill one well and one sidetrack in the area south of the Colville River unit. According to permitting filings, the proposed Putu exploration project Putu No. 1 would be a directional well on ADL 390674 targeting a bottomhole location on ADL 390153. Putu No. 1A would be a vertical sidetrack from the same starting location.

“The Putu 1 well will provide additional reservoir information in the area and narrow uncertainty around reservoir description parameters including oil-water contact, sand quality and thickness, and oil viscosity,” the company wrote in filings.

The proposed surface location of the wells is on Kukpiik Corp. land. ConocoPhillips said it intends to work closely with the Native corporation throughout the project. The relevant subsurface lands are jointly owned by the state and Arctic Slope Regional Corp.

ConocoPhillips believes that construction of a 1-mile ice road originating at the Alpine Resupply Road at the Colville River unit and an 800-foot-square ice pad accompanying the project should be included under previously acquired permits. The ice pad would hold a 60-man drilling camp for mobilization, demobilization and support and a second 60-man testing camp for activities after drilling is completed.

Less risk; more importance

For now, ConocoPhillips has abandoned offshore programs and is avoiding risky exploration ventures. The stepping-out strategy is central to operations.

The strategy is responsible for increasing the importance of the Alaska segment as the global company struggles to respond to declining oil prices. The plan is to more or less offset production declines from aging fields through improved technologies and conservative exploration.

“Over the past couple of years, we’ve been able to change the profile of our Alaska business,” ConocoPhillips Chief Executive Officer Ryan Lance said at the end of 2015. “We’ve transformed the declining production base into one that can deliver stable production for a decade.”

A new-found optimism surrounding the company's Alaska segment and several years of profitable operations spurred Alaska capital spending from the budget ax in 2016.

While ConocoPhillips slashed its 2016 budget by 25 percent over 2015 levels, the company cut Alaska spending by only 5 percent to $1.3 billion. Given that the company completed two major capital projects in Alaska in 2015, those cuts were negligible.

Alaska spending represented 17 percent of the total $7.7 billion budget in 2016, versus $2.6 billion in the Lower 48, $4.4 billion in the Asia Pacific and the Middle East regions, $1.3 billion in Europe and $800 million in Canada.

Robust activity

Over the past four years, ConocoPhillips has drilled nine exploration or appraisal wells at its four North Slope units — the Cassin No. 1 and No. 6 wells in the Bear Tooth unit in 2013; the Rendevous No. 3 and Flattop No. 1 wells in the Greater Mooses Tooth unit and the CD-5-21 (or “Hyperor” well) in the new CD-5 pad at the Colville River unit in 2016.

In addition to the CD-5 pad at the Colville River unit and the GMT-1/GMT-2 development in the Greater Mooses Tooth unit, ConocoPhillips sanctioned the Drill Site 25 and the Drill Site 18 NEWS project at Kuparuk.

While the NEWS project is an expansion of existing infrastructure to target heavier oil deposits in the West Sak...
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formation at the Kuparuk River unit, the other three projects represent a similar type of strategic advance.

ConocoPhillips, based on its successes and continued capital commitment, appears to be poised to retain its status as Alaska's largest oil producer for the foreseeable future.

Mooses Tooth

In May 2001, before forming the Mooses Tooth unit, Phillips Alaska Inc. announced oil discoveries from the Spark No. 1, Spark No. 1A, Moos Tothe C, Lookout No. 1, Rendezvous A and Rendezvous No. 2 wells. Except for the Lookout well in the northeast corner of the unit, all of those wells were clustered in the center of the unit. In subsequent years, the company drilled exploration wells in the east and south of the unit, including Pioneer No. 1 and Grandview No. 1 in early 2009 and Rendezvous No. 3 and Flat Top No. 1 in early 2014.

The recently sanctioned $900 million GMT-1 development is on the eastern end of the unit, at lease A-87798. The project includes construction of a drilling pad, a 7.7-mile road and associated facilities and pipelines and an initial nine-well drilling program with the capacity for 33 wells. Production from GMT-1 is expected to come online in late 2018 with approximately 30,000 barrels of oil per day, gross, at peak production, according to ConocoPhillips.

ConocoPhillips also is permitting the GMT-2 development in the south-central portion of the unit, near lease A-87781. The project includes construction of a drilling pad, a 7.7-mile road and associated facilities and pipelines and an initial nine-well drilling program with the capacity for 33 wells. Production from GMT-2 is expected to come online in late 2018 with approximately 30,000 barrels of oil per day, gross, at peak production, according to ConocoPhillips.

ConocoPhillips thus can use existing well bores to target pockets of oil too small to justify drilling a separate vertical well. The company is testing eight different zones near a single wellbore at Kuparuk, the company used coiled-tubing equipment to drill the first “octolateral” on the North Slope. “That’s a very cost-effective way to get at those zones that weren’t producing before,” Hirshberg said.

Uber rig commissioned

ConocoPhillips Alaska announced Oct. 6, 2016, that it had commissioned Doyon Drilling Inc. to build a new extend¬ed-reach drilling rig for the North Slope. The rig will increase the surface area that can be accessed from a single drill site from 55 square miles to 125 square miles, the company said.

The company said that the rig will initially target Fiord West, an underdevel¬oped satellite oil field adjacent to the Beaufort Sea, in the extreme northwest of the Colville River unit.

The rig will be able drill to distances of more than 33,000 feet, versus 22,000 feet for current rigs. ConocoPhillips spoke¬woman Natalie Lowman told Petroleum News that the rig would allow Fiord West to be developed from existing drilling pads, producing around 50,000 barrels per day.

“Adding the ERD rig to our fleet on the North Slope is a potential break通过 event,” Marushack said. “It could enable increased oil production by reducing the cost of developing economically chal¬lenged or previously unreachable reservoirs.”

The rig features a muscular top drive to deliver torque to the huge length of subsur-
Hendrix: Open dialog on Alaska O&G

Walker’s cabinet-level oil and gas adviser to governor and former Apache head in Alaska, says robust communication with industry, feds and stakeholders can boost production

BY STEVE SUTHERLIN
Petroleum News

Alaska has a new strategy to attract and retain oil and gas producers and explorers. In July 2016, Gov. Bill Walker appointed the former oil company executive John Hendrix to a new cabinet-level position as chief oil and gas adviser.

Hendrix believes that communication is the key to establishing better relations between the industry and government.

“My job is trying to increase oil and gas production,” Hendrix told Petroleum News in a December interview.

As someone who speaks the language of the industry, Hendrix has moved to open a dialog with all of the companies operating in Alaska, he said.

Hendrix, who has nearly four decades of oil and gas experience, said more than half of his efforts were engineering and management positions on the North Slope and in Anchorage for BP, most recently served as Apache Corp.’s general manager in Alaska from 2011 to 2016.

“I’ve met with all the oil and gas companies in Alaska since I’ve been here (in the cabinet), and continue to meet with them on how to be competitive,” he said. “It’s very important for the governor and Alaska to have a vibrant oil and gas business and to demonstrate to the world that we’re open for business; we’re going to continue to reach out to every oil and gas company that’s here working.”

Hendrix said the governor’s office also plans to reach out beyond the state to promote Alaska oil and gas prospects, joining the Alaska Department of Revenue delegation at the annual NAPE Summit, Feb. 15-17 in Houston.

“It’s just being competitive,” he said. “We understand that the Alaska oil and gas industry is vital to Alaskans; it’s our engine.”

New realties

The recent downturn in oil prices saw Alaska’s oil and gas production tax revenue collections, exposing state spending levels as unsustainable on a long term basis and creating a multibillion dollar budget deficit in the short term.

While state lawmakers explore spending cuts and potential new sources of revenue, Hendrix seeks to find ways to make the state more competitive as an oil province in the current price environment.

“We want to structure ourselves so that we can be competitive in a $50 a barrel world and if we focus around that, anything above $50 a barrel is cream,” he said.

Hendrix was pleased with the results of the state’s record-setting Dec. 14 North Slope and Beaufort Sea lease sales which produced a combined $17.77 million in apparent high bids.

“It was a very popular lease sale,” he said.

With the lease sale completed, Hendrix said he is looking forward to the upcoming legislative session which he hopes will provide the federal clarity the governor’s office will need to determine what it can do help companies succeed in exploration and development.

How can we help?

Hendrix said the state is actively looking for ways to help companies succeed in Alaska. He said that when he — along with the Division of Oil and Gas and the Department of Natural Resources — meets with oil and gas companies, discussions center around how Alaska as a state can do things to help with infrastructure, roads, pads and permitting.

String of pearls

Alaska’s North Slope holds a great deal of potential for the future, Hendrix said.

“We have a great option set.”

Hendrix said federal intervention is the culprit in making many of Alaska’s oil and gas leases impossible to develop economically.

“Wouldn’t it be nice if we had a master plan — and we’re talking about this right now on the North Slope — to pre- permit leases so you could go out and drill and develop?” Hendrix said. “Then it’s no longer this probability and possibility, it’s a reality that when we sell leases ... people can drill.”

Hendrix is optimistic that the Trump administration, working with Alaska’s Republican Sen. Lisa Murkowski, Sen. Dan Sullivan and Reg. Don Young, will move to eliminate permitting barriers that block development in Alaska.

Alaska competes with states like Texas, which holds a lot of private property and doesn’t have to go through all the federal permitting that Alaska does, he said.

“They don’t have sanctuaries and wilderness and monuments as much as we do. 65 percent of our state is owned by the federal government, less than 3 percent is privately held,” Hendrix said.

With Trump in office, Alaska may — if we cut and potential new sources of revenue, Hendrix said, adding that he expects the Trump administration to be sensitive to the negative impacts of federal overreach.

Opportunity set

“One thing I’ve been doing since I’ve been here is talking to DOG and DNR about building an opportunity set,” Hendrix said.

“They are all of our oil and gas companies, what’s the timing, what’s keeping them from happening. We work them all in concert with each other and understand when you pull the lever for that, and there is a common thread, like what technology will unlock what — like all the tons of billions of barrels underground of heavy oil.

“ANWR is on the radar, just like Smith Bay and everything else but was to basically be smart about things,” he said.

“We’ve got to be prudent about it; we’ve got to keep it all on the radar.”

Hendrix said that he and Natural Resources Commissioner Andy Mack learned that the state’s forward planning was conducted only five years into the future.

“We need to be looking 20 years out,” he said. “We need to start asking ourselves, what will the North Slope look like in 2050?”

Nurturing competition

While Alaska’s North Slope traditionally has been dominated by majors BP, ConocoPhillips and ExxonMobil, that own
North Slope leftovers aplenty

Alaska still has plenty of crude oil and natural gas: USGS geologist Dave Houseknecht overviews potential hydrocarbons that remained undiscovered and/or undeveloped.

**Arctic potential**

Commenting that the preponderance of Alaska’s hydrocarbon resources lie in the state’s Arctic region, Houseknecht referenced a 2009 study that the USGS had carried out, estimating the volumes of oil and gas that may remain undiscovered across the whole of the Arctic. Based on analyses of the various geologic basins that lie around the Arctic region and Houseknecht’s own fieldwork, he concluded that northern Alaska presents the most promising Arctic region for oil exploration. Undercover natural gas in the Arctic, on the other hand, is likely concentrated in both the Russian and U.S. sectors of the region, Houseknecht said.

The U.S. Geological Survey and the Bureau of Ocean Energy Management have estimated that there may be about 17 billion barrels of technically recoverable oil remaining undiscovered onshore in northern Alaska.

**Cook Inlet**

The petroleum geology of Cook Inlet is very different from that of the North Slope and is closely related to the fact that the petroleum basin underneath the inlet has formed as the Pacific plate, one of the massive plates that form the Earth’s crust, slides under the Alaska continent.

Oil and associated gas, both formed from the heating of hydrocarbon source rocks, are found in the deeper basins and field gas fields are in state land and around the upper Cook Inlet, the more northerly part of the interior, where there is also oil and gas potential on the federal outer continental shelf in the more southerly lower Cook Inlet, where “development” is focused on the development of the Cosmopolitan oil and gas prospect, offshore the southern Kenai Peninsula, appears to hold well for interest in the lower Cook Inlet, where the Bureau of Ocean Energy Management will be holding a lease sale in a couple of years, Houseknecht said.

**Other basins**

There are several other basins with hydrocarbon potential in other parts of Alaska, including the Susitna basin that extends north from the Cook Inlet basin and the Nenana basin in the Alaska Interior. The Alaska Department of Natural Resources and USGS have been collaborating on researching the oil and gas potential of the Susitna basin. Drilling data and analogs in the coastal areas of Wrangell and Selawik basins in northwest Alaska suggest that these basins are gas prone, with potential gas resources to supply local communities.

But northern Alaska, offshore and onshore, with an estimated nearly 40 billion barrels of oil and more than 200 tcf of gas, remains in the Alaska driving seat as a world-class resource. There are few places on Earth where it is possible to find this scale of resource either on land or beneath water as shallow as that of the Chukchi and Beaufort seas, Houseknecht said.

**The U.S. Geological Survey**

Although current oil and gas resources in the Cook Inlet basin in Southern Alaska, the state’s other producing oil and gas province, has estimated undiscovered oil resources of 1 billion barrels in state lands and a further 1 billion barrels in the central part of the basin, Houseknecht said. Estimated undiscovered resources amount to 14 trillion cubic feet of gas, with the total volume of resource that have been proved to exist and that can be viably produced. It appears that the reserves volumes for Alaska as a whole lie in the range of 3.4 billion to 5 billion barrels of oil and 28 tcf to 36 tcf of gas, with the preponderance of these reserves being in the northern part of the state, Houseknecht said.

Further, there are published estimates of undiscovered oil and gas for various parts of Alaska, commercial confidentiality issues make it difficult to obtain estimates for oil and gas resources, the volumes of resource that have been proved to exist and that can be viably produced. It appears that the reserves volumes for Alaska as a whole lie in the range of 3.4 billion to 5 billion barrels of oil and 28 tcf to 36 tcf of gas, with the preponderance of these reserves being in the northern part of the state, Houseknecht said.

**Other resources**

Houseknecht said that, in addition to the continued production of oil from traditional field reservoirs, operators operating on the North Slope have been starting to develop relatively impermeable sand reservoirs using shale oil development in the Lower 48, such as horizontal drilling and massive “fracking” techniques. USGS has assessed the possibility of developing shale oil in northern Alaska and concluded that there may be 1 billion barrels of marketable oil of this type, with perhaps 40 to 100 tcf of shale gas, but that because of difficult economicals, development of these resources may require development of more conventional hydrocarbons, Houseknecht said.

There is also a massive North Slope resource in the form of perhaps 37 billion barrels of heavy oil, a form of natural bitumen. Two of the larger companies operating on the North Slope have been trying to find viable ways of developing this resource, but with mixed success, Houseknecht said. However, as technology evolves, and if oil prices remain high or increase, this challenging resource may enter the oil production profile for northern Alaska, he said.

Coal in the methane, natural gas that can be extracted from coal seams, is common in many parts of Alaska but is likely to be of value more as a rural energy source rather than as a driver for major gas production, Houseknecht said. Another potential source of gas, something out in the future, is gas hydrate, an ice-like material that exists onshore and offshore the North Slope.

Houseknecht referenced a 2008 study that the USGS had carried out, estimating the volumes of oil and gas that may remain undiscovered across the whole of the Arctic. Based on analyses of the various geologic basins that lie around the Arctic region, the agency’s scientists had concluded that northern Alaska presents the most promising Arctic region for oil exploration.

Editor’s note: This overview was provided prior to Armstrong/Repsol announcing their giant Nanushuk discovery that suggested a whole new source of North Slope oil coming from the Cook Inlet basin in Southcentral Alaska, the Cook Inlet, where the Bureau of Ocean Energy Management will be holding a lease sale in a couple of years, Houseknecht said.
the Trans Alaska Pipeline System, the playing field is opening for smaller players, Hendrix said, adding, “There are a lot of partnering opportunities that they can have.”

Since 2002, small and mid-size oil prospects have been developed by several independents and majors that were new to Alaska. Of special note is when Denver independent oil man Bill Armstrong began partnering with larger companies from outside the state to bring new oil online.

“The larger companies (TAPS, Prudhoe and Kuparuk River owners) need TAPS filled and they can’t fill it themselves, so we need to continue to encourage the small independents and the major independents to come to Alaska to drill and explore,” he said. “I think you’ll see that owners of the pipeline appreciate companies putting oil down the trans-Alaska pipeline — and hopefully gas down the gas pipeline in the future — because we need them all up here.”

The state will continue to actively encourage facility sharing, another area where every player benefits, not just in reducing costs but in reducing environmental impact. “This is talking very openly, but we know that the North Slope is difficult to get permits in,” Hendrix said. “It’s a fragile, hostile environment at times and the less we can make a footprint like a facility, and that we could share it makes sound sense,” which is what several independents are already doing, or plan to do.

“I think you’ll see that Armstrong is moving ahead with a well this winter, and that’s because they’re building a relationship with Conoco and other people on the North Slope, and understanding if you can facility share you lower your lifting costs.”

Educate, communicate

Hendrix said the state must educate the incoming U.S. president on the benefits of oil and gas development in Alaska, while seeking to remove some of the roadblocks the federal government throws in the way. “We have a resource-rich state that’s always developed resources responsibly,” Hendrix said. “The cost of doing business up here is expensive not only because of being in the Arctic but also because we have a lot of regulations that are double-dipping and we need to help work on that.”

The Walker administration understands that oil and gas is vital to the state, he said. “We need to partner with the oil and gas industry in a responsible way,” he said. “We still have a lot of opportunities out there, and it’s putting our heads together on how to make this work at $50 oil or less prices so we can bring new exploration into development and into production as soon as possible.”

“We need people to come to Alaska, drill exploration wells, and get good quality well testing and core data; that helps us,” Hendrix said. “We want people to drill wells.”

Reports on production testing in the Kuparuk indicated flow rates of some 3,750 barrels per day of 37 API oil. Flow testing in the Nechelik showed 28 API oil flowing at some 270 barrels per day.

Storied Alaska history

Through a series of acquisitions, ConocoPhillips traces its Alaska roots back to pioneering oil and gas discoveries on the Kenai Peninsula and in Cook Inlet, including the historic Swanson River discovery of 1957 by Richfield Oil Co.

Ten years later on the North Slope, ARCO’s Prudhoe Bay State No. 1 well struck oil and gas in April 1967. The completion of the Sag River State No. 1 in March 1968 confirmed the discovery of the Prudhoe Bay field, the largest oil field in North America. Today, ConocoPhillips owns 36.5 percent of the Prudhoe Bay unit.
Hilcorp tackles North Slope challenges

**Quest for Arctic profitability focused on costs, workovers, infill wells in recently acquired units; lowers price stings**

**By Steve Sutherlin**

Petroleum News

Cook Inlet producer Hilcorp Alaska LLC expanded to the North Slope in 2014 with a package of four BP Exploration (Alaska) Inc. properties. In one fell swoop, Hilcorp became owner and operator of the Northstar unit, operator and majority owner of the Duck Island unit, operator and 50 percent working interest owner of the Milne Point unit and a 50 percent working interest owner of the offshore Liberty field.

The local subsidiary of the Texas-based independent intended to develop the Arctic as it had been developing Cook Inlet: reducing operating costs, revitalizing fields on a nearly well-by-well basis and opportunistic drilling of wells in and around existing units.

Hilcorp expected Arctic operations to be costlier and more difficult, but it hadn’t anticipated a sharp decline in oil prices that began just as it was taking possession of its North Slope properties.

“We have a long way to go before we’re coming anywhere close to making the money that we hoped to make when we originally made that investment a year and a half ago,” Hilcorp Energy Co. President Greg Lalicker said at the Resource Development Council’s annual conference November 2015 in Anchorage.

Lalicker said Hilcorp didn’t expect higher oil prices to rescue the investment; instead, the company was addressing the problem.

**Hot property: Milne Point**

At the 2016 Resource Development Council conference, David Wilkins, senior vice president for Alaska for Hilcorp, said the company is making investments to increase production and efficiency at Milne Point.

He said Hilcorp was permitting the Moose Pad at Milne Point to accommodate 76 wells and up to 15,000 barrels per day of production. First drilling is expected in 2018 and first production in 2019.

**Mature field tactics**

The company is commissioning the Innovation rig at Milne Point, the lightest modular rig on the North Slope capable of drilling wells on 10-foot spacing, allowing it to work in the tight quarters at Endicott and Northstar.

Most of Hilcorp’s resources on the Slope since the acquisition have gone toward the Milne Point unit. Hilcorp has expanded infrastructure, proposed administrative changes, repaired existing wells and begun drilling new wells.

Hilcorp believes Milne Point contains considerable resources, from light oil in deep reservoir rocks to heavy oil in the Ugnu formation. Accessing those resources is a slow and steady process, according to Lalicker.

“It isn’t one big project that makes this happen,” he told Alaska lawmakers at an informal meeting in February 2016. “It’s lots of little things all the time. That’s what you do with properties late in their life.”

In 2015, working under an existing BP plan of development, Hilcorp brought five wells back into operation but saw a slight decline in total unit production, which it blamed on a large backlog of workovers to complete.

Under a plan of development which runs through July 2017, Hilcorp proposed drilling eight new wells on five pads targeting three of the four formations present at the unit, conducting workover operations on up to 16 existing wells, and expanding infrastructure to accommodate increased oil production. BP drilled seven wells at Milne Point in 2014 — including multimilateral wells, accounting for 14 generations altogether. Hilcorp drilled three wells there in 2015, and eight wells through the first nine months of 2016.

**Working on several pads**

Aside from a well at L pad, the BP drilling program in 2014 occurred exclusively at F pad. Hilcorp in 2015 and 2016 drilled 11 wells including four at L pad, three at J pad, two at B pad, one at K pad and one at C pad. While BP exclusively targeted the Kuparuk formation, Hilcorp was primarily targeting the Schrader Bluff formation (aside from one Kuparuk well at K pad and one Sag River well at C Pad). BP drilled mostly laterals and sidetracks of existing wells while Hilcorp drilled exclusively single wells.

**Hilcorp concentrates on maintenance**

Finally, while BP employed new technological applications to improve production, Hilcorp favored maintenance activities. Hilcorp completed three wells at Milne Point in 2015 but conducted workover operations on 54 existing wells — 29 in the Kuparuk formation, 23 in the Schrader Bluff formation and two in the Ugnu formation.

Much Milne Point effort in 2016 focused on administrative and infrastructure programs such as permitting projects to improve injection at the unit by expanding the physical boundary of the unit, modifying an existing underground injection control Class I permit, building a grind-and-inject facility and expanding the associated Milne Point B pad.

In 2016, Hilcorp asked the state for permission to add some 1.66 acres to the existing L pad for a proposed five-well development program and to add some 1.59 acres to E pad for a proposed eight-well development program.

In 2014, Milne Point production was 7.1 million barrels, for a cumulative total of 321.9 million by the start of 2015, according to the Alaska Oil and Gas Conservation Commission.

With Hilcorp as operator, production declined to 6.8 million barrels in 2015. In the first six months of 2016, the unit produced 3.5 million barrels.

**Duck Island, Northstar**

At the Duck Island and Northstar units, Hilcorp has been working over existing wells. The company drilled no new wells or sidetracks at either unit.

Between July 2015 and April 2016 Hilcorp conducted 11 workover projects at Duck Island and five workover projects at Northstar, while proposing five projects at Duck Island and three at North Star.

According to the AOGCC, Duck Island produced 2.7 million barrels of oil in 2014. Production declined in 2015 to 2.5 million barrels for the year and a cumulative total of 481.6 million by the start of 2016. In the first six months of 2016, the unit produced 1.3 million barrels.

The Northstar unit produced 3.2 million barrels in 2015, according to the AOGCC, for a total of 162.8 million by the start of 2015. Annual production declined to 2.2 million barrels in 2015, and 1 million barrels in the first six half of 2016, suggesting a slowdown in the decline rate.

**Liberty**

Hilcorp is permitting development at Liberty, which could add 60-70,000 bpd to the trans-Alaska oil pipeline over a 15-20 year life. Hilcorp filed a new development proposal with regulators in late 2014, to develop the Liberty field from a new gravel island in the Beaufort Sea.

The U.S. Bureau of Ocean Energy Management officially began reviewing the new proposal in mid-September 2015 and twice extended a public commenting deadline on the initial scoping portion of the environmental review.

Currently, BP is Hilcorp’s partner at Liberty, but the company has not said it is adverse to adding other partners.

See project details on Hilcorp’s special website for Liberty at http://libertyprojectak.com/
BRPC aims for late 2017

BY KAY CASHMAN
Petroleum News

In early 2016, Brooks Range Petroleum Corp. said it expected to boost oil production from the Mustang field at the Southern Midways unit in late 2017. The company saw the project as a potential anchor facility between the Kuparuk River unit and the Colville River unit, a region that ARCO Alaska (currently ConocoPhillips Alaska) once evocatively labeled the “billion-dollar fairway.”

Although BRPC originally considered building a 7,500 barrel per day facility, the company eventually doubled the capacity to 15,000 bpd to accommodate potential third-party shippers in the region.

BRPC, the operating arm of a multi-company joint venture, had initially planned to bring the field online in April 2016, but a combination of low oil prices, technical challenges and the challenge of capital investment delayed the start date. Late 2017 put start-up seven years after the first exploration wells were drilled, which was when Alaska North Slope crude was selling for more than $120 a barrel.

“We’re off to a new start now,” Brooks Range Petroleum Operations and Strategy Manager Jack Laasch told the Alaska Support Industry Alliance in May 2016. He was referring to both the resumption of development work and to new ownership.


In return for using the Alaska Industrial Development and Export Authority as a financier for two major infrastructure projects at the Mustang project, the consortium handed over some working interest in the leases to a pair of public private joint ventures. After all the dust had settled from those deals, BRPC was operating the Southern Midways unit on behalf of seven working interest owners: JK E&P subsidiary Caracol Petroleum LLC (36.28 percent), TP North Slope Development LLC (22.46 percent), Mustang Operations LLC (10.37 percent), Ramthorn Investment Inc. (6.08 percent), AVGG LLC (3.82 percent) and Mustang Road LLC (1 percent).

Technical challenges

BRPC completed an initial three-well drilling program in early 2015. All three wells faced complications, making them unsuitable for production without additional work. A subsequent “root cause analysis” determined that the company needed to acquire a new rig or significantly modify its existing rig to accommodate high pressure in the reservoir.

Analyzing and addressing the problem occupied the remainder of 2015 and the first half of 2016. Laasch said the company would be ready to resume its drilling program at Mustang with a modified rig sometime in the second quarter of 2017.

The Alaska Department of Natural Resources extended the term of the Southern Midways unit agreement until December 2017 to accommodate the new schedule.

In the most recent plan of development, released in late September 2016, BRPC presented a timeline for bringing Mustang online between October and December 2017. The company described its current timeline as a “very high level” assessment based on its current understanding of the field and current economic conditions within Alaska.

Prior to the expected arrival of the first Alaska-fabricated modules in April 2017, the company plans to complete pipeline installation and interconnection and some remaining pad work. The last Alaska-fabricated modules are expected in September 2017, with the Canadian-fabricated modules arriving in August 2017 and installed by October 2017, providing two to three months for conducting the final system-wide review of facilities.

BRPC expects Mustang to initially produce approximately 6,000 barrels per day and gradually increase to a peak of 12,000 bpd by late 2018 and into 2019. A third-party evaluation suggests 24.7 million barrels of proved oil reserves, almost 44 million barrels of probable reserves and $1 million barrels of possible reserves.

Economies

Speaking to the Commonwealth North Energy Action Coalition in June 2014, top executive of BRPC Bart Arnfield said that the project would be “viable” between $80 and $120 per barrel. In his presentation to the Alaska Support Industry Alliance in May 2016, when oil prices were approximately $46 per barrel, Laasch said the company was committed to bringing the project online at any price but was looking for $50 per barrel or higher.

The Southern Midways unit benefits from its location. It sits along the southwestern border of the Kuparuk River unit, and the Mustang development is less than 1,000 feet from the Alpine common carrier oil pipeline, which follows a series of pipelines to the trans-Alaska oil pipeline and outside markets. The ASRC Exploration LLC-operated Placer unit is immediately to the north, providing a potential future customer for facilities.

As of May 2016, Laasch said the company expected to spend another $8 million on field engineering, $25 million on fabrication and $33 million on the installation of facilities on the field pad, in addition to $145 million already spent between December 2014 and November 2015 — $85 million for surface facilities and $60 million for drilling wells.

Tofkat deal

In a Nov. 3, 2016, decision the state Department of Natural Resources gave ConocoPhillips Alaska permission to acquire a package of leases from the former Tofkat unit and add them to the Colville River unit, allowing a joint venture operated by Brooks Range Petroleum Corp. to transfer 15 Tofkat leases to the Colville River unit.

In a pair of decisions, Commissioner Andrew T. Mack asked ConocoPhillips to resubmit an application to add those 15 leases and seven related leases to the Colville River unit — a request previously turned down by DNR.

ConocoPhillips leased the acreage during the 1990s, as the Tintina prospect, but failed to explore the area and eventually relinquished the acreage back to the state.

ConocoPhillips plans to drill the Putu No. 1 well and Putu No. 1A sidetrack on the package of Tofkat leases in the first quarter of 2017 and said it could launch an environmental review for a potential development later in 2017, if drilling results warrant it.

—Kay Cashman

ASRC advancing Placer

Independent and subsidiary of Native regional corporation move North Slope unit to production

BY KAY CASHMAN
Petroleum News

Hunting at promising results from its first exploration well, ASRC Exploration LLC asked the state Department of Natural Resources for breathing room as it proceeds with work at its North Slope Placer unit — a request DNR granted in September 2016, giving the company until Sept. 8, 2021, to complete a work plan for the unit. Without the extension, the unit would have expired five years after it was formed on Sept. 9, 2016.

In a letter to state officials, the subsidiary of Arctic Slope Regional Corp. suggested that the Placer No. 3 well expands the known size of the reservoir and appears to be capable of producing economically.

Geologists said the well made a discovery in granite, a finding that bodes well for future development because granite is known to be a more productive interval at the unit, but ASRC told the state it intends to determine, at a later date, whether other zones at the unit also have the capability to be productive.

A two-year program proposed by the
Indie paves way to North Slope oil

BY KAY CASHMAN

If you think you don’t have what it takes to make a fortune on Alaska’s North Slope, you can take lessons from Bill Armstrong, the founder and president of several related oil companies doing business in the Far North.

Because the Denver-based Armstrong was a small concern that preferred to operate without debt, it had taken a novel approach to exploring the complex and expensive world of northern Alaska, pursuing “small prospects” (20 million to 500 million barrels) overlooked by BP and ConocoPhillips, the only producer-operators on the North Slope at the time.

Armed with a team of 15 people — some of them former employees of North Slope majors — and a reputation for finding oil and attracting solid partners to operate Lower 48 fields, the independent oilman saved the day for North Slope explorers and North Slope major oil companies like ConocoPhillips Alaska-operated Kuparuk River unit and Thetis Island — an area where Exxon Corp. had made a promising discovery in the mid-1990s, but never pursued development.

When first interviewed by Petroleum News in 2001 and asked about his plans for the leases, Bill Armstrong said, “Just print what I do, not what I say.”

The following story does just that, leading up to the company’s most recent and extraordinary discovery (see top of page 1 story) that taps into an entirely new source of North Slope oil coming from the north, versus the south, the source of the great Prudhoe and Kuparuk fields.

Mark Myers, then the commissioner of the Alaska Department of Natural Resources, referred to the discovery as “amazing.”

In a Feb. 14, 2016, email to Petroleum News, Myers said, “the proven contingent reserve number makes the discovery the largest since the Kuparuk field, and the possible contingent number makes the discovery the largest since Prudhoe;” with one caveat: The “discovery” is “multiple horizons down to and through the 6,700 to 6,900 foot range, would target the biggest range of intervals, the Division of Oil and Gas, part of the Alaska Department of Natural Resources, or DNR, later said, including “the Cretaceous Middle Brookian, Cretaceous Torok, Kuparuk A, Kuparuk C and Jurassic Nuiqsut/Neechik.”

Attracts Pioneer as first partner

Eleven months after buying its first leases in Alaska, Armstrong brought in Texas-based independent Pioneer Natural Resources as a 70 percent operating partner to drill the three wells, which represented half the exploration wells put down on the North Slope in the 2002-03 exploration season.

In March 2003, less than six months after partnering with Armstrong, operator Pioneer announced a 1,300-barrel-a-day oil discovery at the Ivik well.

While it was drilling the Oooguruk well, Pioneer filed a unit plan of operations with the state of Alaska, saying engineering work was underway for possible development and production. The big independent estimated the reserve potential at Oooguruk to be between 70 million and 90 million barrels

Only time and more development drilling will tell.

In the meantime, here is Armstrong’s remarkable (and profitable) adventure in Alaska’s oil and gas fields.

Three oil finds in three years

In July 2002, Armstrong filed permit applications for what it dubbed the Northwest Kuparuk prospect. The independent planned to drill three wells in the coming winter exploration season, the only time explorers were able to get on roadless areas of the tundra to drill in northern Alaska.

Armstrong asked Jacobs Adams, president of Arctic Slope Regional Corp., which represented the Inupiat Eskimo people of the Slope, to name the three wells.

Adams named them Ivik, meaning walrus in the Native language of the region; Oooguruk, meaning bearded seal; and Natchiq, meaning seal.

The prospect name was eventually changed from Northwest Kuparuk to Oooguruk.

Armstrong said the three wells, which would be drilled to true vertical depths in the 6,700 to 6,900 foot range, would target “multiple horizons down to and through the Jurassic.”

The exploration program looked at a range of intervals, the Division of Oil and Gas, part of the Alaska Department of Natural Resources, or DNR, later said, including “the Cretaceous Middle Brookian, Cretaceous Torok, Kuparuk A, Kuparuk C and Jurassic Nuiqsut/Neechik.”

In March 2003, less than six months after partnering with Armstrong, operator Pioneer announced a 1,300-barrel-a-day oil discovery at the Ivik well.
Mobile, lightweight drilling rigs, such as Nabors 105E, have reduced North Slope exploration drilling costs.
of oil equivalent in two main pools, the Kuparuk and the deeper and larger Nuiqsut.

Once Pioneer began drilling it said recoverable reserves at Oooguruk could be as much as 40 percent more than expected: between 120 million and 190 million bbl. Prior to that, the company had only booked 10 million barrels of oil from its Alaska operations.

In addition to the increased resource potential, Pioneer said that Oooguruk wells were performing better than expected.

Identifying more North Slope prospects

In the meantime, Armstrong was working more North Slope prospects.

In July 2003, BP announced the independent was one of the successful bidders for its North Slope exploration acreage. Armstrong won nearly 30,000 acres in the shallow waters of the Beaufort Sea north- west of the BP-operated Milne Point production unit.

In August 2003, Armstrong said it would drill one to three wells at its new Northwest Milne prospect in the 2003-04 exploration season, depending on rig availability.

The proposed wells — the Nikaitchuq No. 1, No. 2 and No. 3 — got their name from an Inupiaq word meaning “to persevere.” They would be drilled from two ice pads near Nuiqsut.

No. 1, No. 2 and No. 3 — got their name from an Inupiaq word meaning “to persevere.” They would be drilled from two ice pads near Nuiqsut. Pictured above is the Ivik well drill site. In the foreground, left to right, is Stu Gustafson, at-the-time vice president of operations for Armstrong Oil & Gas and a consultant to Pioneer on the project, and Bill Van Dyke, at-the-time petroleum manager for the Alaska Division of Oil and Gas. The ice road to the left stands 22′ tall.

In early January 2004, as Armstrong worked for ARCO a decade earlier.

“Very few wells have ever been drilled without multiple partners on the North Slope and we don’t anticipate changing that this year.”

Mark Myers, then Division of Oil and Gas director and a well-respected geologist who had worked for ARCO Alaska prior to joining state government, said the key to success in the area was understanding the Jurassic, which, he said, Armstrong clearly did at Northwest Kuparuk.

“The Jurassic... has significant volume potential to it, but typically produces at slower rates... Other horizons — smaller accumulation — like the Brookian and Kuparuk could add significantly faster flow rates to the project.” Myers said. The result would be “long-term productivity at reasonable flow rates if you can stack them up and that’s something Armstrong is looking to do in that area” — an area Myers had worked for ARCO a decade earlier.

Depending on what they found, he said, production could be handled at a standalone facility or another nearby existing facilities at Milne Point or the Kuparuk River unit, which had spare capacity.

Next up: Kerr-McGee

In early January 2004, as Armstrong moved forward with Northwest Milne drilling, Oklahoma City-based mega-independent Kerr-McGee announced a 70-30 partnership with the Denver independent for operatorship of the prospect.

At the same time, Armstrong filed a unit application with the state of Alaska on behalf of itself and its proposed unit operator, Kerr-McGee, naming the new unit Nikaitchuq.

In March 2004, Kerr-McGee said it had encountered high-quality oil at its first Nikaitchuq well in the Spy Island area, the second such discovery announcement in an Armstrong-identified prospect in 13 months on the North Slope.

At the time, Kerr-McGee was a week away from finishing its second exploration well in the unit, which at the time covered almost 13,000 acres in eight oil and gas leases.

In April 2004, Kerr-McGee formally announced that the Nikaitchuq No. 1 well tested at more than 960 barrels per day of 38 degree American Petroleum Institute, or API, crude oil. The company also said that if the prospect was developed “horizontal wells would most likely be utilized, which...
could be expected to produce at higher flow rates than the vertical well.”

**Another Armstrong/Kerr-McGee deal**

In the last half of 2004, Kerr-McGee and Armstrong crafted an agreement on yet another prospect, which Armstrong unitized at the Tuvaaq unit.

The 14,561-acre Tuvaaq unit was in the nearshore waters of the Beaufort Sea between the Oooguruk and Nikaitchuq units, and north of the Milne Point and Kuparuk River units. It would eventually be developed as part of the Nikaitchuq unit.

**Success: Two for two**

Kerr-McGee was two for two in Alaska by March 2005, announcing another successful drilling season.

The company said it had tested the Schrader Bluff reservoir at its Nikaitchuq No. 4 horizontal appraisal well that winter and it came in at rates of up to 1,200 barrels per day during periods of the initial test, with the crude at 16 to 17 degrees API.

The viscous Schrader Bluff formation, called West Sak at the Kuparuk unit, was under production at three fields onshore: the ConocoPhillips Alaska-operated Kuparuk River unit and the BP Exploration (Alaska)-operated Milne Point and Prudhoe Bay units. Both BP and ConocoPhillips had recently begun large-scale Schrader Bluff-West Sak developments using horizontal wells.

Kerr-McGee had also encountered the same Schrader Bluff interval at the Tuvaaq exploration well, some three miles to the west of Nikaitchuq No. 4.

Based on the results of drilling, Kerr-McGee said it was drilling a sidetrack, the Kigun well.

The Kigun target was in the ConocoPhillips Kuparuk River unit, a farm-out arranged between Kerr-McGee and the major oil company.

“We are encouraged with the results we’ve seen thus far in Alaska,” Dave Hager, Kerr-McGee’s senior vice president responsible for oil and gas exploration and production, said. “Although we still need to complete the appraisal program, based on initial evaluation it appears the Schrader Bluff interval might be developed throughout much of our 36,000 acres.”

Hager, speaking at the A.G. Edwards’ Energy Conference in Boston March 15, 2005, said the company was targeting both reservoirs, the shallower Schrader Bluff and the deeper Sag River. The second horizontal appraisal well that winter, the Nikaitchuq No. 3, tested the Sag River formation, slides accompanying Hager’s remarks described the well as drilling a new fault block. “We did test the Sag River at one of our vertical wells last drilling season (Nikaitchuq No 1) at a rate of 960 barrels a day, 38 degree API,” he said. What the company wanted to find out in the 2004-05 season was what the well would do from a horizontal wellbore.

Nikaitchuq No. 2 had been drilled 9,000 feet southeast of the discovery well and successfully extended the accumulation down dip, Hager said.

Onshore, he said, the Schrader Bluff was being developed on 160-acre spacing, and with “approximately 36,000 acres gross … I think you can see the potential that exists with this particular program.” One of the slides accompanying Hager’s remarks showed a resource of 39 million to 60 million barrels for the company’s Alaska discoveries being appraised at the time.

**Set permitting record**

The Denver independent’s team was still working very closely with Kerr-McGee: Armstrong’s understanding of the area, and its contacts with the Natives, proved valuable to the larger company, Kerr-McGee officials told Petroleum News at the time.

By May 2005, Armstrong had been an active partner in drilling 11 North Slope
exploration wells in three years and had just finished per-
mitting a shared stand-alone production facility for the
Nikaitchuq and Tuvaaq units on behalf of Kerr-McGee in
less than 100 days, which appeared to be a new record for
the North Slope.
State of Alaska officials were saying “Alaska is open for
business” to oil companies.
One of the main criticisms of the state and federal gov-
ernment in Alaska from long-time producers in the state
was about the difficulty of permitting oil and gas activities.
But an executive with Armstrong at the time disagreed
—and proved it by securing permissions to explore in and
develop in record-time.
He told Petroleum News “the exploration and produc-
tion regulatory process” in Alaska was “seamless,” com-
pared to how it had been seven years earlier when he
worked in the North Slope.

**Pioneer, Conoco talk facility-sharing**

At the Pioneer-operated Ooguruk unit in the shallow
waters of the Beaufort Sea, Pioneer was assessing the eco-
nomics of development and working on a facility sharing
agreement with ConocoPhillips, operator of the nearby
Kuparuk River unit.

Rapidly coming to a close was the 2004-05 winter
drilling season, in which Kerr-McGee led the pack for
the number of exploration wells drilled on the North Slope
in a single season — six out of 11 wells.

**$500,000 ‘permitting fee’ obstacle**

Removing a significant obstacle for drilling in state
waters, Armstrong was key in getting a second oil spill
response contractor, Alaska Chadux, to set up business on
the North Slope. At about the same time the only existing
North Slope spill contractor, Alaska Clean Seas, changed
its policies, dropping what many newcomers to the state
referred to as “Alaska’s $500,000 permitting fee” because
state officials demanded participation in a spill response
group and the sign-up fee with Alaska Clean Seas had been
$500,000.

Alaska Clean Seas began offering an associate member-
ship, allowing companies interested in drilling to get
around the group’s $200 million net worth stipulation for
full members and pay a fee for an associate membership
for the duration of an exploration season which was far
less expensive.

**Eni buys Armstrong’s ANS assets**

In August 2005, the playing field on Alaska’s North
Slope changed again with Armstrong attracting yet another
larger oil company; this one a subsidiary of an Italian
mega-major.

Eni Petroleum Exploration Co. purchased Armstrong’s
Alaskan assets, which included 104 oil and gas leases
where the Houston-affiliate of Eni SpA said “reserves are expect-
ted to exceed 170 million barrels.”

The leases encompassed 341,900 gross (273,000 net)
square miles and extended offshore in state and federal
waters. As part of the deal Eni received Armstrong’s minority work-
ing interests with Pioneer and Kerr-McGee, including the
proposed Ooguruk and Nikaitchuq/Tuvaaq development
plan.

Although the terms of the deal were not disclosed,
Armstrong retained a royalty interest in all the leases it sold
to Eni.

Eni told Petroleum News Aug. 26, 2005, that it considered
the “North Slope and Beaufort Sea as areas with exploration potential for
new finds” and said Eni had “decided to establish a position in the area with an emphasis of con-
sistent growth.”

**Armstrong staying in game**

“We’re definitely not leaving Alaska,” Bill Armstrong
told Petroleum News after the announcement of its asset
sale.

“We were not capitalized enough to do the things our
North Slope partners Pioneer Natural Resources and Kerr-
McGee wanted to do. They’ve both been incredibly great
partners for us. It was important to me not to slow them
down and be a drag on development at Ooguruk and
Nikaitchuq, so we sold our assets to Eni,” he said.

Bill Armstrong said his company would stay in the state
and continue to put together exploration prospects in
northern Alaska.

“We still see huge opportunities on the North Slope. . . .
It’s a great place to be and it’s a great petroleum system.
There are certain things we’re pursuing. We’re really look-
ing forward to continuing our relationship with all the play-
ers on the North Slope and the state of Alaska,” he said.

**Track record of success**

Armstrong’s track record to date had been three out of
four — i.e. in three out of four North Slope prospects
explored by its first two partners, oil discoveries had already
been announced — first at Ooguruk by Pioneer in 2003
and then by Kerr-McGee at Nikaitchuq in 2004 and again
by Kerr-McGee in 2005 at Tuvaaq and nearby Kugan, a
well in the Kuparuk unit that essentially confirmed the
Tuvaaq discovery.

Bill Armstrong’s mantra in Alaska “smoother, faster, better,
cheaper: everyday that’s what we try to do.”

By mid-August 2005, well results were still being evaluated
from Kerr-McGee’s drilling of an exploration well at the fourth
prospect, Two Bits (also called Aтараçаq), but Armstrong eventually said it was not commer-
cial, a small blip in an otherwise amazing record of success.

**Armstrong heads south**

Keeping a close eye on his investments in the north, Bill
Armstrong returned to Alaska to actively work an oil and
gas prospect in another underexplored part of the state —
this time in Southcentral’s Cook Inlet basin, in which
exploration had nearly ground to a halt when the Prudhoe
Bay discovery had been announced in 1968.

Although activity eventually picked up in the basin, it
never reached its earlier intensity.

In September 2007, a local affiliate of the Denver inde-
pendent, Armstrong Cook Inlet, announced it had taken
over as operator of the onshore North Fork gas unit from
Gas-Pro. Leases in, and near the southern Kenai Peninsula
unit were transferred to Armstrong CI.

The natural gas field had been discovered in the 1960s
but never developed. After assembling a joint venture of
small independent companies, re-entering the discovery
well and drilling several new wells and building a pipeline,
Armstrong brought the unit into sustained production and
in 2013 sold it to Cook Inlet Energy LLC for nearly $65
million.

Anchor-based Cook Inlet Energy was a subsidiary of
publicly traded Miller Energy Resources of Tennessee.

**Armstrong back on North Slope**

Still bullish on North Slope oil, but continuing to com-
mercialize natural gas over a thousand miles to the south
in the Cook Inlet basin, on Oct. 22, 2008, an Armstrong affil-
iate accounted for 77 percent of the high bids in the state’s
areawide North Slope lease sale and 71 percent of the high
bids in the areawide Beaufort Sea sale.

The affiliate of the Denver independent, 70 & 148
LLC, picked up more than $200,000 in leases, its
unusual name the latitude and longitude coordinates for
the Prudhoe Bay discovery well.

Why that name?

“70 & 148 is a good name,” Bill Armstrong told Petroleum
News in an interview the day of the sale.

Why was the company back in northern Alaska?

“We’re much more bullish on oil than gas, so that’s one
of the reasons we are coming back to the Slope,” Bill
Armstrong said. “It’s a very forgiving petroleum system so
we like it. We’re glad to be back.”

Armstrong said he was also “bullish on oil prices,”
which he pointed out are “much better than when we first
see ARMSTRONG page 17
**Armstrong**

went to the North Slope” in late 2001. “Oil was at $15 a barrel back then, so even if the prices have dropped some recently, they’re still much higher than when we first went up there” ($62.80 a barrel for ANS crude on U.S. West Coast on Oct. 21, 2008, the day before the lease sale). Armstrong said he and his staff, which had grown “substantially” since 2005 when the company sold its oil and gas assets in northern Alaska, are “real excited” to be back “on the North Slope” and “looking forward to working with other leaseholders and operators in the Kuparuk River unit area,” such as “Conoco/Phillips, Pioneer Natural Resources, Eni Petroleum, Chevront and BP”. He said it would take “cooperation between all of us” to get the leases from the Oct. 22 sale explored and developed.

**Plan to be just as active as last time**

When asked if 70 & 148 planned any exploration work during the upcoming winter season, Armstrong said no. “This winter would be too quick for us. We have got to get leases issued, which takes seven to eight months,” he explained.

“But we don’t go into an area NOT to create activity. Our game plan is some variation of what we did before, which is to create a lot of exploration activity. That is good for everybody, including the state of Alaska,” he said.

First oil from the Oooguruk unit flowed to Conoco/Phillips facilities in June 2008, with Pioneer being the first independent to operate an oil field on the North Slope. In the meantime, Eni was building a standalone production facility for Nikaitchuq and Tuvaaq.

**Top bidder at 2009 North Slope sale**

Once again it was dei ja vu as the Division of Oil and Gas director read 93 bids for 80 tracts in the state’s 2009 areawide North Slope oil and gas lease sale on Oct. 28, 2009. Armstrong’s 70 & 148 dominated the sale, with high bids of $7.8 million on 68 tracts and 91.3 percent of the dollar value of all high bids.

70 & 148 took substantial acreage on the west and southwest side of the North Slope, extending a position the company established in 2008 to the west and south of the Kuparuk River unit.

Kerr told Petroleum News that with the acreage from the sale, the company’s Alaska oil and gas lease acreage now totaled some 475,000 acres, taking the list of state oil and gas lease acreage holders.

Kevin Banks, Division of Oil and Gas director at the time, told Petroleum News after the sale that Armstrong had historically done more than just acquire land.

**Placer**

Alaska independent would “re-evaluate and incorporate new seismic into our model to complete geological mapping of the area, perform reservoir engineering for reserves estimates, perform facilities engineering for a development plan, and perform economic evaluations with the goal to sanction the project development.”

Between September 2016 and September 2017, ASRC said it would conduct early development activities, using information from all three existing Placer wells to estimate the “extent, size and continuity of all producible reservoirs.” It would obtain information from the “CGG Tabasco 3D seismic” and merge the findings into other work. ARCO Alaska (now Conoco/Phillips Alaska) referred to the giant fields. With Armstrong in the early development plan, the company said it would improve the economics of other projects in the fairway, by improving the economics of other projects in the fairway, improving the economics of other projects in the fairway.

**Hunch confirmed?**

Although well results were scarce, the results were telling ASRC told the state.

A major point of contention between ASRC and DNR’s Division of Oil and Gas in previous years was how much acreage the company needed to explore the region.

When the company initially requested the unit in early 2011, it wanted to include four state leases covering some 8,769 acres. But later that year, the state approved a 1,480-acre unit covering portions of those leases — restricting the unit boundaries to the area immediately around Placer No. 1 location.

After reprocesping some seismic information over the region, ASRC asked the state to expand to unit to the original boundaries, arguing that any well drilled within the smaller boundaries would be a “twins” of Placer No. 1.

Several rounds of administrative decisions and appeals, the state ultimately approved the larger unit boundaries in late 2014. In early 2016, ASRC finally drilled and completed the Placer No. 3 well.

By saying the well “confirmed extension of the Placer reservoir beyond the central Placer No. 1 location,” the company was suggesting that it was justified in its request to include more acreage in the unit.

In addition to hinting at the reservoir size, ASRC provided another glimpse into its results by telling the state it intended to apply for the well to be certified as capable of producing hydrocarbons in purifying quantities, which can be used to extend certain leases.

When ASRC first took an interest in Placer, as part of an “apprenticeship” to learn more about Arctic oil and gas operations, the prospect was included in the Kuparuk River unit. Conoco/Phillips operated a two-well exploration program in early 2004 on behalf of a consortium of companies, including a 35.7 percent interest for ASRC. But the Placer No. 1 and No. 2 wells ultimately did not justify development. ASRC acquired the prospect through a state lease sale in 2006, after the leases were contractual from the Kuparuk River unit. By the time the company officially acquired the Placer No. 1 well in mid-2010, the leases were only a year from expiring. The original utilization request was an attempt to preserve the leases for exploration work.

**‘Billion-dollar fairway’**

The Placer unit is nestled between the Kuparuk River unit to the east and the Colville River unit to the west. ARCO Alaska (now Conoco/Phillips Alaska) referred to the region as the “billion-dollar fairway” because of the proven quantities of oil contained between the giant fields. In recent years, independent operators Armstrong Oil & Gas and BRPC have been pursuing the opportunities in that fairway. With Armstrong in the early development program at the south end of the fairway, the opportunity was not missed by the state of Alaska, which is to create a lot of exploration activity. That is good for everybody, including the state of Alaska, he said.

Historically they’re more than just somebody picking up a piece of ground. Obviously the exploration work they did at Oooguruk and Nikaitchuq led to producing oil fields,” he said.

A new approach to development

With Oooguruk development moving ahead as planned, Pioneer announced a new approach to developing the field in June 2009, a year after bringing it into production.

Pioneer planned to drill horizontal lateral wells in the second and third quarters of 2009 to fracture and stimulate the Nauquat formation, the deeper of the two Oooguruk pools.

Scott Shefllick, chairman and chief executive officer of the parent company, said Pioneer wanted to expand Oooguruk vertically by developing shallower oil deposits and horizontally by reaching farther into the land.

The differences between Eni and Pioneer, partners at Oooguruk, were important.

Pioneer was among the largest independents in the country, but still a small company by oil industry standards.

“Eni’s approach different

It wasn’t long before Eni bought out all of Kerr-McGee’s interest in Nikaitchuq, owning 100 percent of the field.

Under the agreement, the royalty rate on oil produced from several leases rose and fell on a sliding scale connected to the delivered price of Alaska North Slope crude oil. Up to an inflation-adjusted price of $42.54 per barrel, ENSI paid 5 percent royalties to the state. As oil prices increased, so did the royalty rate, topping out at 16.66 percent.

The state said yes.

The expanded Nikaitchuq unit protected more of the resource by utilizing boundaries that Eni said contained 180 million barrels of recoverable reserves from two formations, including one with heavier, and therefore more costly, oil.

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The original royalty rate attached to most leases in the

**Editor’s note:** Articles by Eric Laidig in Petroleum News were used to research this article.
OPPORTUNITIES FOR PROFITS IN ALASKA’S NEW OIL BOOM

Lesson learned? Build modules in Alaska

In January 2008, Eni sanctioned a $1.45 billion development plan for Nikaitchuq. Plans included a 3.8-mile subsea pipeline connecting the island to a processing facility at Oliktok Point capable of processing up to 10,000 barrels of fluid per day, and a 14-mile pipeline connecting that facility to the ConocoPhillips-owned Kuparuk network, which would in turn deliver the fluids to the trans-Alaska oil pipeline.

Eni ultimately asked for more time to develop Nikaitchuq. The state approved the request, but noted in its ruling that the company missed the window to barge “processing and operations modules” to the North Slope.

“A variety of factors, including but not limited to schedule delays, not meeting sealift deadlines, capital constraints and fabrication delays have caused Eni to change the pace of development for the Nikaitchuq unit from an accelerated pace of development to a more normal pace,” the company said in a plan of development filed in July 2009.

Production began from Oliktok Point on Jan. 31, 2011, just four days shy of three years after Eni sanctioned development.

Armstrong brings Repsol to Alaska

In early 2011, Armstrong snagged its biggest deal yet: Spanish mega-major Repsol as a 70 percent partner in the ConocoPhillips-owned Nikaitchuq unit and the Pikka unit along the Colville River Delta. Each of the exploration and development programs were becoming clear, Armstrong Director Ed Kerr said, “In 10 or 15 years people will talk about Repsol the same way they talk about BP and ConocoPhillips today, in terms of … contributing to Alaska’s economy.”

More detailed results

In mid-2015, the partners provided more detailed results for the first time. According to Armstrong, two wells from the winter exploration season of 2014-15 and two wells from previous seasons targeted the “East Alpine” field and “encountered oil productive Alpine sand in excess of 95 feet thick at a depth of 6,500 feet with porosities ranging from 15 percent to 25 percent. Well control and seismic data indicates the oil pool covers an area in excess of 15,000 acres.”

Another seven wells in the “Nanushuk reservoir” had “proven an oil pool that covers more than 25,000 acres, at a depth of 4,100 feet, with an oil column of 650-plus feet, and up to 150 feet of net pay with an average porosity of 22 percent.”

While the companies said they needed more wells to “confirm the ultimate size of some discoveries, this season’s (winter 2014-15) results justify moving forward with development,” according to Armstrong, which said the companies were permitting developments in the Nanushuk and Alpine.

Accelerating development

Armstrong had held a 45 percent interest in the exploration acreage and a 30 percent interest in the development acreage. Following restructuring, Armstrong had a 75 percent interest and operatorship in the exploration acreage and a 45 percent interest in the development acreage with an option to acquire another 6 percent and operatorship, which Armstrong quickly elected to take.

All 16 wells drilled found oil and most found oil in multiple zones, according to Armstrong. A third-party report from the engineering firm DeGolyer and MacNaughton provided reserve numbers.

In February 2016, Bill Armstrong told Petroleum News that the partners would accelerate development of their Pikka unit, with production by 2021. An early description calls for three gravel pads with standalone processing facilities and as many as 76 production and injection wells, in addition to associated infrastructure.
continued from page 1

BIDS

39,080 acres; Burgundy Xploration LLC, 279,360 acres; Caracol Petroleum LLC and TP North Slope Development LLC, 12,800 acres; and ConocoPhillips Alaska Inc., 146,600 acres.

Alliance, based in Nevada, is newly formed; Caracol and TP North Slope have small acreage positions. Accumulate and Burgundy are in the exploration stage on acreage south of current production; Armstrong is in the process of developing its Pikka unit and has extensive North Slope acreage; ConocoPhillips has extensive North Slope production and operates the Kuparuk River and Colville River units.

A Division of Oil and Gas map of tracts receiving bids shows small areas of acquisition in or near developed areas of the Slope, but the majority of activity is in the acquisition of three large blocks south of existing leased acreage. Burgundy Xploration was the most active bidder by tract, with apparent high bids on some 190 tracts. The company also bid in conjunction with Accumulate Energy Alaska on almost 100 tracts, with the company filling in large block positions to the southwest and southeast of acreage they already hold south of Great Bear Petroleum’s position. Accumulate Energy is a subsidiary of Australian-based 88 Energy Ltd. A Dec. 15 statement from 88 Energy said the net land position for Accumulate, assuming all of the tracts are taken, is now more than 400,000 acres, with a joint venture position, with Burgundy Xploration, of more than 690,000 acres.

The company said the upcoming lease No. 2 well will test the flow potential of the HRZ.

ConocoPhillips

While ConocoPhillips Alaska had fewer apparent high bids, it bid on 146,600 acres, more than Burgundy Xploration because fewer of Conoco’s bids were in the area where the state has broken traditional lease blocks into four parts.

In a statement provided by spokes-woman Natalie Lowman, the company said it was pleased with the results of the lease sales and with the acreage it picked up. In addition to bidding on state acreage, ConocoPhillips dominated BLM’s NPR-A sale.

“We’ll be evaluating our plans for this new acreage,” she said. “There are a number of factors that go into decisions on exploration, and we don’t discuss our exploration plans until they are confirmed.”

ConocoPhillips bid heavily in the area adjacent to NPR-A south of existing acreage positions, as did Armstrong Energy, with the two often bidding on the same tracts. ConocoPhillips was most often the apparent high bidder, but Armstrong did place the highest per-acre bid in the sale; $111.07 per acre, on tract 29R, a total bonus bid of $159,940.80, the division said.

Beaufort Sea

The state received eight bids on seven tracts, a total of 33,460 acres, in the Beaufort Sea areawide sale, with the highest bid, $50 per acre, submitted by Eni Petroleum US LLC for a tract on the northern edge of the Eni-operated Njekaitchaq field, a 1,280-acre tract with a total bid of $64,000.

The sum of apparent high bids for this sale was $257,430.80. The minimum bid per acre for the sale was $25.

Narwhal LLC, a new entrant, bid $25.06 an acre on six tracts on the northern and southeastern edges of a large block of existing Shell leases at Harrison Bay. According to state corporation records, Narwhal was formed in early December. The company’s agent is Jesse Mohltzheimer, president and CEO of SolstenXP, an Anchorage-based project management company whose services, as listed on its website, include exploration project management.

The six tracts on which Narwhal bid totaled 32,180 acres for which the company bid a total of $806,430.80.

One other bidder, Alaska LLC, an existing small leaseholder, was a competing bidder on the tract which Eni took, bidding $25.39 per acre.

NPR-A

The federal Bureau of Land Management received $18,813,588.93 in apparent high bids at its 2016 National Petroleum Reserve-Alaska lease sale, the 13th sale. BLM has held since 1993. Ted Murphy, BLM associate state director, said the agency received 92 bids on 67 tracts, with a total of $22,578,611.78 bid. There are 134 existing leases in NPR-A.

The NPR-A sale was dominated by ConocoPhillips Alaska Inc. ConocoPhillips bid on four tracts by itself but the majority of its bids, 61, were in partnership with Anadarko E&P Onshore, its partner at the Colville River unit.

Armstrong Energy took a single tract on the eastern edge of the sale and was apparent low bidder in four leases taken by ConocoPhillips and the ConocoPhillips-Anadarko bidding partnership, all on the eastern edge of the sale in an area formerly held by Repsol. ConocoPhillips and Anadarko appeared to be filling in a large block of available acreage between existing lease positions, moving west.

NordAq took a single tract adjacent to its existing acreage in mid-NPR-A.

BLM did not break out the per-acre bid amount at the sale.

NordAq bid $61,158.93 on the tract, there were no competing bids.

Armstrong Energy bid $216,229 on the single tract, there were no competing bids.

ConocoPhillips bid $1,293,665,65 for four tracts, and the bidding partnership of ConocoPhillips and Anadarko bid $17,240,536 on 61 tracts, 92 percent of the apparent high bids in the sale.

The minimum bids for the sale were $25 per acre for tracts designated as high potential and $5 per acre for tracts designated low potential.

By comparison, BLM drew six bids for its 2015 sale, all from ConocoPhillips, with a total bid of $788,680 and an average bid per acre of $31.91 for the 28,389 acres in those tracts.

Murphy noted that the state receives half of the revenues from NPR-A lease sales.

—A copyrighted oil and gas lease map from Mapmakers Alaska was used in preparing this story.
FIND continued from page 1

OPPORTUNITIES FOR PROFITS IN ALASKA'S NEW OIL BOOM

Nanushuk play

ConocoPhillips said that the discovery is in the Nanushuk formation, a part of the Brookian sequence, the youngest and shallowest of the major petroleum bearing rock systems on the North Slope. The two wells were each drilled to vertical depths of just over 4,200 feet.

During a talk at the Alaska Support Industry Alliance’s Meet Alaska conference on Jan. 13, 2017, Marushack said that the Willow discovery represents a new oil play for ConocoPhillips. As a follow-up to the discovery and as an avenue to pursuing the play, the company purchased neighboring acreage in the December 2016 state and federal lease sales: 65 tracts amounting to 594,972 acres in the federal sale, and 74 tracts amounting to 142,280 acres in the state sale. The federal tracts were purchased jointly with Anadarko Petroleum.

“We’ve got running room now to test that new play on state lands and onto federal lands,” Marushack said, also commenting that, although the play probably extends west from Willow, the play is blocked in that direction by land within NPR-A that has been withdrawn from oil and gas leasing by the federal government.

Major NPR-A step-out

Marushack said that Willow represents a major step-out from the company’s developments at Greater Mooses Tooth 1 and Greater Mooses Tooth 2. ConocoPhillips has teams working on figuring out the most appropriate development scenario for Willow, with a key decision revolving around whether the new field is developed as a satellite of the Alpine field, or whether the field will have its own standalone production facilities.

As a satellite field, production would probably be limited to some 40,000 or 50,000 barrels per day, while standalone facilities could enable that higher level of 100,000 barrels per day to be reached, Marushack said.

Following the drop in the price of oil in the past couple of years, ConocoPhillips has an annual capital budget of about $5 billion, with some $1 billion of that being allocated to Alaska, Marushack said. That Alaska spend supports developments such as the GMT-1 and GMT-2 projects, as well as supporting the company’s North Slope exploration efforts. But, if Alaska projects are delayed, the capital allocated to those projects will be diverted to projects elsewhere. In particular, Alaska, with its relatively high cost environment, now competes for investment dollars with shale oil developments elsewhere in North America, Marushack said, although Alaska remains the most profitable place that the company does business according to quarterly reports.

He said that ConocoPhillips had drilled 29 exploration wells in Alaska since 2000, about three-quarters of the exploration wells drilled in the state during that time period. However, the company did not drill any exploration wells between 2009 and 2013 because of the very high taxes in those years, he commented.

When it comes to developing Willow, Marushack said that the state provides much help with project permitting, including federal permitting. The company also works with the Alaska congressional delegation and with the Native communities.

“We’ve got this four or five pronged approach on how we are working the developments, and that’s what we need to do,” Marushack said.

More fields to come

ConocoPhillips’s newly announced Willow oil discovery in the National Petroleum Reserve-Alaska is the third recent major oil find in Brooklyn rocks near and to the west of the Colville River delta, near the Beaufort Sea coast, to the west of the central North Slope. The Brookian is the youngest and shallowest sequence of rocks in the petroleum systems of the North Slope.

Armstrong Energy partnered by Repsol E&P USA is planning an oil development involving a major find in the Nanushuk formation in the Pikka unit, to the east of the Colville River delta. And Cactus Energy has announced a huge oil find in the Torok formation, immediately below the Nanushuk formation, at Smith Bay, about 90 miles west of the delta. The Torok and Nanushuk are formations, Cretaceous in age, within the Brooklyn sequence.

Willow has its oil reservoir in the Nanushuk and seems closely analogous to Armstrong’s Nanushuk discovery.

Significant new play

Geologist David Houseknecht from the U.S. Geological Survey has seen these finds as part of a significant Brookian oil play that exists along the northern side of the North Slope, west from the Colville River delta area and particularly associated with the Nanushuk and Torok formations. The play is also associated with the Barrow Arch, a major, regional geologic structure that runs along the Beaufort Sea coast and is associated with most of the producing oil fields on the North Slope.

Houseknecht has suggested that the oil in the Brookian play has come from a source to the north, deep under the Beaufort Sea, with the oil flowing up the northern flank of the Barrow Arch.

Stratigraphic traps

Seismic data from the region suggest that the Willow oil lies in a stratigraphic trap, probably toward the base of the Nanushuk, rather than being trapped in a geologic structure, Houseknecht said. Oil flowing up the flanks of the Barrow Arch, either from the south or from the north, would tend to become caught in traps of this type in the Brookian, he said. That concept leads to the conclusion that there is likely to be a prolific oil play running east to west along this region of the northern North Slope and Beaufort Sea coast.

*Given the need to maximize the trans-Alaska pipeline throughput and to maintain a thriving contractor community, the legacy producers on the North Slope are happy to see more companies operating on the Slope, Marushack said.

see FIND page 22

see FIELDS page 22
PLAy

In late 2015, anxious to get on a fast track to development at Pdka, Bill Armstrong convinced Repsol to sell back partial interest in their shared North Slope leases, giving his company majority ownership and operational control. Repsol retained the right to take a minority percentage in any North Slope leases picked up by Armstrong in the future, which the company has exercised since that date.

Nobody has seen before

The most exciting news about the Nanushuk discovery was the fact it appeared to be a new play for the region west of the Kuparuk unit.

“Nanushuk is a new and different play for the North Slope, notable for even thicker pay than that discovered in the Alpine reservoir and at such a shallow depth (4,100 feet as compared to 6,500 feet),” —Bill Armstrong

The huge Nanushuk oil development being planned by Armstrong marks a sig- nificant bright spot amid the current gloom and the risk of low oil prices and declining Alaska oil production. But could this particular discovery turn into a new, unmitigated oil exploration play in Arctic Alaska, with the potential to bring many more barrels of oil to the northern end of the trans-Alaska pipeline?

In a talk at the Alaska Geological Society’s annual technical conference on April 22, 2016, U.S. Geological Survey geologist Dave Houseknecht, an established expert on Arctic Alaska petroleum systems, presented compelling evidence for looking into this new play possibility. Essentially, while rocks of middle Cretaceous age, including the Nanushuk formation, along the Beaufort Sea coast west of the central North Slope, have tended to play second to the Colville basin, the Nanushuk has revealed the possibility of major undiscovered oil resources along a fairway extending perpendicular to the trend associated with estuary-like conditions on the ancient landscape.

Dave Houseknecht

The three major North Slope source rocks of the region, the Nanushuk, Simpson and Foothills, have all lie in proximity to the Nanushuk 6 and Nanushuk 7.

DavE HOUSEKNECHT

Geologists have long considered the oil in the producing North Slope oil fields — in Prudhoe Bay and Kuparuk, for example — to have large reservoirs primarily from the south, where the oil source rocks have been buried relatively deep and have reached temperatures conducive to oil formation. The three major source rocks are the Triassic Shublik formation, the lower Jurassic Kingak shale and the lower Cretaceous Pebble shale/gamma ray zone (or GRZ).

But seismic data from surveys that cross the Beaufort Sea coast show those same source rock intervals dipping steeply to the north, under the nearshore waters of the

PLAY page 22

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In the area of the Colville basin a major geologic discontinuity called the lower Cretaceous unconformity, below the middle Cretaceous strata, slopes markedly upward from south to north toward the Barrow Arch. But the arilling of the basin by the sediment deposited from the west has resulted in the Nanushuk strata lying very flat from a north-south perspective. To the north of the Barrow Arch, on the other hand, the Nanushuk dips steeply northward into another basin, referred to as the Canada basin.

Myers remained intrigued by what he’d seen, but did not suspect that the Nanushuk reservoir was sourced from the north, from under the Barrow Arch, unlike the North Slope’s producing fields such as Prudhoe Bay, Kuparuk and others, which had been sourced from the south.

The Nanushuk is a new and different play for the North Slope, notable for even thicker pay than that discovered in the Alpine reservoir and at such a shallow depth (4,100 feet as compared to 6,500 feet). —Bill Armstrong

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OPPORTUNITIES FOR PROFITS IN ALASKA’S NEW OIL BOOM

CONTINUATION

The first to announce a major Nanushuk discovery and subsequent development plans, Bill Armstrong was pleased by ConocoPhillips’ Willow announcement.

“We are really excited about what we have found at Pikka and for what CP has found at Willow: Both discoveries are big and may give a lot bigger. Pikka and Willow could be the first of many, as they have revealed a new play type for the North Slope that should have lots of running room.”

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continued from page 20

FIND

Cost cutting

ConocoPhillips has driven down its costs in Alaska over the past couple of years. However, when compared with the flexibility of

GTM-2, which lies about eight miles farther into the NPA-R, is

Almost untouched

But, although the oil play along the middle Cretaceous shelf margin may extend nearly 100 miles west of the Colville Delta area, the play remains almost untouched, with only a handful of exploration wells penetrating it offshore. Wells drilled far to the west have demonstrated the pres-

Unit expansion approved

Pikka, which sits between the Colville River unit (Alpine and its satellites) to the west, the Oooguruk unit to the northeast and the Kuparuk River unit to the east, will during the development time included 33 state and joint state and Arctic Slope Regional Corps leases. But in 2016, Armstrong applied for 24 state leases to be added to the southern part of the unit the unit — 17 on the west side of the unit and seven on the east side. In its application Armstrong said that the expansion was needed to accommodate all of the wells specified in a plan of development filed in a permit application to the U.S. Army Corps of Engineers in June 2015. That expansion was approved in January 2017 by the state.

“We’ve got running room now to test that new play on real state and onto federal land.”

—ConocoPhillips Alaska President Joe Marushack

continued from page 21

2021

production rate as high as 250,000 bop/d under the possible contingent reserve.”

According to Armstrong, he and his partners have “multiple horizons” in the Pikka unit, and plan to “develop the Nanushuk and Alpine horizons, the biggest, at this time.”

Armstrong made “a major oil discovery in the Cretaceous Nanushuk formation, which they have encountered in seven wells,” Myers said, calling the discovery “amazing,” and “they have reported a very significant oil discovery in the Jurassic Apache sandstone, which…was encountered in four of their wells.”

The Nanushuk pool has a 600-foot-plus oil column and good porosity, he said.

According to News that the Nanushuk pool contained oil across a 25,000-acre area at a depth of about 4,100 feet, with 225 feet of net pay in the 650 vertical feet of reservoir rock.

Alaska conference on Jan. 13, Joe Marushack, president of ConocoPhillips Alaska, indicated that his company also believes that Willow forms part of a new oil play running east to west through the company’s leases in the northeastern NPA-R and some state lands.

By contrast, the nearby Alpine oil field and its attendant satellite fields have oil reservoirs in the older and deeper Beaufortian rock sequence.

Armstrong “excited”

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“We are really excited about what we have found at Pikka and for what CP has found at Willow: Both discoveries are big and may give a lot bigger. Pikka and Willow could be the first of many, as they have revealed a new play type for the North Slope that should have lots of running room.”

—ALAN BAILEY & KAY CASHMAN

continued from page 3

PLAY

The likely timing of oil generation also matches the possibility of oil migration into traps of Cretaceous age, he said.

In terms of the petroleum geology of the region, a series of steeply dipping geologic faults associated with the formation of the Canada basin could have impacted the preservation of oil source rocks and the ability of oil to flow from those rocks into the Torok and Nanushuk. But, while faults may play a role in trapping oil, some oil traps would be stratigraphic, caused by subsurface pinch outs of reservoir rocks, while other traps would involve a combination of structural and stratigraphic features, Houseknecht suggested.

Alaska conference on Jan. 13, Joe Marushack, president of ConocoPhillips Alaska, indicated that his company also believes that Willow forms part of a new oil play running east to west through the company’s leases in the northeastern NPA-R and some state lands.

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continued from page 20

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