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On the cover: Water is pumped onto the Arctic Ocean sea ice to thicken it and create an offshore ice road in January.

Photo by Judy Patrick

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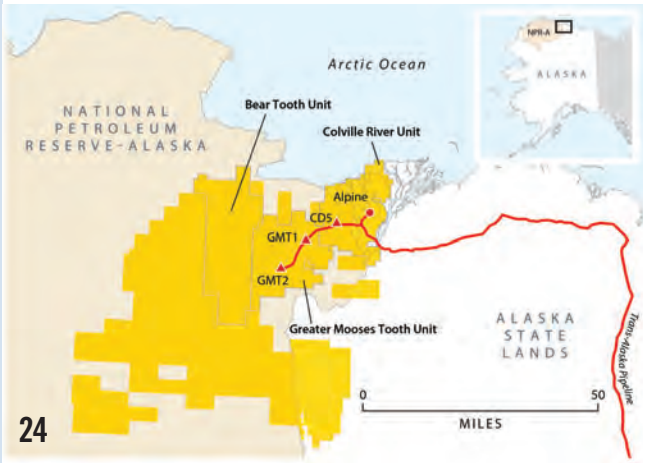

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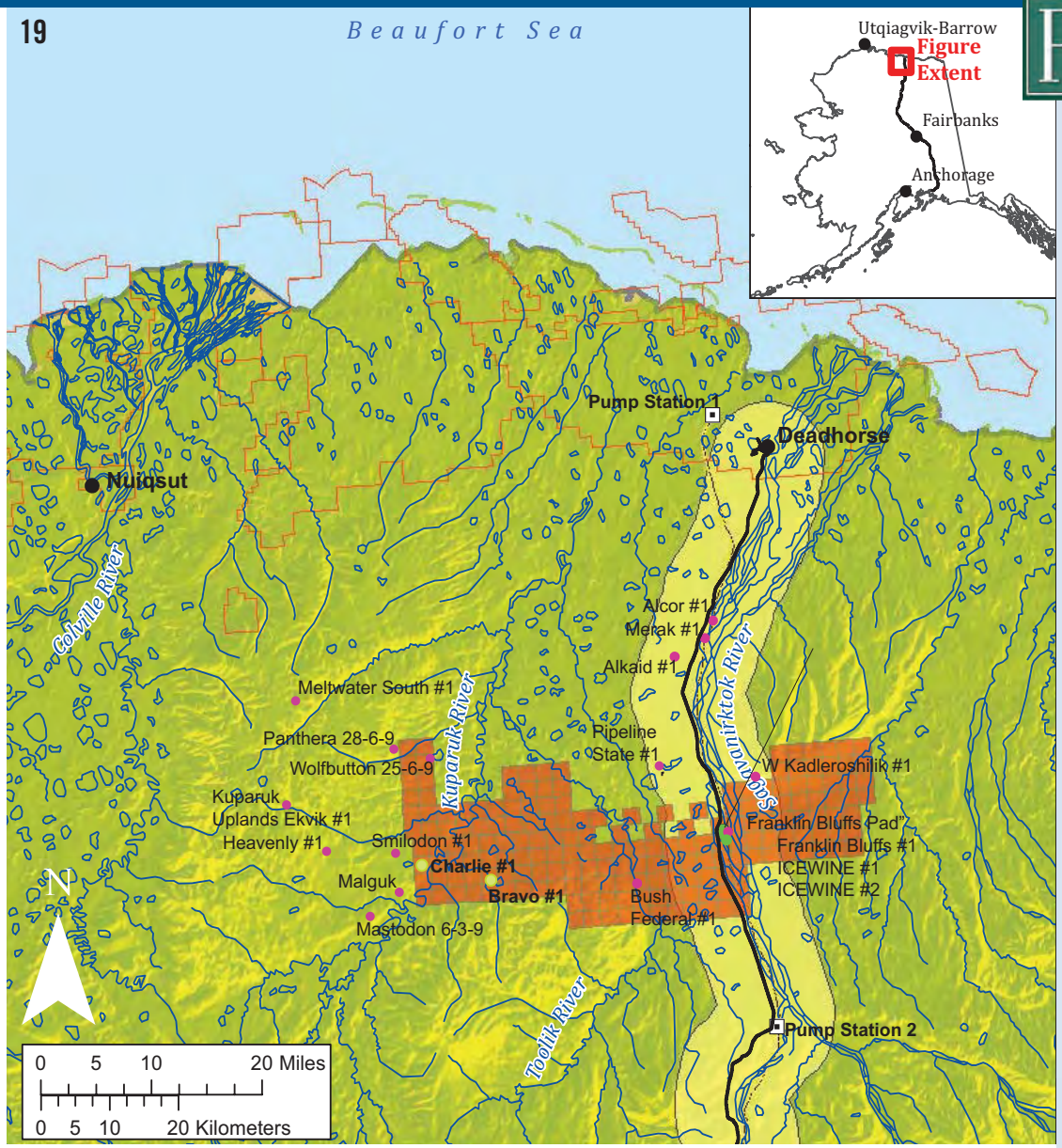

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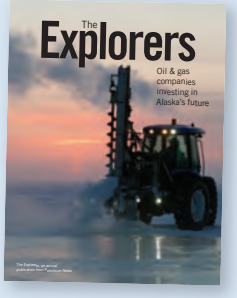

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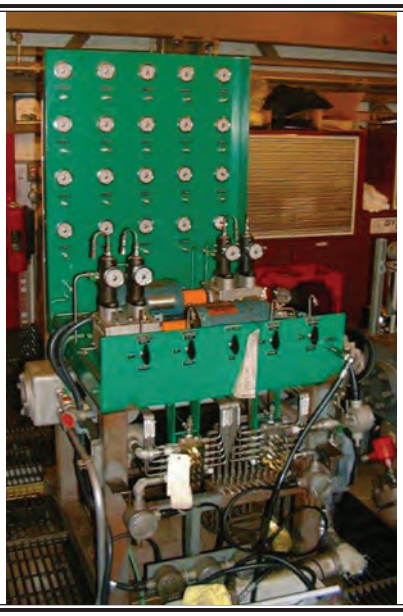

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Explorers at 20

Looking back at the first issue of the Explorers

By ERIC LIDJI
For Petroleum News

This is the 20th edition of the Explorers. The magazine started in 2002 as "The Independents" and expanded in 2004 into "The Explorers." We didn't publish in 2013, making this the 20th edition of the publication.

"The Independents" was a response to the Charter for Development of the Alaska North Slope. A wave of major mergers and acquisitions in the oil industry at the turn of the 21st century greatly impacted Alaska. To address concerns about consolidation on the North Slope, the State of Alaska signed a deal on Dec. 2, 1999, with ARCO Alaska and BP Exploration Alaska, creating a framework to open the basin to "independent" oil companies. Phillips Petroleum Co. later signed the deal when it acquired ARCO Alaska and then carried that commitment through its subsequent merger with Conoco Inc.

Among its terms, the Charter required the majors to provide facility and pipeline access at "reasonable" terms and to make certain seismic and well data available to third parties.

In those years, "independents" were generally small, privately held upstream companies looking to drill exploration wells in overlooked areas and hopefully bring fields into production. That first issue of "The Independents" profiled Winstar Petroleum LLC, led by legendary oilman Jim Weeks. Thanks to the terms of the Charter, Weeks expected Winstar Petroleum to become the first independent oil producer on the North Slope.

In looking through that inaugural issue, some notable facts emerge.

For one, only a few of those original independents still operate in Alaska.

Do you remember Andex Resources? Cassandra Energy? Evergreen Resources? Forest Oil? Northstar Energy Group? Pelican Hill Oil & Gas? UltraStar Exploration?

Even the bigger, international upstream "independents" like Anadarko Petroleum, EnCana Oil & Gas, Unocal and XTO Energy are all no longer operating in Alaska.

But some of those early independents hung on.

The 2002 issue includes a breaking news piece about a recent acquisition by Pioneer Natural Resources Alaska LLC, the Alaska subsidiary of a Texas-based independent. Over the next five years, Pioneer brought the Oooguruk unit into production, beating Weeks.

The issue also profiles Armstrong Oil & Gas Corp. and the Alaska Venture Capital Group. For more than 20 years, those two companies have been important voices for independent companies trying to find a way to explore and operate on the North Slope.

Independents have remained a foundational part of the exploration landscape, but the majors are still major in a basin that favors big companies with deep pockets. "The Independents" became "The Explorers," in part, to include ConocoPhillips, which has been the most dominant and consistent force in Alaska exploration over the past 20 years.

Some other changes since that first issue: improvements to horizontal drilling technology, the rise of the Nanushuk formation as a major play, expanded eastern North Slope infrastructure, the opening of the National Petroleum Reserve-Alaska, and the acquisition of BP Exploration Alaska's North Slope assets by the privately held Hilcorp Alaska LLC.

Another notable fact: the balance of projects listed in that original issue of the publication leans toward Cook Inlet. Today, exploration activity heavily favors the North Slope.

And while independents have been a crucial factor in that shift, the North Slope remains a difficult place for independents to operate. One of the unspoken themes in this issue of the Explorers is the ongoing challenge facing independents: getting facility access, getting financing and riding the inevitable wave of obstacles and delays on the North Slope.

In the past 20 years, only two independents — and only one of them a "small independent" — have brought North Slope fields from exploration to production: Pioneer Natural Resources and Brooks Range Petroleum Corp. Eni now operates the Oooguruk unit, and ConocoPhillips operates some of Brooks Range Petroleum Corp.'s acreage.

But despite the challenges, independent companies keep coming to the North Slope each winter, bringing with them employment opportunities, novel ideas, and new enthusiasm.

This issue includes profiles of six exploration companies: 88 Energy, ConocoPhillips, Eni, Great Bear Pantheon Hilcorp, and Jade Energy. Those companies are targeting plays with long histories, and so the issue also includes six articles looking at the backstories of various regions and trends: the "billion-dollar fairway" at the western end of the central North Slope, the "string of pearls" in the eastern North Slope, the rise of the Nanushuk formation, efforts to explore the Arctic outer continental shelf, exploration dreams in the foothills of the Brooks Range Mountains and similar hopes for Interior Alaska. ●

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Open for business

Alaska's stable financial and political environment plus longtime ESG partnerships mean strong investment opportunities

By CORRI A. FEIGE

Commissioner, Alaska Department of Natural Resources

Our resource development industry, and the corporate and financial investment needed to power it, is refocusing. Weighing environmental, social and governance, ESG, impacts is increasingly important, even as geopolitical events bring a focus back to energy security and producing energy here at home. Multinational investors are especially concerned about the impacts of development, and customers and consumers want to understand them.

We in government, and in industry, must be able to answer one fundamental question: Can we produce more energy, and export more energy to our allies, in a way that is sustainable? In Alaska, we know the answer is yes. In fact, our long history of success in each of these areas — environmental protection, social impact and fair governance — continues to improve.

CORRI FEIGE

ESG has been part of oil and gas development in Alaska since statehood. We pioneered many of these criteria before there were checklists or labels for them. Stipulations driven by state regulatory experts and local conditions, social license built on local values and consistent governance informed by local residents who live in the jurisdiction have all pushed industry in Alaska to be far more than a purely economic engine.

We have rigorous standards of review and compliance to encourage development while protecting our unique Alaska environmental and cultural values. In Alaska, ESG applies regardless of the area being developed or the size of the company. We see this focus on the North Slope, where Prudhoe Bay has been the modern anchor of our oil production, and we are pushing to attract investment for responsible exploration and development across the entire state. I, along with other state leaders, have been working to carry these messages to financial executives and policy leaders to educate them about all that we do in Alaska to achieve ESG success. Because of our commitment to protecting the environment (and corresponding improvements in technology and operations) we are confident we can continue this success as markets increasingly want to limit greenhouse gas emissions associated with secure, responsible U.S. — and Alaska — energy.

Environmental

Alaska has rigorous standards for environmental protection regarding methane emissions, with strict laws against waste. Venting of natural gas is not allowed, and flaring is also restricted, with strict reporting requirements and oversight. This stands in stark contrast to other development areas in North America and around the world. Fugitive emissions from well sites and infrastructure, which are also regulated in Alaska, are a concern in many places. In Alaska our producers are proactively monitoring and safeguarding against this form of waste.

For those of us who live in Alaska, the social benefits of resource development are apparent and abundant. Alaska's model for regulating and encouraging development has long been focused on local priorities and public involvement.

Alaska has also long worked to ensure surface impacts are minimized to the greatest extent possible. This is achieved through increasingly smaller development pads that occupy significantly smaller footprints. Today entire fields can be developed from just a few gravel pads with a total footprint of a couple dozen acres. Technology and a commitment to safe, optimized operations continues to reduce this impact, tighter wells spacings and advanced drilling rigs that can now reach over 200 square miles of subsurface reservoir from a single surface location.

Social

For those of us who live in Alaska, the social benefits of resource development are apparent and abundant. Alaska's model for regulating and encouraging development has long been focused on local priorities and public involvement. Local communities benefit greatly from development, especially on the North Slope, through job creation in the vicinity of their communities, support for social programs and charities, infrastructure development, and direct revenue via property taxes.

Development in the National Petroleum Reserve-Alaska and in the 1002 Area of the Arctic National Wildlife Refuge both hold continued promise for the social and economic benefits already seen on state lands of the North Slope. We see this as an important matter of self-determination for our local communities. The North Slope Borough and the Alaska Native Claims Settlement Act, ANCSA, corporations in the region know this well after decades of facilitating North Slope development.

On a statewide level, royalty revenues have a long history of funding Alaska's critical public services including education, critical infrastructure and social programs in what may be the country's most geographically unique and, in some regions, economically strained state. Alaska's unique sovereign wealth investments, via the Permanent Fund, also shares annual dividends with all Alaskans.

Governance

Alaska holds companies accountable. We are proud of attracting some of the most socially responsible energy companies in

the world. Alaskans expect companies to protect the environment and fully comply with regulation, but also to develop cultural ties with their community and give back through impactful corporate citizenship. Not only do these companies hire local Alaskans they also attract many non-Alaskans to work here and make their home here — many of whom become lifelong residents.

Alaskans also demand a high degree of transparency and opportunity for public input in our regulatory processes. Everything from land disposals to permitting is open to public input and, if necessary, adjustment to address concerns raised by the public. Any company hoping to operate successfully here must embrace a value system that respects and protects subsistence rights and practices, honors, and works in good faith with Alaska Native landowners. They hire Alaska companies, employ a local workforce that knows how to operate safely in our unique environment and adhere to the highest possible compliance with the state's regulatory system. Those that fail to respect this social compact simply do not last long up North.

Investment in Alaska is sustainable — economically and socially

As Alaska explorers and developers, you know that Alaska's geologic potential is immense. Our recent exploration successes — even in challenging markets — have confirmed this is truer than ever. And ESG goals are baked into our resource development DNA in Alaska, providing opportunities for companies to improve the ESG profile of their portfolio by operating in Alaska's unique setting.

In recent months, as the administration has worked to educate the financial community about how unique Alaska truly is, we found that some have policies against investing in Alaska resource development without knowing anything about our state — about us — or how we do business. They had no idea about how significant the social impact of oil and gas is to Alaskans, or how much we lose if development declines, or of the untapped natural resources still available. The anti-Arctic rhetoric is, in reality, anti-Alaskan, and we have taken steps to counter that perception. With Gov. Mike Dunleavy's leadership, we will continue to tell our story and keep our state strong for future generations.

Energy security and new energy horizons

International turmoil is driving demand for increased energy security, and for diversified sources of energy. Whether derived from fossil fuels or from renewable energy sources, both policy makers and consumers are pushing for cleaner emissions profiles for the energy they use. We believe Alaska is excellently positioned to produce traditional sources of energy, like oil and gas, with an increasingly smaller footprint, and to lead the way in the production of the next generation of clean fuels, such as hydrogen and ammonia thanks to our abundance of natural gas.

Alaska's basins could also become the premier location for carbon sequestration on the West Coast of North America. Carbon sequestration can increase the production and recovery for oil and gas reservoirs and extend the life of current infrastructure.

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FEIGE COMMENT *continued from page 11*

These are natural progressions from our longstanding focus on improving ESG performance, and exciting possibilities as industry in Alaska continues to grow and adapt.

Federal actions

Federal actions can have significant impacts on development of our resources, affecting Alaska's economy and our future. The current administration in Washington, D.C., has been taking a comprehensive approach to limit development on federal lands — despite the increasingly clear signals that these policies decrease both domestic energy security and our ability to support allies around the world, in addition to driving up consumer costs. This has largely been done through executive orders, secretarial orders and program reviews.

Because of this, our exploration and development projects have an uncertain future. This has cost hundreds of Alaskans their jobs because projects have been put on hold, possibly for several years. Materials and equipment lie unused. In the case of villages within the National Petroleum Reserve-Alaska, it has also delayed or even jeopardized the millions in anticipated annual revenues that are due to flow into the Impact Mitigation Grant Fund from production at projects like Willow.

But the state of Alaska is standing firm on asserting its rights through Gov. Dunleavy's Statehood Defense Initiative. We are pursuing litigation against the federal government in many areas related to resource development, such as the challenge to the federal leasing moratorium implemented on President Biden's inauguration. We participate in every public process we can related to federal regulatory rulemaking and policy changes that may negatively affect the resource development industry in Alaska.

We are optimistic about Alaska's future. We have a significant record of success to build on, and our state is well-positioned to succeed in a world with increasing needs for sustainable and responsibly sourced energy.

The future is strong for Alaska

Amidst the challenges of finding capital, federal regulatory interference and educating the markets about the actual ESG successes we see in Alaska, we have companies stepping up to the plate and seizing the opportunity to explore for resources in our great state. We are proud to have explorers like 88 Energy, ConocoPhillips, Eni, Hilcorp, Jade and Great Bear Pantheon who are actively exploring Alaska this year, and major new development projects, in Oil Search/Santo's Pikka and ConocoPhillips' Willow, that are continuing to progress.

We are optimistic about Alaska's future. We have a significant record of success to build on, and our state is well-positioned to succeed in a world with increasing needs for sustainable and responsibly sourced energy. This is even more clear now that we have all been reminded how critical energy independence — through reliable domestic production — is to our economy and national security. ●

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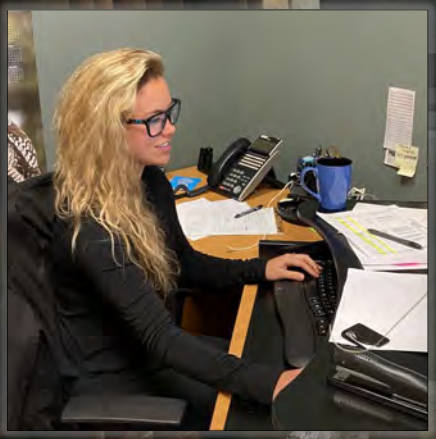

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Hunt for shallow oil on Alaska's North Slope

Bill Armstrong, state's most successful explorer for missed onshore oil fields, says ANS has largest clinoform system on planet; 94% drilling success in Nanushuk

By KAY CASHMAN
Petroleum News

On April 12, Petroleum News talked with Bill Armstrong about his plans for exploration in Alaska.

When he first arrived in Alaska more than 20 years ago, Armstrong predicted the "best days of Alaska oil and gas were yet to come" — a bold statement considering North Slope oil production was in decline, with the 800-mile trans-Alaska oil pipeline carrying half the oil it had at peak production in 1988.

Armstrong has since made believers of many Alaskans. He was responsible for the discovery of the North Slope Oooguruk field, Nikaitchuq field and the still expanding Pikka field complex which includes the Pikka, Horseshoe, Stirrup and Mitquq discoveries.


BILL ARMSTRONG

Through these exploration efforts Armstrong partnered up with multiple new entrants to the North Slope — Eni, Pioneer, Kerr McGee, Repsol and Oil Search (now part of Santos).

"The Nanushuk discoveries at Pikka were a big surprise to the industry as it was a shallow horizon in and amongst deeper developments in the Alpine and Kuparuk River field areas," Armstrong said.

"The size of the Nanushuk fields was the biggest surprise with several of the new fields estimated to be in excess of 1 billion barrels of recoverable oil."

Armstrong said the Nanushuk play is still in its infancy and Pikka-size oil discoveries are likely repeatable across Alaska's North Slope, stretching 350-miles from the western edge of the state near the Chukchi Sea, through the bourgeoning Pikka/Willow complex, all the way to the eastern edge of Alaska state lands.

Focused on two areas

Currently, Armstrong told PN, his Alaska companies are focused on two areas of the North Slope:

1. Going west from Pikka into the federal lands of the National Petroleum Reserve-Alaska, or NPR-A.

2. Extending the play to the east, Armstrong's Lagniappe Alaska controls a 340,000-acre position southeast of Prudhoe Bay, south of Badami and southwest of Point Thomson — see map in the pdf and print versions of this story. Lagniappe first began acquiring leases in November 2018 and now holds the 340,000-acre Lagniappe block 50-50 with Santos-owned Oil Search (Alaska).

Going west

Armstrong through his companies North Slope Exploration and North Slope Energy has acquired a million+ acre land position west of Conoco Phillip's Willow field in the NPR-A (all the leases are shared 50-50 with Oil Search).

> *The only oil plays globally that can compete with the North Slope's Nanushuk play in size "are in offshore deepwater plays … and … those plays are super expensive and some are technically challenged, whereas Alaska's North Slope shallow oil is onshore, near pipelines, and in the midst of infrastructure," Armstrong said.*

"All of these lands were acquired on seismic leads that are Nanushuk look-alikes to what has been found at Pikka and Willow. We have a high amount of confidence in what these large traps look like on seismic. The NPR-A is a huge area (roughly the size of the state of Indiana) with very little well control and not a lot of 3D seismic coverage;" something Armstrong feels is crucial in finding these fields.

"I would not be confident drilling a Nanushuk wildcat without 3D. But what we have seen on what little 3D data is available is extremely encouraging."

Armstrong is working on a yet to be announced project on a portion of his NPR-A acreage and is hopeful for drilling to begin next winter.

Expanding Pikka fairway eastward

Going east, Armstrong intends to drill the first wells in the Lagniappe block next winter or, at the latest, in the following winter.

"Our Lagniappe block is really exciting. The eastern play is also an extension of our Pikka play and, like moving west into the NPR-A, it is one of the most underexplored areas on the North Slope," Armstrong said.

"We have some 340,000 acres under lease, but the actual play is about 1,750 square miles and there is virtually no well control with only one well per 200 miles or so," he said. "None of these wells were targeting the Nanushuk as they were mostly drilled decades ago chasing Prudhoe Bay type ideas, but they all had indications of oil and gas in samples and, in some cases bypassed pay on logs. In a nutshell, it is wide fricking open," he said.

The limited well control along with high quality 3D seismic data is key to understanding the potential in the area.

The 850 square miles of recently reprocessed 3D seismic licensed over Lagniappe have helped Armstrong to identify multiple high potential targets with a similar seismic response to discoveries in the Pikka area. (The 3D seismic at Lagniappe is only a small portion of the greater than 5,000 square miles of 3D Armstrong currently

owns or has licensed across the North Slope).

"The geologic and seismic play concepts in our eastern acreage are very similar to Pikka;" he said, "onshore, large, aerially extensive stratigraphic traps, multiple potential pay zones, good gravity oil, reasonably close to underutilized existing infrastructure, no communities nearby, and no problems with road access. The targeted objectives are slightly younger than what we have near Pikka but with better porosity and permeability, even though they are slightly deeper."

North Slope best in world

The Nanushuk play on the North Slope is "undeniably the greatest onshore conventional oil play in the entire world," Armstrong said.

The only oil plays globally that can compete with the North Slope's Nanushuk play in size "are in offshore deepwater plays, such as Guyana (ExxonMobil, Hess, CNOOC), Suriname (Apache, Total) and the new Namibia discoveries (Shell, Total) and all of those plays are super expensive and some are technically challenged, whereas Alaska's North Slope shallow oil is onshore, near pipelines, and in the midst of infrastructure," Armstrong said, noting it is just a few miles from the Lagniappe block to the underused Badami processing facilities, which can handle some 35,000 barrels of oil per day.

"Alaska should be on every oil company's top burner as a place to be working," he said.

"The bottom line is Repsol and Armstrong found Pikka with the Qugruk 3 well drilled nine years ago. It was a big Nanushuk oil discovery. We knew that right away, but many people said, 'no way something of that size could be sitting undiscovered on the North Slope,'" he said.

"The system of clinoforms that stretch from the Chukchi on the west to the eastern boundary of the state is the largest on the planet. The only geologic analog for this system is the West Siberian Basin."

"We took a lot of slings and arrows, with people saying it couldn't be that big."

"We knew it was going to be big because we had the data, but people wanted proof, so we successfully stepped out to the north, and then to the south and then farther south and it kept getting bigger and bigger," Bill Armstrong said in the April 12 interview.

As time went by Armstrong and Repsol's doubters changed their tune as more wells were drilled. "When we drilled Horseshoe people started realizing what we knew from the start — that our Pikka field was huge. People looked at Horseshoe as a wildcat, but we knew it was 'just' a 20-mile, an almost unheard of extension, to what we'd found at Pikka," he said.

The Pikka Nanushuk find is now recognized as a continuous field that is 3.5 miles wide and 40 miles long.

"It is almost exactly the same size as the giant East Texas field (the second largest field ever discovered in the U.S. with an EUR of 5.4 billion barrels). East Texas is also a stratigraphic sandstone trap that pinches out from west to east — ours is a mirror image pinching out east to west and they're almost the same age. Oil field twins separated at birth," Armstrong said, describing the comparison as "geeky geologist talk."

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ARMSTRONG *continued from page 15*

Nanushuk has 94% success rate

"Ironically, the first oil field ever discovered in Alaska was a Nanushuk discovery at Umiat in 1946, but the field wasn't large enough to support such a large project in those days on the North Slope," Armstrong said.

"What we have found on Alaska's North Slope doesn't happen very often and that is a new play in an old province."

After finding the Prudhoe Bay field, "explorers looked for more big structures, Prudhoe lookalikes which they were unable to duplicate, and then they stumbled into the Kuparuk sands, and then they started looking for more Kuparuk fields. Next, they discovered Alpine field in the older Jurassic, and everyone then chased after Alpine," he said.

"Now, most of us are chasing the shallower Brookian plays, in particular the Nanushuk. Since we found Pikka, there have been 33 wells drilled that we know of that have targeted the Nanushuk topset play. Of those, 31 have been discoveries. That's a 94% success rate. There is not a play on the planet that has that high of a wildcat success rate," Armstrong said.

And those discoveries have tallied some 5-7 billion barrels of recoverable oil, he said, naming some of the largest discoveries: Pikka, Willow, Mitquq, Stirrup, Horseshoe and West Willow.

AVO technology

"The North Slope of Alaska is a huge sedimentary basin, yet it is very quiescent structurally. There is not a lot of faulting and not a lot of four-way closures — yet, it has these incredibly rich source rocks which have generated massive amounts of petroleum. The Prudhoe Bay field and to some degree the Kuparuk field are gentle structures, but most of the fields on the North Slope are stratigraphic traps," Armstrong said.

"Historically, chasing stratigraphic traps has not been easy," but a major factor in recent drilling successes, he said, is "the use of geophysical AVO technology which sees the change in seismic amplitude with offset. It is a version of bright spot technology that has been used successfully all over the world. Oil Search, Repsol, Armstrong and ConocoPhillips have recognized its value in targeting the Nanushuk across the North Slope."

"The proof is in the pudding," Armstrong said, "in the 31 out of 33 successful wells that have targeted the play."

COURTESY ARMSTRONG

"Since we found Pikka, there have been 33 wells drilled that we know of that have targeted the Nanushuk topset play. Of those, 31 have been discoveries. That's a 94% success rate. There is not a play on the planet that has that high of a wildcat success rate," Armstrong said.

Largest clinoform system on earth

Last year geoscientists from Armstrong Oil & Gas and Repsol USA published a paper in the American Association of Petroleum Geologists, or AAPG, "Giant Field of the Decade: 2010-2020" with comprehensive information about the discovery and the geologic and geophysical characteristics of the Pikka field.

The authors of the paper point out that several exploratory wells near Pikka happened to be drilled at locations that just missed the huge Nanushuk oil pool. In addition, the Pikka discovery lies below the Colville River flood plain, a factor that renders seismic surveying in the area especially challenging.

The paper said seismic data, in combination with existing well data, demonstrated that sands of the Nanushuk had been laid down as a series of bodies across and down the upper edge of the shelf of an ancient marine basin. The flow of sediments from the west into the basin caused the shelf margin to progressively move towards the east, leaving in its wake a series of sigmoidal "clinoforms," consisting of sand bodies dipping towards the east and elongated in a north-south direction.

"The system of clinoforms that stretch from the Chukchi on the west to the eastern boundary of the state is the largest on the planet. The only geologic analog for this system is the West Siberian Basin, which is one of the largest and most prolific hydrocarbon basins in the world and has more than 100 giant fields," Armstrong said.

Per the U.S. Geological Survey, discovered hydrocarbons in the West Siberian Basin are 144 billion barrels of oil and more than 1,300 trillion cubic feet of natural gas. The assessed mean undiscovered resources are 55.2 billion barrels of oil, 642.9 trillion cubic feet of gas, and 20.5 billion barrels of natural gas liquids.

"The comparison bodes well for the future of North Slope exploration," he said. "There is no conventional onshore oil play in the world that has the type of potential that still exists on the North Slope. These massive shallow oil targets more than offset the Alaska challenges of weather, infrastructure access, funding issues."

Also, Armstrong noted, "the North Slope is one of the cleanest, most environmentally friendly, lowest carbon intensive oil production provinces in the world. A lot to like." ●

Contact Kay Cashman at publisher@petroleumnews.com

Nanushuk keeps hope alive

Ten-years in, Nanushuk formation remains a bright spot for explorers

By ERIC LIDJI
For Petroleum News

Of all the exploration trends on the North Slope over the past two decades — the rise of independents, the shifting fortunes of offshore drilling, the promise of source rock development — none has been as immediately consequential as the Nanushuk formation.

The formation is responsible for the biggest North Slope discoveries in the past seven years. And unlike major discoveries locked in remote corners of the basin, several Nanushuk discoveries are located amid the thicket of North Slope infrastructure. Some of those initial Nanushuk discoveries have already moved into development and production.

In early 2016, toward the beginning of the Nanushuk era, legendary North Slope oilman Bill Armstrong described the Nanushuk as "a new and different play for the North Slope." The significant detail was the geology: thicker pay at shallower depths.

"That's what makes it so exciting," Armstrong explained. "Nobody has seen this formation productive in this depositional environment before. You look at how thick it is, how good the oil is, how good the reservoir is — it all bodes really well for the play."

Soon government officials and scientists were joining the enthusiasm, expressing hope that the Nanushuk formation could rejuvenate the industry and fill the pipeline. The play is so hot that Shell Offshore Inc. recently requested to change its plan of exploration for its Beaufort Sea leases to target the Nanushuk, rather than the Torok — even though the company is actively looking for another company to oversee its exploration venture.

Pikka, Horseshoe, Quokka

The Nanushuk era began when Armstrong Oil & Gas partnered with Spanish major Repsol starting in 2011 for an exploration program focused on the billion-dollar fairway — the swath of land between the Kuparuk River unit and the Colville River unit.

The Nanushuk era began when Armstrong Oil & Gas partnered with Spanish major Repsol starting in 2011 for an exploration program focused on the billion-dollar fairway — the swath of land between the Kuparuk River unit and the Colville River unit.

The first big announcement from that effort was the Pikka discovery in 2014 and 2015. The companies reported proven contingent oil reserves of 497 million barrels, probable contingent reserves of 1.4 billion barrels and possible contingent reserves of 3.7 billion barrels. Armstrong estimated that the Pikka field could produce 120,000 barrels of oil per day at its peak — capable of increasing throughput in the trans-Alaska oil pipeline by nearly 25%.

Pikka generated considerable interest but was quickly overshadowed by the Horseshoe discovery farther to the south in 2017, following an administrative reshuffling that put Armstrong in charge. Horseshoe was billed as the largest conventional domestic onshore oil discovery of the last 30 years — some 1.2 billion barrels of recoverable oil.

Armstrong eventually brought Oil Search to Alaska. The company now operates the Pikka unit, recently received state approval to form the Horseshoe unit, and is waiting to hear on a similar request to form the Quokka unit — all three targeting the Nanushuk.

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ARMSTRONG *continued from page 17*

Tulimaniq

In early 2016, Caelus Energy Alaska LLC announced the Tulimaniq discovery, estimated at 6 billion to 10 billion barrels of oil in place in Smith Bay, off the northern coast of the National Petroleum Reserve-Alaska. The discovery is in the Torok formation, which is present throughout the region and is associated with the Nanushuk formation.

The Talisman-subsidiary FEX commissioned a 3D seismic survey in Smith Bay in the 2000s but never drilled. NordAq Energy Inc. later acquired the acreage and initiated permitting activities and early field work but also never advanced the project to drilling.

Caelus acquired a majority interest in the prospect in 2015 and launched a two-well exploration program the following year. The company expected to find a 1 billion barrel field but significantly underestimated, instead finding six to 10 times that amount — one of the largest discoveries in North Slope history. But the project also had big costs. Caelus estimated it would take $8 billion to $10 billion to develop the area.

The company was also working at the time on the Nuna prospect. Nuna is a nearshore satellite of the Oooguruk unit and also located in the Torok. The two plays had some symbiosis, providing insight on well design and other engineering matters.

By early 2019, though, Caelus was "winding down" its Alaska operation. It began looking for a partner to join on a 2021 appraisal program in Smith Bay. Smith Bay Company Alaska eventually acquired the prospect. The company has said it intends to conduct appraisal activities, including unitization and additional drilling as early as 2023.

Willow, Narwhal

ConocoPhillips joined the Nanushuk trend in early 2017 when it announced the Willow discovery, some 300 million barrels at its Bear Tooth unit in the NPR-A. The company later increased the estimate to 586 million barrels with potential production in the range of 160,000 barrels per day. And officers described a sequence of potential lookalike fields across the region that could provide opportunities for decades to come.

But as it proceeded with the project, ConocoPhillips soon faced challenges from environmental groups that challenged the legal validity of the Willow environmental impact statement. Now the project is on hold while the company decides its next move.

At the same time, ConocoPhillips began pursuing a Nanushuk play at the Narwhal prospect (also known as Putu, Titania or Tofkat) south of the Alpine field. The company announced a discovery between 100 million and 350 million barrels of oil equivalent.

Given the proximity to Alpine, ConocoPhillips was able to utilize the nearby CD-4 pad, using extended reach drilling to bring the field into production in late 2021.

Placer, Merlin

The promise of the Nanushuk formation has also attracted new players and reimagined old plays. ASRC Exploration came to believe that its Placer prospect contained some promising leads in the Nanushuk. 88 Energy was one of the bright spots on the exploration calendar this past winter with its Nanushuk play, called Merlin. ●

Contact Eric Lidji at ericlidji@mac.com

88 Energy faces disappointment with ambition

Small independent with multiple subsidiaries exploring four varying prospects

By ERIC LIDJI
For Petroleum News

88 Energy Ltd. is a small company with a big reach. An Australian independent with numerous Alaska subsidiaries, the company arrived in the state in late 2014 and is pursuing four projects across the North Slope. The projects are located in different parts of the basin and face different exploration challenges.

Project Peregrine and Project Umiat are adjacent to each other in the National Petroleum Reserve-Alaska, an area known to contain considerable reserves but long hampered by distance from infrastructure. Project Icewine is in the central North Slope south of the Prudhoe Bay unit. It contains conventional and unconventional prospects. Project Yukon is on the eastern North Slope near the border of the Arctic National Wildlife Refuge, a region becoming increasingly attractive due to recent infrastructure projects in the area.

ASHLEY GILBERT

ERIK OPSTAD

Under the name Tangiers Petroleum Ltd., 88 Energy originally pursued oil and natural gas prospects offshore Morocco and both onshore and offshore Australia. Following a pivot, the independent 88 Energy Ltd. now oversees four Alaska subsidiaries: Emerald House, Accumulate Energy Alaska, Captivate Energy Alaska and Regenerate Alaska.

This winter, the company drilled the Merlin No. 2 appraisal well at Project Peregrine. It also pursued partnership and farm-out opportunities in all three of its project areas.

Early results from Project Peregrine were disappointing. In late March 2022, with logging nearly complete at Merlin No. 2, 88 Energy said that the "reservoir quality at this location is insufficient to warrant a production test." The company said it would "assess the merits of a future 3D seismic acquisition program to better identify … future drilling locations to optimally test and determine the potential commerciality of the Peregrine acreage."

Project Peregrine

The largest investment in the 88 Energy portfolio this year comes at Project Peregrine, an oil prospect in the southeastern corner of the National Petroleum Reserve-Alaska.

The project began in 2019, when XCD Energy announced plans to pursue the Merlin prospect at Project Peregrine. The small independent brought the project to the North American Petroleum Expo in early 2020 in the hopes of finding farm-out partners.

With the arrival of the pandemic soon after, the company suspended those plans.

Soon after, 88 Energy acquired XCD Energy. By summer, the company was planning a two-well exploration program at Project Peregrine. The project encompasses a package of federal leases covering 195,373 acres between the Umiat and Willow prospects. Project Peregrine currently includes two prospects: Harrier in the north and Merlin in the south.

88 Energy acquired the initial acreage in mid-2020 through an off-market takeover of XCD Energy and secured a farm-out partner for the project toward the end of the year.

The company identified three prospects at the leases: the Merlin and Harrier prospects in the Nanushuk formation and the Harrier Deep prospect in the Torok formation.

The Nanushuk targets are around 5,000 feet deep and are considered analogs to ConocoPhillips' large Willow discovery. The Torok target is around 10,000 feet deep.

The 88 Energy subsidiary Emerald House drilled the 5,267-foot Merlin No. 1 well in early 2021 using All-American Rig 111 — an innovative decision for the region.

One of the biggest challenges of exploring the NPR-A is infrastructure. Only a small section of a massive area is easily accessible through existing roads. Building long ice roads increases the cost of exploration, which hampers the economics of projects.

All-American Rig 111 allowed 88 Energy to sidestep that infrastructure challenge. The company was able to save time, and reduce the cost of the project, by transporting relatively light and portable rig in parts over snow trails, rather than building ice roads.

Merlin No. 1 encountered oil in "multiple stacked targets" of the N20 and N18 intervals of the Nanushuk, according to 88 Energy. The well also noted a "hydrocarbon signature" in the N19

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NAME OF PARENT COMPANY:
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NAME OF ALASKA COMPANY:
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COMPANY WEBSITE: www.88energy.com

88 ENERGY *continued from page 19*

interval. The well logged 41 net feet of pay across the three intervals. An analysis of extracted fluids estimated oil quality between mid-30s and low-40s API.

According to 88 Energy, the well proved the "petroleum system and primary targets" of the program. The results encouraged the company to return this year to drill Merlin No. 2.

The Merlin No. 2 appraisal well is east and downdip from Merlin No. 1. The approximately 8,000-foot Merlin No. 2 well is targeting an estimated 652 million barrels of oil in three zones in the Nanushuk formation identified during Merlin No. 1 drilling.

The Merlin No. 2 project used the Arctic Fox rig — a bigger rig for a deeper well, although Emerald House was still able to use a single-land snow road for transportation.

The results of Merlin No. 1 also suggested the value of drilling a Merlin 1A sidetrack to target a deeper target. The proposed 6,000-foot sidetrack would target the N14 interval.

The proposed Harrier No. 1 well would provide further information about those deeper targets by pursuing the N15 and N14 North intervals to the north of the Merlin wells. The company postponed the well over political uncertainty following the presidential election.

In early 2021, 88 Energy also acquired the Umiat prospect. The oil prospect sits immediately south of Project Peregrine but is considered a separate venture.

If the company were able to successfully bring either Peregrine or Umiat into production, it would immediately improve the economics of both projects, especially if the company were able to justify permanent infrastructure such as a pipeline or a long-haul road.

Following the Merlin No. 2 results, Managing Director Ashley Gilbert said in a statement, "We appreciate that this result will be disappointing news for shareholders, in particular that we were again unable to obtain a fluid sample at surface or perform a flow test. However, we will now take the necessary time to fully analyze the data from the Merlin 2 well. This will provide a basis upon which the company can provide further updates on the future potential appraisal program for the Project Peregrine acreage."

Icewine

The Icewine project is the second wave of source rock exploration on the North Slope.

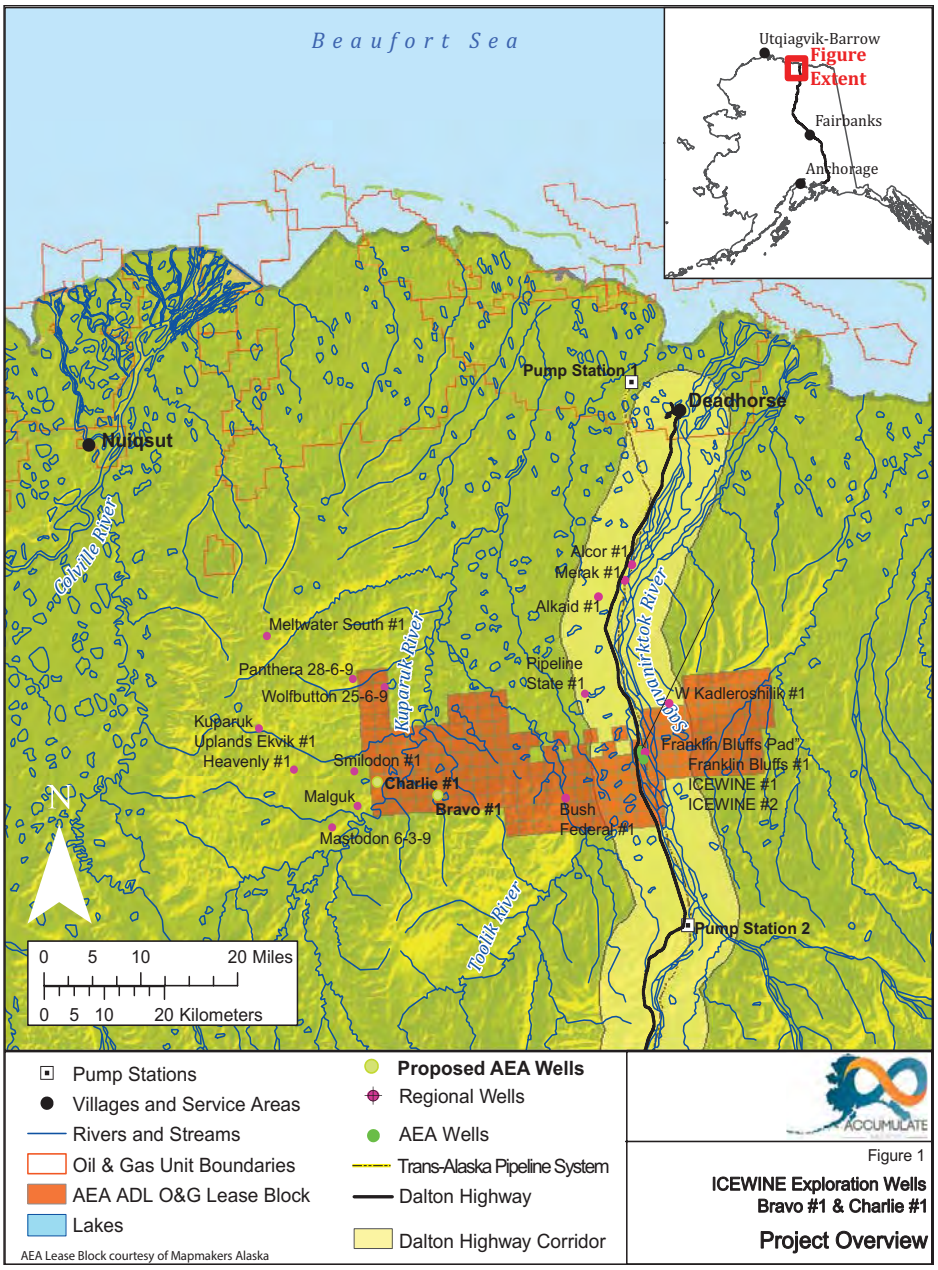
The first wave began a decade ago, when Great Bear Petroleum surprised the industry by acquiring some 500,000 acres in the central North Slope and announcing a paradigm-shifting campaign to employ dozens of rigs drilling thousands of wells year-round.

That dream persists through the efforts of Great Bear Pantheon, although the strategy has now shifted to include a significant conventional exploration program in the near term.

88 Energy arrived in Alaska in late 2014 through an agreement with Burgundy Xploration to acquire 87,000 acres in the central North Slope south of Prudhoe Bay.

The Icewine project is just to the south of the Great Bear Pantheon leases. 88 Energy currently holds some 193,000 net acres in two blocks along the Dalton Highway.

To date, 88 Energy has acquired 2D and 3D seismic over the leases and drilled three wells. Icewine No. 1 and Icewine No. 2 were unconventional wells on the eastern block, which straddles the Dalton



The largest investment in the 88 Energy portfolio this year comes at Project Peregrine, an oil prospect in the southeastern corner of the National Petroleum Reserve-Alaska.

Highway. Charlie No. 1 was a conventional well on the western block and discovered condensate. The results of Great Bear Pantheon's Talitha A well to the north have the potential to extend the Icewine leases, according to 88 Energy.

The Icewine project began in 2015 as a joint venture between Burgundy Xploration and the 88 Energy subsidiary Accumulate Energy Alaska. Each of the companies had acquired exploration acreage in the Franklin Bluff region in the preceding years.

Accumulate Energy Alaska drilled the 11,600-foot Icewine No. 1 well in late 2015 from the Franklin Bluffs pad, adjacent to the Dalton Highway. The well targeted unconventional prospects in the HRZ shale and also conventional Kuparuk prospects.

The joint venture planned to return to the Icewine project to drill a lateral with multistage fracturing to provide points of comparison to Icewine No. 1. But after reviewing results from a $3 million 2D seismic acquisition, the company decided to drill, hydraulically fracture and flow test the 11,450-foot Icewine No. 2 vertical well in early-to-mid 2017.

The seismic also identified some 20 conventional prospects in the Brookian. Following the Icewine program, 88 Energy began investing in the prospects in its block of leases west of the Dalton Highway. The company commissioned a 3D seismic survey and began permitting the proposed 11,000-foot vertical Bravo No. 1 and Charlie No. 1 wells.

88 Energy drilled the 11,112-foot Charlie No. 1 well in early 2020. The well penetrated several conventional targets, as well as the HRZ shale. The company announced a large oil accumulation in the Seabee formation and a condensate discovery in the Torok.

88 Energy never drilled the Bravo well, but it later acquired 10 leases in the nearby Heavenly prospect from Arctic Slope Regional Corp. The leases were associated with Phillips Petroleum's Heavenly No. 1 discovery well west of White Hills in 2002.

In a 2019 investor presentation, 88 Energy said that a Torok discovery at Heavenly contained as much as 120 million barrels of oil — with a low of 22 million barrels, a gross mean of 68 million barrels and a net mean to the company of 58 million barrels.

Project Yukon

As work was underway at Icewine in 2017 and 2018, 88 Energy acquired a package of leases at the Yukon prospect on the eastern North Slope near the border of ANWR.

The company has 100% working interest in some 38,681 acres in the area through its subsidiary Regenerate Alaska. The leases include the Yukon Gold No. 1 discovery well, drilled by BP in the early 1990s.

The company has 100% working interest in some 38,681 acres in the area through its subsidiary Regenerate Alaska. The leases include the Yukon Gold No. 1 discovery well, drilled by BP in the early 1990s. 88 Energy acquired 3D seismic over the acreage in 2018 and added a tract in early 2021. Now, it's looking for nearby joint venture partners.

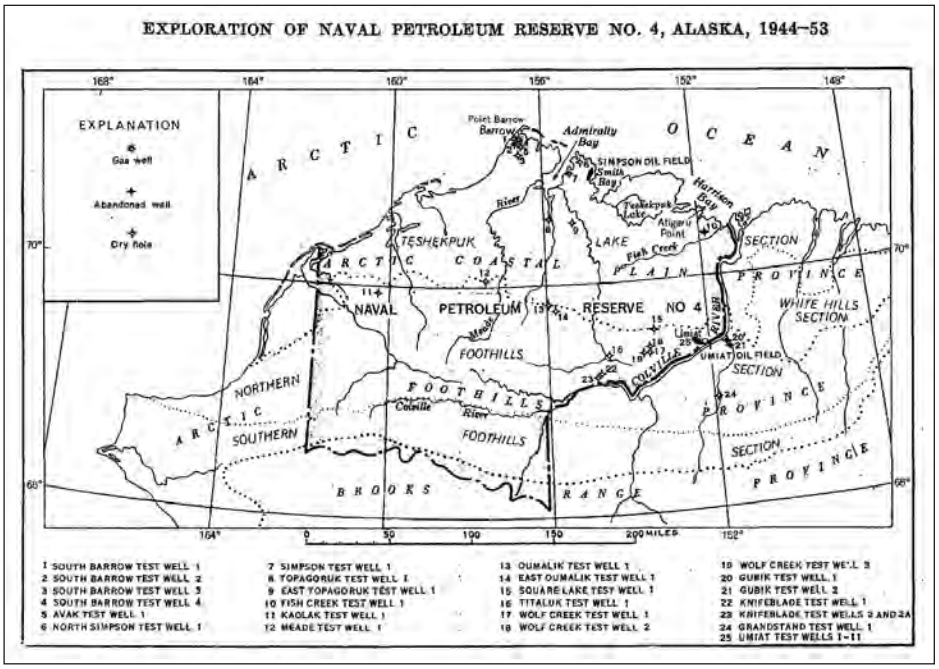
88 Energy estimates that the acreage contains some 90 million barrels of prospective resource and believes there is an opportunity to utilize new Point Thomson infrastructure. ●

Contact Eric Lidji at ericlidji@mac.com

The perpetual allure of the foothills

Just north of the Brooks Range are known reservoirs, always a bit beyond reach

By ERIC LIDJI
For Petroleum News



DEPARTMENT OF THE INTERIOR

The U.S. Navy discovered the Umiat oil field in 1946, during a post-war exploration campaign in the National Petroleum Reserve-Alaska to increase domestic oil supplies.

There's an old oil patch quip with a lot of truth to it. It goes like this: You don't need to drill wildcats to find oil. You just need to look for the most inconvenient places on earth to operate, and that's most likely where you'll find oil.

You can apply that logic to the foothills of the Brooks Range.

Here is a region split between state, federal and Native land management, in a corner of Alaska with continuous permafrost and complex geology, more than 80 miles from the Dalton Highway and related pipeline infrastructure. And sure enough, it contains one of the largest known yet undeveloped oil fields in the state and an undeveloped natural gas field once thought to be large enough to provide a path toward Alaska statehood.

These oil and natural gas prospects have thwarted developers for more than 75 years, since the federal government began exploring the region in search of strategic reserves after World War II. And yet, every few years, advances in technology and changes in oil prices convince new players to bring new enthusiasm to the region, despite setbacks.

The remoteness of the region also makes it a perfect test case for a perennial debate: should governments build speculative infrastructure to reduce industry costs? On several occasions over the past few decades, the State of Alaska has evaluated major road and pipeline initiatives to the foothills region in the hopes of encouraging development.

Umiat

The U.S. Navy discovered the Umiat oil field in 1946, during a post-war exploration campaign in the National Petroleum Reserve-Alaska to increase domestic oil supplies.

The Navy had drilled 11 wells by 1952 followed by a deeper test well drilled in 1979.

Industry mostly ignored the distant region throughout the 1980s and 1990s. The majors were fully occupied with North Slope giants, and the independent era had yet to begin.

In the early 2000s, private companies including Arctic Falcon Exploration, Renaissance Alaska, and Rutter and Wilbanks began taking an interest in the Umiat oil field, although none were able to advance the project beyond some eager and well-intentioned sniffing.

Renaissance Alaska proposed an eight-well exploration program at Umiat in 2008. But it postponed the program due to a shortened travel season and was never able to return.

The Australian independent Linc Energy Ltd. acquired Renaissance in June 2011. Things looked promising. Prices were high, a state-backed road was progressing, and improved technology was suggesting new ways to overcome the difficult geology of the region.

But low snowfall again complicated logistics, forcing Linc to scale back its plans.

Even so, Linc moved the project forward for the first time in decades.

The vertical Umiat No. 18 well collected 300 feet of core and encountered 100 feet of net pay in the Lower Grandstand in early 2013. Mechanical problems prevented a flow test.

Using chilled drilling mud to prevent permafrost from thawing in the shallow reservoir, and employing an open-hole completion design, Linc drilled the 4,100-foot Umiat No. 23H well in early 2014. It was the first horizontal well ever drilled at the field and the first successful flow test at the field in decades. The well produced at a sustained rate of 250 barrels per day and a peak rate of 800 barrels per day, according to the company.

Linc proposed various development strategies for Umiat. The most ambitious plan called for drilling as many as 150 development wells from 13 drilling pads as

early as 2021.

A decline in oil prices around that time left Linc overexposed in Alaska. The company filed for bankruptcy protection in 2016 and subsequently sold its Alaska assets.

A company called Arctic Acquisition Inc. grabbed Umiat with an $80 million credit bid and handed over operatorship to Malamute Energy Inc. Malamute Energy spent several years de-risking the property before selling it to the 88 Energy subsidiary Emerald House.

The acquisition includes some surrounding leases, and Emerald House is beginning its exploration at the Merlin prospect immediately north of the previous Umiat drilling.

Gubik

During the record price spikes of the mid-2000s, Anadarko Petroleum Corp. pursued an even more logistically challenging project in the foothills: the Gubik Complex.

Based on results from a pair of exploration wells in the early 1950s, the U.S. Geological Survey estimated that the Gubik gas fields contained 600 billion cubic feet of natural gas.

The large Texas independent acquired more than 3.3 million acres in leases across the foothills region in 1998 and created a joint venture in 2007 with three partners.

Anadarko eventually drilled four historic wells in 2008 and 2009, the first exploration wells in northern Alaska to explicitly target natural gas instead of oil. The project stunned and thrilled policymakers, who saw it as a sign that Anadarko was expecting a gas line.

The goal was to prove up several relatively smaller natural gas fields capable of justifying development as a group. And while all four wells encountered natural gas, including one well flowing at 15 million cubic feet per day, the general lack of progress on a North Slope natural gas pipeline in the region dimmed Anadarko's enthusiasm for the project.

The company eventually dropped the project and then gradually withdrew from Alaska entirely, aside from retaining its non-operating minority in several North Slope fields.

Infrastructure

These foothills exploration efforts have often inspired infrastructure ideas.

Gov. Wally Hickel proposed major road projects as a way to spur economic development. Gov. Frank Murkowski created the "Roads to Resources" program to direct state dollars toward transportation projects designed to encourage development.

Based on results from a pair of exploration wells in the early 1950s, the U.S. Geological Survey estimated that the Gubik gas fields contained 600 billion cubic feet of natural gas.

The Palin administration proposed a $4 billion, 500 million-cubic-foot per-day "bullet line" from the North Slope to Anchorage in 2009, designed to kickstart a larger North Slope natural gas pipeline. But the project lacked support and eventually faded.

The Palin administration that year also proposed the Road to Umiat, a 90-mile year-round road from the Dalton Highway to the Umiat area to improve the economics of resource extraction. The road drew skepticism from environmental groups and from those who saw it as "corporate welfare." The Parnell administration advanced the so-called Foothills West Transportation Access program until early 2015, when it cancelled the project. ●

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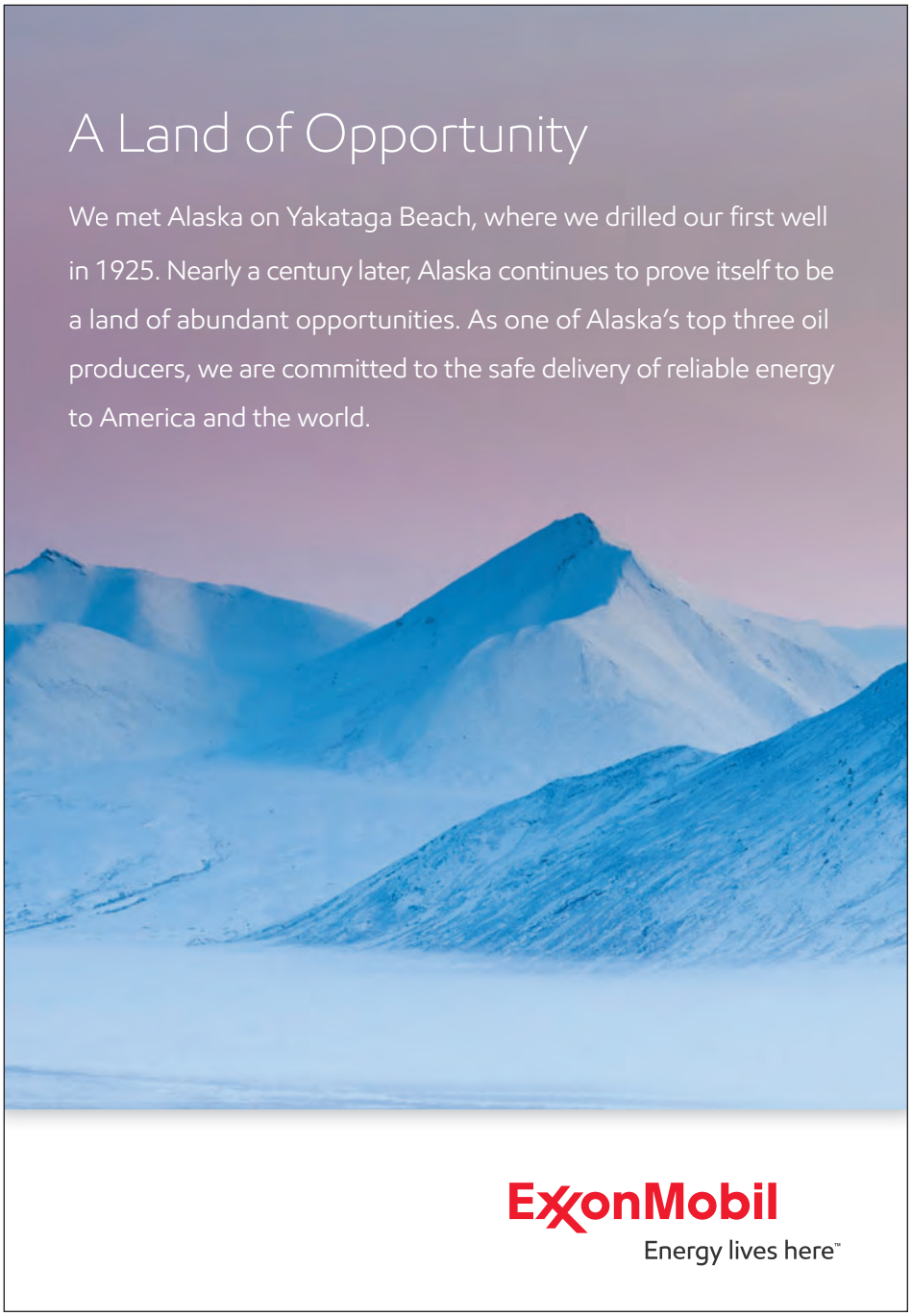

ConocoPhillips still resetting from pandemic

COVID-19 curtailed big plans for 2020; will those plans resume next year?

By ERIC LIDJI
For Petroleum News


RYAN LANCE

If you look at a chart of ConocoPhillips' exploration activity on the North Slope over the past two decades, it echoes the average ANS West Coast spot prices over the same time.

ConocoPhillips has been the most prolific explorer in Alaska in the 21st century and also the most consistent. It is the only explorer from the mid-1990s still actively exploring in the region. And yet, on three occasions over the past two decades, it has had multi-year down cycles: 2010 and 2011, 2015 and 2017, and the present: last year and this year.

The first followed the bust of late 2008, when prices fell from a high above $130 to a low below $40 between June and December. The second followed the bust of 2014 through 2016, when prices fell from a high above $110 to a low around $30. The third and current follows the bust of early 2020, when prices fell from a high above $65 to a low of $16.

So what does that mean for ConocoPhillips in the near term?

One takeaway: ConocoPhillips always bounces back.

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ConocoPhillips ConocoPhillips

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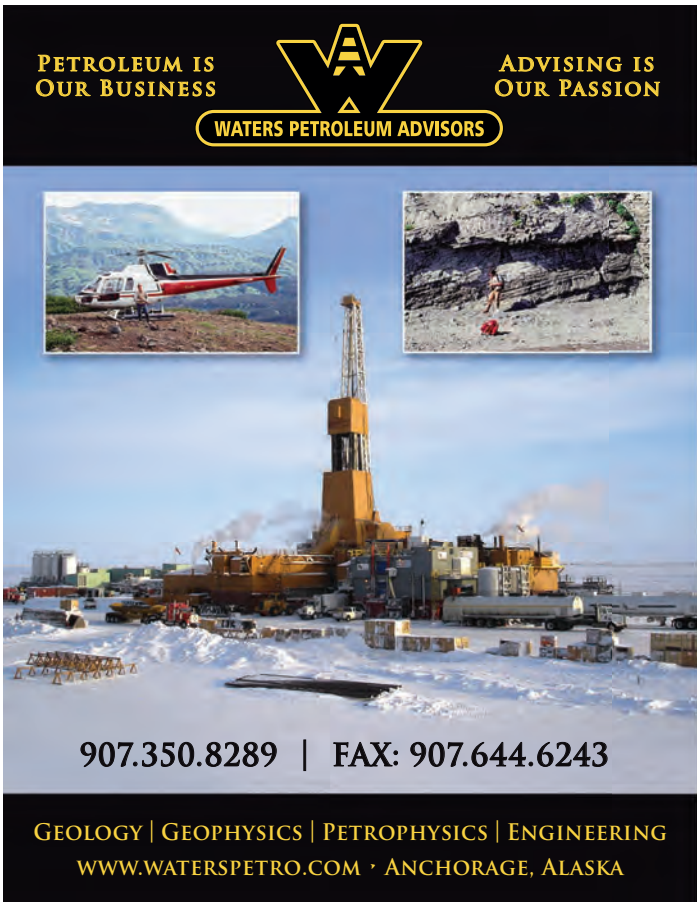

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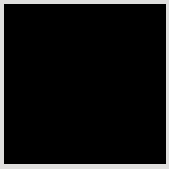

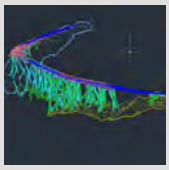

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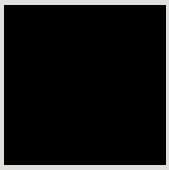

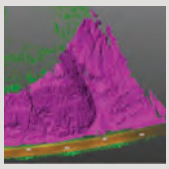

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CONOCOPHILLIPS *continued from page 24*

Between 2011 and 2015, it undertook crucial early exploration at the Greater Mooses Tooth unit. Between 2017 and 2020, it made its Willow discovery at Greater Mooses Tooth, and explored the Putu and Stony Hill prospects south of the Colville River unit.

Another takeaway: the current situation is unusual and awkward, and therefore hard to use for prediction. Oil prices fell due to the global shutdown at the start of the pandemic, a one-in-a-century event. With economies opening, oil prices are now rising again.

EREC ISAACSON

That should signal a return to exploration. But the "relatively high" prices of January and February 2022 were the same as the "relatively low" average prices from late 2014, when ConocoPhillips was last slowing its exploration activities. The bounce in oil prices following the Russian invasion of Ukraine only complicated things further: does it represent a short-term response to geopolitics or a sustained change in the market?

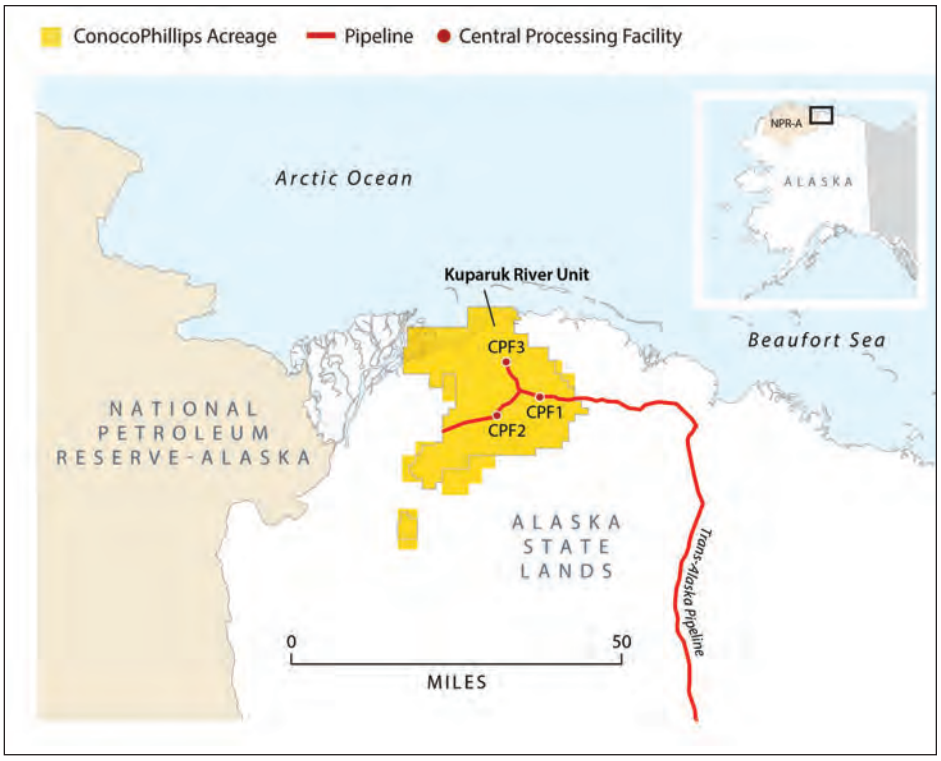
Whenever exploration activities resume, ConocoPhillips will be in the envious position of having to choose among many favorable options for where to begin investing. The company has promising plays to the north, south and west of its existing developments.

'Hitting reset'

In a presentation at Meet Alaska in late March 2021, ConocoPhillips Alaska President Erec Isaacson described 2021 as "hitting reset." The company would focus on lowering costs and engaging stakeholders and would also resume regular development drilling, as well as progress on $1.1 billion in projects across the North Slope: Greater Mooses Tooth No. 2 construction, Alpine expansion, Willow permitting, Nuna development and ongoing work at the Eastern NEWS (North East West Sak) at the Kuparuk River unit.

But prior to the pandemic, ConocoPhillips had been expanding exploration activities.

In addition to its long-standing movement to the west, it was pursing emerging opportunities closer to its existing units at the western edge of the central North Slope, most notably in the Torok and Nanushuk formations around the Kuparuk River unit.



CONOCOPHILLIPS ALASKA INC.

For years, ConocoPhillips focused the bulk of its onshore exploration energy on its leases west of the Colville River unit. But in recent years, it has also explored to the south.

ConocoPhillips was planning a seven-well exploration program for 2020, but it had only completed three wells when the pandemic forced companies to curtail their activities.

Even when restrictions eased, the company suspended some drilling activity, pending the results of the Nov. 3 ballot initiative to increase oil production taxes in the state. After the ballot measure was defeated, ConocoPhillips resumed development work at the Kuparuk River, Colville River and Greater Mooses Tooth units but made no exploration plans.

Willow and Harpoon

The undrilled wells from 2020 were associated with the Willow development.

With its initial developments at the Greater Mooses Tooth unit underway, ConocoPhillips began pursuing exploration targets to the west. The two-well Tinmiaq program in early 2016 led to a major discovery announcement in early 2017: the Willow prospect was estimated to contain as much as 300 million barrels of recoverable oil in the Nanushuk formation and could potentially produce as much as 100,000 barrels per day at its peak.

ConocoPhillips returned with a four-well program in 2018 (Tinmiaq No. 7, No. 8 and No. 9 and West Willow No. 1) and a five-well program in 2019 (Tinmiaq No. 10, No. 11, No. 13, No. 15 and No. 16, along with re-entry of Tinmiaq No. 2 and Tinmiaq No. 9).

The company announced a six-well program for 2020 but was only able to complete two wells (Tinmiaq No. 18 and No. 20) before coronavirus restrictions interceded. The company still holds permits for the un-drilled Tinmiaq No. 19 and Tinmiaq No. 24 wells.

Seismic activity had also identified an anomaly at the Harpoon prospect, southwest of Willow. Before launching an exploration program, ConocoPhillips Executive Vice President of Exploration and Production Matt Fox said, it "looks like there could be … quite substantial resources. Now it could be gas and it could be water. It's almost certainly a reservoir, because we're pretty sure that's what the seismic signature's telling us … but it doesn't have to be huge for it to be a tieback to the Willow hub."

In addition to the six Tinmiaq wells, the company planned four "rank exploration" wells at Harpoon — 10 well locations intended to support a seven-well

drilling program.

ConocoPhillips completed the Harpoon No. 2 well before the pandemic shutdown in early 2020, leaving Harpoon No. 1, Harpoon No. 3 and Harpoon No. 4 undrilled.

ConocoPhillips later announced that Harpoon No. 2 had been a dry hole. In a subsequent earnings call, Fox said that the company intended to return to the area. He described a larger "Harpoon Complex" containing Harpoon, Lower Harpoon and West Harpoon.

Narwhal

For years, ConocoPhillips focused the bulk of its onshore exploration energy on its leases west of the Colville River unit. But in recent years, it has also explored to the south.

Earlier this year, the company began sustained production from the Narwhal participating area in the southeast corner of the Colville River unit, adjacent to the Pikka unit. The company is currently utilizing the existing CD4 pad and plans to build a new CD8 pad.

The news was a major milestone for the stubborn prospect.

ConocoPhillips began pursuing the so-called Titania prospect in 2002, but the state terminated the leases in 2004 after the company failed to meet drilling commitments.

A few years later, a joint venture operated by Brooks Range Petroleum Corp. pursued the acreage as the Tofkat prospect. The company encountered hydrocarbons in early 2008 with the Tofkat No. 1 well and two sidetracks. It formed

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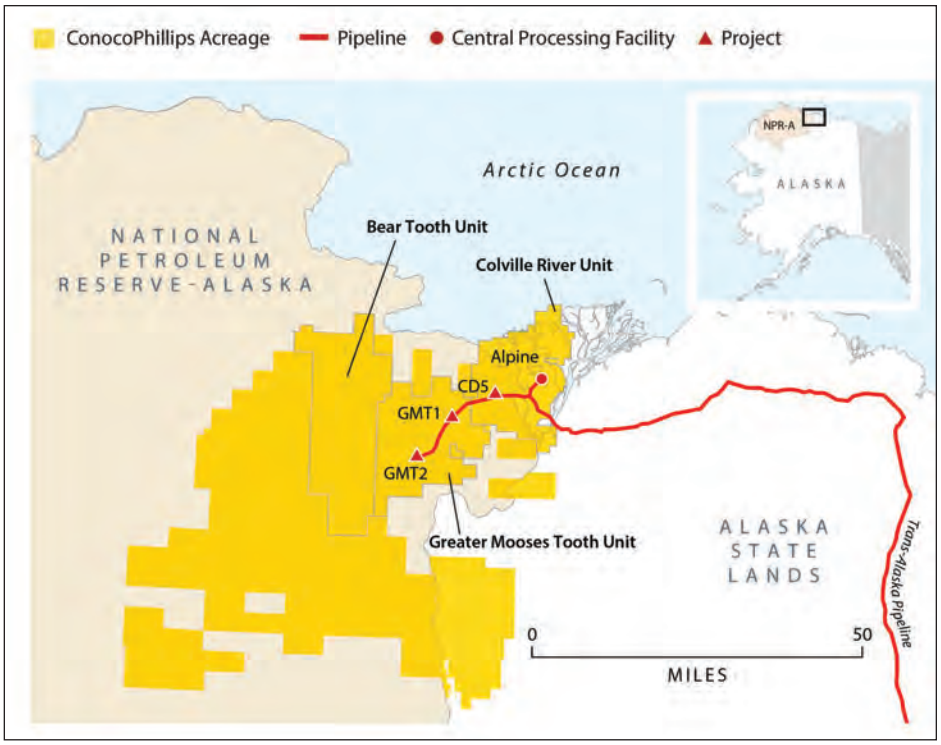

CONOCOPHILLIPS ALASKA INC.

Persistence in the billion-dollar fairway

Companies continue to explore the region between Kuparuk and Alpine

By ERIC LIDJI
For Petroleum News

Toward the end of the 20th century, ARCO Alaska supposedly invented a term that may have been mere marketing but has since become an accepted vision for the North Slope.

The billion-dollar fairway.

The billion-dollar fairway is the strip of land between the Kuparuk River unit and the Colville River unit — the second and third largest producing units on the North Slope.

The area is currently home to the Pikka unit, the Southern Miluveach unit, the proposed Quokka unit, the Narwhal prospect and the Winx No. 1 well. And that's not to mention a long list of former units and prospects, some now included in that current list of ventures.

Naming the area may have been a way to draw attention to its challenge: here was a big strip of land that should have been home to considerable oil production but wasn't yet.

Sinclair Oil drilled the first wildcat wells in the fairway in 1965 and 1966. Think about the North Slope at that time. The discovery wells for the Prudhoe Bay and Kuparuk River units were still a few years off. The Alpine field was decades away from discovery.

The fairway wasn't a fairway. It was just another remote corner of a remote region.

Various companies tiptoed into the region over the following decades, as oil production began at nearby Prudhoe Bay (1977), Kuparuk River (1981) and Alpine (2000).

With those units in production, and more importantly with the regional infrastructure in place, the absence of production in the fairway became more prominent and puzzling.

Although companies perennially returned to the fairway in those decades, no major discoveries were announced and no development plans were proposed. While the fairway may be slender by North Slope standards, it was plenty wide enough to prohibit — or at least to complicate — the natural tendency to step out from the units on either side of it.

Here was a sequence of midsize fields, just beyond the range of existing processing facilities. If ever there were a region calling for independents, this would seem to be it.

The Charter for Development of the Alaskan North Slope was created in 1999 in part to draw attention to promising but underdeveloped regions like the billion-dollar fairway.

And within a decade, new players — some of them independents, others majors with no significant history in Alaska — were pursuing opportunities up and down the fairway.

Development

Between 2006 and 2015, the Alaska Department of Natural Resources approved the formation of seven units in the fairway: the Brooks Range Petroleum Corp.-operated Putu, Tofkat, Kachemach and Southern Miluveach units, the ASRC Exploration LLC-operated Placer unit and the Repsol E&P USA Inc.-operated (now operated by Oil Search) Qugruk and Pikka units.

Sinclair Oil drilled the first wildcat wells in the fairway in 1965 and 1966. Think about the North Slope at that time. The discovery wells for the Prudhoe Bay and Kuparuk River units were still a few years off. The Alpine field was decades away from discovery.

Even with all that interest, development has remained elusive.

With the Putu, Tofkat, Kachemach and Southern Miluveach units and the Placer unit, operators struggled to improve the make the economics work for midsized fields.

A recurring theme in the regulatory filings from those years is a desire by operators to expand existing unit boundaries or to merge several neighboring prospects into a single unit. But the state was consistently reluctant to make those sorts of accommodations.

Brooks Range Petroleum Corp. originally proposed Putu and Tofkat as a single unit. The state split the acreage into two neighboring units. The company struggled for years to make the projects work, only to relinquish the acreage in 2012 and 2016. ConocoPhillips ultimately acquired the acreage and incorporated it into plans for the Colville River unit.

Brooks Range Petroleum Corp. also originally proposed Kachemach and Southern Miluveach as a single unit. The state split the acreage into two neighboring units. The state terminated the Kachemach unit in 2014, after Brooks Range Petroleum Corp. failed to cure a default set in motion by missed work commitments. The company had also attempted to merge Kachemach with the nearby Placer unit and the proposed Tapqaq unit.

The state terminated the Placer unit in mid-2019, just a few weeks after Arctic Slope Regional Corp. put the prospect on the market. The move followed years of debate between the state and the corporation over the appropriate boundaries of the small unit.

Arctic Slope Regional Corp. eventually sold the unit to Oil Search (Alaska) LLC in March 2021. The leases are now included within Oil Search's proposed Quokka unit.

The biggest recent hope for independents in the billion-dollar fairway was the Southern Miluveach unit. After more than a decade of work, Brooks Range Petroleum Corp. brought the Mustang field online at the unit in late 2019, becoming the first small independent in Alaska history to take a North Slope field from discovery to production.

Brooks Range Petroleum Corp. financed the program in part

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CONOCOPHILLIPS *continued from page 27*

the Tofkat unit in October 2011. The state terminated the unit in March 2016, when BRPC missed work commitments.

ConocoPhillips acquired the acreage again and asked to incorporate the leases into the Colville River unit. The state approved the request with conditions, including drilling commitments. The company drilled the Putu No. 2 and Putu No. 2A wells in early 2018 and later announced a 100 million to 350 million barrel discovery at Narwhal.

With that announcement, ConocoPhillips shifted to development at Narwhal. The existing infrastructure in the area allowed the company to quickly bring it online.

Stony Hill

As part of the original exploration campaign in the area in 2018, ConocoPhillips also explored the Stony Hill prospect in the NPR-A, south of the village of Nuiqsut.

The Stony Hill No. 1 well and Stony Hill No. 1A sidetrack on federal lease AA-00093131 encountered oil in two zones. But the company felt that the prospect required additional appraisal drilling and analysis — similar to its early evaluations of Putu.

The Putu wells were closer to infrastructure and came first, suggesting that Stony Hill could be a higher priority whenever ConocoPhillips resumes exploration activities.

ConocoPhillips described Stony Hill as a prospect similar to Willow and estimated that it contained at least 300 million barrels of recoverable oil in the Nanushuk formation. In November 2017, ConocoPhillips executive Matt Fox said the company had identified "a lot" of Willow lookalikes in the Nanushuk and "every one of them we've drilled so far has had oil in it, so we're hopeful that several of these Willow lookalikes will deliver."

Nuna

ConocoPhillips also expanded its onshore exploration north of the Kuparuk River unit in 2019, when it acquired the Nuna prospect from Caelus Natural Resources Alaska LLC.

Pioneer Natural Resources drilled the Nuna No. 2 discovery well during the 2012-13 winter drilling season, estimating ultimate oil recovery between 75 million and 100 million barrels of oil from the Torok formation of the Brookian sequence. Caelus later estimated that Nuna could produce 25,000 barrels of oil per day over 20-30 years.

Caelus Natural Resources sanctioned a $1.4 billion development in 2015 and received a royalty modification from the state. But the company paused work a few years later over concerns about the economic climate and ultimately left the state in 2019. It sold the Oooguruk unit to minority partner Eni and sold the Nuna satellite to ConocoPhillips.

ConocoPhillips has yet to announce its plans for Nuna, but the prospect fits within the company's stated goals. It can be pursued using existing infrastructure, and it sits within a formation where ConocoPhillips has been accumulating information for nearly a decade.

In mid-2021, ConocoPhillips announced the Coyote discovery east of Nuna. At the time, ConocoPhillips Alaska President Erec Isaacson said Coyote was in the Brookian topset above the Nuna Torok discovery, describing Coyote as shallow: i.e. a Nanushuk play. ●

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THE FAIRWAY *continued from page 28*

with help from the Alaska Industrial Development and Export Authority, a public corporation created to spur economic development throughout the state. The partnership allowed Brooks Range Petroleum Corp. to build independent processing facilities at the Mustang field.

The prospect of independent processing facilities promised to improve the economics of every play in the region. But the field and its processing facilities are currently in cold shutdown as holding company Mustang Holdings LLC works to sell foreclosed assets.

One big change in the billion-dollar fairway came after 2015, when Repsol — working with Armstrong Energy LLC and GMT Exploration Co. LLC — announced a discovery in the Nanushuk formation at the Qugruk unit. The discovery is proving to be a paradigm shift, changing the way companies look at prospects throughout the fairway. If those promises come true, the billion-dollar "valuation" of the fairway may prove to be low. ●

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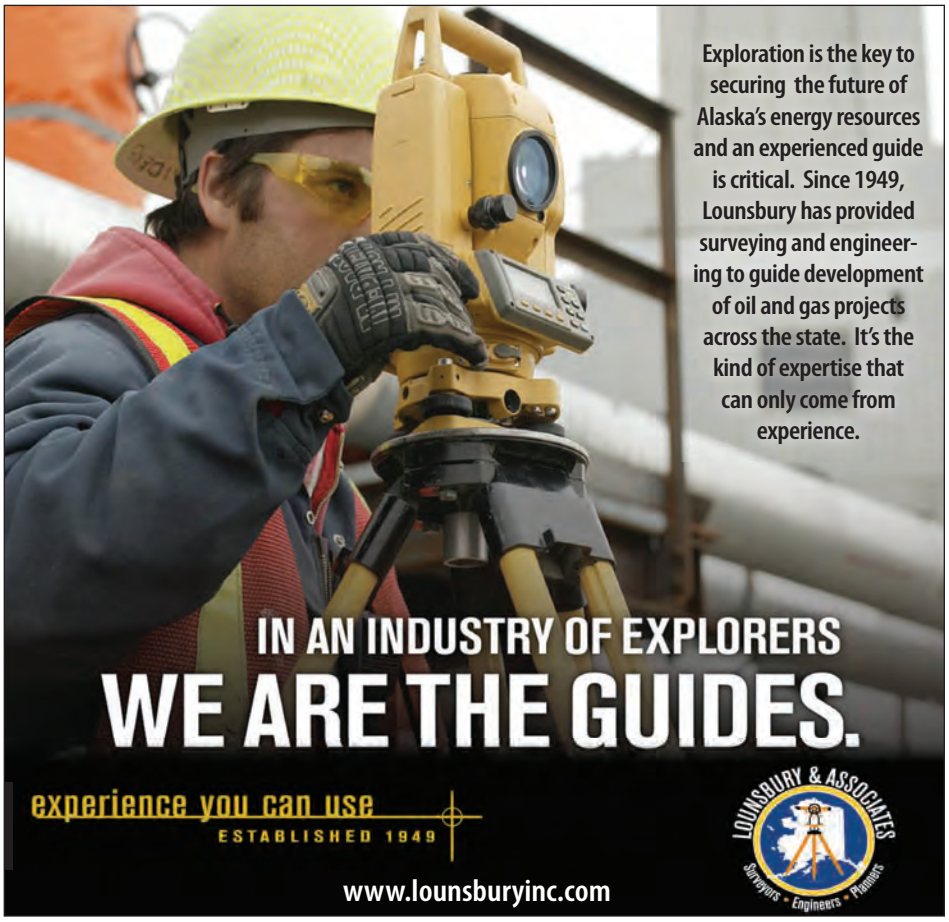

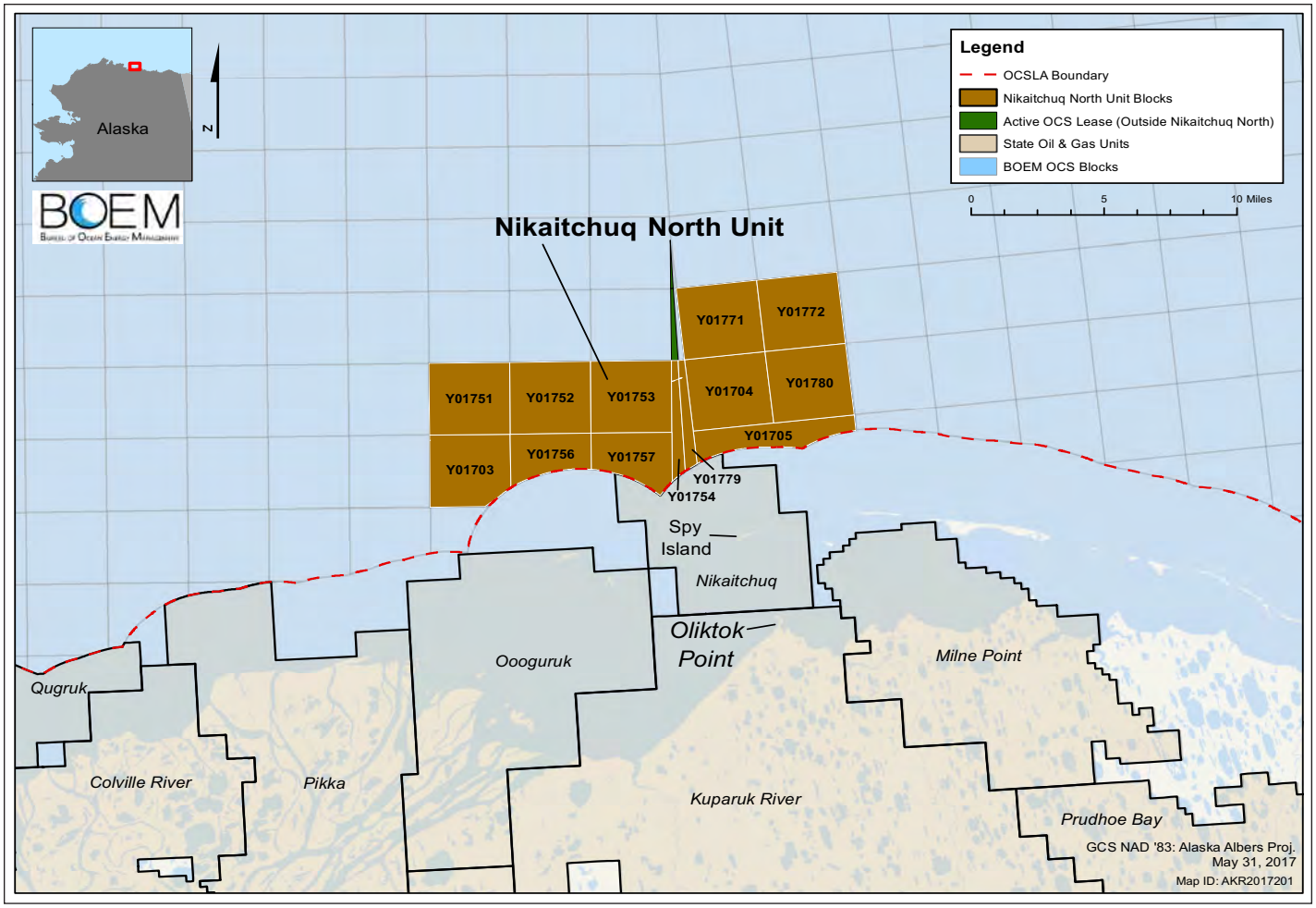

ENI US OPERATING CO. INC.

Fate of Nikaitchuq North uncertain

Eni misses initial deadline for spudding follow up well in Arctic OCS

By ERIC LIDJI
For Petroleum News

Eni US Operating Co. Inc. designed its facilities at the Nikaitchuq unit to handle 40,000 barrels per day. With some tinkering, they could be expanded to 50,000 barrels per day.

But right now, after 11 years of productive life, the offshore unit in the coastal waters of the Beaufort Sea north of Oliktok Point is averaging some 17,000 barrels of oil per day.

ROBERT PROVINCE

To fill the gap between production and capacity, the local arm of the Italian major has been pursuing a range of projects in recent years. It has added multilaterals to existing wells, improved well design, repaired and maintained wells, and tested new sands.

Throughout, the company has also been pursuing expansion projects, including two projects to step out development to the east and the west, within its unit boundaries. But its most ambitious project involves a block of leases to the north, beyond the unit.

The multiyear Nikaitchuq North exploration program is targeting

Eni US

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PARENT COMPANY WEBSITE: www.eni.it

an unidentified seismic anomaly in federal waters of the Outer Continental Shelf, north of the existing state managed Nikaitchuq unit. The company drilled an initial well in the 13-lease Harrison Bay Block 6423 Unit in 2018 and 2019 and initially planned to return to the area to drill a follow-up well this winter. The company had not drilled the well by early April 2022.

Aside from drilling locations, and other details included in permitting documents, the company has kept many of the details of the program private for now. But in a presentation to the Alaska Resource Development Council in 2017, Eni suggested that the Nikaitchuq North project could "double recoverable reserves and replace decline."

Eni SpA is one of the largest oil companies in the world. It employs some 33,000 people in more than 70 countries and produces nearly 2 million barrels of oil equivalent daily.

Alaska represents a small percentage of that global operation, but it has become a stable and predictable source of production and revenue for the company over the past decade.

Eni actually began its life in Alaska in the 1960s, when an earlier subsidiary conducted activities in Cook Inlet. Its current tenure dates to the mid-2000s when the company acquired onshore exploration acreage in the central North Slope and then partnered with Armstrong Resources to pursue promising nearshore acreage off the North Slope coast.

Eni began developing the Nikaitchuq unit in 2008 and brought the unit online in January 2011. To date, the company has spent more than $2 billion developing the unit. The development includes an onshore facility at Oliktok Point and an offshore facility at Spy Island, as well as independent processing facilities and a sizable drilling program.

Decade of expansion

The Nikaitchuq North project emerged during a transitional period at the unit.

Eni suspended development drilling at Nikaitchuq in May 2015 during a downturn in oil prices. The decision came as the company was considering its options for expansion.

After completing its initial drilling program for the Oliktok Point Pad in October 2012, Eni shifted to a campaign to projects that would extend field life. It sidetracked existing wells in 2013 and 2014 and appraised an undeveloped nearby N sand target in 2014.

Continuous drilling began at the Spy Island drill site in November 2012. The company expanded the program in early 2013 with its first multilateral well and expanded the program again in late 2013 by adding laterals to all new Spy Island production wells.

The company conducted the West Extension Project at Spy Island between the third quarter of 2014 and early 2015 and launched the East Extension Project in 2015, before suspending all drilling activities at the unit and putting Doyon Rig 15 in cold stack.

Eni emerged with a new direction in 2017. The company released the Nabors 245 rig in late 2017 and contracted the new Nordic Calista Rig No. 4 for workover activities. It also announced Nikaitchuq North, its first Alaska exploration venture since drilling wells at the onshore Rock Flour and Maggiore prospects in the central North Slope in 2007.

NN-01

The Nikaitchuq North project is technically ambitious.

Instead of building a new artificial island, Eni proposed ultra-extended reach drilling from its existing Spy Island drill site. NN01 would have a vertical depth of 8,131 feet and a measured depth of 34,150 feet. NN02 would have a vertical depth of 8,329 feet and a measured depth of 38,173 feet. Proposed sidetracks would measure about 1,000 feet.

To accommodate those extreme angles, the company requested upgrades of Doyon Rig 15, increasing the top drive torque to 72,000 foot pounds from 63,000 foot pounds and also increasing the pressure rating for the drilling mud manifold, according to Eni.

On the administrative side, Eni acquired ADL 393175 in a state Beaufort Sea lease sale in late 2016. Sandwiched between the state unit and the federal unit, it provided "some protection acreage, should there be any future development opportunities involving the Nikaitchuq North Exploration Project," the company explained in its development plan.

NN-01 faced numerous obstacles and setbacks.

Eni spud the well in late December 2017 using Doyon Rig 15, but "unforeseen impacts to the drilling schedule" delayed drilling activities until February 2018. The company was aiming for a target around

continued on next page

ENI *continued from page 31*

34,000 feet but ultimately suspended the ultra-extended reach well in August 2018 at a total depth of 30,010 feet, "as a result of drilling complications."

The company resumed drilling operations at NN-01 in January 2019. But in April 2019, unidentified complications once again forced the company to suspend operations.

The delays forced Eni to defer plans for a sidetrack. With summer approaching, the company was facing seasonal drilling restrictions off the coast of the North Slope.

NN-02

In a subsequent plan of development, Eni turned away from NN-01 and toward a second well, NN-02, targeting the same seismic anomaly. The plan called for spudding the well in the second quarter of 2020 and reaching a target depth by the third quarter of the year.

But drilling plans were stalled again after working interest partner Shell "elected to go non-consent in the drilling of NN-02 well therefore causing Eni to temporarily postpone drilling plans," Eni wrote in a report to the U.S. Bureau of Ocean Energy Management.

The U.S. Bureau of Safety and Environmental Enforcement ultimately granted Eni a two-year suspension of its program, giving the company until April 2, 2022, to drill NN-02.

In early March 2022, U.S. Bureau of Safety and Environmental Enforcement Press Secretary Sandy Day told Petroleum News that Eni had neither drilled the NN-02 well nor filed for a suspension of operations, or SOO. Under the terms of the SOO, simply spudding the well would automatically extend the leases, even if operations were immediately suspended. The "original SOO for Eni was effective for two years starting April 3, 2020. The SOO will expire on April 2, 2022, unless some other action is taken. To date, there have been no conversations with Eni regarding another SOO," Day said.

Without drilling activities to automatically extend the leases, Eni would need to negotiate with BSEE or the U.S. Bureau of Ocean Energy Management on new leasing terms.

Timing

Timing matters.

Eni is using Doyon Rig 15 both for the Nikaitchuq North exploration project and for ongoing development activities at the Spy Island drill site of the Nikaitchuq unit.

Ongoing development drilling is important, as Eni is facing an upcoming contraction.

State regulations give companies 10 years of sustained production before automatically contracting a unit down to its productive leases — meaning leases included in a participating area, leases under plans of exploration or development, or leases actively or indirectly being developed. The window is intended to give operators enough time to gradually expand production while discouraging companies from "warehousing" productive leases that could possibly be developed more quickly by another company.

Eni asked the state to defer a pending contraction of six leases near Spy Island, north of Oliktok Point. The leases were added to the unit as part of an October 2007 expansion.

The acreage is believed to contain potentially commercially recoverable reserves in the Cretaceous Schrader Bluff and the Triassic Sag River formations — too small to be developed independently of Nikaitchuq but large enough to be worthwhile for Eni.

For those reasons, and given the recent delays caused by the coronavirus pandemic, the state approved the deferral, giving Eni until the end of September 2022 to test the leases.

Target

Aside from the general information about depths and locations found in its permitting documents, Eni has provided little information about its target at Nikaitchuq North.

To date, Nikaitchuq unit development has been limited to the OA sands of the Schrader Bluff formation. The company tested the potential of the N sand over the past decade.

Given the relative heaviness of Schrader Bluff oil, it would require considerably technical assistance to flow and would appear to be an unlikely target for the project.

Using the geometry of the well as a clue, it would appear Eni is

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targeting Jurassic Alpine sands at the Nikaitchuq North leases. Before Eni came onto the Nikaitchuq unit, operator Kerr-McGee and its partner Armstrong had publicly discussed the possibility of testing the Jurassic Nuiqsut sandstone and the Triassic Sag River sandstone north of the unit.

Other plays

For a time, it seemed that Eni might be moving into exploration in Alaska.

Eni acquired several significant assets when Caelus Natural Resources Alaska LLC left the state in 2018 and 2019. Eni acquired 70% interest of the Oooguruk unit, giving it complete working interest and operatorship of the nearshore Beaufort Sea oil field.

Through its deal, Eni also acquired some 350,000 acres of undeveloped leases in the eastern North Slope. Sitting between the Prudhoe Bay unit and the Point Thomson unit, the block was relatively near several pieces of crucial North Slope infrastructure: the city of Deadhorse, the Dalton Highway and the trans-Alaska oil pipeline.

Given that proximity to infrastructure, Caelus had believed it could economically produce plays smaller than 100 million recoverable barrels — small by North Slope standards.

Caelus never drilled exploration wells in the acreage, but it acquired 175 square miles of new 3D seismic data and reprocessed another 275 square miles of existing 3D data.

The seismic data and information from surrounding legacy wells "confirm deeper petroleum system elements and de-risked shallower Brookian reservoirs and hydrocarbon charge and phase within the area," Caelus said in statements. Those prospects had mostly been ignored, according to Caelus, until the Pikka and Horseshoe discoveries in the central North Slope renewed interest in the shallow Brookian Nanushuk formation.

Eni initially expressed enthusiasm with the opportunities in the eastern North Slope, saying it planned to "apply its business model and experience," involving "fast-track exploration" and "a short time to market" for the "potential new discoveries."

But Eni surrendered the acreage in July 2021. Asked why it relinquished the property, the company told Petroleum News: "Eni completed its exploration studies on the area the leases covered and the prospectivity of the area didn't meet Eni's economic metrics."

For Eni, the primary benefit of the Caelus deal was gaining complete working interest in the offshore Oooguruk unit. The state-managed unit is located immediately to the west of the Nikaitchuq unit. Eni had already been a 30% minority owner in the unit since Pioneer Natural Resources Alaska Inc. brought it into production in 2008.

The three big moves of the past few years — the Oooguruk acquisition, the eastern North Slope relinquishment, and the move into Nikaitchuq North — suggest that Eni is prioritizing its existing developments over wildcat exploration. But those moves also indicate that Eni is willing to pursue ambitious exploration work in Alaska that has the potential to significant extend the productive life of its first and still primary asset.

There are successful North Slope models for this approach, most notably ConocoPhillips' decades-long push to extend development to the west of the Kuparuk River unit. It will be interesting to see where Eni goes next, regardless of the success of Nikaitchuq North. ●

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Tiptoeing toward the Alaska OCS

Exploration proposal this year returns attention to distant federal waters

By ERIC LIDJI
For Petroleum News

Eni's Nikaitchuq North project is a small step back into the Alaska Outer Continental Shelf after several years away from the region by North Slope explorers.

Offshore exploration was a leading drama of the Alaska oil industry during the 2000s and 2010s, as companies like ConocoPhillips, Shell, Repsol, Statoil and others worked semi-successfully to arrange drilling programs in the Beaufort and Chukchi seas.

A range of political, legal and logistical setbacks turned companies away from the region in recent years, and there has been little evidence of a revival in the works.

Shell

In the decades before leaving the state for the first time in 1998, Shell had pursued pioneering wildcat programs in the Beaufort Sea, the Chukchi Sea, the Gulf of Alaska, the Bering Sea and Cook Inlet. The company returned a few years later through acquisitions at a Beaufort Sea lease sale in 2005 and a Chukchi Sea lease sale in 2008.

A four-well program planned for the Sivulliq (Hammerhead) prospect in the Beaufort Sea in 2007 was delayed by legal challenges from local groups. The federal government approved a scaled back program at Sivulliq in 2009, only to impose a federal moratorium on all outer continental shelf drilling after the Deepwater Horizon oil spill in the Gulf of Mexico in April 2010. Regulatory disputes prevented the program in 2011.

At the same time, a one-well program targeting the Burger prospect in the Chukchi Sea in 2010 was delayed by legal challenges to the validity of the lease sale.

With all those legal and regulatory obstacles surmounted, Shell announced a five-well offshore program for 2012 — three in the Chukchi Sea and two in the Beaufort Sea.

But this time, shipping delays in the finicky Arctic Ocean forced the company to suspend work after drilling only the top-hole section of one well in each of the two seas. Then, at the end of the season, the Kulluk drill ship ran aground, damaged beyond repair.

Shell recovered by 2014, only to face a new round of legal challenges. When its parent company purchased a large natural gas producer, and oil prices tanked, Shell cancelled its Beaufort Sea plans and scaled back its Chukchi Sea plans to a single well. It drilled the well in 2015, but the results weren't enough to justify the hassle, and so the company cancelled its program and eventually retreated from the Alaska OCS altogether.

The decision soon prompted the U.S. Department of the Interior to cancel its upcoming lease sales in the Beaufort and Chukchi seas, effectively closing the region.

Shell still holds leases in the area but wants a partner to operate them.

JUDY PATRICK

Oooguruk island 2008.

ConocoPhillips

The other big player in the Alaska OCS was ConocoPhillips.

The company acquired a package of leases in the Beaufort Sea between 1998 and 2007. The leases included the McCovey No. 1 exploration well drilled by EnCana in December 2002 and the 54-1 well and 54-1-A sidetrack drilled by Gulf Oil around 1984.

Toward the end of 2008 and the beginning of 2009, ConocoPhillips dropped most of its acreage in the Beaufort Sea to focus on a new package of leases in the Chukchi.

The company spent some $504 million to acquire the Devil's Paw prospect in the Chukchi Sea in 2008. It pulled together a joint venture with Statoil of Norway and the U.S. subsidiary of the Chinese National Offshore Oil Corp, but a fieldwork program in the area never led to drilling. A shift toward onshore plays in 2010 came at the expense of risky offshore prospects, and the Shell saga added to ConocoPhillips' skepticism.

"While we are confident in our own expertise and ability to safely conduct offshore Arctic operations," said Trond-Erik Johansen, president of ConocoPhillips Alaska at that time, "we believe that more time is needed to ensure that all regulatory stakeholders are aligned."

Since dropping those offshore plays — as well as a big swath of National Petroleum Reserve-Alaska acreage — ConocoPhillips has focused on infrastructure-led exploration at onshore plays in the central North Slope and the National Petroleum Reserve-Alaska.

Following its acquisition of BP's North Slope assets in 2014, Hilcorp assumed responsibility for the Liberty project. Under the current strategy, Hilcorp wants to develop the offshore field from a newly built gravel island.

Liberty

BP Exploration Alaska Inc. also pursued OCS opportunities.

Shell encountered oil at the Liberty field during drilling programs in the 1980s. BP followed up, drilling the Liberty No. 1 discovery well in early 1997. It subsequently announced a commercial discovery estimated at more than 100 million barrels of oil.

BP initially planned to develop the field from an artificial gravel island. But the company later announced plans to develop the prospect using ultra-extended reach wells drilled from the Endicott field at the nearby Duck Island unit. To accommodate the extreme distance, BP commissioned a special rig capable of handling some of the longest wells ever drilled. But the rig created technical problems — each resulting in additional delays — and faced regulatory hurdles following the Deepwater Horizon oil spill in 2010.

By late 2012 and early 2013, BP had increased its resource estimate to some 150 million barrels. But it had also abandoned the plans for extended-reach drilling, seeming instead to favor an artificial island containing both drilling and processing facilities.

Following its acquisition of BP's North Slope assets in 2014, Hilcorp assumed responsibility for the Liberty project. Under the current strategy, Hilcorp wants to develop the offshore field from a newly built gravel island. The $1 billion project could produce for 30 years, reaching a peak of 70,000 barrels per day, according to Hilcorp.

Nearshore

As those three majors were facing down big obstacles at their large projects in federal waters, several new or small players were finding success slightly closer to shore.

In the early 2000s, Armstrong Resources proved up the Northwest Kuparuk, Nikaitchuq and Tuvaaq prospects in the nearshore waters of the Beaufort Sea.

Pioneer Natural Resources Alaska Inc. became the first independent producer on the North Slope when it brought the Northwest Kuparuk prospect online as the Oooguruk unit in 2009. Its minority partner Eni followed a few years later with the Nikaitchuq unit, by combining the Nikaitchuq and Tuvaaq prospects directly east of the Oooguruk unit.

Both projects involved artificial islands. But while Pioneer chose to rent capacity at ConocoPhillips facilities, Eni elected to construct independent processing facilities.

The current Nikaitchuq North project should be seen as an extension of those nearshore plays, rather than a return to the OCS interest of 10-20 years ago. Even so, success in the area might induce other players to pursue opportunities in the basin. But success won't come this year, as Eni missed an important drilling milestone on its leases.

And it's worth noting that an earlier attempt by Eni was delayed when minority partner Shell backed out of the project, leaving Eni to find a new partner or go it alone. ●

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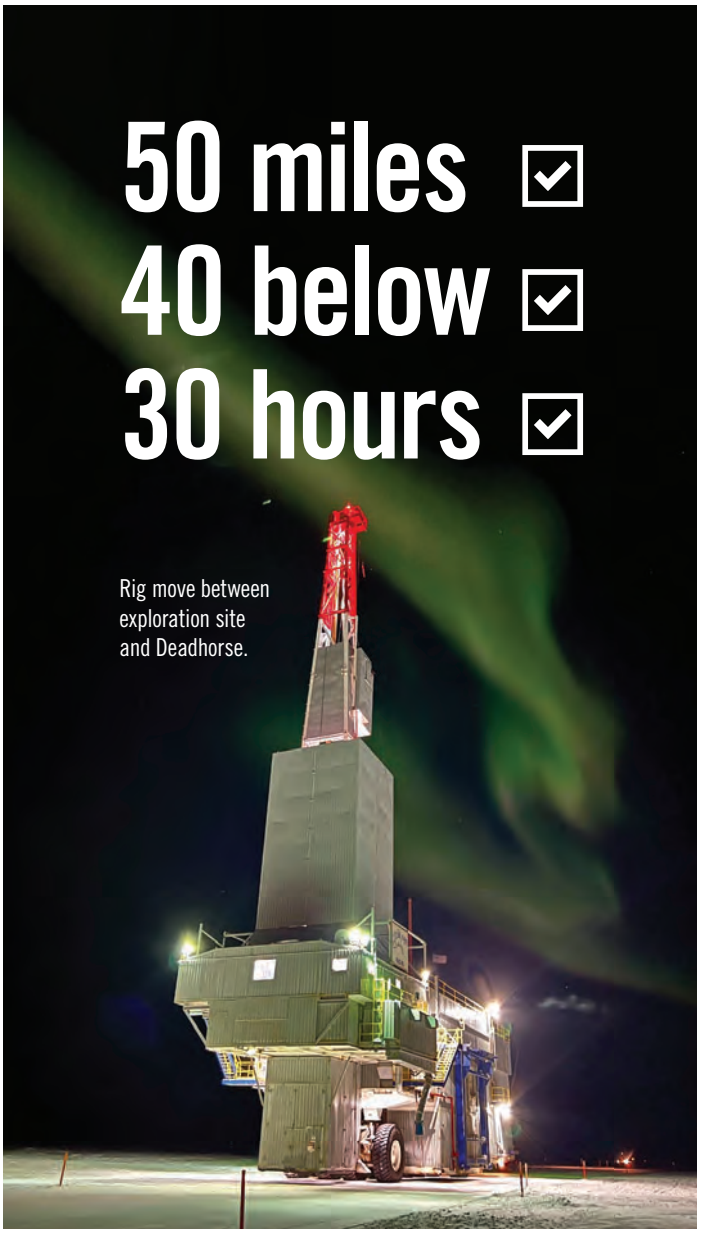

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Hilcorp plays it safe and takes risks

Company expands infrastructure in Cook Inlet while pursuing future wildcats

By ERIC LIDJI
For Petroleum News


LUKE SAUGIER

You can plot exploration plays along a spectrum, and the plays in Hilcorp Alaska LLC's portfolio exist at opposite ends of that spectrum, with very little in the middle.

At one end are infrastructure-led plays. These plays use existing production as an anchor for exploration activities. They are relatively cost-effective, low-risk and sustainable.

Over the past few years, Hilcorp has been undertaking these infrastructure-led projects around its onshore developments on the Kenai Peninsula, leading to new developments.

At the other end of the spectrum are wildcats in undeveloped basins. These are far from infrastructure and short on pre-existing information. They can be risky and uncertain. But if they succeed, they can open vast reserves for future exploration and development.

While Hilcorp has generally focused on maximizing existing production through well work and step out projects, it often keeps a few of those wildcat projects on the side.

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Cook Inlet

After years spent reviving fields at its many existing developments across the Cook Inlet basin, Hilcorp has increasingly been bringing its perspective to exploration opportunities.

The company has a system. First it drills several quick and shallow stratigraphic test wells, and then it uses the results to guide a small number of traditional exploration wells.

For example: Seaview.

Hilcorp acquired an aerial gravity and magnetics survey over the southern Kenai Peninsula prospect in 2015 and shot 20.54 miles of 2D seismic in 2016. In the summer of 2017, it drilled seven shallow stratigraphic test wells at the prospect. Using that data, the company completed the 10,148-foot Seaview No. 8 exploration well in late 2018.

The results justified development. Following a slight delay resulting from pipeline construction, Hilcorp brought the Seaview field into production in June 2021.

Shortly after completing its Seaview exploration campaign in


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late 2018, Hilcorp moved a bit to the north to pursue the Whiskey Gulch prospect on private land north of Anchor Point. (Oil patch veterans may remember the unrelated Whiskey Gulch unit formed on the North Slope by Brooks Range Petroleum Corp. in 2005 and terminated in late 2006.)

"The team is very excited about this one," Hilcorp Alaska Kenai team lead Jennifer Starck said in February 2021, at an Alliance Kenai digital luncheon. "The thing that's most exciting about this one is… it's all on roads, with a very known, feasible connect point for Enstar, which gets that gas right off to market quickly; that being said, you're still talking about two to three years between right of way, installation, and permitting."

The Alaska Oil and Gas Conservation Commission issued permits in late 2019 for Hilcorp to drill five stratigraphic test wells at the prospect: Whiskey Gulch 1-B, Whiskey Gulch 2, Whiskey Gulch 3, Whiskey Gulch 7 and Whiskey Gulch 10. In November 2019, Hilcorp drilled four of the five permitted wells — all but Whiskey Gulch 3. The shallow test wells were only about 600 feet deep.

The following year, the AOGCC issued seven additional permits for Whiskey Gulch stratigraphic test wells: Whiskey Gulch 4, Whiskey Gulch 5A, Whiskey Gulch 6, Whiskey Gulch 9A, Whiskey Gulch 11, Whiskey Gulch 12 and Whiskey Gulch 13. In July 2020, the company completed all seven, as well as the earlier Whiskey Gulch 3.

With two seasons of stratigraphic testing completed, Hilcorp transitioned to traditional exploration at Whiskey Gulch. The company proposed a two-well exploration program.

In planning documents, Hilcorp proposed building a 2.75-acre gravel pad on private surface lands at the end of Cape Ninilchik Avenue to support drilling. Construction would begin in mid-March, with drilling in June, with testing through early September.

The 10,000-foot Whiskey Gulch No. 1 well would target oil and gas to the southeast of the pad. The 8,491-foot Whiskey Gulch No. 14 well would target gas to the northeast.

Hilcorp spud Whiskey Gulch No. 1 in August 2021 but has yet to publicly announce results. The company received its final permits for Whiskey Gulch No. 14 in January 2022, but the well had not yet been drilled by April 2022, according to AOGCC records.

In permitting documents for Whiskey Gulch No. 14, Hilcorp said that analysis of Whiskey Gulch No. 1 and wells from surrounding fields "suggests that the Whiskey Gulch Undefined Gas Pool consists of a series of thin, discontinuous, stacked channel sands with a low net-to-gross ratio," requiring tighter spacing that other fields.

Given the complexity of land ownership in the southern Kenai Peninsula, Hilcorp would almost certainly need to apply for a participating area to develop Whiskey Gulch.

Following the Whiskey Gulch program, Hilcorp turned to Happy Creek.

In September 2021, the company received seven AOGCC permits for stratigraphic test wells, south of its Ninilchik unit: Happy Creek No. 1, Happy Creek No. 4, Happy Creek No. 5, Happy Creek No. 6, Happy Creek No. 8, Happy Creek No. 9 and Happy Creek No. 10. The company had not dilled any wells by April 2022, according to the AOGCC.

Yukon Flats

Yukon Flats is one of Alaska's perpetual "maybes."

Doyon Ltd. owns about 1.6 million acres of subsurface lands in

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HILCORP *continued from page 37*

the Yukon Flats area north of Fairbanks. The Alaska Native corporation for the Interior region spent years negotiating a land swap in the region with the U.S. Fish and Wildlife Service, which oversees the 10-million-acre Yukon Flats National Wildlife Refuge. When those negotiations failed, Doyon revisited the acreage and came to reconsider its potential.

In December 2019, Doyon and Hilcorp signed an agreement, creating a multi-year framework for the company to conduct exploration activities on the Yukon Flat acreage.

The program called for an airborne gravity survey in 2020 and 2021 to gather information to support a future seismic survey in the area around Birch Creek in 2022 and 2023.

With favorable results, the joint venture would conduct exploration drilling.

Even with the restrictions and uncertainly of the pandemic, Hilcorp was able to conduct the airborne gravity survey in the summer of 2020 and acquire the data it wanted.

In mid-June 2021, the AOGCC issued permits for Hilcorp to drill 15 stratigraphic test wells in the basin: Birch Creek No. 1, No. SE1, No. 3, No. 4, No. 5 and No. 6, Canvasback No. 1 through No. 6, and Saloon Island No. 1XX, No. 2. Between June 23 and July 23, the company completed all but Saloon Island No. 1XX and No. 3XX.

The Birch Creek wells were clustered at 16N/10-11E and 17N/7-8E. The Canvasback wells were at 18N/7-8E. The Saloon Island wells were at 18N/12-13E and 19N/12E.

According to Doyon, all 15 wells were drilled last summer to about 250 feet.

Texaco conducted a 2D seismic survey in the Yukon Flats region in the 1970s. Louisiana Land and Exploration conducted exploration in the adjacent Kandik area in the 1970s.

Exxon was pursuing an exploration program in the Yukon Flats region in the late 1980s in partnership with Amoco, but the Exxon Valdez oil spill in March 1989 prompted the company to withdraw from all wildcat exploration in the state, including Yukon Flats.

Exxon had been targeting source rocks near the Birch Creek, Beaver and Fort Yukon blocks in the central part of the Yukon Flats basin. "Exxon negotiated on a concurrent basis (1) an exploration lease option agreement with Doyon for oil and gas rights, (2) separate surface use agreements with the three villages, and (3) a surface use agreement with Doyon for its surface acreage which ended up mirroring the village agreements on commercial terms," Doyon Ltd. CEO Aaron Schutt told the Resource Development Council in September 2020. In the winter of 1988-89, "Exxon gathered approximately 280 miles of 2D helicopter supported Poulter type seismic along several widely spaced lines. Between 20-30 percent of the data was gathered on federal refuge lands."

Doyon returned to the region between 2008 and 2012, conducting a 2D seismic program near Stevens Village at the far western edge of the Yukon Flats basin. A 3D seismic survey, conducted in the winter of 2012 and 2013, was the last exploration in the area.

The land swap negotiations delayed progress for five years. In the meantime, a new USGS gravity survey indicated the presence of a series of sub-basins starting around 8,000 feet. Some of these sub-basins were close to the trans-Alaska oil pipeline.

Petrotechnical Resources of Alaska later estimated the possible existence of 300 million to 1 billion barrels of oil and perhaps 1 trillion cubic feet of natural gas in the basin — essentially an Alpine-sized field located much closer to people and to infrastructure.

Iniskin and Blackbill

Among the lower priority projects in the Hilcorp portfolio are the Iniskin Peninsula and a project in the federal waters of the lower Cook Inlet outer continental shelf.

The peninsula sits across Cook Inlet from Kachemak Bay, and it is one of those classic Alaska prospects: known to contain oil but hampered by logistical challenges.

Hilcorp revisited the prospect in the 2010s, believing that modern technology could address the low rate of oil flow that hampered exploration in the 1900s, 1930 and 1950s.

The company conducted a 2D seismic survey over the area in 2013. The survey provided the first information about subsurface structure and stratigraphy. The results suggested that previous exploration might have overlooked a deeper crest of an anticline in

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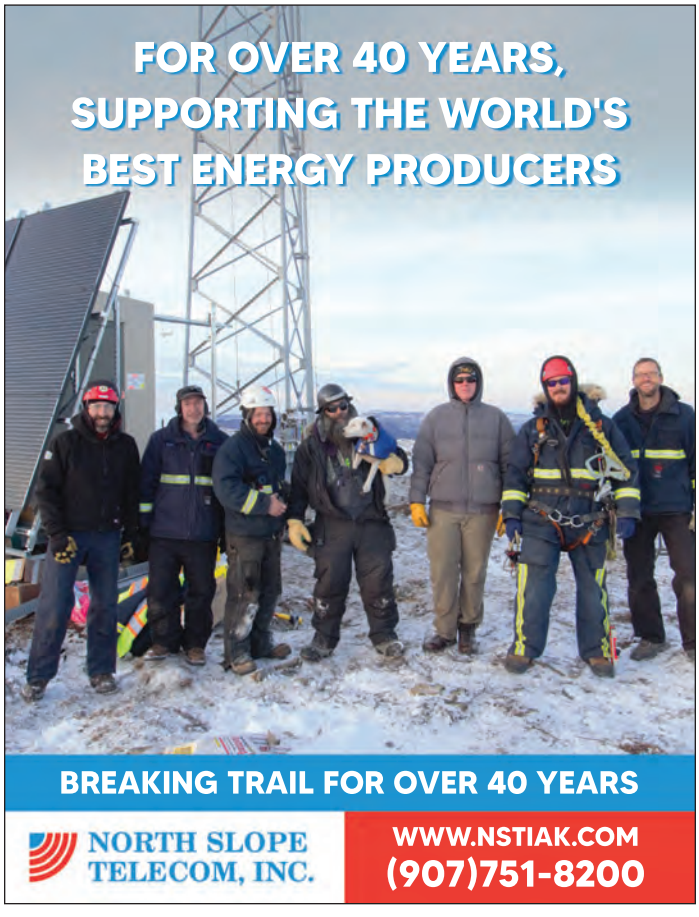

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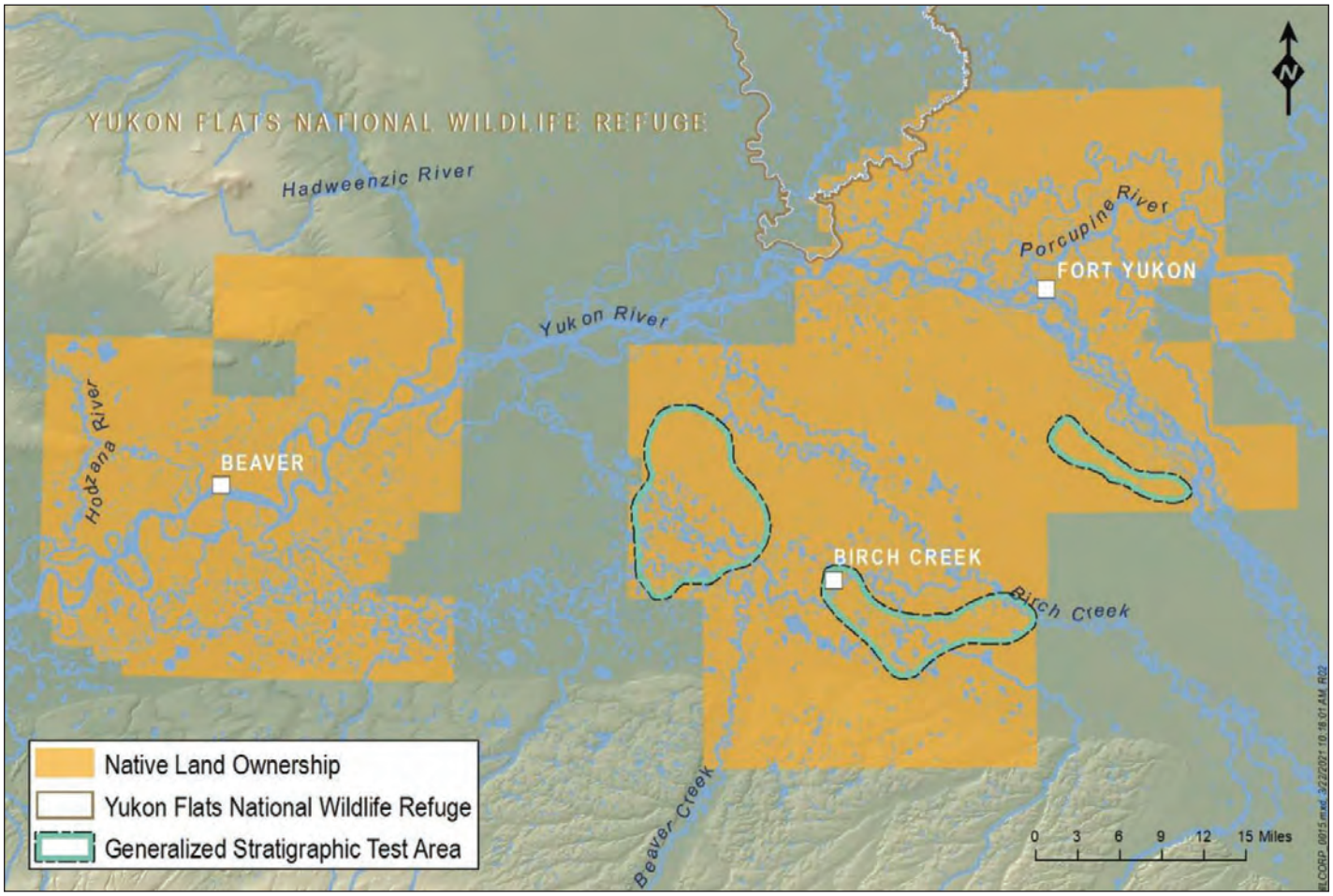

DOYON LIMITED

PHOTO BY JUDY PATRICK, COURTESY HILCORP ALASKA LLC

For the 2021 POD period Hilcorp said it anticipated drilling up to four new wells at the GMPA, with potential candidates including two coil tubing drilling sidetracks within the Lisburne and Point McIntyre PAs.

HILCORP *continued from page 38*

the area.

The next step would be an exploration well, which the company has yet to announce, although it acquired two tracts in the area in a 2020 lease sale. The physical remoteness of the area would make it challenging to bring both equipment and personnel to the site.

"We don't like the reservoir, nobody does," Hilcorp Senior Geologist Dave Buthman told Petroleum News, "but what we like is you've got about 9,000 feet of source rock there, right along the Bruin Bay fault in a similar structural position to the largest oil field in the basin which is McArthur River, which made about 650 million barrels of oil so far."

Hilcorp acquired 14 leases in the outer continental shelf of Cook Inlet in a federal lease sale in June 2017. The company conducted a 3D seismic survey over the leases in 2019 and a geohazard survey in 2021. The program initially included plans for two-to-four exploration wells between 2020 and 2022. The company had not yet drilled those wells by early 2022, perhaps in part due to the economic disruptions of the past few years.

In discussing the project, Hilcorp expressed an interest in bringing the Seadrill West Epsilon jack-up rig to Cook Inlet. The rig is capable of drilling deeper wells than either the Spartan 151 or Randolph Yost jack-up rigs, which are currently in the region.

The proposed Blackbill program would target an oil reservoir encountered by ARCO's Raven No. 1 well in 1982. The location is due west of Homer, halfway across Cook Inlet. ●

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Interior Alaska keeps drawing interest

Hilcorp project in Yukon Flats follows decades of work throughout basin

By ERIC LIDJI
For Petroleum News

The modern Alaska oil industry is in its eighth decade, and before that came decades of wildcat exploration. By now, explorers have sniffed every corner of the state.

And yet, even after so much time and work and expense, oil and natural gas production remains firmly focused in just two basins: Cook Inlet and the North Slope.

Between them is a vast region known locally as the Interior.

The Interior would seem to have many advantages. Situated well below the tundra, it sidesteps many of the seasonal restrictions that create so much uncertainty for North Slope explorers. It is close to existing road infrastructure, such as the Parks Highway. But it's far enough away to avoid disputes over property rights and setbacks, the kind that occasionally emerge in populated sections of the southern Kenai Peninsula.

Reviewing the plays in the Interior, familiar themes emerge. One is the use of exploration licensing, which was created to encourage exploration is basins outside the North Slope and Cook Inlet. Another is the complex geology that complicates intriguing discoveries. A third is the way that larger natural gas developments, especially on the North Slope, have a way of smothering Interior projects in commercial uncertainty.

Yukon Flats

A large portion of the Interior — 11.5 million acres currently, with another million promised — is overseen by Doyon Ltd., the Alaska Native corporation for the Interior. Doyon has been a longtime oil patch presence through its oil field services companies.

While exploration, development and production have been constant in Cook Inlet and on the North Slope for decades, the Interior has yet to become a third producing basin in Alaska. And yet, explorers have never fully forsaken the region, either.

Interest may swell and shrink in any given year, depending on the market. But there always seems to be at least one company trying to put together an Interior program.

Hilcorp is currently that company. A deal signed with Doyon in December 2019 created a multi-year framework for Hilcorp to conduct exploration in the Yukon Flats.

The Yukon Flats have intrigued exploration companies going back to the 1970s and almost came to fruition in the late 1980s, when Exxon was operating in the region. (See article on Hilcorp.)

Nenana

The most frequented prospect in the region has been the Nenana basin.

Doyon pursued Nenana basin exploration for two decades, chasing leads from wells drilled in the gas-prone area southwest of Fairbanks in the 1960s and the 1980s.

Doyon first secured an exploration license in the Nenana basin in 2002, launching a long effort to make a commercial discovery. The company drilled several wells, commissioned various seismic surveys, and brought together many joint ventures. But finally, in early 2019, Doyon said it was done with the Nenana basin (at least for now).

The effort proceeded in waves.

The initial wave started with the 2002 exploration license. A joint venture led by Andex Resources LLC acquired leases and 2D seismic but suspended the project during the Petroleum Profits Tax debates and North Slope natural gas pipeline discussions of 2006 and 2007. The companies felt that the policies were overlooking the Interior.

An extension of the exploration license through 2012 accommodated a new joint venture, this one led by Babcock & Brown Energy, which was later renamed Rampart Energy Co. The partnership drilled the roughly $15 million 11,100-foot Nunivak No. 1 well in mid-2009. Although non-commercial, the results intrigued Doyon. But a state-backed plan to bring North Slope liquefied natural gas to the Interior to address rising energy prices again brought uncer-

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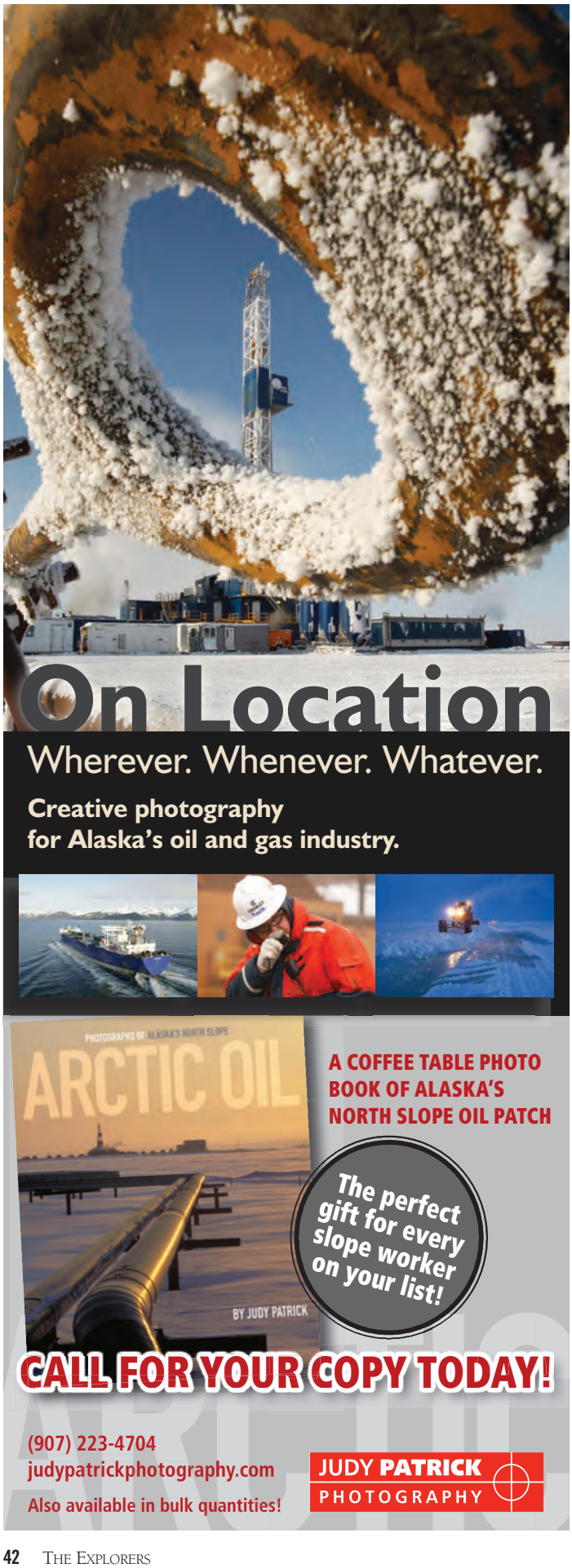

INTERIOR *continued from page 41*

tainty to the project, and the joint venture dissolved.

Working without partners, Doyon kept at it. The company converted some of the license to leases in 2012, commissioned a 2D seismic survey in the northern end of the basin that same year, drilled the 8,667-foot Nunivak No. 2 well in mid-2013, and then commissioned a targeted 3D seismic survey in 2015, a targeted 2D survey in early 2016, and a 64-square-mile 3D seismic survey in 2016 and 2017. And then Doyon partnered with Cook Inlet Region Inc. for the Toghotthele No. 1 well in mid-2016 and Totchaket No. 1 well in mid-2018, both located at the northern end of the Nenana basin.

But in early 2019, the disappointing results of Totchaket No. 1 convinced Doyon to withdraw investment from the project and allow its leases in the area to expire.

A separate project proceeded nearby during the same time. Rocky Riley of Tolovana Construction Co. received a five-year license for the North Nenana basin in 2015, but he had failed the meet the $500,000 minimum work commitment by 2020.

Copper River

While the Yukon Flats and the Nenana Basin have attracted the most exploration interest, other corners of the Interior have occasionally seen bursts of investment.

There have been at least 12 exploration wells drilled in the Copper River basin in the Glennallen region, starting with the unsuccessful Eureka No. 1, drilled back in 1953.

The Texas-based independent Rutter & Wilbanks Corp. drilled the Ahtna 1-19 well in the area between 2005 and 2007. The well encountered natural gas, but high subsurface pressures and water encroachment prevented the company from continuing.

The Ahtna Inc. subsidiary Tolsona Oil and Gas Exploration LLC returned in late 2016 with the Tolsona No. 1 well through an exploration license. The local Alaska Native corporation designed the well based upon some of the lessons learned from Ahtna 1-19.

But the lack of announcements in the years since suggest disappointing results.

Delta Junction

Never a major site of investment, the Delta Junction region is nevertheless perennially part of the energy conversation in Alaska. It has been a proposed stop for a future North Slope natural gas pipeline and a proposed home for a large wind farm.

The area is also thought to contain shallow natural gas.

Lapp Resources acquired more than 300,000 acres of shallow gas leases in the area in the early 2000s. The plan was to use abandoned military pipelines to bring fuel to Fairbanks. But partner Evergreen Resources backed out, and principal Dave Lappi dropped most of the leases. He said that potential investors worried that a North Slope natural gas pipeline — if built as designed — would fully supply the Fairbanks market.

Healy

Usibelli Coal Mine Inc. drilled the 1,265-foot HC No. 1 well in September 2014 to follow up on natural gas shows encountered through its coal mining activities.

"It was successful in confirming the existence of gas in the basin, but it's inconclusive on a commercial level," Usibelli company representative Mitch Usibelli told Petroleum News in January 2017. Although the company had permitted a four-well program, it has yet to drill a second well, and its exploration license has since expired. ●

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Jade working to make Sourdough viable

Small independent is facing down numerous obstacles in eastern North Slope

By ERIC LIDJI
For Petroleum News


ERIK OPSTAD

The excitement of the word "discovery" belies a basic fact of the Alaska oil industry: finding oil is often only a small first step on the road to developing it. The bigger step is finding an economic way to bring a discovery — even a large one — to market. Obstacles include geology, geography, infrastructure, politics, global economics and financing.

Jade Energy Inc. is currently walking that lonely road.

The subsidiary of independent ELKO International is looking to explore the Sourdough prospect within Point Thomson Unit Area F on the eastern North Slope in early 2023. And while the company stands upon decades of work conducted by BP Exploration Alaska Inc. and others more than a generation ago, the project remains hampered by its challenging economics, as well as by a sequence of frustrating administrative delays.

Jade Energy LLC

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Various operators conducted seismic operations over the area from the mid-1970s into the 1990s. BP drilled two wells on the Sourdough lease in the mid-1990s. In 1997, it announced a discovery estimated to contain some 100 million barrels of recoverable oil.

In the nearly 25 years since then, the eastern North Slope has been haltingly but gradually opening through developments at the Badami unit and then at the Point Thomson unit.

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JADE ENERGY *continued from page 43*

By extending the pipeline infrastructure across hundreds of miles of the eastern North Slope, those two units have improved the possibility of a "string of pearls" — a series of developments between the Prudhoe Bay unit and the Arctic National Wildlife Refuge.

Those include Yukon Gold, Stinson and Sourdough.

But to make Sourdough work, Jade Energy needs some help, both globally and locally.

Globally, it needs oil prices to remain above $90 per barrel for an extended period of time. Locally, it needs assistance from Alaska policymakers and from industry partners.

Even though many of those factors remain unresolved, the company is continuing to permit its proposed Jade No. 1 exploration well. Given the long lead time in the Arctic, the company is looking to position itself to move quickly when circumstances align.

Jade Energy LLC is a partnership between two longtime North Slope veterans: Anchorage-based Erik Opstad and Colorado-based Greg Vigil, who each own 50%.

History

Initial exploration of the Sourdough prospect began in the mid-1970s, as part of exploration activities at what is now called Area F of the Point Thomson unit.

Exxon commissioned the Point Thomson 3D seismic program over 70 square miles of Area F in 1989. BP commissioned the Yukon Gold 3D program over 95 square miles of Area F in 1994 and the Mammoth 3D program over 13 square miles of Area F in 1997.

BP drilled the 12,562-foot Sourdough No. 2 well in March 1994 and the 12,475-foot Sourdough No. 3 well in March 1996. The company announced its discovery in 1997 but also successfully petitioned the AOGCC to grant extended confidentiality on both wells.

Area F was created as part of Point Thomson settlement talks a decade ago. It brings together 7,647 acres of non-contiguous leases in the northeast and southeast corners of the unit. The Sourdough project is targeting the southeastern leases, known as Tract 32.

Exxon drilled three wells in the northeastern leases between 1975 and 1995: Alaska State A-1 and Alaska State A-2 from ADL 047556 and Alaska State G-2 from ADL 343110.

Given its location at the far eastern edge of the Point Thomson unit, the Sourdough prospect has long been seen as a potential gateway to a future development in ANWR — not only because its physical proximity could bring infrastructure to the edge of ANWR but also because some geologists believe the Sourdough reservoir extends into ANWR.

Recent work

Immediately after being formed in 2018, Jade Energy LLC commissioned a new compressive sensing imaging, CSI, 3D seismic survey over the Sourdough area.

In a late 2018 agreement, ExxonMobil assigned a 62.674% working interest in Tract 32 of ADL 343112 to Jade, retaining a 2% overriding royalty interest. The following summer, BP assigned its 32.326% interest in the lease to Jade, retaining a 1.03% overriding royalty interest. Those two deals gave Jade 95% working interest in Sourdough, with ConocoPhillips Alaska Inc. holding the

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JADE ENERGY *continued from page 45*

remaining 5%.

Through a farm-out agreement, Jade planned to drill an exploration well on the lease in early 2020. The company conducted preliminary permitting activities in early 2019 with a goal of drilling the Jade No. 1 exploration well in early 2020 using an ice road and ice pad. The results of the well would determine additional appraisal drilling in early 2021.

The approximately 12,750-foot well would penetrate "all of the prospective Brookian sand target that lay between 11,000 feet and the Hue Shale at 12,500 feet," the company wrote in permitting documents. The company hoped to use Nordic Rig-3 for the well.

In mid-summer 2019, a delayed barge carrying a rig to the Point Thomson unit forced Jade to postpone its program by one year. In the company's next plan of development, filed toward the end of the year, it pushed the timeline back again, the early 2022.

Then-Division of Oil and Gas Director Tom Stokes told Petroleum News at the time that the delay was the result of scheduling challenges associated with seasonally restricted tasks, like barging in equipment and ice road construction. Stokes said oil prices were not an immediate issue.

Even with those delays, Jade was still making progress.

"Generally speaking, we fully or partially achieved 92 percent of the goals [for 2019] … while 8 percent of the targets were missed. The misses were largely the result of new information provided by the second field study conducted by Jade to support appraisal operations," the company wrote in March 2020 filing submitted to state regulators.

As an example, Jade noted that a Bathymetric survey of the PTU service pier approach showed the need for sea-bottom dredging in advance of the arrival of a land barge. With no time to do the work, let alone permit it, the company was forced to delay its campaign.

And toward the end of the year, Jade acquired the remaining 5% working interest in its lease from ConocoPhillips, giving the company 100% interest in Sourdough.

Obstacles

Then came the upheavals of early 2020.

"Despite the COVID-19 situation and challenges imposed by a less than robust commercial environment in the Alaska oil industry we are largely on schedule with plans outlined in the 2nd Jade POD," Erik Opstad told Petroleum News in October 2020.

In a third plan of development filed around that time, Jade described a range of permitting and preparatory activities through 2021 to support early 2022 drilling.

But then the company faced an unexpected obstacle.

The sale of BP Exploration Alaska Inc.'s North Slope assets to Hilcorp Alaska LLC complicated the final administrative transfer of 5% interest in the Sourdough lease. It took until July 2021 to resolve the uncertainty, late enough in the year that Jade was forced to delay its drilling again, this time until early 2023.

Even with the final transfer, some administrative kinks have persisted.

Associated with that 5% working interest is an NPSL (net profit share leases) development account worth more than $200 million. Jade is working with Hilcorp, ExxonMobil and the Department of Natural Resources to transfer the account, which would, according to Jade, "materially improve the calculated economics of the prospect."

Jade hopes to avoid a similar administrative delay in the early months of this year, as Hilcorp takes over from ExxonMobil as the new operator of the Point Thomson unit.

Jade was also making the case for royalty modification and for House Bill 81, which would give the state the authority to reduce the 40% net profit share leases burden on ADL 343112 to the point that development becomes commercially viable.

Correlative rights also hang over Sourdough.

According to the 2018 seismic program, some 40% of Area F reserves fall within ExxonMobil leases. Those additional reserves would improve the economics of Sourdough, making it easier for Jade to secure financing for its proposed drilling campaign. But under the current arrangement, ExxonMobil indicated it would transfer additional resources to Jade only following a successful initial drilling campaign.

"We have somewhat of a chicken and egg scenario here," Jade wrote in a recent POD.

"The bottom line is that Jade still cannot demonstrate that Area F can be commercially developed. Until that changes, the funding required to launch a development program will simply not be available. This is particularly true under the Biden Presidency given the political risk added to any Alaska oil and gas project by that administration," Jade wrote, adding: "There are those that will argue that spending near $1 million to fully permit the Jade 1 appraisal well is a foolish undertaking unless the project is deemed commercially viable. However, given the lead time needed to obtain approvals on the complete permit package, Jade has been and will continue to be willing to accept the risk believing that eventually we will be able construct a commercial development scenario." ●

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Stringing the pearls

The 'string of pearls' is the 'billion-dollar fairway' of the eastern North Slope

By ERIC LIDJI
For Petroleum News

Imagine the North Slope developed the other direction. Here's what actually happened.

The Prudhoe Bay unit came online in 1977 and was followed a few years later by the Kuparuk River unit to the west. Then came the Alpine field at the Colville River unit, and more recently the first producing fields in the National Petroleum Reserve-Alaska.

Those four developments have accommodated work at nearshore prospects to the north like Oooguruk and Nikaitchuq and exploration at emerging onshore fields in the "billion-dollar fairway." The western end of the central North Slope is a tight scrum of producing fields with exploration plays and other growth opportunities to the west, north and south.

But what if it had gone the other way? What if, in the years immediately after Prudhoe Bay came online, oil development had proceeded eastward, rather than to the west?

Say, for example, that the Badami unit came online in 1980, rather than the late 1990s. It would have brought pipeline infrastructure to the edge of the massive Point Thomson unit. And if Point Thomson would have come online in the early 2000s, it would have brought infrastructure to the edge of Area 1002 of the Arctic National Wildlife Refuge.

Development went west because that was the better option. The fits and starts of development on the eastern North Slope emerged from geology, geography and politics.

The new processing facilities for these eastern North Slope fields might have eased development of the Endicott field at the Duck Island unit and the Liberty field, too.

All this infrastructure might have also greatly improved the economics of a different "billion-dollar fairway," one encompassing a sequence of prospects east of Prudhoe Bay.

And who knows, perhaps slender unpaved fork roads would now lead to small fields dotting that vast undeveloped area between the Dalton Highway and the Canning River, accessing all sorts of smaller onshore prospects that no one has yet bothered to name.

Why not?

In reality, of course, it was never a simple choice of east or west.

Development went west because that was the better option. The fits and starts of development on the eastern North Slope emerged from geology, geography and politics.

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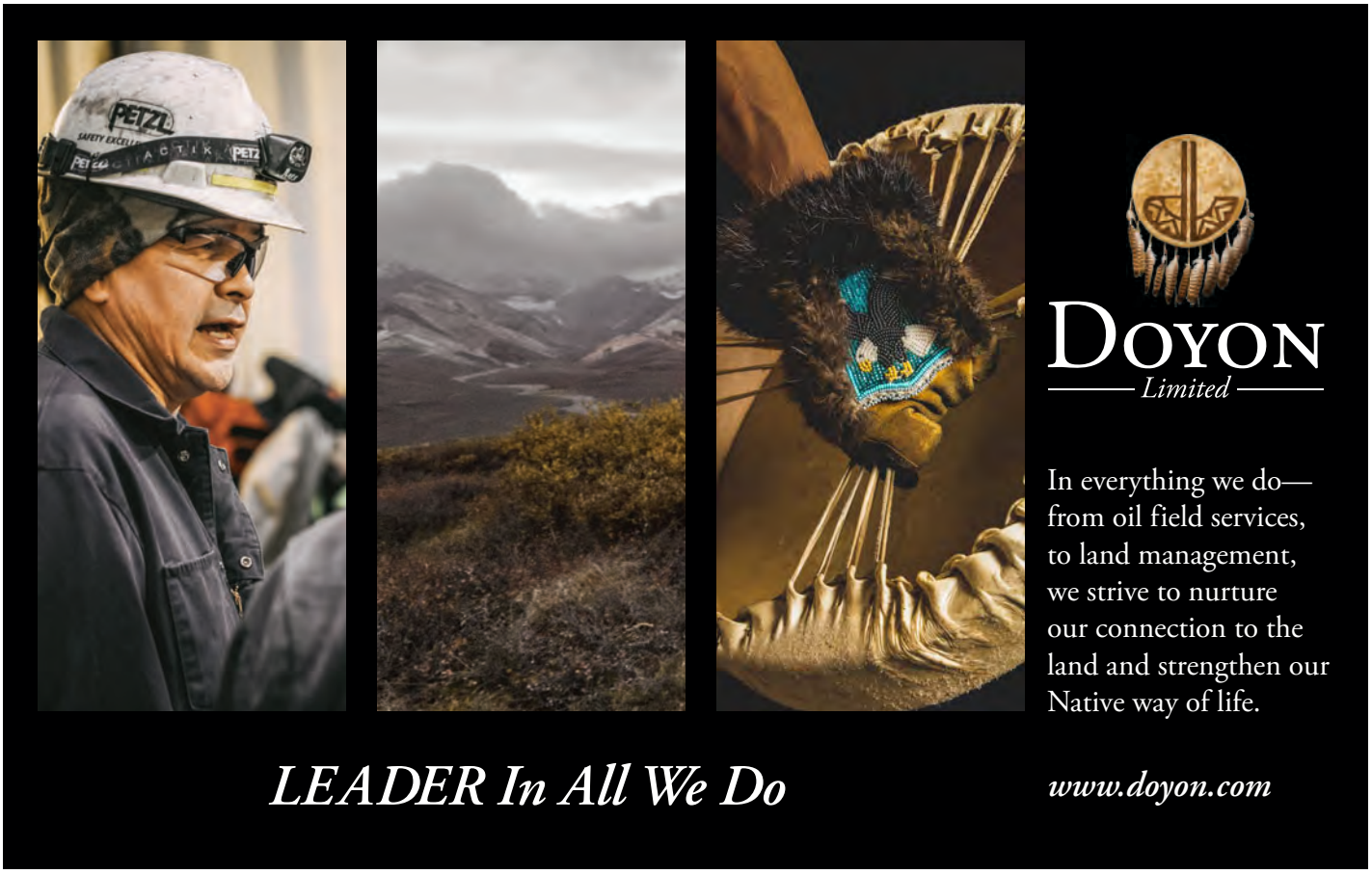

STRING OF PEARLS *continued from page 47*

The Badami unit is much farther east of Prudhoe Bay than the Kuparuk River unit is to the west. It is also much smaller than Kuparuk, and its turbidite reservoir is much more persnickety than the conventional reservoirs at the Kuparuk field (even the viscous ones).

The Point Thomson unit is huge, but it also comes with geologic complications. The extremely high pressures at the field have caused delays and added expense for decades.

And while the reopening of the NPR-A in 1999 created development incentives to the west, the ongoing political refusal to allow development at ANWR over that same time has reduced activities to a single exploration well drilled more than 35 years ago, as well as a recent lease sale that was soon slowed by a change in presidential administrations.

But the thought experiment is still useful. It reveals a truth about the oil industry in general and the North Slope in particular — one that is good for explorers to remember.

While bigness has always been a crucial factor for success on the North Slope, it has never been the only factor. A large enough discovery can certainly alleviate many other complications, such as remoteness, complex geology and extreme engineering needs.

But in point of fact, one of the enduring themes of the North Slope has been the importance of location. All throughout the basin you can find prospects that could be considered perfect candidates for development in all respects except one: location.

Reality

Even with its setbacks, the eastern North Slope still draws interest.

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The startup of Badami in the late 1990s followed by the startup of Point Thomson in the 2010s carried pipeline and processing infrastructure across hundreds of miles of the area.

Spare capacity on the 70,000-bpd Point Thomson Export Pipeline and the 35,000-bpd Badami Pipeline soon revived talk of a "string of pearls." That's the eastern North Slope equivalent of the "billion-dollar fairway." State officials began promoting the phrase in the 1990s to describe their hopes of infrastructure-led exploration activities in the region.

Pearls include East Mikkelsen, Greater Bullen, Kuvlum-Lonestar, Red Dog, Slugger (South Thomson), Sourdough, Stinson, Telemark, Yukon Gold, and of course …

ANWR

Over the past 25 years, each of those prospects has had its moment. Right now, the moment belongs to two prospects being pursued by a pair of small independents.

Jade Energy is attempting to overcome logistical and economic obstacles to explore the Sourdough prospect, located at the far eastern edge of the Point Thomson unit, on leases known as Area F (see article). 88 Energy recently acquired the nearby Yukon Gold No. 1 well and associated exploration acreage and is searching for partners (see article).

For a while, a third opportunity joined those.

Caelus Natural Resources Alaska LLC acquired 350,000 onshore acres between Prudhoe Bay and Point Thomson in 2015. The company acquired 175 square miles of new 3D seismic and reprocessed another 275 square miles of existing 3D seismic in the area.

"Adjacent infrastructure with available capacity reduces threshold volumes required for developing discoveries in the sub-100 MMBO recoverable range," Caelus said. "Multiple play types within proven stratigraphic horizons provide significant upside potential in previously poorly-imaged structural trends and/or subtle stratigraphic traps."

Eni acquired the leases when Caelus left Alaska in 2019 and initially expressed some enthusiasm for its exploration potential. But by mid-2021, Eni had dropped the acreage, telling Petroleum News at that time, "Eni completed its exploration studies on the area the leases covered and the prospectivity of the area didn't meet Eni's economic metrics."

Although progress has been few and halting on the eastern North Slope, the string of pearls remains a major growth area for the basin, if circumstances accommodate.

Newest eastern play

The newest play in the region comes from the prolific Armstrong Oil & Gas.

The company plans to drill its first exploration wells in its new Lagniappe block either this coming winter or the following winter. "Our Lagniappe block is really exciting. The eastern play is also an extension of our Pikka play and, like moving west into the NPR-A, it is one of the most underexplored areas on the North Slope," Bill Armstrong told PN (see story).

The company holds some 340,000 acres southeast of Prudhoe Bay, but the Lagniappe play covers only about 1,750 square miles of the lease block. There has been very little previous exploration drilling on the acreage and none targeting the Nanushuk. Armstrong recently reprocessed 850 square miles of 3D seismic in the area to help identify targets. ●

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Great Bear Pantheon takes the lead this winter

Small joint venture testing three onshore prospects in the central North Slope

By ERIC LIDJI
For Petroleum News


PAT GALVIN

North Slope oil exploration in the 21st century has often been a story of second acts: not so much the second acts of exploration companies but the second acts of exploration plays.

Some 70 years after exploration began in earnest, much of the basin is known. But only a small portion of it is known well. With new technologies, new economics and new players bringing new ideas and energy, once old prospects keep becoming new again.

Great Bear Pantheon is currently exploring three prospects in the central North Slope south of the Prudhoe Bay unit. The prospects have long exploration histories but not particularly deep exploration histories, with few prior wells to use as starting points.

Following an ambitious campaign to develop unconventional resources in the area, the companies behind Great Bear Pantheon pivoted in recent years to focus on conventional targets in the same general area, forming the Greater Alkaid and Talitha units in 2020.

The pursuit of those prospects makes Great Bear Pantheon one of the most active explorers this winter, albeit in a season with somewhat reduced activity. The company is testing the existing Talitha A well and drilling a new well at Theta West. The company reported positive initial assessments from both projects, earlier this year.

Great Bear Pantheon raised $96 million in late 2021 to support its current program. The financing included $41 million in equity and a $55 million convertible bond.

In December 2021, the company announced plans to assess "eight targets across three wells" this year, including four at Talitha A "and two targets each at Theta West and at our Alkaid 2H development well adjacent to the Dalton Highway and TAPS." In other documents, the company detailed a $50.6 million program, spending $10.7 million at Talitha A, at least $16.7 million at Theta West No. 1 and $23.2 million for Alkaid No. 2.

The primary goal of the exploration program this winter is to determine the deliverability of the prospects, according to Great Bear Pantheon. By drilling vertical test wells, the company hopes to affordably yet effectively determine the type and quality of oil in its plays, allowing it better design a potential horizontal development program in the future.

Unconventional

Great Bear Petroleum LLC came on the Alaska scene in 2010 with an ambitious plan to develop the source rocks responsible for the massive North Slope petroleum system.

The company bid more than $8 million for 105 tracts covering more than 500,000 acres at a state lease sale. The haul accounted for 92% of the high bids in that sale.

The idea was to bring an emerging Lower 48 strategy to Alaska. By hydraulically fracturing source rock like the Eagle Ford shale and the Barnett shale, companies were revitalizing basins once thought past their peak. "It's new to Alaska but it's not new to resource play exploitation in the Lower 48," Ed Duncan of Great Bear said in 2010.

The proposal was unlike anything undertaken in Alaska.

The company envisioned three 15-year phases, each featuring 3,000 wells drilled from one-acre pads, with 200 wells to a pad. The program would require 20 rigs, drilling year-round. It would cost approximately $2 billion each year, at a rate of $10 million per well.

Great Bear estimated the project would produce some 200,000 barrels per day by 2020 and climb steadily from there, peaking at 600,000 barrels per day by 2056. The company even claimed it could produce 1 million barrels per day, simply by drilling more quickly.

For comparison: at that time, only about 1,000 wells had been drilled in the main Prudhoe Bay field, throughput on the trans-Alaska oil pipeline was hovering around 550,000 barrels per day, and the state usually only had between 20 and 30 rigs at any

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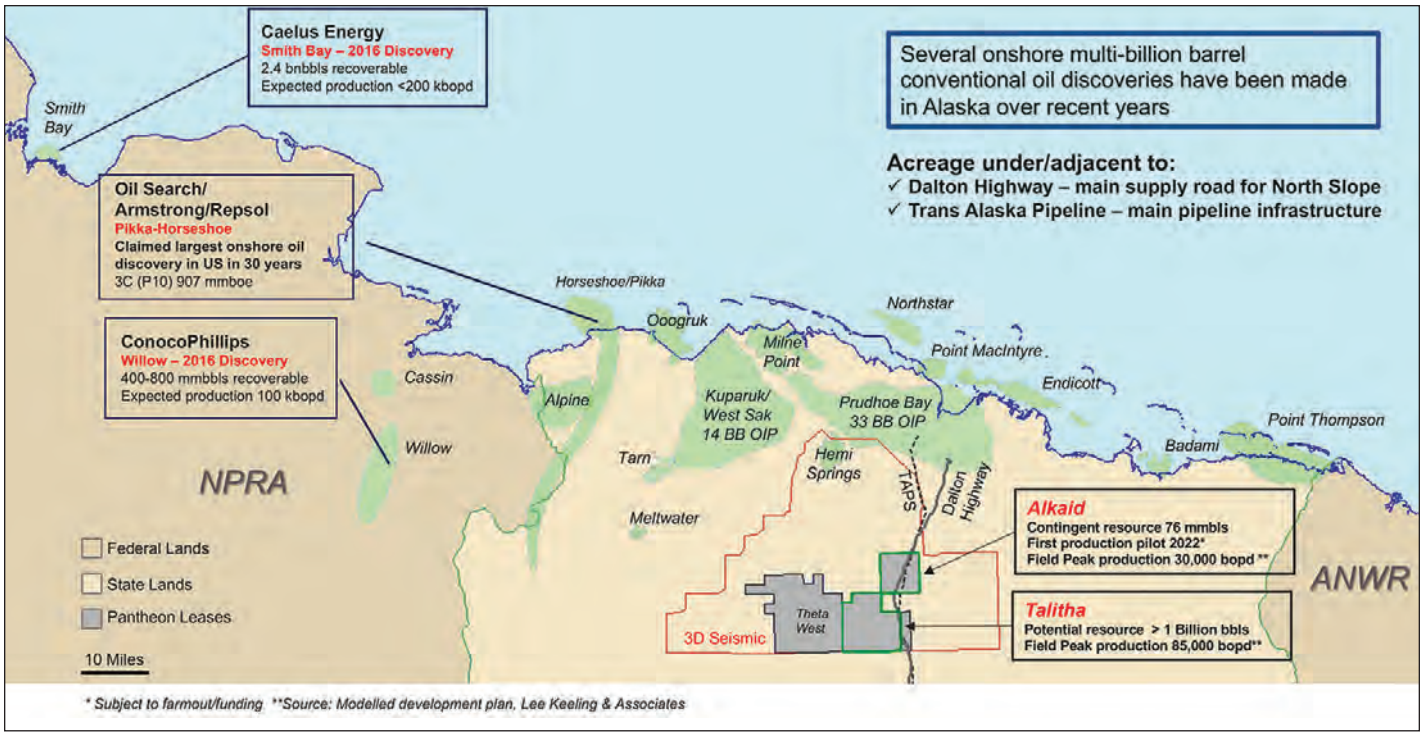

GREAT BEAR PANTHEON

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given time.

In an initial exploration season in 2012, Great Bear found oil where it expected to find it, but it faced various operational delays. The company spent several years evaluating its drilling results and conducting seismic and then re-emerged in 2014 with a new strategy.

For the 2015 winter exploration season, Great Bear proposed a three-well program that would target both conventional and unconventional resources. The cash flow from conventional production would help finance the unconventional development program.

Alkaid

Great Bear began with the Alkaid 1 well in early 2015. The well targeted the Kuparuk formation, but operations were ended before the entire Brookian had been penetrated.

Flooding along the Dalton Highway prevented the company from flow testing the well that season. But by the time the company suspended the well and demobilized equipment, all zones had been logged and sidewall cores had been taken at the deepest zones, confirming indications of oil in three major zones, from some 4,000 feet to 8,100 feet.

With the arrival of partner Pantheon, the new Great Bear Pantheon returned to the Alkaid prospect. The joint venture re-entered and flow tested Alkaid 1 in early 2019.

The well produced 108 barrels of 38 degree API oil and 300 barrels of water over 24 hours from the Upper Brookian formation. The company estimated that its main zone of interest in the Brookian formation contained some 240 feet of net pay within 400 feet of reservoir rock. Secondary targets in the West Sak and Ugnu formations were both wet.

"Such flow rates are considered to be an excellent result and indicate the potential for materially higher flow rates when wells are drilled in the typical manner for Brookian wells in Alaska — horizontally, stimulated and with larger intervals perforated," Pantheon said in a March 24, 2019, statement, referring to the vertical Alkaid No. 1 well.

The results also led Great Bear Pantheon to combine Alkaid and the nearby Phecda prospect into a single undertaking, increasing known as the Greater Alkaid prospect.

"These two projects will now likely be part of a single development plan, favorably located adjacent to the Dalton Highway and TAPS pipeline," the company said. "The better than expected results in the zone of interest will also impact the pre-drill P50 technically recoverable resource estimates which will be assessed in the near future."

That summer, Pantheon proposed a phased production program at Alkaid designed to bring the field into production as early as 2021. Following optimistic conversations with state and federal regulators, it revised that timetable, saying it could begin production by the summer of 2020, "subject to completion and timing of a successful farmout."

To improve farm-out discussions, Pantheon acquired minority partners Halliburton Energy Services LLC's and Red Technology Alliance LLC's 25% interest in the Greater Alkaid leases. But the arrival of the coronavirus pandemic in early 2020, followed by the global crash in oil prices, forced the company to take a new approach.

With operations increasingly inching toward normalcy — or at least a more predictable form of uncertainty — Great Bear Pantheon is planning to return to the prospect.

The company plans to drill the Alkaid No. 2 well this spring or summer. With good results, production could begin "soon thereafter," Cheatham said in a statement.

In early April 2022, as the Explorers was going to press, the state began accepting comment on a two-well exploration program proposed by Great Bear Pantheon LLC. The program would include the Alkaid No. 2 and Alkaid No. 3 wells, from two pads located about four miles apart with a third staging pad at the Alcor No. 1 site.

Following preparatory work from mid-May through June, the company would drill Alkaid No. 2 with a horizontal component in July and Alkaid No. 3 after July 31.

The company plans to drill the Alkaid No. 2 well this spring or summer. With good results, production could begin "soon thereafter," Pantheon CEO Jay Cheatham said in a statement.

In a presentation earlier this year, the company described two zones at Alkaid. The shallow zone contains some 2.6 billion barrels of oil in place with 404 million barrels of recoverable oil, according to a company estimate. The zone is an extension of geology evaluated by the Talitha program in recent years. The deep Brookian zone contains 76.5 million barrels of contingent resources, accord to a Lee Keeling & Associates estimate.

Great Bear Pantheon is currently estimating peak production of 85,000 barrels per day from the shallow zone and 30,000 barrels per day from the deep zone.

Talitha

Great Bear Pantheon drilled the 10,456-foot Talitha A well in 2021 and announced that the well had encountered five distinct oil horizons in a 3,700-foot column: the Shelf Margin Deltaic, the Slope Fan System, the Upper Basin Floor Fan, the Lower Basin Floor Fan and the Kuparuk. The company currently believes that the stacked play contains 12 billion barrels of oil in place with some 1.4 billion barrels of recoverable resources.

The company returned to the well this year, using the Nordic Calista No. 3 rig for a testing operation. The program began by plugging the deep Kuparuk zone to support a future well in the area and then tested the four remaining zones from deepest to shallowest.

The shallower Shelf Margin Deltaic was the primary target of the program. The company said it was aiming for an initial production rate of 50-80 barrels per day from a vertical test well. "Such a flow rate in a vertical configuration is expected to translate into materially higher flow rates in a horizontal configuration, which is how all production wells will be drilled," the company explained in a Jan. 24 news release.

Testing was completed in early February. The operation perforated three 10-foot intervals — 9,405 feet to 9,415 feet, 9,205 feet to 9,215 feet and 9,045 feet to 9,055 feet.

Each interval was individually stimulated and flow test. The well produced 35 to 39 degree API oil and averaged 73 barrels of oil per day over a three-day period. It produced at a sustained rate of approximately 40 barrels per day on the final day of testing.

COURTESY PAT GALVIN

Talitha at dusk.

"This is a great result and better than we had expected at this location, given that the Talitha A well was positioned to prioritize the Shelf Margin Deltaic horizon. The (Basin Floor Fan) horizon in this well is in a downdip distal location with suboptimal reservoir qualities, over 10 miles from the ideal location," Cheatham said. "Whilst these flow rates exceeded our expectations, we must caution that, although this is very positive for Theta West, it does not guarantee success. We must wait to complete the drilling and for flow test results from the Theta West No. 1 well. However, we remain cautiously optimistic."

The testing also confirmed deliverability, according to Cheatham. The high-quality light oil moved easily through the vertical well. The company considers that to be good news for a potential development plan with horizontal wells and multi-stage stimulation.

Early in its evaluation of the Talitha prospect, Pantheon described Talitha A as a re-drill of Pipeline State No. 1 from 1986. The Talitha program targeted some of the same oil sands that ARCO had encountered in its earlier well, but it applied knowledge acquired from recent discoveries in the region and four decades of improved technologies.

"ARCO drilled the well looking for a thick, clean sand and instead found a thick zone of interbedded, laminate-type sands and shale," Pantheon Technical Director Bob Rosenthal said during a June 2019 webcast to share additional results. "The sands were oil-bearing but at the time given the … $10 price of oil and the fact completion technology wasn't as advanced as it is today, the well was plugged and abandoned. … With today's horizontal drilling technology we believe we have a significant discovery" at the Talitha prospect.

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Theta West

The results of the Talitha program led to another prospect: Theta West.

The company identified the prospect following the discovery of light oil in the Basin Floor Fan of the Talitha A well. The company compared the discovery to prospects in West Africa, in the Gulf of Mexico and Guyana. At the time, it estimated a P50 contingent resource of 1.41 billion barrels of oil for "primary recovery" on its acreage.

"We think we've got one of the largest discoveries made in the world in the last year," technical director Bob Rosenthal told Petroleum News in early November 2021.

In December 2021, the state Division of Oil and Gas approved a plan for constructing an 8-mile ice road from the Dalton Highway to the Talitha A pad and a 10.5-mile ice road from the Talitha A pad to the Theta West site. The Theta West site would require a new 520-foot by 240-foot ice pad with a 50-to-100-bed crew camp, storage areas and maintenance buildings. The 9,300-foot Theta West No. 1 well would "test and evaluate multiple targets in the Brookian formation with an emphasis on the Basin Floor Fan."

Great Bear Pantheon spud the well on Jan. 21 using Nordic Calista Rig 3. The company said it planned to drill to target depth, case the well and begin testing the two primary targets for the well, the Lower Basin Floor Fan and Upper Basin Floor Fan.

"The spudding of the Theta West 1 well marks another important day for Pantheon shareholders," Cheatham said after the company announced spudding the well. "As happened last year, our contractors have built the ice roads and drilling pads safely and on schedule. This has enabled us to have our equipment on both locations by mid-January, maximizing our time to complete our planned two well winter campaign."

Great Bear Pantheon drilled the 10,456-foot Talitha A well in 2021 and announced that the well had encountered five distinct oil horizons in a 3,700-foot column: the Shelf Margin Deltaic, the Slope Fan System, the Upper Basin Floor Fan, the Lower Basin Floor Fan and the Kuparuk.

In late March 2022, Pantheon reported that the Lower Basin Floor Fan of the Theta West No. 1 well "flowed high quality, light 35.5-38.5 degree API gravity oil at rates that averaged over 57 barrels of oil per day with peak rates exceeding 100 bpd over 2.5 days."

Although forced to suspend the well to accommodate an extreme incoming storm, Pantheon said in a statement that the initial results of the well "supports, and likely exceeds, its pre-drill resource estimates of 1.2 billion barrels of oil (recoverable)."

"We are very excited by this result at Theta West. This well is a successful 10.5-mile step-out from the LBFF oil-bearing interval at Talitha. The test result confirms a vast oil resource and also confirms our geologic model. Its proximity to infrastructure gives Pantheon a strategic advantage over other greenfield projects," Cheatham said.

With winter operations complete for the year, the company is now planning the Alkaid No. 2 well, which it will drill in July 2022 from a gravel pad near the Dalton Highway. ●

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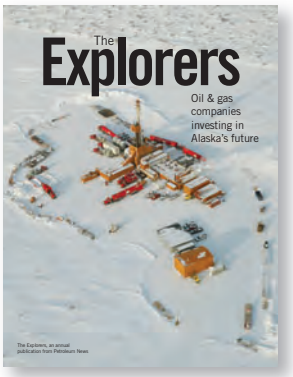

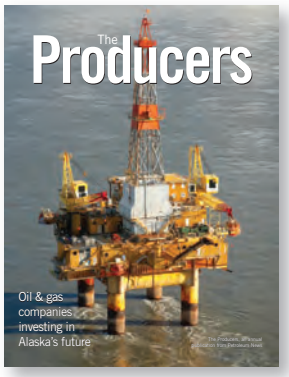

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