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The Explorers, an annual publication from Petroleum News

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MAILING ADDRESS:
PO Box 231647
Anchorage, AK 99523-1647
Phone: (907) 522-9469
Email:
circulation@PetroleumNews.com
Web page:
www.PetroleumNews.com

To order additional copies, contact Heather Yates at hyates@petroleumnews.com

On the cover: A ConocoPhillips Alaska exploration project

Photo courtesy ConocoPhillips Alaska

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The Explorers

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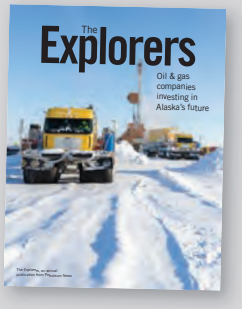

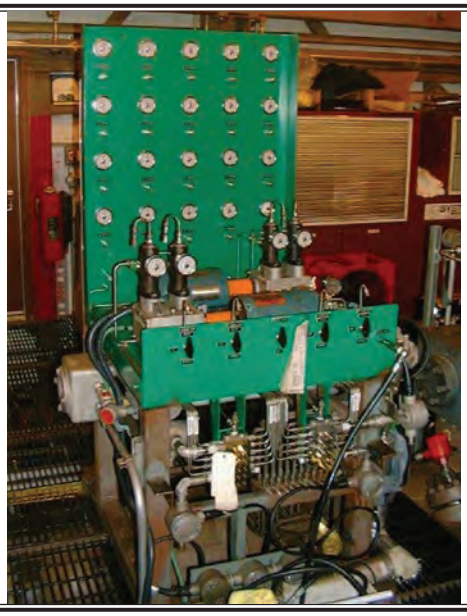

New frontiers of Alaska exploration

True wildcats may be rare, but companies are still pushing boundaries

By ERIC LIDJI
For Petroleum News

Exploration is always about frontiers. In the old days, those frontiers were usually geographic. Wildcatters struck out for remote parts of Alaska, exploring places where few people had ever stood, let alone drilled.

In a mature basin, though, the "frontier" of exploration can be defined more broadly.

It can include frontiers of technology, frontiers of geology, frontiers of chemistry, frontiers of regulatory and administrative regimes, and even frontiers of economics.

While there is a lot of undeveloped acreage in Alaska, and some of it is known to be prospective for oil and natural gas, the majority of the exploration occurring across the state today occurs in the vicinity of existing development. And yet, all seven companies profiled in this edition of The Explorers are all venturing into their own frontiers.

• 88 Energy is attempting to succeed where other small independents have failed in the past: simultaneously managing multiple plays in multiple areas. The company is currently managing five projects between the Canning River and the Colville River. It has been jumping from region to region each year in an attempt to advance projects and secure funding. This year, the company is working at Project Phoenix in the central North Slope.

• **ASRC ENERGY** is conducting a long-term production test of methane hydrates on the North Slope, a project desired by industry watchers for more than two decades. There are huge volumes of known hydrates reserves on the North Slope, and previous players have made progress in understanding this unusual resource. And yet, no one has ever conducted a long-term test of the effects of sustained production on these reservoirs.

• **CONOCOPHILLIPS ALASKA** is returning to exploration work after a two-year pause brought about by the pandemic — one of its longest pauses ever. The company will be focusing this year on its Bear project, while also reviewing the portfolio of opportunities west and south of the Colville River unit that it was pursuing before the upheavals of 2020.

• **GREAT BEAR PANTHEON** is now a producer, and it continues to explore three onshore prospects in the central North Slope: Alkaid, Talitha and Theta West. These conventional prospects are likely the beginning of a much larger initiative. The joint venture has also been perpetually keeping its eye on deeper source rocks in the region.

• **HILCORP** is the only explorer in Cook Inlet this year. It is celebrating the completion of its first decade in the basin, a decade that saw the company push existing developments into new acreage. The results? The Ninilchik unit is now the largest natural gas producer in the basin. In recent years, the company has also been pursuing a genuine frontier play through its exploration partnership with Doyon Limited in the Yukon Flats basin in the Interior.

• **JADE ENERGY** is pursuing the long-known and often-ignored Sourdough project in the Point Thomson unit on the eastern North Slope. Before the small independent can tackle the technical challenges of the field, it must surmount regulatory, administrative and financial hurdles. It achieved a big regulatory milestone recently, but it still needs the cooperation of some larger companies, as well as the global investor community.

• **LAGNIAPPE ALASKA** dropped its first exploration project as this issue of The Explorers was going to press. The company is resuming its pre-pandemic momentum by proposing a three-to-six well exploration program on its block of leases south of Badami. Bill Armstrong claims that the block represents the same opportunity as the Nanushuk in the 2010s — an overlooked play primed to bring huge attention to an undeveloped region.

And while those companies are pursuing exploration opportunities on state leases, other companies continue to explore other parts of the state through the exploration licensing program. The state is managing two projects in southcentral and dealing with an appeal of its denial of a recent project proposed in the Katalla region of the Gulf of Alaska.

These are genuine frontier plays, with the wildcatting spirit that made Alaska famous. ●

Contact Eric Lidji at ericlidji@mac.com

Exploration licensing draws perpetual interest

Smaller players continue to utilize the frontier exploration program

By ERIC LIDJI
For Petroleum News

Almost the entirety of commercial oil and natural gas production in Alaska occurs in two basins: there is the North Slope including its nearshore waters in the Arctic Ocean, and there are the two onshore sides of Cook Inlet as well as the body of water in between.

These are also the general regions where the state holds lease sales each year.

Then there is the rest of Alaska: a vast state with many known and unknown opportunities for future development. Many obstacles hamper these areas: remoteness, lack of infrastructure, complex geology, land ownership and perpetual disinterest.

But opportunities undoubtedly exist.

For those companies who want to venture beyond the regions covered by existing lease sales, the state provides a mechanism to allow for activities: the exploration license.

In the decades since the exploration license program began, it has led to many issued licenses, a small number of exploration activities, and no commercial production to date.

Exploration in the Houston-Willow area began around 1917, when excavations for the Alaska Railroad exposed subbituminous coal, according to the Division of Oil and Gas. The coal was mined intermittently and supplied area military bases until at least 1955.

Exploration licensing is not available everywhere, only in areas determined by the state.

The word "determined," here, is a technical term, referring to a corner of Alaska law and regulations governing land use in the state. The state Division of Oil and Gas can make a preliminary determination that certain areas are suitable for exploration licensing. From there, it can accept proposals for exploration and ultimately issue licenses, if it chooses.

Each April, companies can nominate specific segments within those areas. A nomination must cover a segment of land between 10,000 and 500,000 acres. The applicant proposes the geographic

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LICENSING *continued from page 9*

area, a financial work commitment, and a term limit. The process allows other companies to make competing bids, in an effort to get the best deal for the state.

This nomination process is intended to mimic the competitive nature of lease sales, so that the state of Alaska can fulfill the "maximum benefit" clause of the state constitution.

There are currently two active "determined" areas.

The "Southcentral Region" is an L-shaped area including the coastline along Prince William Sound and extending north to include the southern edge of the Interior, including the cities of Cordova, Valdez, McCarthy, Glennallen, Talkeetna, Paxson and Tok.

The "Nenana Region" covers a smaller area immediately west of the Fairbanks North Star Borough and immediately west and north of the Interior city of Nenana.

Through the exploration license program, the state is overseeing one active exploration license and three pending license applications, and has one license under appeal.

Houston-Willow

The state Division of Oil and Gas awarded a six-year license in December 2018 to Samuel Cade and Daniel Donkel covering 18,698 acres in the Houston-Willow basin.

The partners submitted their initial application to the state in April 2007. The original application also included LAPP Resources Inc. After the 2011 death of principle Dave Lappi, the corporation was dissolved. The proposal advanced under Donkel and Cade.

The state received no competing proposals for the acreage. The partners expanded their proposed scope of work in 2015 and were awarded the exploration license in 2018.

The original decision called for a five-year term with a $750,000 work commitment, but the decision was later revised to a six-year term with a $500,000 work commitment.

Exploration in the Houston-Willow area began around 1917, when excavations for the Alaska Railroad exposed subbituminous coal, according to the Division of Oil and Gas. The coal was mined intermittently and supplied area military bases until at least 1955.

According to the decision, some 22 exploratory wells, stratigraphic test wells, and core holes have been drilled in the basin. Of those, 13 were clustered near Houston and Willow. Prior wells were drilled mostly to evaluate shallow gas and coalbed methane potential.

JUDY PATRICK

The 800-mile trans-Alaska oil pipeline stretches from Prudhoe Bay in the north to the Port of Valdez in the south.

The U.S. Bureau of Mines drilled three Houston core holes in 1951-52, with reports of methane and brackish water. Anchorage Oil and Gas completed a sidetrack of one of these Houston core holes in 1955, but no information exists about the well results.

Anchorage Gas and Oil Development and Hackathorn Drilling separately completed five wells in the Rosetta exploration program between 1956 and 1962. The area saw little exploration for decades. Then, between 1998 and 2004, Growth Resource International and Evergreen Resources completed six coalbed methane wells in the Houston area.

"To date, drilling in the area has encountered no oil shows, and only noncommercial quantities of gas," the division noted. But, it added, "Further exploration using modern seismic, drilling, and logging techniques would likely help to resolve details of the anticline's geometry and to clarify its conventional gas and CBM resource potential."

Gulf of Alaska

The Nikiski-based Cassandra Energy Corp. is currently appealing a decision by the state to decline an exploration license in the Gulf of Alaska, an area better known as Katalla.

In a preliminary finding from 2019, the state Division of Oil and Gas favored granting the company a 10-year license over 65,773 acres with a $1 million work commitment.

Cassandra Energy President William H. Stevens had a lease-purchase option with the Welch family of Cordova on the nearby 465-acre Katalla oil field where 154,000 barrels of oil were produced and refined in a small refinery that was completed in 1911.

The refinery burned down in 1933 and was never rebuilt.

Katalla is one of the legendary underdeveloped legacy fields of Alaska.

Sir Thomas Boverton Redwood encouraged a British consortium to drill an exploration well near Katalla Meadows in 1902, investigating oil seeps identified in the mid-1890s.

The British consortium sold some of its claims and wells in 1910 to Amalgamated Development Corp. out of Washington state. The following year, Amalgamated Development Corp. sold the claims to Chilkat Oil Co., which built a small refinery.

Kennecott Copper Corp. acquired the properties in 1922, a few years after additional drilling in the area led to a small boost in production. That summer, a Mobil field party reported: "If the same area with the same geology were located in California, a deep well would unhesitantly be recommended" — a sentiment that has echoed down through the decades all across the Alaska oil patch. The refinery burned down in 1933 and was never rebuilt. The area became a ghost town. All told, 154,000 barrels of oil were produced.

Following a visit to the site in 1938, Chevron geologist G. Dallas Hanna wrote, "This history of the region has been filled with countless blasted hopes and bitter

disappointments. Millions of dollars have been spent fruitlessly on projects which doubtlessly seemed commercially feasible at the time, but which were destined to fail for one reason or another. Probably no other equal area in Alaska has had so sad a fate."

Even so, a new attempt to develop the area came in 1951, when Northern Development Co. discovered a provision of federal law giving the Interior Department permission to grant contracts in frontier basins. Throughout the late 1950s and early 1960s, many companies visited Katalla, drilling some 25 wells. None yielded commercial discoveries.

Chugach Alaska Corp. secured an exclusive exploration contract over the area from the early 1980s through the early 2000s. Stevens joined that venture in the early 2000s, but his project was thwarted by a combination of environmental and regulatory delays.

In late 2020, after completing its review of the proposal, the state ultimately denied the application, saying that the proposal failed to serve the best interests of the state.

"The decision isn't ruling out exploration in the Gulf of Alaska," then-Division of Oil and Gas Director Tom Stokes told Petroleum News. It ruled out Cassandra's Katalla proposal for exploration in a remote coastal location some 40 miles east of Cordova.

The change came largely as a result of interagency land management agreements.

For example, the U.S. Fish and Wildlife Service asked not to include some of the state-owned coastal lands it manages along the coast of Controller Bay. Those lands were needed for staging equipment and siting drilling locations as part of the proposal.

The final finding noted also shallow waters and navigation hazards in Katalla Bay, as well as "local severe winter weather conditions" such as wind speeds and wave heights, all of which increased the potential risk of accidents and spills during exploration.


Anchorage Daily Times

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July 23, 1957 headline "Richfield Hits Oil" in the Anchorage Daily Times proclaims the discovery of the Swanson River oil field on the Kenai Peninsula that kicked off the Alaska oil boom.

It might have been possible to offset some of those concerns with mitigation measures, but those measures would require a large discovery. At the moment, according to the state, the geologic data doesn't suggest a large discovery. In short, "the potential positive effects of the exploration license do not clearly outweigh or balance the potential negative effects to the other resources and habitat of the license area," Stokes wrote.

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Cassandra Energy appealed the decision, and the appeal remains open.

Susitna Valley

There are also two pending Susitna Valley applications from the Alaska Natural Gas Corp. Although the company is preparing a single exploration program, it ultimately applied for two licenses to accommodate the 500,000-acre limit for a single license.

The two license areas cover 913,249 contiguous acres in the Susitna River basin within the Matanuska-Susitna Valley, immediately west of the Parks Highway. The first area covers 433,331 acres, and the second covers 479,918 acres immediately to the north.

Alaska Natural Gas Corp. submitted its proposal in late April 2017, asking for 10-year licenses, each with a $500,000 work commitment. "The proposed amount was not accepted because it did not reflect the current economic climate or the likely costs to conduct a field program sufficient to realize usable data. Costs of the proposed activities described in the proposal were considered, including remote sensing; geological, geochemical, and geophysical studies; and exploration drilling," the state concluded and instead imposed a $3 million and $3.3 million work commitment, respectively.

The licenses only allow for natural gas exploration. The Susitna Valley is considered gas-prone, with a higher likelihood of unconventional resources such as coal-bed methane.

Alaska Natural Gas Corp. is a privately held company. In state corporations filings, Robert Fowler is listed as president and Jean-Robert Pronovost as secretary and treasurer.

On its website, the company said it plans to use horizontal drilling technology to target coal-bed methane — extracting natural gas from underground coal seams in the region.

The state describes the Susitna Valley basin as underdeveloped.

To date, there have been nine exploration wells and four core holes drilled within the license area. All were plugged and abandoned as dry holes, although some had gas shows.

The 7,265-foot Union Texas Pure Kahiltna Unit No 1 was completed in March 1964, and the 13,708-foot Unocal Trail Ridge Unit No. 1 was completed in October 1980. Both wells encountered coal beds, "suggesting a correlation with the coal-bearing formations in the Cook Inlet basin that produce natural gas," according to the state finding.

While five previous wells in the Susitna basin have encountered coal seams, "none proved to have coalbed methane in economic quantities," according to the state. For that and for some other geologic reasons, the state said that the potential for conventional oil and gas, as well as coalbed methane, is "low to moderate" in the Susitna Valley.

Cook Inlet Energy LLC obtained a 10-year exploration license over the area in 2011.

Susitna Basin Exploration License No. 4 covered 62,909 acres with a $2.25 million work commitment. The company acquired a second license, Susitna Basin Exploration License No. 5, in 2012, covering 45,764 acres with a $250,000 work commitment. The company never completed its proposed work and had ultimately surrendered both licenses by 2016. ●

Contact Eric Lidji at ericlidji@mac.com

Phoenix rising from central North Slope

88 Energy pursuing six targets from Hickory No. 1 well, south of Deadhorse

By ERIC LIDJI
For Petroleum News

ASHLEY GILBERT

ERIK OPSTAD

Like many previously small players in Alaska, 88 Energy is holding more acreage than it can currently afford to develop at one time, and therefore the company has been strategically hopscotching its leasehold in recent years, proving up one corner at a time.

Through its subsidiary Accumulate Energy Alaska Inc., 88 Energy spud the Hickory No. 1 exploration well at its Project Phoenix on March 9 with the Nordic Calista Rig No. 2.

The small Australian independent is currently operating five projects on the North Slope stretching from the Canning River to east to the Colville River to the west.

In the eastern North Slope, along the border of the Arctic National Wildlife Refuge 1002 Area, the company operates Project Yukon through its subsidiary Regenerate Alaska.

In the central North Slope, the company holds a large swatch of non-contiguous acreage straddling the Dalton Highway and the trans-Alaska oil pipeline. Through its subsidiary Accumulate Energy, the company operates Project Icewine and the associated Project Phoenix, previously known as Icewine East. Through its subsidiary Captivate Energy, the company operates Project Leonis on acreage immediately south of Prudhoe Bay.

In the foothills of the Brooks Range Mountains, the company operates the neighboring Project Peregrine and Project Umiat through its subsidiary Emerald House.

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, 88 Energy Ltd. came to Alaska in late 2014 to pursue North Slope opportunities.

The company entered the North Slope basin through an agreement with Burgundy Xploration to acquire 87,000 acres of Prudhoe Bay, acreage that later became known as Project Icewine. Through subsidiaries, 88 Energy initially focused its resources on Project Icewine, acquired 2D and 3D seismic and drilling several exploration wells.

Initially, the company viewed the region as an unconventional play. But the drilling and seismic activity pointed toward conventional opportunities, which could potentially allow the company to generate cash flow more quickly to fund a wider range of projects.

After several years of work at Icewine, and acquiring leases at Project Yukon, 88 Energy shifted to Project Peregrine, drilling two wells at the Merlin prospect in 2021 and 2022.

NAME OF PARENT COMPANY:
88 Energy Ltd.
NAME OF ALASKA COMPANY:
88 Energy Alaska Inc.
ALASKA OPERATING SUBSIDIARIES:
Accumulate, Captivate, Regenerate, & Emerald House
AUSTRALIA COMPANY HEADQUARTERS:
Ground Floor, 516 Hay Street, Subiaco WA 6008, Australia
MAILING ADDRESS:
PO Box 352, Subiaco WA 6904, Australia
PHONE: +61 (0)8 9485 0990
U.S. COMPANY HEADQUARTERS:
1300 Post Oak Blvd. Ste. 2400, Houston, TX 77056
MAIN EMAIL: admin@88energy.com
TOP EXECUTIVE: Ashley Gilbert, managing director
ALASKA MANAGER: Erik Opstad (Oversees Accumulate, Captivate & Emerald House)
COMPANY WEBSITE: www.88energy.com

This year, 88 Energy returned to the central North Slope to explore Project Phoenix and to acquire a new package of leases just south of Prudhoe Bay, known as Project Leonis.

Phoenix

88 Energy drilled the Hickory No. 1 exploration well earlier this year to test four reservoirs: the Shelf Margin Delta, Slope Fan System, Basin Floor Fan and Kuparuk.

The primary targets of the well are three reservoirs in the Shelf Margin Delta (SMD-C, B and A). The Slope Fan System and Basin Floor Fan reservoirs are secondary targets. The deeper Kuparuk reservoir is considered a tertiary target and would only be drilled if time, borehole conditions and other technical considerations allowed, according to 88 Energy.

The company plans to flow-test the Hickory well next winter, pending the results of the current drilling program. "This provides ample time post-drilling to optimize the flow test program, design, permitting and implementation," 88 Energy said in March 2023.

The well is part of Project Phoenix, in the central North Slope. The company previously called the acreage Project Icewine East but changed the name to reflect a new strategy.

Originally envisioned as an unconventional HRZ play, "Project Phoenix is now focused on the proven oil-bearing conventional reservoirs that were identified during the drilling and logging of Icewine-1 and 2," the company said in a statement in December 2022.

The company selected the drilling location based on the Franklin Bluffs 3D seismic survey, along with information from

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88 ENERGY *continued from page 13*

its Icewine No. 1 well and information from recent drilling and flow tests conducted by Pantheon Resources on nearby acreage. "These existing data sets, and the multi-disciplinary evaluation undertaken on them, substantially increases our confidence in unlocking the potential of the Icewine East acreage," 88 Energy Managing Director Ashley Gilbert said in a statement in September 2022.

The company said it is targeting "647 million barrels of oil unrisked net mean prospective resources" with Hickory No. 1 and that Icewine East contains 1.03 billion total barrels.

The project is a joint venture with Burgundy Xploration. Through subsidiary Accumulate Energy, 88 Energy holds 75.2% working interest in some 184,000 net acres.

The company plans to build a 500-foot ice road connecting the Dalton Highway to a temporary 600-foot by 600-foot ice pad located some 30 miles south of Deadhorse. The company plans to drill the proposed 13,000-foot vertical well using the Nordic Rig 2.

88 Energy estimated that the Hickory No. 1 well would cost approximately $13.5 million, which the company said was relatively low due to its proximity to the Dalton Highway.

The company was raising A$17.5 million to support the exploration project.

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.

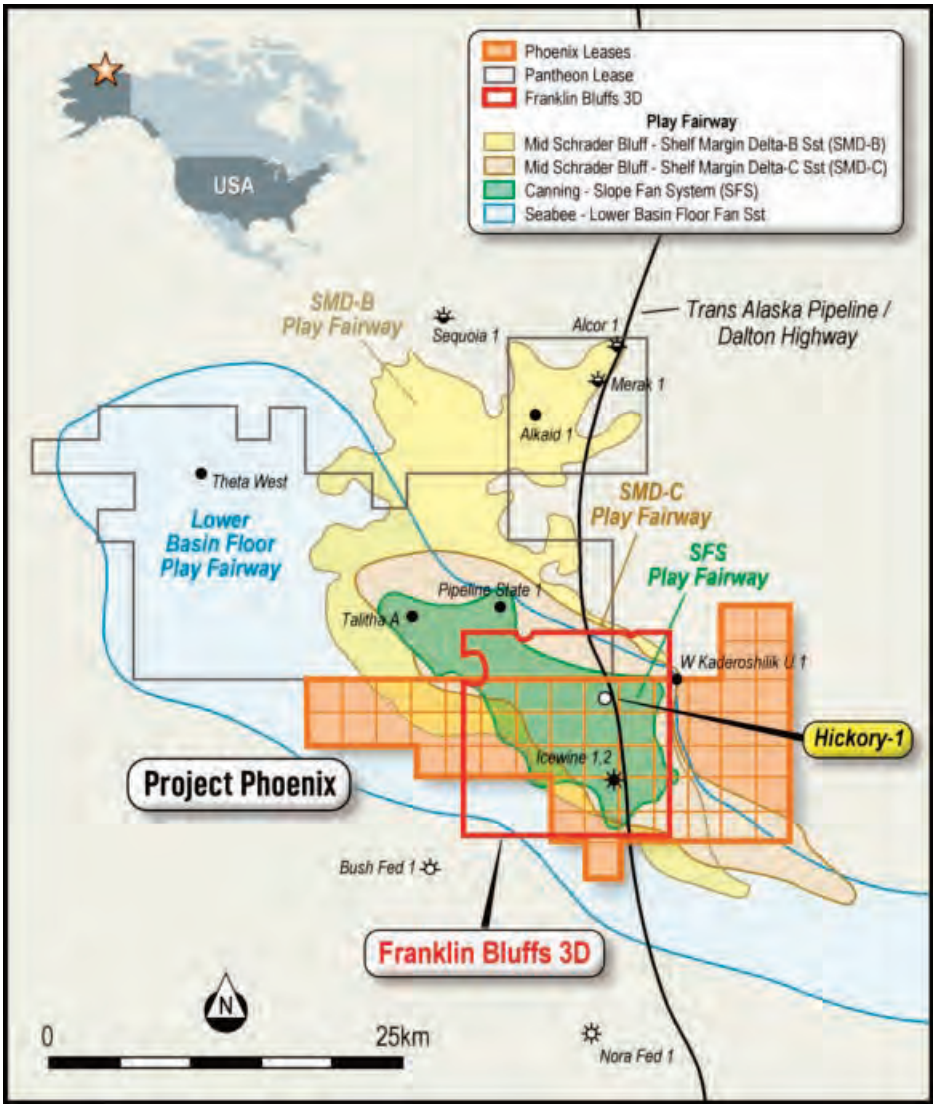
Icewine began as a renewed focus on North Slope source rock exploration, pursuing opportunities identified by Great Bear Petroleum LLC. The original Icewine leases were just south of the original package of leases acquired by Great Bear Pantheon.

88 Energy acquired 2D and 3D seismic over the leases and drilled three wells. Icewine No. 1 from 2015 and Icewine No. 2 from 2017 were unconventional wells on the eastern block of leases. The company subsequently plugged and abandoned both wells. Charlie No. 1 was a conventional well on the western block and discovered condensate.

Peregrine

Project Peregrine covers 195,373 net acres in the National Petroleum Reserve-Alaska immediately north of the Umiat prospect and a bit south of the Willow prospect. 88 Energy is the sole working interest owner, through its subsidiary Emerald House.

The company has identified three prospects at the Peregrine Project: Merlin and Harrier in the Nanushuk formation and Harrier Deep in the Torok/Basin Floor Fan. 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.



88 ENERGY

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, 88 Energy Ltd. came to Alaska in late 2014 to pursue North Slope opportunities.

Emerald House drilled the 5,267-foot Merlin No. 1 well in early 2021 using All-American Rig 111. The innovative design of the rig allowed it to be deconstructed and transported over existing snow trails in parts, rather than over expansive ice roads.

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

According to 88 Energy, the well proved the "petroleum system and primary targets" of the program. The results encouraged the company to return in 2022 to drill Merlin No. 2.

Emerald House drilled the 7,334-foot Merlin No. 2 appraisal well east and down-dip from Merlin No. 1 using the Arctic Fox rig. It targeted an estimated 652 million barrels of oil in three Nanushuk

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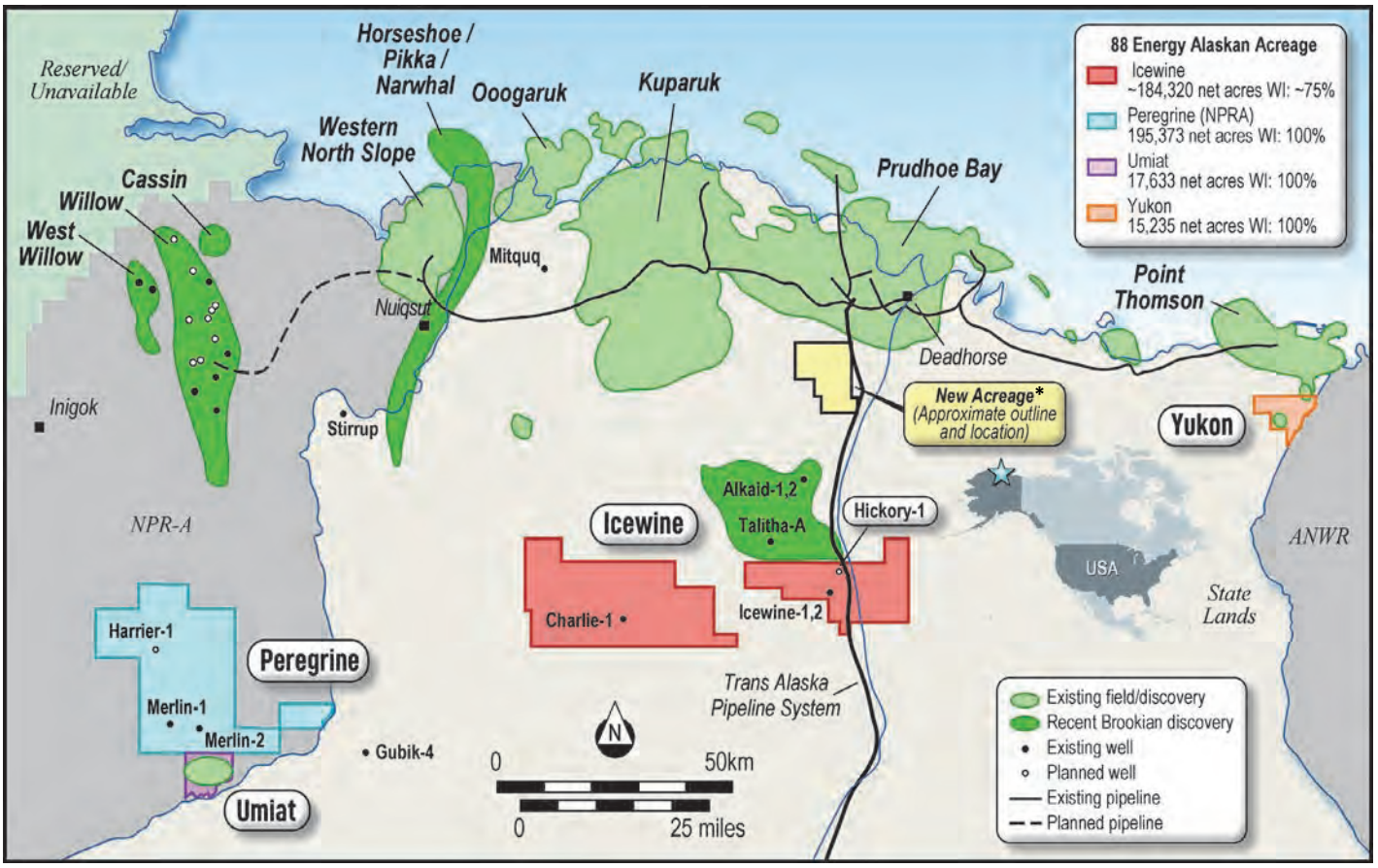

88 ENERGY *continued from page 14*

zones identified by Merlin No. 1 drilling — N18, N19 and N20.

The tightness of the formation prevented the company from logging samples from all three zones, and the company ultimately plugged and abandoned the well. In an investor presentation from February 2023, the company said that the prospective resource estimates of the well would be "reassessed in conjunction with post well analysis." In another section of the company website, 88 Energy estimated a mean prospective resource of 652 million barrels of oil from the N18, N19 and N20 zones at Merlin.

Following the Merlin No. 2 results, 88 Energy 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."

In the third quarter of 2022, a coalition of environmental groups including the Sierra Club, Friends of the Earth and Greenpeace sued the U.S. Bureau of Land Management in the federal District Court of Alaska for approving Project Peregrine exploration plans.

The Merlin No. 1 results also suggested the potential of a proposed 6,000-foot Merlin 1A sidetrack targeting the N14 interval. The company estimates a mean prospective resource of 132 million barrels. The company has yet to sanction the Merlin No. 1A sidetrack.

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.

Umiat

The small independent XCD Energy initially announced plans in 2019 to pursue the Merlin prospect. The company brought the project to the North American Petroleum Expo in early 2020 looking for farm-out partners. The company suspended its plans over the next few months, in response to the emerging global coronavirus pandemic.

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.

In early 2021, 88 Energy also acquired the neighboring Umiat prospect. The oil field sits immediately south of Project Peregrine but is considered a separate venture. The two projects are inevitably linked, though, as the development of one would certainly improve the economics of the other, allowing for the possibility of much shared infrastructure.

Umiat is one of the "white whales" of the North Slope—often pursued, never captured.

The U.S. Navy discovered the oil field in 1946, during a postwar exploration campaign in the National Petroleum Reserve-Alaska to increase domestic oil supplies. But the distant and difficult prospect was sidelined throughout the 20th century, as companies worked to develop new North Slope giants, the Prudhoe Bay and Kuparuk River units.

With the dawn of the independent era in the late 1990s and early 2000s, private companies Arctic Falcon Exploration, Renaissance

The company began acquiring leases at the Yukon prospect on the eastern North Slope near the border of Area 1002 of the Arctic National Wildlife Refuge in 2017 and 2018, including acreage within Area 1002. After the Biden administration suspended ANWR activity in 2021, Regenerate Alaska asked the administration to cancel those leases and to refund bonus bids and rental fees. Knik Arm Services LLC also surrendered its leases.

Alaska, and Rutter and Wilbanks pursued Umiat. But none advanced the project beyond preliminary exploration.

An eight-well program proposed by Renaissance Alaska in 2008 was postponed due to a shortened travel season. Australian independent Linc Energy Ltd. in 2011 also had to scale back its plans due to low snowfall but still managed to drill the first well 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.

An ambitious development program for Umiat was thwarted by a decline in oil prices, leading Linc to file for bankruptcy protection in 2016 and sell its Alaska assets.

Arctic Acquisition Inc. grabbed Umiat with an $80 million credit bid and turned 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 in 2021.

Leonis

In a November 2022 lease sale, 88 Energy subsidiary Captivate Energy acquired 10 state leases covering approximately 25,600 acres in the central North Slope, south of the Prudhoe Bay unit, adjacent to the Trans-Alaska Pipeline System and the Dalton Highway.

Known as Project Leonis, the acreage was included in the Storms 3D seismic data from 2005 and contains ARCO's Hemi Springs Unit No. 3 exploration well from 1985. The acreage also includes Pioneer Natural Resources' Hailstorm No. 1 well from early 2006.

Hemi Springs Unit No. 3 well files indicated more than 200 feet of logged net pay in the Upper Schrader Bluff reservoir, with good porosity and oil shows evident over the interval. An initial internal interpolation of the Storm 3D data indicated an Upper Schrader Bluff prospect bound by faults on three sides, according to 88 Energy.

In a statement around the acquisition, the company said it needed to "understand the regional setting and faulting that defines the potential exploration target before deciding on any future work program." A February 2023 presentation on the company website proposes reprocessing the Storms 3D seismic data in the second quarter of the year.

PHOTO COURTESY OF ACCUMULATE ENERGY ALASKA, INC./88 ENERGY LTD

Nordic Calista Rig-2 and facilities at the Hickory-1 wellsite.

Yukon

88 Energy also holds acreage on the eastern North Slope.

The company began acquiring leases at the Yukon prospect on the eastern North Slope near the border of Area 1002 of the Arctic National Wildlife Refuge in 2017 and 2018, including acreage within Area 1002. After the Biden administration suspended ANWR activity in 2021, Regenerate Alaska asked the administration to cancel those leases and to refund bonus bids and rental fees. Knik Arm Services LLC also surrendered its leases.

The Alaska Industrial Development and Export Agency, the state of Alaska, Kaktovik Inupiat Corp., the North Slope Borough and Arctic Slope Regional Corp. filed suit against the U.S. Department of the Interior over the moratorium, while the Native Village of Venetie, the Arctic Village Council, the Gwich'in Steering Committee and several environmental organizations have intervened in support of the Interior Department.

Even after surrendering the leases, 88 Energy holds some 38,681 acres in the area through its subsidiary Regenerate Alaska. The leases include BP's Yukon Gold No. 1 discovery from the early 1990s. 88 Energy acquired 3D seismic over the acreage in 2018.

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

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.

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.

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.

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

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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. ●

Editor's note: this article first appeared in the 2022 edition of The Explorers.

Contact Eric Lidji at ericlidji@mac.com

Armstrong chases Pikka look-alikes east, west

Lagniappe targeting South Badami; North Slope Energy to West Castle

By KAY CASHMAN
Petroleum News

BILL ARMSTRONG

As this issue of The Explorers was going into production, the Alaska Department of Environmental Conservation was in the middle of a 30-day public comment period for an Oil Discharge Prevention and Contingency Plan, or ODPCP, for an exploration program on the North Slope east of Prudhoe Bay and south and southwest of the Badami unit. Lagniappe Alaska LLC, one of Bill Armstrong's companies, is looking to drill between three and six onshore oil and gas wells on state leases over a two-year period starting in February 2024. The drilling project is called the South Badami Exploration Area Program.

At the same time far to the west on the North Slope another Armstrong company, North Slope Energy LLC, is moving ahead with permitting to drill up to two wells in the West Castle prospect in the National Petroleum Reserve-Alaska. The exploration wells will be drilled over a two-year period into a 92,000-acre lease block purchased from Borealis Alaska Oil in early 2020.

"We are moving forward on West Castle but at this time we're not exactly sure when we are going to commence drilling," Bill Armstrong told Petroleum News on April 14. "Hopefully next drilling season (early winter 2024) but it might be the year after."

On the western North Slope Armstrong is pursuing what he described in mid-September 2022 as "a perfect look-alike to Willow and Pikka," meaning Nanushuk reservoirs.

"West Castle is a gorgeous prospect. We identified it off of 3D seismic," he previously told PN.

The West Castle leases lie to the immediate west of ConocoPhillips' Harpoon prospect.

Limited info on Harpoon

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

In an earnings call in early 2020, ConocoPhillips executive Matt Fox said Harpoon 2 appeared to have "clipped the edge of the topset based on its log response," adding that the company wouldn't know for sure until it drilled a second well.

Asked by analysts whether the well had encountered hydrocarbons, Fox acknowledged that it had. "It looks from a lithological perspective similar to other lithological signatures we're seeing on the edge of these topsets," he said.

The company said it believed in the potential of the "Harpoon Complex," described as Harpoon, Lower Harpoon and West Harpoon, and intended to return to it in the future.

But the pandemic prevented that.

When asked whether ConocoPhillips Alaska Inc. still holds the Harpoon leases, company spokesperson Rebecca Boys said on April 17: "Yes, CPAI still holds leases covering the Harpoon Complex."

In regard to drilling plans for the area, Boys said: "CPAI does not have plans to drill in the area in the coming winter exploration season."

NAME OF PARENT COMPANY:
Armstrong Oil & Gas
COMPANY HEADQUARTERS:
1421 Blake St., Denver, CO 80202
TOP EXECUTIVE: Bill Armstrong
TELEPHONE: 303-623-1821
COMPANY WEBSITE: www.armstrongoilandgas.com

West Inigok exploration

Armstrong's plans for West Castle became public after North Slope Energy applied to the Alaska Department of Environmental Conservation for an ODPCP as part of its West Inigok Exploration Area Exploration Program.

DEC posted a public notice on the application on Sept. 15, 2022. It was re-posted Feb. 23.

Like the Lagniappe application the ODPCP was signed by Armstrong, president of Armstrong Oil &Gas Inc., and in this case manager of North Slope Energy.

The 200-plus-page document said the "primary target reservoir objectives are Nanushuk sand."

An existing 7.5-acre gravel pad will be used as an operations base. It is connected to the Inigok Airstrip by an all-season gravel road that can be accessed using ice or snow roads in the winter.

The pad and the airstrip's 6,500-foot runway improve the logistics of exploratory drilling in the area, the ODPCP said.

North Slope Energy plans to drill the two exploratory wells during the 2024 and 2025 winter seasons in the area west of Inigok Airstrip within the petroleum reserve. All planned exploratory drilling projects will be conducted on ice pads using overland packed snow roads originating from Drill Site 2P and extending west across the Colville River to the West Inigok Area exploration drill sites.

The route will continue west past the Inigok Airstrip to the farthest well site.

An ice pad will be constructed, approximately 500 feet by 400 feet in size adjacent to DS-2P to provide space for storage and fuel storage and transfer. Access routes will be built and maintained using the generally accepted practices for the North Slope, subject to U.S. Bureau of Land Management and Alaska Department of Natural Resources tundra opening criteria.

Pre-packing of the trail will be requested prior to the official tundra opening to preserve early snow.

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Single vertical wellbores

For the first drilling season, the All American 111 drill rig will be mobilized to drill up to two well sites located approximately 18 miles west of Inigok Airstrip.

Ice roads from Inigok will be built for project mobilization and operations and include staged response equipment, storage tanks, camp, and ice road and pad construction equipment.

Wells are planned as single, vertical wellbores drilled into potential liquid hydrocarbon zones. Well formation evaluations via open and cased hole logs will be performed during drilling at all wells.

At completion of formation evaluation, wells will be plugged and abandoned in compliance with Alaska Oil and Gas Conservation Commission and BLM requirements.

The North Slope Energy well sites and the majority of support activities will occur far inland, outside of recognized polar bear habitat. The well locations are more than 50 miles south of the nearest coastal shoreline.

Well site locations are as follows and include well name, latitude, longitude, meridian, township, range and section:

UCW-1 69.965390 -153.549056 U.M. T7N R7W 14.

ULCW-21 69.883514918578 -153.722429 U.M. T67N R7W 103.

Castle Prospect trend

In early 2020 Borealis, a June 2019 re-brand of Nordaq Energy, held lease position in the petroleum reserve amounting to 206,966 acres, referred to as the Castle Prospect Trend, directly southwest of ConocoPhillips' Willow oil discovery. There were six individual lower Nanushuk prospects, including the West Castle prospect, within the trend.

The Inigok No. 1 test well, drilled in the trend area in the 1980s by Husky Oil for the U.S. Geological Survey, indicated a strong possibility of finding oil. Although the well was drilled deep, in search of oil in the Ellesmerian sequence, the host sequence for oil in the Prudhoe Bay field, the upper part of the well found gas with compositions indicative of the presence of light oil in the Brookian sequence, the rock sequence that includes the Nanushuk.

Testing the Brookian prospects only requires relatively shallow drilling, to depths of around 4,000 to 5,000 feet.

South Badami program

Bill Armstrong told Petroleum News in a March 30, 2023, text that the South Badami single, vertical wellbores will target Brookian objectives — "Pikka look-a-likes that are defined off of high effort, reprocessed modern 3Ds. Really exciting stuff. Big targets."

There has been "virtually no prior drilling in the area. The wells that have been drilled have great shows and some have bypassed pay on old logs," Armstrong added.

Ice roads will be constructed to access drill sites.

Potential well names and locations (Latitude, Longitude, Meridian, Township, Range, Section) are as follows:

- King Street-1 70.085880 -147.552190 U.M. T9N R18E 34
- Voodoo-1 70.028080 -147.367630 U.M. T8N R19E 22
- Montucky-1 69.981620 -146.763780 U.M. T7N R21E 12
- Killian-1 70.115032 -147.234009 U.M. T9N R19E 23
- Killian-2 70.108218 -147.081451 U.M. T9N R20E 28
- Sockeye-1 70.073558 -146.764640 U.M. T8N R21E 1

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Phone: (907) 272-1232
Fax: (907) 272-1344

www.petroak.com
info@petroak.com

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First winter drilling

Per the ODPCP, the first winter mobilization will be conducted via an overland ice road route originating off the all-season Endicott Road and extend southeast across east fork of the Sagavanirktok River. The route will then cross the Kadleroshillik River, Shaviovik River, and Kavik River and terminate at the Montucky-1 well site.

This first winter drilling program will transport the Nabors 105 drill rig to the Montucky-1 well site and the Arctic Fox drill rig to the Voodoo-1 and King Street-1 well sites.

Well formation evaluations via open and cased hole logs will be performed during the drilling at all wells.

At the conclusion of all formation evaluation work scopes, the wells will be plugged and abandoned.

At the end of each drilling season, all equipment associated with the project will be demobilized to Deadhorse over the constructed ice road. Locations with temporary infrastructure constructed of snow and ice will be cleaned of all debris and potential contamination and allowed to naturally thaw to its original state.

A little something extra

Lagniappe is a Cajun word that loosely translates into "a little something extra" or "a good unexpected surprise" — apropos for the Nanushuk play on the North Slope, which Armstrong and a partner first drilled and identified as a huge oil reservoir in 2013 (Qugruk 3 well). The discovery led to the Pikka oil field, today operated by Santos Ltd.'s Oil Search (Alaska).

Since that billion-barrel discovery, the industry has been on a tear, drilling at Pikka, Horseshoe, Putu, Mitquq, Stirrup, Willow, West Willow, Harpoon and Bear.

All reports say the play concept in Lagniappe's acreage to the east is very similar: Multiple zones, onshore, good gravity oil, reasonably close to infrastructure.

But the targeted objectives are slightly younger than what Santos and partner Repsol have at Pikka et al but with better reservoir qualities — porosity and permeability — even though they are somewhat deeper.

There have been very few wells drilled in and near Lagniappe's South Badami area — and most of those wells were drilled in the 1970s trying to find another Prudhoe Bay, but almost all of the wells had good oil shows, Armstrong said.

Prior to finding all of that oil in the Nanushuk formation west of the central North Slope most people were saying the North Slope had very little remaining potential. The Nanushuk at Pikka changed all that.

"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. ●

Eric Lidji contributed to this story.

Contact Kay Cashman at publisher@petroleumnews.com

ASRC Energy looks long term

Alaska Native corporation undertaking long-sought long-term methane hydrates test

By ERIC LIDJI
For Petroleum News


REX ROCK SR.

Methane hydrates were once considered something of a nuisance — a hard, snowy-looking substance known to occasionally clog pipes throughout northern oil fields.

In the early 21st century, though, this unconventional resource got a second look.

That's because methane hydrates have a magical quality to them. Get the methane out of the "snow," and they contain approximately 160-180 times their volume in free gas.

With the desire for new hydrocarbons, methane hydrates started to seem interesting, leading to a flurry of federally funded activity in Alaska in the early 2000s.

While those efforts yielded much valuable data, they lacked one crucial detail: time. The theories behind developing methane hydrates have never been tested over long periods of time to understand how the complex reservoir behaves to gradual changes in pressure.

Starting this year and continuing into next, ASRC Energy Services is conducting that long-awaited test on behalf of a multinational partnership between America and Japan.

The Japanese Organization for Metals and Energy Security, JOGMEC, and the U.S. Department of Energy are jointly funding the methane hydrate project with the U.S. Geological Survey and the U.S. National Energy Technology Laboratory participating.

The Japanese government wants to understand the technological underpinning for successfully producing methane hydrates to improve its domestic energy production.

The United States has a similar interest. "The success of this test will move us closer to characterizing, evaluating and confirming the potential for gas hydrates production on the Alaska North Slope, in the Gulf of Mexico and globally," Assistant Secretary for Fossil Energy and Carbon Management Brad Crabtree said in a statement. "We look forward to continue working with our partners to conduct world-class gas hydrates research."

Methane hydrates occur when natural gas molecules become trapped within a matrix of frozen water underground. According to the Office of Fossil Energy, "Gas hydrate deposits are found wherever methane occurs in the presence of water under elevated pressures and at relatively low temperatures, such as beneath permafrost or in shallow sediments along deepwater continental margins. Once assumed to be rare, gas hydrates are now thought to occur in vast volumes and to include 250,000-700,000 trillion cubic feet of methane and the formation thickness can be several hundred meters thick."

The reward is potentially huge. One cubic meter of this gas-infused water can release 164 cubic meters of natural gas. And according to the U.S. Geological Survey, the North Slope could hold some 53.8 trillion cubic feet of natural gas contained within hydrates.

By comparison, the Prudhoe Bay and Point Thomson units are currently estimated to contain some 40 trillion to 50 trillion cubic feet of conventional natural gas resources.

NAME OF COMPANY: Arctic Slope Regional Corp.
COMPANY HEADQUARTERS: P.O. Box 129, Barrow, Alaska 99723
TOP ALASKA EXECUTIVE: Rex A. Rock, Sr., president and CEO
TELEPHONE: 907-852-8633 • **COMPANY WEBSITE:** www.asrc.com

Those conventional resources are of course much easier and cheaper to produce than methane hydrates, but the potential for a symbiotic relationship exists. Alaska is one of the few basins in the world where large methane hydrate prospects exist within close proximity of existing production facilities, giving the North Slope a strategic advantage.

The challenge has been finding an economically viable way to free the gas.

ASRC Energy

ASRC Energy Services began the current effort in January 2019 by drilling an initial test well from a pad at the Prudhoe Bay unit. But plans for follow-up wells the following year were delayed by the disruptions of the early months of the coronavirus pandemic.

The 2019 project occurred back when BP Exploration (Alaska) Inc. operated the Prudhoe Bay unit. The plan was to drill three wells. The first penetrated two highly saturated hydrate-bearing reservoirs. (There is a third hydrate bearing sand zone in the same area.)

For the other two wells, one would have been used for the sustained testing of natural gas production from the hydrates, while the other would have been used for data collection.

ASRC Energy Services will conduct the work through an agreement with Hilcorp Alaska.

The current project involved expanding the existing Prudhoe Bay Unit 7-11-12 gravel pad by constructing an adjacent ice pad for staging modules associated with the project.

Production Test Well 1 (PTW-1) will be completed in the B horizon of the reservoir and PTW-2 in the B and D horizons. The wells will be some 4,000-feet true vertical depth.

PTW-1 will be produced through a series of depressurization tests. ASRC Energy plans to closely monitor natural gas and water production rates. "The test will proceed for several months to confirm reservoir deliverability," according to the Alaska Division of Oil and Gas. "In the event of a failure of PTW-1, PTW-2 will be brought online."

As much as 1.7 million standard cubic feet per day of gas will be produced daily from the project, according to the state, about the size of a mid-range Cook Inlet natural gas field.

Any production will be used at the facility, with additional supplies coming from an unnamed North Slope producer, according to the state. "In emergency conditions, excess produced gas will be flared. In no circumstances will produced gas be shipped off site."

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About hydrates

Although there have been several efforts in Alaska over the years to better understand the nature of methane hydrates, this project is the first to tackle long-term sustainability.

The project involves drilling two test wells followed by a months-long production test.

The first well was completed in November 2022 and the second earlier this year. The production test is currently scheduled to begin in April and run through the end of 2024.

The project involves an unusually long production test by the standards of the North Slope. That duration is a result of the unique physical nature of methane hydrates.

As you may remember from high school physics, pressure and temperature are almost directly proportional: the more pressure, the higher the temperature, and vice versa.

In conventional hydrocarbon management, the goal is to keep a reservoir sufficiently pressurized, so that hydrocarbons naturally rise to the surface through a wellbore. As the reservoir is depleted, this natural pressure declines, often requiring artificial interventions such as electric submersible pumps, gas lifts, and various water and gas injections.

Methane hydrates remain stable within a certain range of relatively high pressures and low temperatures. The natural depressurization caused by production can create changes in reservoir temperature, which can change pressure, which in turn can influence the relationship between the methane molecules and the surrounding matrix of icy water.

If that process can be better understood and controlled, the hydrates can be unlocked.

ASRC Energy Services began the current effort in January 2019 by drilling an initial test well from a pad at the Prudhoe Bay unit. But plans for follow-up wells the following year were delayed by the disruptions of the early months of the coronavirus pandemic.

Despite some successful short-term demonstrations of hydrate production, there has not yet been any sustained, long-term production test accounting for depressurization.

With the current project, the idea is to design a long-enough production test to monitor the changes in natural gas production from hydrates as reservoir pressure declines.

Barrow

The closest thing to a long-term production test in Alaska is the Barrow gas fields.

In the early 2000s, production at the East Barrow field surpassed its original gas in place estimates without any decline in reservoir pressure. Geologists began wondering whether methane hydrates might be "replenishing" the conventional gas reservoir at the field.

The current cumulative production of the East Barrow gas field is more than 50% above the original resource estimates for the field, and production rates remain steady.

The city of Utqiaġvik credits the extended life of the field to methane hydrates. With ongoing production, the reservoir loses pressure, freeing methane from the water matrix.

(An alternate theory credits the extended production to water flowing into the reservoir and bolstering production. But low water production at the field suggests otherwise.)

The U.S. Department of Energy took an interest in Alaska methane hydrates in the mid-2000s, spending millions of dollars on multiple projects. One of those projects was a two-phase effort to better understand the methane hydrates potential at the Barrow gas fields.

A preliminary study in 2006 suggested the East Barrow and Walakpa reservoirs might exist at least partially within the stability zone required for producing hydrates.

The planned second phase of the project would have included a one-well program at the Barrow gas fields to determine whether or not hydrates could be produced commercially.

In early 2010, the Department of Energy backed away from the project, citing overall budget cuts. The city of Utqiaġvik and

Petrotechnical Resources of Alaska Inc. cancelled the methane hydrates tests and focused instead on increasing Barrow gas production.

The city of Utqiaġvik continued with its drilling program in 2011 and 2012. And while the program was not focused specifically on methane hydrate production, data collected during drilling provided additional insights into the characteristics of methane hydrates.

"We believe we have the first commercial gas hydrate production in the world," North Slope Borough oil and gas liaison Dudley Platt told Petroleum News in August 2012.

The Savik No. 1 and Savik No. 2 wells from 2011 and 2012 were drilled directionally through the Upper and Lower Barrow Sandstone reservoir rocks in the East Barrow field.

Savik No. 1 appears to have encountered methane hydrate in the upper sands while encountering gas in the lower sands with good flow rates and good wellhead pressure.

Savik No. 2 also penetrated both sand bodies, but wellhead pressure declined rapidly during flow testing. The problem appeared to be methane hydrates plugging the downhole section of the well. The city of Utqiaġvik eventually shut in the Savik No. 2.

But then, in July 2014, wellhead pressure at Savik No. 2 well increased without any external stimulation and natural gas flowed from the well at commercial rates.

As gas production and associated hydrate dissociation continued, engineers came to believe that the base of the hydrate stability zone had risen above the level of downhole end of Savik No. 2, so that the well was communicating with free gas in the reservoir.

In a presentation to the Society of Petroleum Engineers in May 2016, Nolan Youngmun of Petrotechnical Resources of Alaska presented some findings from the Barrow gas field project. Drilling operations had confirmed the presence of methane hydrate deposits in the East Barrow gas field, he noted, and the results of the Savik program supported the idea that methane hydrate dissociation, combined with a small amount of water influx, had been recharging and maintaining the pressure in the East Barrow gas pool.

Mount Elbert

As the U.S. Department of Energy was investigating methane hydrates at the Barrow gas fields, it was also working on another project with a big coalition. BP Exploration (Alaska), ASRC Energy Services, Ryder Scott Co., the U.S. Geological Survey, the University of Alaska Fairbanks and the University of Arizona all participated at points.

The project partners completed an initial phase of seismic calibration, reservoir modeling and economic evaluation in 2004. In the next phase, BP Exploration planned to drill a stratigraphic test well at the Mount Elbert prospect at the Milne Point unit in early 2007 to obtain field data about the gas hydrate deposits. A main goal was to test the efficacy of the seismic data, to make it easier and more accurate to identify prospects in the future.

In other words, the team used seismic data to make predictions about the prospect and then drilled the well to get some confirmation of those predictions. "As it turned out our predictions were very correct," the Department of Energy's methane hydrates technology manager Ray Boswell said at the time. The well confirmed hydrates in two zones.

The Mount Elbert stratigraphic test well successfully penetrated several hundred feet of hydrate bearing sandstone in early 2007. "With this project we have significantly increased our understanding of gas hydrate-bearing formations on the Alaska North Slope," Scott Digert, BP resource manager and the gas hydrate project's technical adviser said at the time, adding. "The results also illustrate the value of collaborative research."

The approximately 3,000-foot well was designed to pass through the permafrost in the area while remaining inside the zone of hydrate stability. "We weren't sure if these shallow formations would have sufficient charge of gas from the deeper oil fields, nor that they would have sufficient seal to retain this gas in the shallow sediments, because a lot of them are soft sediments," ASRC Energy Services Project Manager Robert Hunter said at an October 2007 presentation at the Arctic Energy Summit Technical Conference.

The project also involved some technical milestones. Given the vagaries of hydrate depressurization, the team needed to find a way to recover core samples before the methane disassociated from the water. In addition to using chilled drilling mud, "We used the first ever wireline coring

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ASRC ENERGY *continued from page 27*

system on the North Slope with a conventional drill rig, which enabled us to pull up the core quite quickly about 24 feet at a time," Hunter said.

The well also included the first open-hole extended duration pressure test of a gas hydrate reservoir, allowing the team to verify some of the conclusions of its prior modeling.

The following year, the Mallik gas hydrate well in the Mackenzie River Delta in Canada produced for six days, demonstrating the feasibility of continuous gas production.

And then, the U.S. Geological Survey released an assessment estimating that the North Slope contained some 85 trillion cubic feet of technically recoverable gas hydrates resources — technically recoverable, but not necessarily economically recoverable.

The next phase involved analysis, using the data collected from the drilling program to better understand the Mount Elbert reservoir and to devise ways to produce its hydrates.

At the time, in early 2007, the team expected to continue its analysis for about a year, at which point it would make decisions about the future of the project. One possibility being considered back then was drilling a second well to support full-scale production test.

In early 2009, the Department of Energy and BP Exploration (Alaska) announced plans to conduct a long-term gas hydrates production test but emphasized that the project was intended to gather data. "This production test would be to maximize the science," the National Energy Technology Laboratory Arctic Energy Office's Brent Sheets said. "We're not really after maximizing the production right now… We want to build in flexibility so that they can test various production methods and see which ones are going to work."

Ignik Sikumi

Instead, the Department of Energy became involved in a third North Slope methane hydrates project. The project was an effort led by ConocoPhillips Alaska to determine whether methane hydrates could be produced using carbon dioxide injections, essentially combining gas production from methane hydrates with carbon dioxide sequestration.

The project was designed to keep the hydrate matrix intact. The best-known methods for disassociating hydrates were designed at the surface, in the days when the resource was primarily seen as a nuisance: occasionally plugging pipes. Allowing completed disassociation to occur underground could possibly cause subsidence in some reservoirs.

ConocoPhillips spud the 2,597-foot Ignik Sikumi No. 1 well — Ignik Sikumi is Inupiaq for "fire in the ice" — in early 2011 from a site adjacent to L-pad at the Prudhoe Bay unit.

By the time the company returned the following winter to conduct the injection portion of the project, Japan Oil, Gas and Metals National Corp. had also joined the project.

The team injected a mixture of nitrogen and carbon dioxide into the methane hydrate reservoir over 13 days. The well produced continuously for 30 days — far surpassing the previous record of six days set in 2008 during the Mackenzie River Delta project.

The missing component of all these methane hydrates projects, though, as well as other subsequent projects around the world, was long-term data: what happens to the reservoir over time. The current ASRC Energy Services project is intended to answer that question. ●

Contact Eric Lidji at ericlidji@mac.com

Bullish on Bear

ConocoPhillips returns to North Slope exploration after two-year pandemic pause

By ERIC LIDJI
For Petroleum News


EREC ISAACSON

ConocoPhillips Alaska Inc. returned to exploration activities this winter after a two-year pandemic-induced lull. But the company did not exactly pick up where it had left off.

When the pandemic arrived, the local subsidiary of the multinational upstream company was planning an expansion of its North Slope exploration activities — activities that have made the company the prolific and consistent North Slope explorer of the 21st century.

The company was continuing its decades-long westward push but was also pursuing new exploration opportunities to the south of its Colville River unit and Alpine oil field.

The pandemic halted that expansion, and those projects are not part of the current plans.

ConocoPhillips planned to drill the Bear No. 1 exploration well this winter in the area south of Nuiqsut, following leads identified in a seismic program from several years ago.

In late February, the company spud Bear No. 1 from state lease ADL 393519. The lease is neither contained within any existing unit nor adjacent to any ConocoPhillips unit.

ConocoPhillips ConocoPhillips

COMPANY HEADQUARTERS: Houston, Texas
TOP ALASKA EXECUTIVE: Ryan Lance
ALASKA SUBSIDIARY: ConocoPhillips Alaska
TOP ALASKA EXECUTIVE: Erec Isaacson, president, ConocoPhillips Alaska
ALASKA OFFICE: 700 G St., Ste. 1950, Anchorage, AK 99501
PHONE: 907-276-1215
COMPANY WEBSITE: www.conocophillipsalaska.com

The project included a 500-foot by 500-foot ice pad at Kuparuk River unit drill site 2P, a 30-mile snow trail from 2P to the drill site, and a 700-foot by 700-foot ice pad at Bear No. 1. The company planned to build a temporary ice airstrip on frozen lake MC7908.

A project timeline proposed construction activities through the end of February, drilling activities from late February through early April, followed by demobilization. ConocoPhillips

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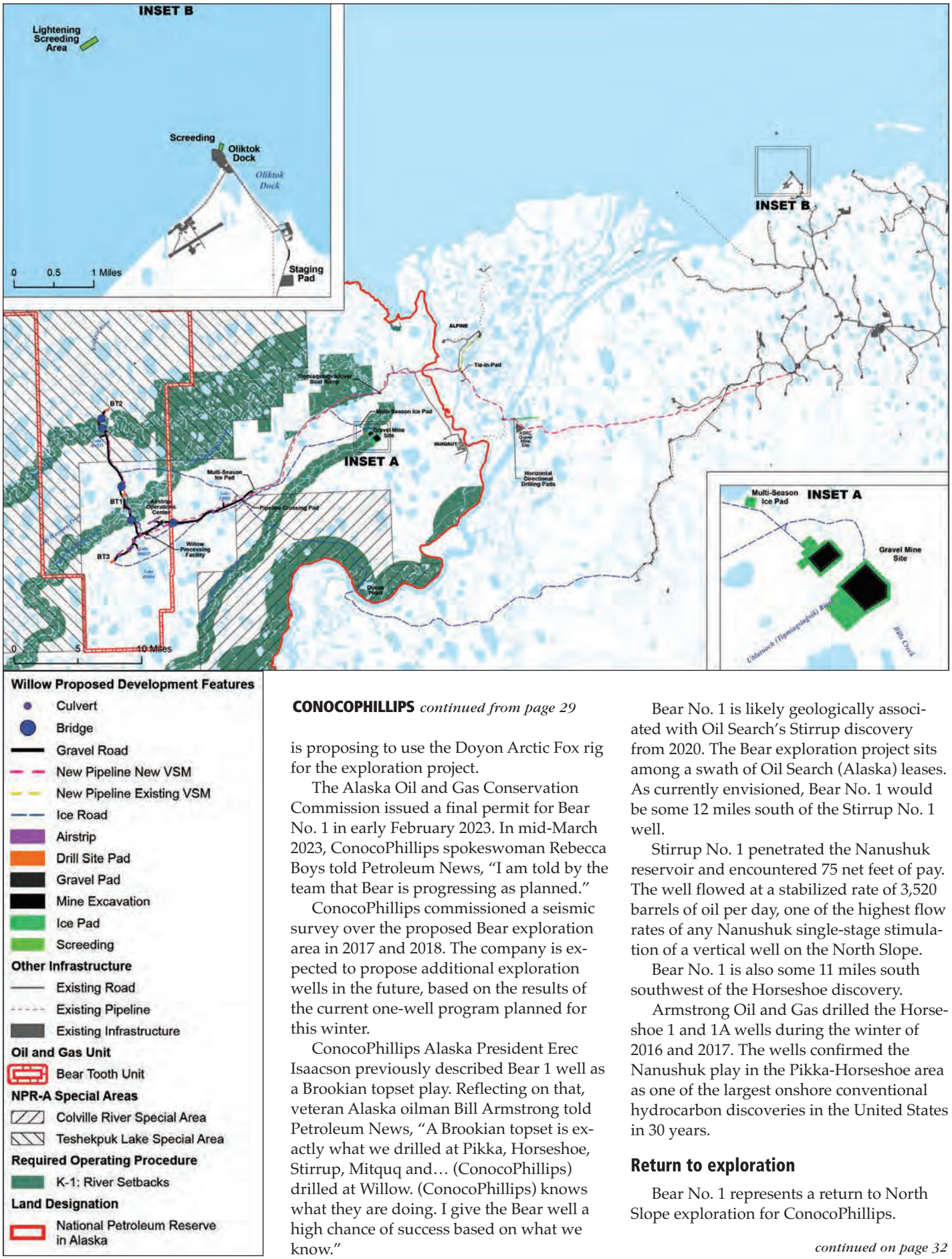

CONOCOPHILLIPS ALASKA

CONOCOPHILLIPS *continued from page 29*

is proposing to use the Doyon Arctic Fox rig for the exploration project.

The Alaska Oil and Gas Conservation Commission issued a final permit for Bear No. 1 in early February 2023. In mid-March 2023, ConocoPhillips spokeswoman Rebecca Boys told Petroleum News, "I am told by the team that Bear is progressing as planned."

ConocoPhillips commissioned a seismic survey over the proposed Bear exploration area in 2017 and 2018. The company is expected to propose additional exploration wells in the future, based on the results of the current one-well program planned for this winter.

ConocoPhillips Alaska President Erec Isaacson previously described Bear 1 well as a Brookian topset play. Reflecting on that, veteran Alaska oilman Bill Armstrong told Petroleum News, "A Brookian topset is exactly what we drilled at Pikka, Horseshoe, Stirrup, Mitquq and… (ConocoPhillips) drilled at Willow. (ConocoPhillips) knows what they are doing. I give the Bear well a high chance of success based on what we know."

Bear No. 1 is likely geologically associated with Oil Search's Stirrup discovery from 2020. The Bear exploration project sits among a swath of Oil Search (Alaska) leases. As currently envisioned, Bear No. 1 would be some 12 miles south of the Stirrup No. 1 well.

Stirrup No. 1 penetrated the Nanushuk reservoir and encountered 75 net feet of pay. The well flowed at a stabilized rate of 3,520 barrels of oil per day, one of the highest flow rates of any Nanushuk single-stage stimulation of a vertical well on the North Slope.

Bear No. 1 is also some 11 miles south southwest of the Horseshoe discovery.

Armstrong Oil and Gas drilled the Horseshoe 1 and 1A wells during the winter of 2016 and 2017. The wells confirmed the Nanushuk play in the Pikka-Horseshoe area as one of the largest onshore conventional hydrocarbon discoveries in the United States in 30 years.

Return to exploration

Bear No. 1 represents a return to North Slope exploration for ConocoPhillips.

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ExxonMobil.com

A Land of Opportunity

We met Alaska on Yakataga Beach, where we drilled our first well in 1925. Nearly a century later, Alaska continues to prove itself to be a land of abundant opportunities. As one of Alaska's top oil producers, we are committed to the safe delivery of reliable energy to America and the World.

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CONOCOPHILLIPS *continued from page 30*

The company was expanding its exploration activities in the region when the pandemic halted activities. Even when restrictions eased, the company suspended some drilling activity, pending the results of a ballot initiative to increase state oil production taxes.

After the ballot measure was defeated, ConocoPhillips resumed some development activities at the Kuparuk River, Colville River and Greater Mooses Tooth units but made no exploration plans. In late 2021, the company received an AOGCC permit for an exploratory well at drill site 3S at the Kuparuk River unit, part of a broader infrastructure-led exploration strategy. The company completed the well before the end of the year and received permits in late 2022 for three follow-up exploratory wells at drill site 3S.

As of the end of January 2023, those three wells remained uncompleted.

Coming into the pandemic shutdown of spring 2020, ConocoPhillips had eight AOGCC drilling permits approved for upcoming exploration wells: two West Willow wells, three Tinmiaq wells, and three Harpoon wells. All were associated with the Willow prospect.

CONOCOPHILLIPS ALASKA

Willow ice road construction, April 2023.

The relatively large exploration program represented the culmination of nearly five years of sustained activities to prove up possibilities west of the Greater Mooses Tooth unit.

The current Greater Mooses Tooth developments largely originated with Phillips Alaska Inc.'s announcement of National Petroleum Reserve-Alaska discoveries in May 2001.

Those prospects became the center of the Greater Mooses Tooth unit and accommodated exploration to the south and the east. Willow pushed exploration activities to the west, becoming part of the Bear Tooth unit immediately adjacent to Greater Mooses Tooth.

After staking its first Tinmiaq wells in late 2015, ConocoPhillips completed a two-well exploration program in early 2016. Toward the end of that year, the company expanded its leasehold in the region by acquiring 737,252 acres through federal and state sales. In early 2017, the company announced a major discovery in the Nanushuk formation.

Willow was initially estimated to contain some 300 million barrels of recoverable oil and to have the potential to produce as much as 100,000 barrels per day at its peak. In subsequent documents, the company increased the resource estimate to 600 million barrels of recoverable oil and the peak production estimate to 180,000 barrels per day.

A four-well program in 2018 and a five-well program in 2019 helped delineate the Willow prospect. The company planned a six-well program in 2020 but only completed the Tinmiaq No. 18 and Tinmiaq No. 20 wells before coronavirus restrictions interceded.

Following a two-year halt to exploration, ConocoPhillips is proceeding with

construction activities based on its existing data, rather than returning to complete those halted wells.

Following legal, regulatory and political disputes, Willow advanced in mid-March 2023 when the Biden administration issued a record of decision for the project. The decision denied two of the five drill sites proposed by ConocoPhillips Alaska and dropped the option to consider future development of one of the dropped drill sites. ConocoPhillips relinquished leases on some 68,000 acres in the National Petroleum Reserve-Alaska north and south of Bear Tooth — about a third of its area leasehold.

With favorable rulings, preliminary construction could begin as soon as the winter of 2023-2024, and first oil could come as early as 2029, according to project timelines.

Harpoon

As part of the foreshortened exploration program of early 2020, ConocoPhillips was planning a Harpoon exploration program, in addition to its six-well Tinmiaq program.

The company had identified 10 locations for a seven-well program and also planned to complete four "rank exploration" wells at Harpoon during the drilling season in 2020.

The Harpoon well locations were about 20 miles southwest of the Bear Tooth unit.

The company completed the Harpoon No. 2 well that winter but was forced to cancel plans for the three remaining wells — Harpoon No. 1, Harpoon No. 3 and Harpoon No. 4.

Harpoon No. 2 proved to be a dry hole, but the company remained optimistic.

ConocoPhillips Executive Vice President of Exploration and Production Matt Fox later described a "Harpoon Complex" containing Harpoon, Lower Harpoon and West Harpoon. He said that the company remained interested in the opportunity. As of early 2023, the company had not yet announced any plans to return to the Harpoon prospect.

In the fall of 2022, North Slope Energy LLC executive Bill Armstrong announced the multiyear West Castle exploration program on leases immediately west of Harpoon in the National Petroleum Reserve-Alaska. Armstrong described the prospect as "a perfect look-alike to Willow and Pikka," meaning a reservoir

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CONOCOPHILLIPS ALASKA

Sun dog is visible around Doyon Arctic Fox rig. March 2023.

CONOCOPHILLIPS ALASKA

A truck lays ice chips for construction of an ice pad for the Willow project. April 2023.

CONOCOPHILLIPS *continued from page 33*

in the Nanushuk formation.

Harpoon has also been discussed in conjunction with other prospects in the region, such as the nearby Harrier prospect being promoted by XCD Energy Ltd. in early 2020.

Narwhal

As ConocoPhillips resumes its exploration push to the west, it is also beginning to regain some exploration momentum to the south — specifically south of the Colville River unit.

One intriguing aspect of the curtailed 2020 program was activity extending in multiple directions. In recent years, and especially with the move away from offshore exploration, the company had been increasingly focused to the west: the Kuparuk River unit, leading to the Colville River unit, leading to Alpine satellites, leading to the Greater Mooses Tooth Unit in the National Petroleum Reserve-Alaska, leading to the Bear Tooth unit.

This was part of ConocoPhillips' larger infrastructure-led exploration strategy that favored nearby, lower-risk opportunities over the expensive wildcats of previous decades.

The push to the south was also part of that infrastructure-led exploration strategy.

Through a series of acquisitions, followed by negotiations with the state, ConocoPhillips returned to an old prospect located at the southeast corner of the Colville River unit.

The Narwhal participating area is the current name of the prospect. ConocoPhillips called the prospect Titania in the early 2000s and Brooks Range Petroleum Corp. called it Tofkat in the mid-2000s. ConocoPhillips called the prospect Putu in the late 2010s and later announced a 100 million to 350 million barrel Nanushuk discovery at Narwhal.

ConocoPhillips initially developed the Narwhal prospect from the existing CD4 pad at the Colville River unit, bringing the participating area online in early 2022.

Longer-term development plans include a new drilling pad, called CD8. The current timeline calls for sustained production by 2028 with a peak of 32,000 barrels per day.

Through several decisions in early 2022, the state Division of Oil and Gas approved the Narwhal Phase II geophysical exploration program proposed by SAExploration. The permit allowed the company to conduct a land-based seismic survey on 85 square miles of state lands and waters within the Colville Delta region around the village of Nuiqsut.

The Putu exploration program of 2018 also included exploration of the nearby Stony Hill prospect in the NPR-A, south of the village of Nuiqsut. The company conducted a two-hole program — one well and one sidetrack — on federal lease AA-00093131. The program encountered oil in two zones. But the prospect required additional appraisal and ultimately lost out to Putu/Narwhal, which was closer to existing infrastructure.

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

The Kuparuk River unit also contains some prospects for growth.

ConocoPhillips acquired the Nuna prospect from Caelus Natural Resources Alaska LLC in 2019. The prospect was originally associated with the Oooguruk project but could be accessed from existing facilities at Oliktok Point, located within the Kuparuk River unit.

Based on an initial exploration program at Nuna in 2012, Pioneer Natural Resources had estimated ultimate oil recovery between 75 million and 100 million barrels of oil from the Torok formation of the Brookian sequence at Nuna. Caelus Natural Resources later estimated that Nuna could produce 25,000 barrels of oil per day over 20-30 years. It sanctioned a $1.4 billion development in 2015, underpinned by royalty modification from the state. But the company postponed the project over economic concerns and ultimately sold the Oooguruk unit to minority partner Eni and the Nuna satellite to ConocoPhillips.

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.

ConocoPhillips initially identified the Coyote prospect after reviewing a 3D seismic survey from 2015. The company drilled a test well from Kuparuk River unit drill site 3S in 2021 and returned with a sidetrack in early May 2022. The appraisal sidetrack was "very successful," according to ConocoPhillips, exceeding company expectations and providing "key data" to help them better understand the Coyote reservoir interval.

ConocoPhillips said it planned to drill a producer and injector pair at Coyote in late 2022 that would enable it "to gather other critical data" to aid future development of Coyote.

In October and December 2022, the company received final Alaska Oil and Gas Conservation Commission permits for two exploration wells and an associated sidetrack from drill site 3S — KRU 3S-701, KRU 3S-701A and KRU 3S-704. The company had yet to complete any of those wells by early February 2023, according to AOGCC records.

Earlier this year, the AOGCC approved a three-year enhanced oil recovery pilot project at Coyote. The project includes a central horizontal producer with at least one and possibly two offsetting horizontal injectors. The drilling would occur at drill site 3S and would target a lease within the Kuparuk River unit and a non-unitized lease ADL 392374.

As part of the application, ConocoPhillips estimated 31 million barrels of oil within the proposed pilot area, with primary recovery at 5-10%, waterflood recovery at 20-30% and an additional 1-5% recovery from potential injection of enriched gas.

ConocoPhillips officials have been including Coyote, Nuna and Northeast West Sak in a slate of Greater Kuparuk Area projects. The company has said that Coyote and Nuna would be developed from Kuparuk River unit drill sites 3S and 3T. Drill site 3T is the new name for the expanded Nuna pad, which Pioneer Natural Resources built to support its Nuna work back in 2012 and 2013, when the project was still an Oooguruk satellite.

ConocoPhillips has yet to announce detailed Nuna plans, 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.

"We continue to progress the project planning and approvals for the development at 3T, a planned future drill site where we plan to locate the Nuna development," the company said last May. "It will be sited on the existing gravel pad within the Nuna acreage we acquired from Caelus. We plan to drill some wells in the same reservoir in the 3S area in Q3 2022 that will provide key learnings to help us further optimize the 3T development plans."

The state approved the drill site 3T expansion project in February 2023.

The project includes expanding the existing drilling pad, a 2.9-mile access road and access road intersection near drill site 3S. Expansions will accommodate a single production module and a larger drilling rig for directional extended reach drilling. The project calls for 29 wells from the expanded 3T pad. The expansion project also includes some 3 miles of new pipelines from drill site 3T to drill site 3S, as well as associated infrastructure.

Construction activities could begin as early as August 2023 and continue through September 2024 with drilling running from October 2024 through December 2027. ●

Contact Eric Lidji at ericlidji@mac.com

Hilcorp exploring near and far

Although rarely touted as an explorer, Hilcorp has been both bold and consistent

By ERIC LIDJI
For Petroleum News


LUKE SAUGIER

Hilcorp Alaska LLC's exploration activities can be charted along a spectrum.

At one end of that spectrum are step-out, delineation or appraisal wells, often closely associated with existing production. Sometimes these wells aren't even listed as "exploratory" in permitting paperwork. And yet, they reveal the presence of oil and natural gas where none was previously known to exist: the essence of exploration.

At the other end of the spectrum are preliminary surveys and test wells in regions without any commercial production to date. While not quite wildcats, these projects are much closer to the traditional image of exploration: occurring far beyond existing infrastructure.

Over the past decade, Hilcorp has become one of the dominant players in Alaska — holding an important position in the Cook Inlet and on the North Slope and even showing a willingness to invest in some of the more promising frontier basins across the state.

Hilcorp arrived in the state with a reputation for reviving aging fields. Exploration was supposedly secondary. But maintaining an exploration mindset has been an important part of the company's first decade in Alaska, especially in the southern Kenai Peninsula.

Between the Ninilchik unit to the north and the Seaview unit to the south, the company has pursued half a dozen exploration projects, mostly since 2017. The company has also conducted early work at two intriguing frontier prospects: Yukon Flats and Blackbill.

Ninilchik

The campaign at the Ninilchik unit is now entering its second decade. Hilcorp first began exploring and developing the unit in 2013 and 2014, soon after arriving in Alaska.

The onshore field runs along the coast south of Kasilof in the southern Kenai Peninsula.

Chevron discovered natural gas in the Tyonek formation in June 1961. Marathon discovered two nearby fields in 2001 and 2002 and launched a development program.

The state formed the Ninilchik unit in 2001. It expanded the unit in 2003 to include the former Falls Creek unit and to form the Falls Creek, Grassim Oskolkoff and Susan Dionne participating areas. The Susan Dionne participating area was expanded in 2007.

In one of its first big Alaska projects, Hilcorp drilled four wells at the southern end of the unit under its 2013 plan of development. The company wanted to learn more about the existing gas fields and to explore the potential for oil. The oil target proved to be noncommercial, but the gas drilling justified an expansion of infrastructure at the unit.

Buoyed by those results, Hilcorp initially proposed a six-well exploration program at Ninilchik in its 2014 plan and later expanded the program to 11 wells. The results of that second year of work again convinced the company to expand its operations at the unit.

With its 2015 plan, Hilcorp began describing its upcoming plans as development and delineation work, suggesting that its activities were shifting away from exploration.

Pearl

In early 2022, Hilcorp applied to drill the Pearl 2A well from the Pearl Pad into an undefined gas pool and the Ninilchik Beluga/Tyonek gas pool at the Ninilchik unit.

The project dates back to exploration activities from the 1960s.

Mobil Oil drilled the Ninilchik Unit No.1 in the area in 1964. Union Oil Company of California appears to have used the well as the basis for its Pearl No. 1 well in 2002.

Union Oil Company of California drilled the 8,000-foot vertical Pearl No. 1 gas well in February and March 2002. The company plugged and abandoned the well in April 2003.

Pearl No. 1 was part of a three-well exploration program associated with Enstar Natural Gas Co.'s construction plans in the region. The well failed to find commercial quantities of natural gas, leading Enstar to terminate its proposed Kenai-Kachemak Pipeline in Ninilchik, rather than extend it all the way to Anchor Point. It would take another decade before developments in the region finally connected nearby Homer to the regional grid and another decade before Hilcorp revisited the potential of the southern Ninilchik unit.

After completing its initial seasons of activities at Ninilchik,

Hilcorp Energy Co.

COMPANY HEADQUARTERS: 1111 Travis St., Houston, Texas 77002
TELEPHONE: 713-209-2400
ALASKA SUBSIDIARY: Hilcorp Alaska LLC
TOP ALASKA EXECUTIVE: Luke D. Saugier, senior vice president
ALASKA OFFICE: 3800 Centerpoint Dr., Ste.1400, Anchorage, AK 99503
TELEPHONE: 907-777-8300
COMPANY WEBSITE: www.hilcorp.com

Pearl is an example of a strategy Hilcorp has replicated throughout the region: drilling several stratigraphic test wells in preparation for a small number of exploration wells.

Hilcorp proposed the Pearl pad in 2017 and drilled seven stratigraphic test wells — Pearl No. 1A, Pearl No. 2, Pearl No. 3, Pearl No. 4, Pearl No. 5, Pearl No. 6 and Pearl No. 7 — in the summer of 2017. The stratigraphic test wells were relatively shallow, ranging between 540 feet and 600 feet.

One objective of the Pearl program, according to the decision from the state, was to determine whether the commercial viability of the Ninilchik unit "extends south of the Paxton Pad and potentially beyond the Susan Dionne-Paxton participating area."

Planning documents from the state suggest that the seven stratigraphic test wells were preparation for the Pearl 2A delineation well from the Pearl pad. The Pearl 2A well was originally scheduled for late 2017. In its 16th plan of development, though, the company deferred the project until at least 2022 or later, "contingent on market conditions."

The project re-emerged in early 2022 when Hilcorp applied for an Alaska Oil and Gas Conservation Commission spacing exemption for the well into an undefined gas pool and the Ninilchik Beluga/Tyonek gas pool. The well would be drilled from private leases.

In its application, Hilcorp described Pearl 2A as "the first Hilcorp exploration well drilled around the southern extent of the existing Ninilchik Unit." The previous exploration wells in the area, Pearl No. 1 and Ninilchik Unit No. 1, were both drilled more than 3,000 feet to the southeast, and neither well discovered commercial oil or gas, according to Hilcorp. The closest producing well to Pearl 2A was the Paxton No. 5 well at Ninilchik.

In justifying its request for an exemption, Hilcorp said it "anticipates that the productive sands in Pearl 2A will be discontinuous channel sands in the Beluga and Tyonek Formations within both the Undefined Gas Pool and the Beluga/Tyonek Pool that cannot be produced by wells conforming to applicable spacing restrictions." The company said the result of the well would be used to request changes to the unit boundaries.

The AOGCC approved the space exemption in mid-March 2022, and Hilcorp

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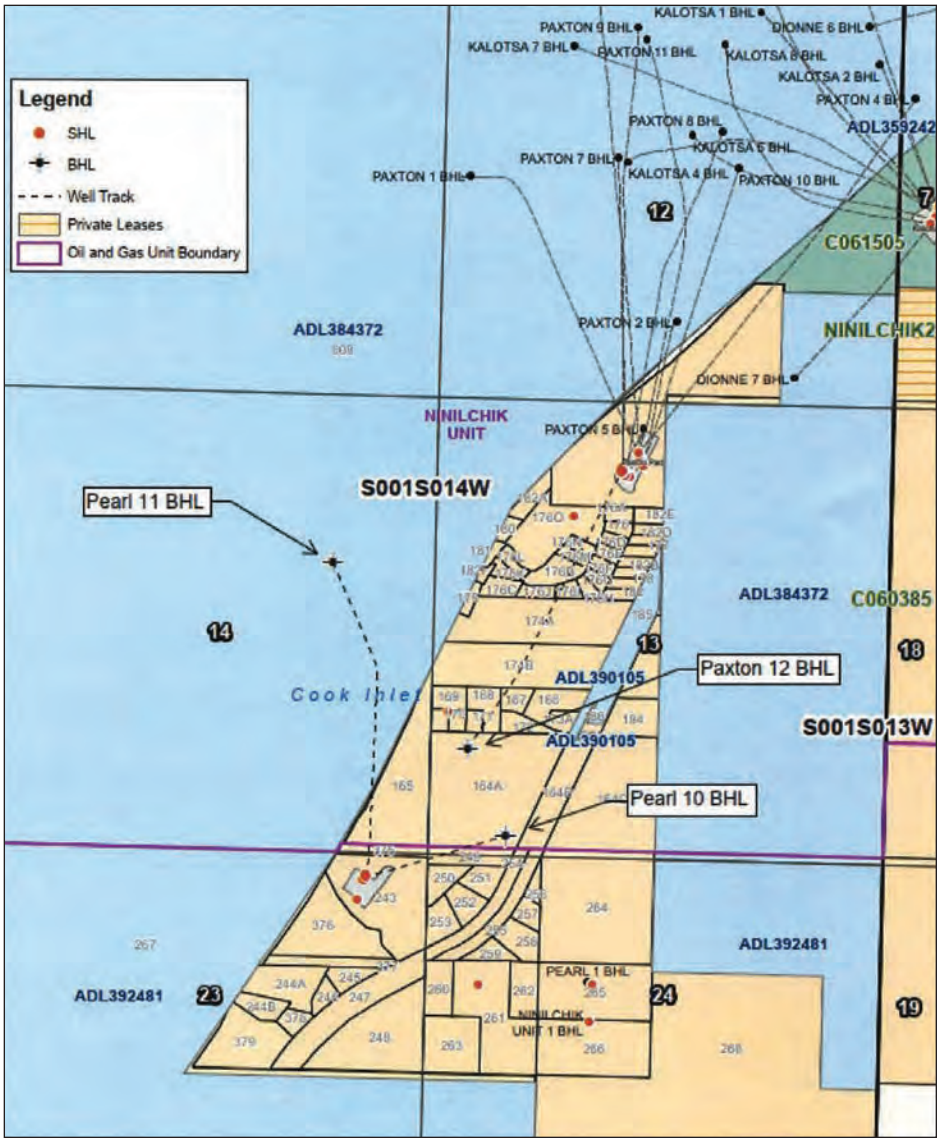
PETROLEUM NEWS FILE

The Tyonek platform



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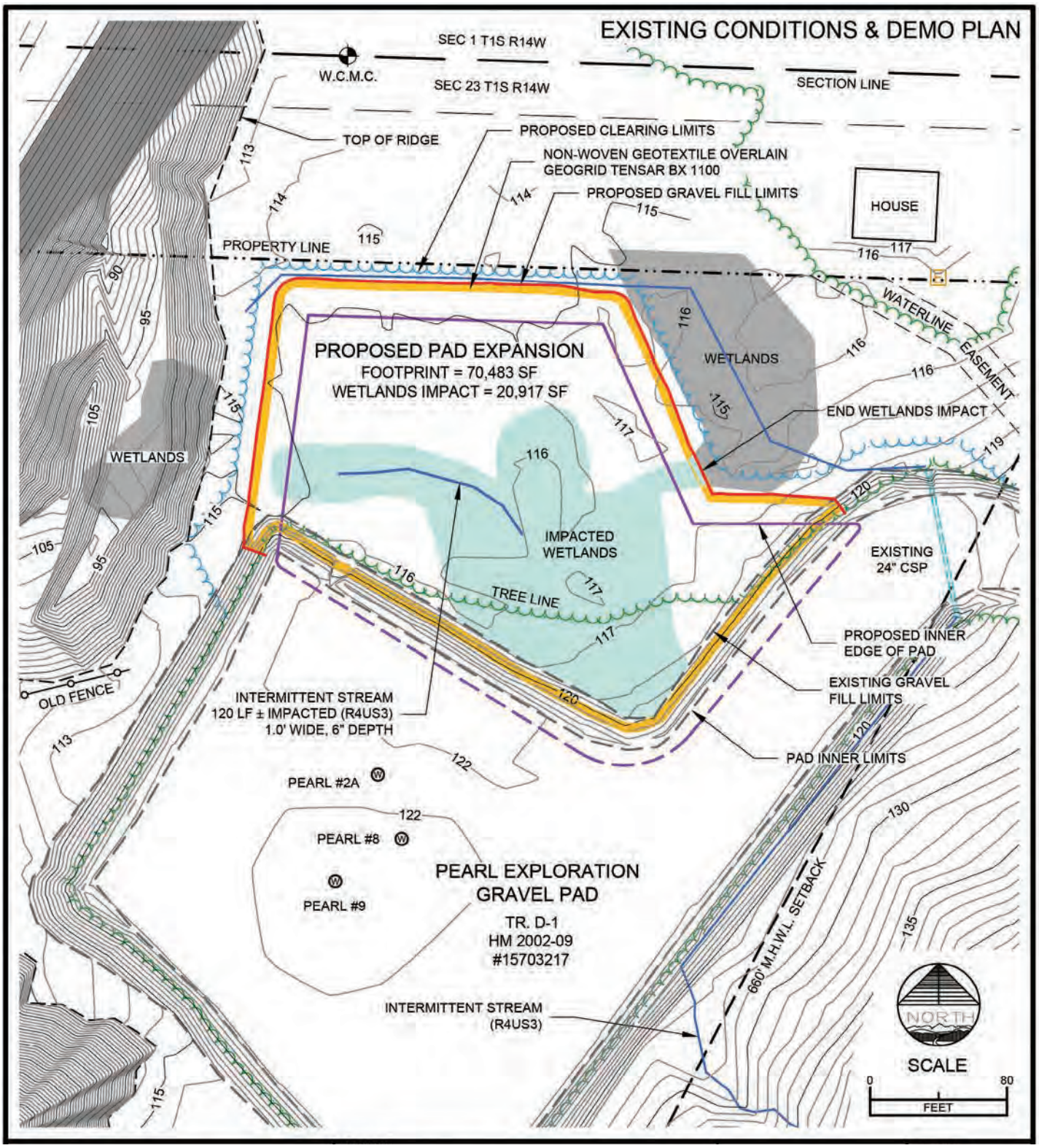

HILCORP ALASKA

HILCORP *continued from page 37*

completed the Pearl 2A well by early June 2022, according to AOGCC well files. Following the successful well, Hilcorp drilled the Pearl No. 8 and Pearl No. 9 wells later in the year. The company is currently planning the Pearl No. 10 and Pearl No. 11 wells sometime this year.

By that point, Ninilchik had become the most productive fields in the Cook Inlet basin. It accounted for 21.4% of the gas production in the basin in December 2022.

In addition to Pearl 2A, Hilcorp has been considering other prospects in the Ninilchik region, including the Blossom No. 1 sidetrack and a well at the Abalone prospect.

Strategy

Pearl is an example of a strategy Hilcorp has replicated

throughout the region: drilling several stratigraphic test wells in preparation for a small number of exploration wells.

Hilcorp acquired an aerial gravity and magnetics survey over the Seaview prospect in southern Kenai Peninsula in 2015, shot 20.54 miles of 2D seismic in 2016, drilled seven shallow stratigraphic test wells in the summer of 2017, completed the 10,148-foot Seaview No. 8 well in late 2018 and brought the field into production in June 2021.

Hilcorp followed Seaview with two stratigraphic test wells at the Deep Creek SW prospect in late 2017. The wells were associated with the Greystone prospect and the Middle Happy Valley area of the Deep Creek unit in the southern Kenai Peninsula.

Hilcorp drilled four stratigraphic test wells at the Whiskey Gulch prospect in late 2019 and eight more in the summer of 2020, followed by a two-well program in late 2021 and early 2022. The company commissioned a 2D seismic program in the area in early 2023.

For its next season, Hilcorp left the Cook Inlet basin to drill 13 of 15 permitted stratigraphic test wells in the Yukon Flats basin, as described later in this article.

Hilcorp returned to Cook Inlet in summer 2022, drilling seven stratigraphic test wells at the Happy Creek project, south of Ninilchik: 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. A month later, the company drilled 11 wells at its Cottonfield prospect in the southern Kenai Peninsula, east of the Cosmopolitan unit — Cottonfield No. 1, Cottonfield No. 2, Cottonfield No. 3, Cottonfield No. 4, Cottonfield No. 5, Cottonfield No. 9, Cottonfield No. 10, Cottonfield No. 11, Cottonfield No. 12, Cottonfield No. 13, and Cottonfield No. 14. (The Cottonfield No. 9 well has not been reported as complete.)

Yukon Flats

Beyond its infrastructure-led exploration projects in Cook Inlet, Hilcorp has also been pursuing some more traditional exploration opportunities in several underexplored basins.

One of those is the Yukon Flats.

Hilcorp signed an agreement in December 2019 with Doyon Ltd. creating a multi-year framework for the company to conduct exploration activities in the Yukon Flats area.

Doyon Ltd. owns about 1.6 million acres of subsurface lands in 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 1 million acre Yukon Flats National Wildlife Refuge. When those negotiations failed, Doyon revisited the acreage and came to reconsider its potential.

The agreement called for several seasons of preliminary work to gather information to support a future seismic survey that would in turn make the case for exploration drilling.

Hilcorp conducted an airborne gravity survey in summer 2020 and acquired the data it sought. 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.

The partnership has produced little public information in the

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HILCORP *continued from page 39*

two years since that stratigraphic campaign. On its website, Doyon writes, "The next steps could be a seismic program or no activity," adding "Additional phases of the exploration project depend on several factors, including analysis of the aerial survey data and stratigraphic test results."

Texaco and the Louisiana Land and Exploration each conducted separate exploration programs in the general Yukon Flats region in the 1970s without pursuing development.

Exxon arrived in the late 1980s with partner Amoco but cancelled its project, as well as all other Alaska wildcat exploration, following the Exxon Valdez oil spill in March 1989.

The Exxon-Amoco partnership had been targeting source rocks near the Birch Creek, Beaver and Fort Yukon blocks in the central part of the Yukon Flats basin.

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.

Other frontiers

In addition to Yukon Flats, Hilcorp has expressed interest in two other frontier projects.

The company conducted a 2D seismic survey over the Iniskin Peninsula in 2013. The survey provided the first data about subsurface structure and stratigraphy. It suggested the presence of a deeper crest of an anticline in the area that had previously been overlooked.

The company has yet to announce a drilling program but has acquired additional acreage.

"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."

Those reservoir challenges hampered previous explorations programs in the 1900s, 1930s and 1950s. The physical remoteness of the area added to the geologic headaches.

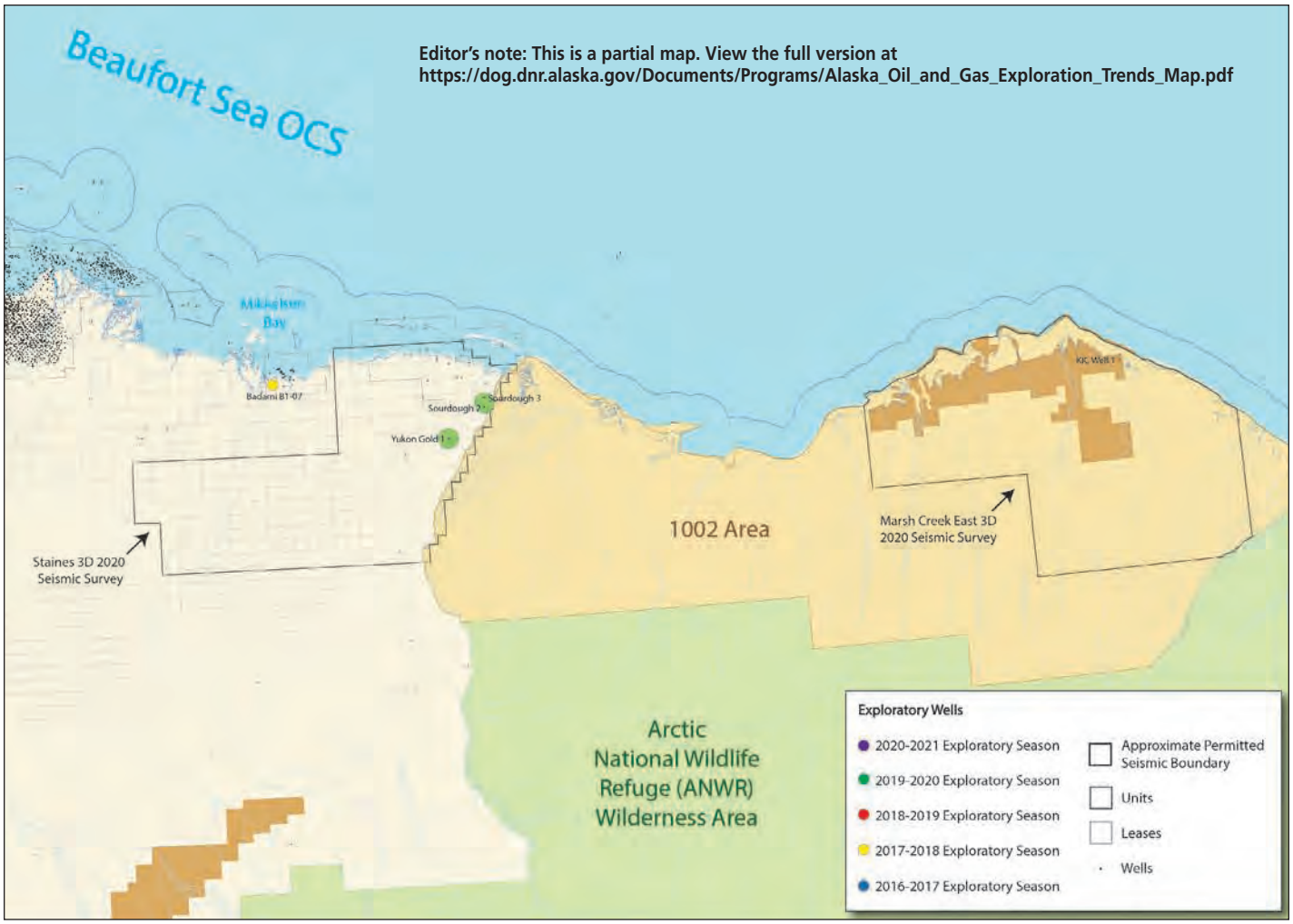
Hilcorp also holds leases at the Blackbill prospect in the Cook Inlet outer continental shelf. It conducted a 3D seismic survey in 2019 and a geohazard survey in 2021.

As described publicly, the program included plans for two-to-four exploration wells between 2020 and 2022. The company had not drilled any Blackbill wells by early 2023.

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. ●

Contact Eric Lidji at ericlidji@mac.com



STATE OF ALASKA

Jade Energy inches closer to exploration

Small independent has most permits and some funding for Sourdough project

By ERIC LIDJI
For Petroleum News

When you get down to it, launching a North Slope drilling program is simple. You just need permission and money. Of course, getting those is where the challenges start.

For the past few years, the small independent Jade Energy Inc. has been pursuing both: trying to get governmental approval and private financing for its Sourdough project.


ERIK OPSTAD

The subsidiary of independent ELKO International started the year celebrating the recent state approval of its most recent plan of development for the project. The plan called for drilling a development well at Sourdough in early 2024, with benchmarks along the way.

Jade Energy LLC

COMPANY HEADQUARTERS: P.O. Box 112212, Anchorage, Alaska 99511
TOP ALASKA EXECUTIVE: Erik Opstad
TELEPHONE: 907-244-5210
EMAIL: Erik.Opstad@Gmail.com

The benchmarks were designed to ensure that Jade Energy had the money and the equipment to drill. According to the December 2023 approval from the state Department of Natural Resources, the company must have funding in place by July 1, 2023, and must secure a drilling rig by Sept. 1, 2023. The company readily accepted both conditions.

The company also secured approval of its oil spill contingency

plan from the state and was waiting to hear about a polar bear plan from the U.S. Fish and Wildlife Service.

Now, the company is working on several fronts to improve the economics of the project in the hopes of securing private financing that has remained elusive in recent years.

Sourdough is located on a tract within the Point Thomson unit on the eastern North Slope. It is one of several projects in the eastern North Slope known as the "string of pearls," a term describing the way midsize projects (the pearls) could be united through shared infrastructure projects, like major pipelines and processing facilities (the string).

With enough of these projects in place, the eastern North Slope could theoretically start to approach the decades-long step-out development seen west of the Kuparuk River unit.

A big part of the appeal of the Sourdough project is its proximity to Area 1002 of the Arctic National Wildlife Refuge. Some geologists believe the Sourdough reservoir extends into ANWR. Even if it doesn't, Sourdough infrastructure would certainly improve the economics of any future development activities in ANWR Area 1002.

Having surmounted the most recent governmental hurdles, Jade Energy is redoubling its efforts to solve the money problem. According to company executive and longtime North Slope oilman Erik Opstad, private investors had soured on the project in recent years but renewed their interest in the opportunity during the fourth quarter of 2022.

"We are actively engaged in money raising for this oil development project," he said in December 2022. "It's gratifying to see interest in oil drilling returning to Alaska."

In an update during an early April 2023 interview with Petroleum News, Opstad said his company had two funding commitments with a third pending but deferred on details.

Economics

According to a 2020 commercial model created by Jade Energy with feedback from the state Department of Natural Resources, the full program proposed for the Sourdough project has a negative net present value approaching $1 billion at projected oil prices.

As it works to make a case for Sourdough, Jade Energy is pursuing four opportunities for improving the economics of the project. Each opportunity involves a different party.

The first opportunity involves increasing reserves at the project.

The Sourdough project is associated with a lease currently contained within the Point Thomson unit Area F: Tract 32 of ADL 343112. While the small independent is the 100% working interest owner of the lease, Hilcorp Alaska operates the surrounding unit, having taken over from ExxonMobil as operator at Point Thomson in 2021.

Soon after coming into existence in 2018, Jade Energy commissioned a new compressive sensing imaging 3D seismic survey over the Sourdough area at Point Thomson.

According to information from that seismic program, some 40% of the reserves at Tract 32 fall within Hilcorp leases. Those reserves would greatly improve the economics of Sourdough but adding them would require approval from Hilcorp.

Hilcorp has indicated it would transfer resources to Jade Energy following a successful initial drilling campaign — a bit of a Catch 22 for the smaller company.

The second opportunity involves improving tax liabilities.

continued on next page

JUDY PATRICK

Nabors rig 27E

JADE ENERGY *continued from page 43*

Jade Energy is waiting for Hilcorp Alaska LLC to transfer an approximately $150 million Development Account Balance at Sourdough. The larger player assumed control of the account through its acquisition of BP Exploration Alaska's properties. Hilcorp was to have transferred the funds this past summer and has not publicly explained the delay.

Although the funds could not be accessed until after the start of production, the presence of the funds would improve the economics of the project by mitigating tax liability. Jade Energy could use the balance to offset some of the net profit sharing lease burden.

The third opportunity involves reducing that net profit sharing burden directly.

A few years ago, the Alaska Department of Revenue determined that the Sourdough project would not be economic at projected oil prices with the existing 40% net profit sharing lease, the standard 12.5% royalty and the usual suite of taxes.

Jade Energy has previously lobbied for a change to the current 40% net profit sharing lease at Sourdough, which comes atop other liabilities. A bill passed the state House of Representatives in 2022 but then stalled in the Senate Finance Committee.

The fourth opportunity involves royalty modification.

In addition to resolving the Development Account Balance transfer with Hilcorp Alaska and getting legislative approval to reduce the 40% net profit sharing lease, Jade Energy could also improve the economics of the project through direct royalty relief.

In late 2022, Jade Energy told Petroleum News that it would formally ask the state to lower the royalty rate on the Sourdough lease to improve the economics of the project.

Conversations about royalty relief are connected to the ongoing commercial model for the project. For the state to approve royalty relief, Jade Energy would need to make the case that a lower royalty rate would be decisive in making the project economic.

"Since parties interested in participating in an Area-F Development have only reappeared in the last few weeks after nearly a year of disinterest, Jade has a sense of urgency to get the model whipped into shape ASAP," Jade said in early November 2022. "Tangential to modeling, is royalty reduction. Thus far, the models run by Jade resulted in a negative (net present value) suggesting that the nearly $1 billion dollar project is not commercial.

"That said, some of the model runs have produced results that are close to offering a positive (net present value). One scenario that is helpful is to reduce the standard 12.5% royalty to say 5%, but then tie that reduction to an oil price schedule so that

the reduction becomes less as the price of ANS crude rises above an agreed benchmark."

Analyzing its situation, Jade Energy asked the state to improve the economics of midsize discoveries. "Everyone will agree that oil and gas operations in Alaska are absurdly expensive when compared with most other onshore venues. Fortunately, these ridiculous costs can occasionally be offset by the financial rewards that can come from the development of outsize Alaskan reserves," the company wrote in filings. "Unfortunately, such reserves are uncommon, but the State of Alaska financial framework is largely structured around these rare elephants, which discourages many independents from entering the market at all, because it is so expensive to conduct business in the state."

History

The leases around Sourdough prospect were first delineated in the mid-1970s.

Exxon drilled three wells in Area F between 1975 and 1995: Alaska State A-1 and Alaska State A-2 from ADL 047556 and Alaska State G-2 from ADL 343110. The company commissioned the Point Thomson 3D seismic program over 70 square miles in 1989.

BP Exploration Alaska Inc. started exploring the area in the mid-1990s.

The company commissioned the Yukon Gold 3D program over 95 square miles of Area F in 1994. It drilled the 12,562-foot Sourdough No. 2 well in March 1994 and the 12,475-foot Sourdough No. 3 well in March 1996. It returned with the Mammoth 3D program over 13 square miles of Area F in 1997. Following that multi-year seismic and drilling program, BP announced a 100 million barrel discovery in 1997. But the company never pursued development and increasingly receded from the North Slope exploration scene.

During its exploration work from the mid-1990s, BP produced some 2,700 barrels per day by stimulating the vertical Sourdough No. 3 well. Opstad believes that a 5,000-foot horizontal completion into the reservoir would result in significantly higher production.

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 targets the southeastern leases, known as Tract 32.

One of the many oddities about the Point Thomson unit was its culture of ownership.

The idea behind unitization is to encourage collaboration to better avoid disputes and duplication. But for the first 20 years of the life of Point Thomson, from the late 1970s into the late 1990s, various working interest owners worked somewhat independently.

The Sourdough prospect was perhaps the best example of that odd ownership culture: BP Exploration (Alaska) Inc. and Chevron USA drilled at the prospect without the participation of any other working interesting owners, including then-operator ExxonMobil.

With the approval of the 15th plan of development at Point Thomson in 1998, that culture began to change. "What we have now is these companies acting like a unit. ... It's a whole different ball game than it's been for the last 20 years," then-Division of Oil and Gas Director Ken Boyd told Petroleum News at the time. Asked about the work in the eastern end of the prospect, Boyd

continued on next page

JADE ENERGY *continued from page 45*

added, "all the unit owners now own a piece of the Sourdough wells — the wells that are within the boundaries of the Point Thomson unit."

Jump another 20 years into the future, to 2018, and Jade Energy faced the opposite challenge: consolidating working interest from many players. Through a late 2018 agreement, ExxonMobil assigned a 62.674 percent working interest in Tract 32 to Jade Energy, 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 remaining 5%. Jade Energy eventually acquired the remaining 5% working interest in its lease from ConocoPhillips, finally giving the company 100% interest in Sourdough.

With the seismic survey completed and the working interest resolved, Jade Energy prepared to use Nordic Rig-3 to drill the Jade No. 1 exploration well in early 2020. 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.

But the realities of getting equipment to the eastern North Slope forced Jade Energy to delay the project into early 2021 and then delay the project again into early 2022.

In early 2022, Jade Energy began rethinking its technical approach to the project, leading the company to significantly redesign and expand its proposed well. The company had originally planned to drill a simple pilot well at Sourdough. "Although we still needed to drill a pilot hole deeper than either existing Sourdough wells (Sourdough No. 2 and Sourdough No. 3) to evaluate potential additional reserves atop the Hue Shale … it didn't make financial sense to plug and abandon that wellbore," the company wrote in filings.

The company instead designed a project where it would "plugback from the pilot hole TD, then complete the well as a horizontal sidetrack."

"Although more expensive than an abandoned pilot hole, this plan makes better use of the capital and was quickly embraced by our investor community," the company added. The company is also considering Hilcorp's proposal to workover and horizontally recomplete the Sourdough No. 3 well.

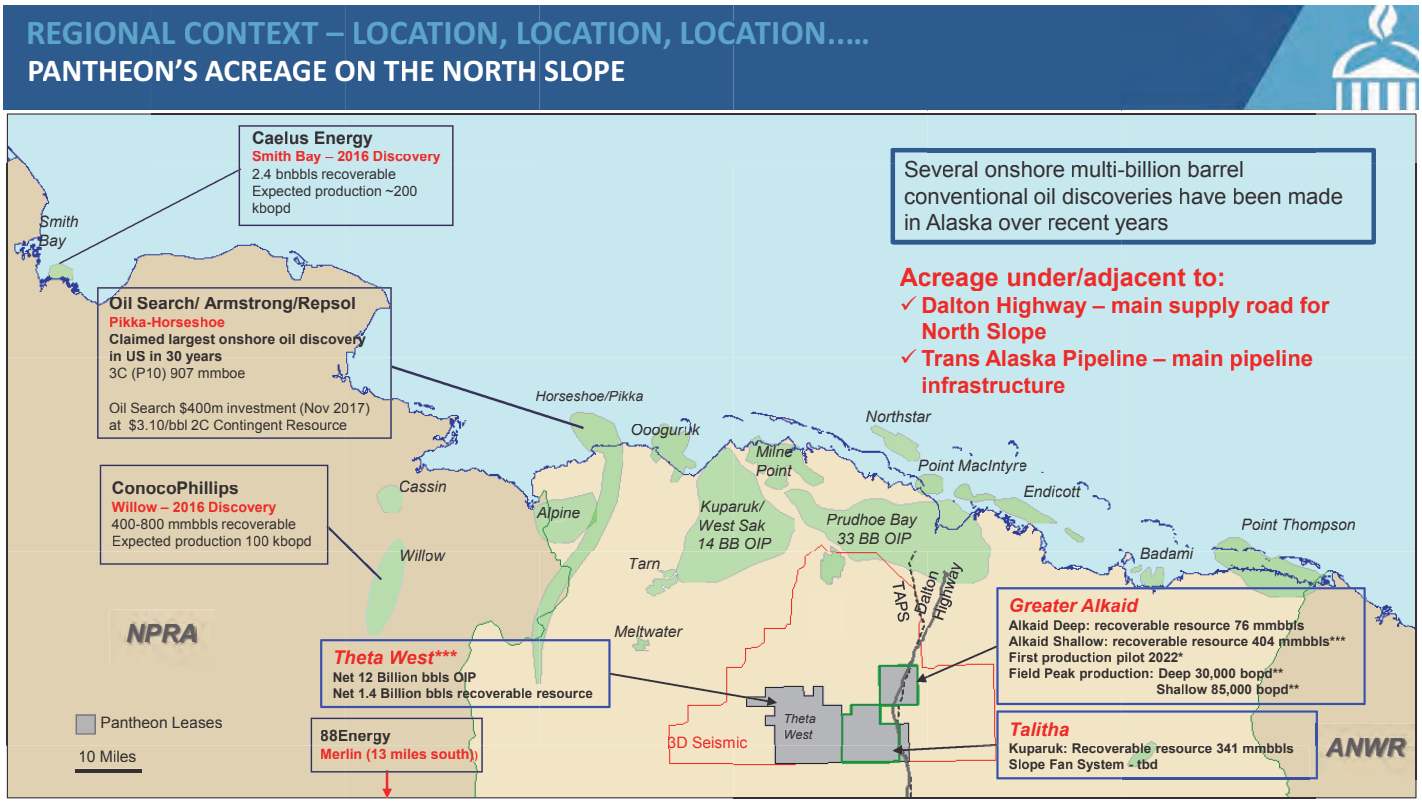
The new well design poses specific rig requirements. To accommodate the estimated reservoir pressures at Sourdough, Jade Energy needs to secure a rig with blowout preventer equipment rated at 10,000 psi. Only a few such rigs currently exist in Alaska.

In filings, Jade Energy mentioned the Nordic Rig 3 and Nabors 27E as possibilities. The Nordic rig poses some transportation challenges when it comes to barging but is thought to move more easily on land. The Nabors rig already has experience at Point Thomson.

The company is also considering modular rigs that could be assembled on site.

In the April 2023 interview, Opstad said, "We're working on finding a rig that can come in overland on snow roads versus ice roads, using the methods and techniques developed in the National Petroleum Reserve-Alaska over the past several drilling seasons. This approach is expected to be a lot more cost-efficient for the Sourdough project." ●

Contact Eric Lidji at ericlidji@mac.com



Great Bear Pantheon becomes a producer

Production test combined with Early Production Unit at Alkaid leads to sales

By ERIC LIDJI
For Petroleum News


PAT GALVIN

The moment an explorer becomes a producer sometimes arrives with a celebratory pop of news. But sometimes it arrives more gradually, like a volume knob slowly being turned.

Over the past year, Great Bear Pantheon began selling liquid hydrocarbons from its Alkaid project into the trans-Alaska oil pipeline. Even though the sales came as part of a production test, sales are sales: the company is now an Alaska North Slope oil producer.

Even so, throughout the spring, the company was muted and cautious as it proceeded with the production test designed to determine the viability of the onshore prospect.

The milestone came about four years after the joint venture began exploring leases in the central North Slope and about 13 years after Great Bear Petroleum first made headlines for proposing a paradigm-shifting source rock exploration program on the North Slope.

Great Bear Petroleum LLC arrived in Alaska in 2010 with an ambitious plan.

Great Bear Pantheon LLC

COMPANY HEADQUARTERS:
310 K St., Ste. 200, Anchorage, AK 99501
TOP ALASKA EXECUTIVE: Patrick Galvin, chief commercial officer & general counsel
TELEPHONE: 907-868-8070

The company wanted to bring Lower 48 style source rock development to the massive petroleum system of the North Slope — targeting the three stacked source rocks responsible for producing the oil at Prudhoe Bay, Kuparuk, Alpine and other fields.

The proposal was unlike anything attempted in Alaska. It involved more rigs and wells and would have produced at a much higher rate than any Alaska field had in decades.

In its 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. It 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.

Within a few years, Great Bear made another important move: partnering with the British independent Pantheon Resources plc to create the joint venture Great Bear Pantheon.

Together, the companies have been pursuing three closely related prospects in the central North Slope, south of the Prudhoe Bay unit, near the Dalton Highway and trans-Alaska oil pipeline: the Greater Alkaid project, the Talitha project and the Theta West project.

Great Bear Pantheon estimates that Greater Alkaid contains 900 million barrels of oil in place, Talitha could contain as much as 1.4 billion barrels of oil in place and Theta West could contain some 12.1 billion barrels of oil place. The trick is proving those estimates, as well as designing a production strategy that maximizes the rate of primary recovery.

Asked in late 2021 about the production potential of the three plays, Pantheon Technical Director Bob Rosenthal told Petroleum News, "At least a billion" barrels, adding. "We think we've got one of the largest discoveries made in the world in the last year."

Alkaid

Great Bear drilled the Alkaid 1 well in early 2015, during the initial phases of its Alaska operation. External factors curtailed some of the company's planned activities, but the completed activities found oil in three major zones between 4,000 feet and 8,100 feet.

As the joint venture Great Bear Pantheon, the company returned to the prospect in early 2019, re-entering and flow testing the Alkaid 1 well. The well produced 108 barrels of oil from the Upper Brookian formation over 24 hours. The company estimated that its main zone of interest in the Brookian 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.

Following those results, Great Bear Pantheon combined Alkaid and the nearby Phecda prospect into a single project, which became known as the Greater Alkaid prospect.

Great Bear Pantheon proposed a phased production program at Alkaid designed to bring the field online as early as 2021. It later advanced the target date to summer 2020, "subject to completion and timing of a successful farmout." The coronavirus pandemic in early 2020, followed by the crash in global oil prices, thwarted that ambitious timeline.

PANTHEON

Nordic Calista Rig-2 on the Alkaid 2 well.

The joint venture finally returned to the field in July 2022 by drilling the Alkaid No. 2 well — a rare summer spud date made possible by its proximity to the Dalton Highway.

Alkaid No. 2 was an appraisal well designed for a long-term production test. The horizontal well would target the same zone encountered in the Alkaid No. 1 well.

Alkaid No. 2 included a nearly vertical 8,950-foot pilot hole with a 5,300-foot lateral bringing the total depth to some 14,300 feet. The company said future wells would include 8,000-foot laterals, but the lateral section of Alkaid No. 2 was shortened to reduce operational risk during the early appraisal phase. "As our first horizontal well, Alkaid 2 is an important operation for Pantheon. The long-term production test through the horizontal section will define the resource and aid the understanding and future development potential of Alkaid. But most importantly, if successful, it will begin generating revenue for the company," Pantheon Resources CEO Jay Cheatham said.

continued on next page

Early on, the lateral became blocked with frac sand. Without a workover rig available, the company used a coiled tubing drilling rig to clear the blockage. The unconventional approach worked, clearing most of the blockage and allowing flow testing to resume.

Even with the partial blockage, the well was flowing in December 2022 at more than 500 barrels per day. The flow included about 200 barrels of oil with the remaining flow including natural gas liquids and condensate, as well as some associated natural gas.

The company believes that the natural gas is contained within the oil, not a gas cap.

The trans-Alaska oil pipeline can accommodate natural gas liquids and condensate, although often at different prices than the listed price of Alaska North Slope crude oil.

By January 2023, Great Bear Pantheon had sold more than 7,000 barrels to the trans-Alaska oil pipeline. The company estimated at the time it was realizing prices at 80-90% of Alaska North Slope crude oil or higher, based on the quality of its product.

To accommodate its aspirations for production, Great Bear Pantheon commissioned an Early Production Unit facility. The modular facility was built in one year, allowing the company to begin appraisal drilling and shift quickly to production, if warranted.

"While a huge learning experience for Pantheon, it proves that given our location we can execute in a single season. We both drill and test wells in a single season while others drill one season and test the next. We were confident that we would need a facility for our long term test, thus committed to it before the spud of Alkaid 2 and were able to design, procure and install in a season," a Pantheon spokesman said in late February 2023.

During the early stages of the Alkaid production test, the company devised several temporary solutions for handling production. Oil would be trucked to market. Water would be injected with the excess taken to a grind and inject facility for disposal. Natural gas would be used for local power and some injection with the excess to be flared.

Although some natural gas production was expected at Alkaid No. 2, the production rates have been higher than Great Bear Pantheon predicted, requiring some handling solutions.

Given the length of the production test planned for Alkaid No. 2, a lot of natural gas would be flared. As part of its permitting program for Alkaid No. 2, Great Bear Pantheon asked the Alaska Oil and Gas Conservation Commission for permission to flare gas for nine months. Operators regularly request permission to flare natural gas during the early stages of a project, but those requests are usually for a few weeks, not most of a year.

The AOGCC was skeptical and required a public hearing, rather than handling the request through a sundry permit. During the hearing, Great Bear Pantheon said that the long production test was needed to determine if the prospect was economically viable.

The AOGCC ultimately approved the request but limited the permit to three-month increments, requiring the company to perennially report on its findings and reapply.

Talitha

Great Bear Pantheon drilled the 10,456-foot Talitha A well in 2021.

The well encountered five oil horizons in a 3,700-foot column. The company called these the Shelf Margin Deltaic, the Slope Fan System, the Upper Basin Floor Fan, the Lower Basin Floor Fan and the Kuparuk. The company returned the following year for a testing operation. The operation 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.

Each interval was individually stimulated and flow tested. 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.

"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 multistage stimulation.

In a plan of operations filed in late November 2022, Great Bear Pantheon proposed returning to this winter to drill the Talitha B well. Talitha B would be a roughly 9,800-foot vertical well drilled to the base of the Brookian sand, just above the HRZ interval.

PAT GALVIN, GREAT BEAR PANTHEON

Nabors 105AC rig drilling Alkaid 2 well.

Great Bear Pantheon initially said it expected to begin drilling operations in January. The company had yet to receive final AOGCC drilling permits for the well as of mid-March.

Early on, Great Bear Pantheon described Talitha A as a re-drill of ARCO's 1986 well Pipeline State No. 1 but with the benefit of four decades of improved knowledge.

"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.

Theta West

In between work at the Talitha A and Alkaid No. 2 wells in early 2022, Great Bear Pantheon drilled the Theta West No. 1 well on nearby acreage in the central North Slope.

The 8,450-foot vertical test well targeted the Upper Basin Floor Fan and the Lower Basin Floor Fan. The goal was to determine reservoir deliverability in preparation for a future horizontal production well. The company spud the well in late January 2022 using the Nordic Calista Rig 3. The well encountered the Upper Basin Floor Fan between 6,800 and 7,000 feet and the Lower Basin Floor Fan between 7,450 feet and 8,410 feet depth.

In late March 2022, the company announced that the well had produced an average of 57 barrels of high quality light oil per day with a peak rate exceeding 100 barrels per day.

The company said its program achieved its primary objectives: to confirm oil quality, to confirm oil movability, and to confirm reservoir deliverability. "We are very excited by this result at Theta West," Cheatham said in a statement. "This well is a successful 10.5 mile step-out from the (Lower Basin Floor Fan) 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." ●

Contact Eric Lidji at ericlidji@mac.com

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