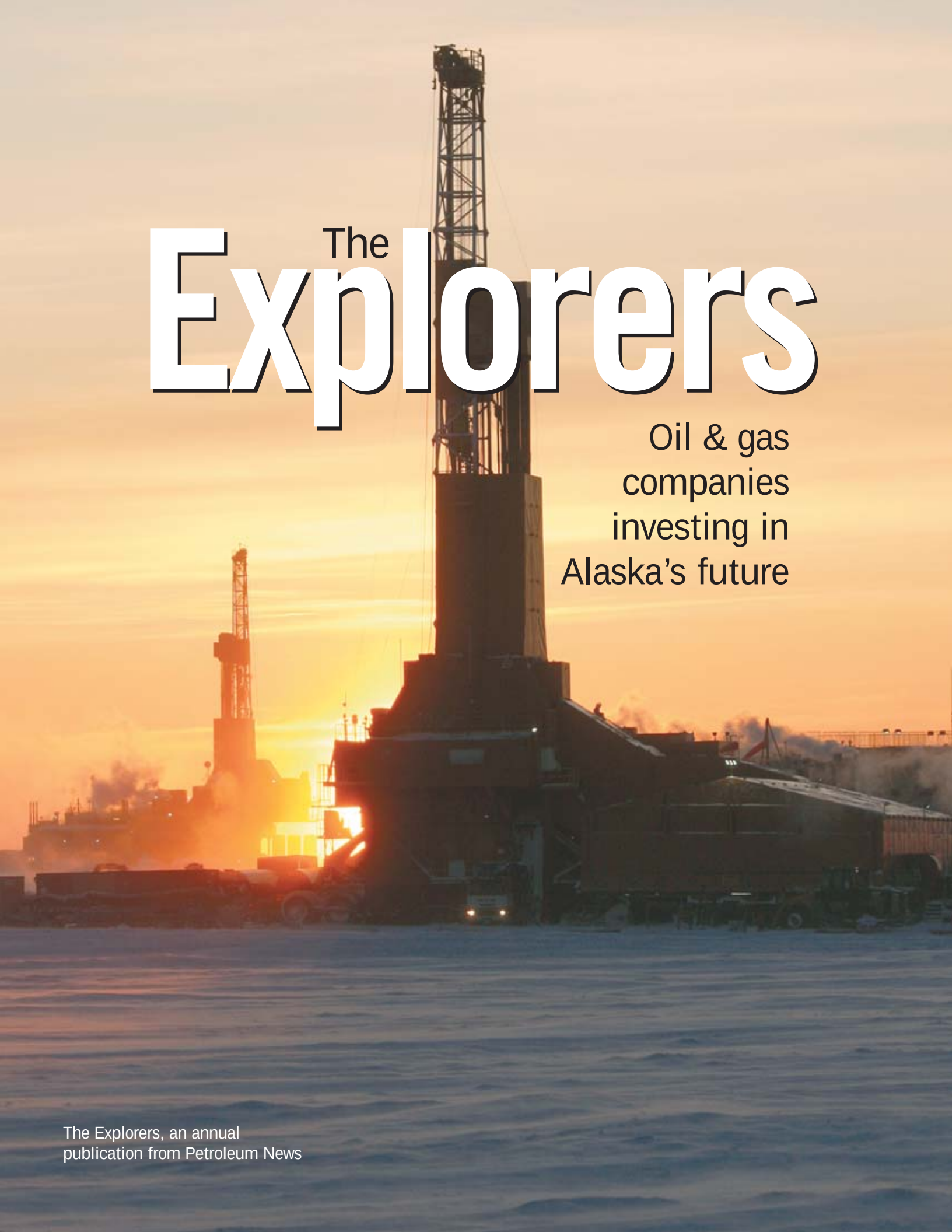

The Explorers

Oil & gas companies investing in Alaska's future

The Explorers, an annual publication from Petroleum News

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North Slope, Cook Inlet exploration continues to pick up

By KAY CASHMAN
Petroleum News

To accommodate our production calendar, The Explorers is written during the first few months of the year, which also happens to be the period of heaviest exploration activity in Alaska, especially on the North Slope. This means new information is coming in as we send the magazine to production between April 4 and April 11, 2019, so readers should check with Petroleum News, our weekly newspaper, on the very latest news about the oil and gas companies featured herein.

Nonetheless, The Explorers magazine is a solid summary of the history of the explorers featured in it and an excellent barometer of what projects they are likely to pursue in the next year or more.

Criteria to be featured in this annual magazine

We try to include every oil and gas company that either drilled an exploratory well in Alaska during the last year and expects to continue exploring, or has announced what we determine to be serious plans to explore in the coming year; the exception being companies such as Doyon, which is moving away from its own exploration (see Petroleum News April 21 or April 28, 2019, issue for an explanation).

We also decided this year to concentrate on Alaska's two major oil provinces — the North Slope and Cook Inlet basin. Until another company does what Doyon did in Interior Alaska, which was make a serious effort to methodically explore (with several wells) an area that obviously has some oil and gas potential, we will stick to the two provinces that produce Alaska's oil and gas.

Eleven companies qualify as explorers

The following 11 oil and gas companies were eligible to be in The Explorers 2019: 88 Energy (subsidiaries Accumulate, Captivate, and Regenerate); ASRC; BlueCrest; ConocoPhillips, Eni; Furie; Glacier, Hilcorp; Jade; Oil Search and Pantheon.

We also included an article on BP's infield "exploration" at Prudhoe Bay.

Looking for new pockets of oil in Alaska's producing legacy fields is something not only BP is undertaking, but ConocoPhillips is doing at Kuparuk River and Alpine, some of which is mentioned in the company's feature in this edition.

Looking for missed, and therefor new, pools of oil on the North Slope has become a near religious exercise on the North Slope since Bill Armstrong entered Alaska in 2001. Armed with moneyed and like-minded partners, he began finding and developing sizable oil deposits that had been missed, or ignored, on the Slope, eventually launching a renaissance in North Slope exploration and development that now has the region classified by IHS Markit as a "late-emerging-phase super basin," rather than a mature basin.

You can read more about Armstrong in the Oil Search feature, as well as in back issues of Petroleum News and its magazines, which are all available at no extra charge to paid subscribers in our online archive at www.petroleum news.com.

ConocoPhillips the most active explorer

The most active explorer in the past year was, hands down, ConocoPhillips Alaska. The company promised six to eight North Slope exploration/appraisal wells in the 2018-19 winter drilling season and per the Alaska Oil and Gas Conservation Commission and Petroleum News' rig report, appears to have drilled seven wells, all classified as exploratory by AOGCC.

ConocoPhillips' first major Nanushuk development at Willow, in what they've

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On the cover: ConocoPhillips had its busiest winter exploration program since 2002 – these rigs were working in the Willow area.

Photo by Judy Patrick, courtesy of ConocoPhillips Alaska

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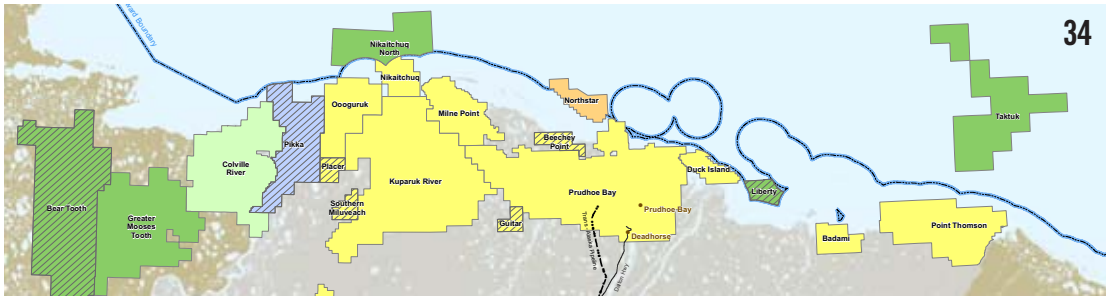

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Maps courtesy of the Alaska Department of Natural Resources, Division of Oil and Gas

Alaska poised for oil renaissance

By CORRI A. FEIGE
Alaska Commissioner of Natural Resources


CORRI FEIGE

Alaska's oil industry in 2019 is poised at the brink of a renaissance.

New discoveries, enhanced opportunities in known fields and innovations in technology are prompting new interest from global players, renewing the promise that Alaska will resume its role as a significant player in world oil markets.

Alaska has long been among the least-explored major oil provinces in the world. The 1968 discovery of Prudhoe Bay, North America's largest field, established the North Slope as not only a steady oil producer, but a constant target for explorers hoping to find the next super giant field. The discovery just a year later of the continent's second-largest field, Kuparuk, cemented our reputation as rewarding hunting grounds for those seeking big oil finds.

Along came Armstrong, Repsol

As exploration and discovery continued across the North Slope, drillers recognized zones of thin laminated sands saturated with oil. But given their more complex nature and what appeared to be a limited lateral extent, these intervals were quickly passed over in the hunt for larger reservoirs. Little did those early drillers know that some 30 years later, intrepid explorers like Armstrong Oil and Gas and Repsol would tease the secrets from these rocks and realize the true significance of the shallow Nanushuk formation.

While Armstrong estimated its Nanushuk discovery in the Pikka unit held a total of at least 500 million barrels oil, Oil Search Alaska's 2018-19 exploration work could add an estimated 250 million barrels to that total. The deeper Torok formation holds additional promise, and the two formations together have illuminated a bright spot in Alaska's oil development, and a glimpse of what the future may hold.

Positive indications from industry

A new generation of oil explorers has continued to probe the North Slope, aided by modern 3D seismic data, decades of analysis from historic North Slope drilling, and hard-won Arctic oilfield know-how. That can-do spirit and Alaska's prolific resource endowment have once again captured the attention of the global oil industry:

• IHS Markit has formally ranked Alaska's North Slope as a "super basin," due to its maturity as an oil producing region and its seemingly unending resource potential.

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FEIGE *continued from page 8*

• Major global oil companies have been busy purchasing seismic data from the state, made available thanks to the former oil tax credit system that drew significant investment dollars to Alaska.

• Recent lease sale activity has seen the largest per-acre bids ever made for state land.

• Oil companies are investing in vast tracts of North Slope lease acreage for a chance to be a part of Alaska's oil future.

Companies emerge stronger

But while the last few years have been exciting for oil explo-

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WELCOME *continued from page 5*

dubbed as the Narwhal trend, is expected to come online in 2024-25, right behind Armstrong partner Oil Search's Nanushuk development at nearby Pikka in 2023. Both operators are building standalone processing facilities and associated infrastructure, as well as utilizing the partly empty existing North Slope oil infrastructure, to bring fields of at least 100,000 barrels of oil a day online — and both expect to develop several other discoveries in the future, involving hundreds of thousands of barrels of light, sweet crude.

Highlights from Alaska's explorers

Following are snippets of info from the explorers featured in this edition:

• 88 Energy looking to drill North Slope Icewine wells, while Yukon Gold excitement grows;

• ASRC Exploration pursuing Kuparuk C and Nanushuk intervals at Placer;

• BlueCrest advances exploration, development of Cosmopolitan in Cook Inlet basin with successful application of new fishbone well design;

• ConocoPhillips boosts capital spend in Alaska; drills into the enigmatic Cairn interval;

• Wildcats in Eni's North Slope future? While CEO talks about stepping up exploration, fate of company's first wildcat in Alaska in 11 years remains hush-hush;

• Development is Furie's focus at Kitchen Lights, but also poking at one of Cook Inlet's most intriguing exploration targets — oil in field's deep Jurassic at 20,000-plus feet;

• Glacier Oil announces North Slope oil discovery, payout in less than 15 months, Starfish prospect one of several new promising pods in Killian sands, plus looking for partners to explore 50-100 million barrel Sabre oil prospect in Cook Inlet;

• Hilcorp aims to drill in lower Cook Inlet — despite delay in 3-D seismic survey lower CI, Iniskin Peninsula and Trading Bay exploration programs on track;

• Jade Energy cuts deal with Point Thomson operator ExxonMobil to drill old BP Sourdough oil discovery on eastern North Slope next to the ANWR 1002 area;

• Oil Search tackles largest Alaska discovery in decades, ahead 3 more Horseshoe wells, Grizzly prospect evaluation, new exploration block on eastern North Slope;

• London-based Pantheon Resources merges with Great Bear, says Alkaid discovery in Brookian bodes well for nearby Phecda prospect, looking for partners.

All in all, things are looking up for the oil industry in Alaska. ●

FEIGE *continued from page 10*

ration and discovery, Alaska's oil producers have been battered by low oil prices and crippled by ever-changing state fiscal policies. Some Alaska leaders had even begun to say the state should give up on oil, and resign itself to a smaller, post-petroleum economy.

Rather than giving up, however, oil producers learned how to reduce their operating costs by employing new technologies and streamlining operations and have emerged stronger as oil prices have stabilized. Our challenge now is to maintain a stable economy and predictable fiscal policy. These are essential to a strong economy, successful businesses, more good-paying jobs and a smaller state deficit.

Talking to companies at CERAWeek

In March, I accompanied Governor Mike Dunleavy and others to a week-long conference, known as CERAWeek, which draws thousands of players from across the global oil industry to Houston. It was a pleasure to talk with leaders in the industry, and to carry the message and evidence that Alaska has tremendous resource endowment, plus the human and infrastructure advantages necessary to deliver those resources to market.

But it was sobering to hear from all sides that Alaska must maintain stable oil tax policies, fix the state's economy and break our deficit-spending habits before Alaska can secure the new investment essential to bringing our resources into production.

Alaska clearly has impressive geological resources and as the largest state, we have room for companies to lease large land positions where they can realize the kind of long-term development that pays dividends to shareholders and builds a stable state economy for Alaskans.

The Department of Natural Resources is working hard to attract investment dollars, and the outlook for the next several years is promising as companies work toward success, exploring for new oil and adding new reserves to their portfolios.

Alaska at tipping point

While oil production had been declining by up to 7% annually just a few years ago, the most recent forecast shows production holding relatively stable at just over 500,000 barrels per day. That is largely due to new developments like the Pikka unit and Greater Moose's Tooth 2 due to come on line in the next few years. And Prudhoe Bay will continue to be the largest-volume producer on the North Slope, all the while advancing new oil recovery technologies to ensure that all producible oil is captured.

But Alaska is at a tipping point, facing critical questions: do we stabilize our industry, our economy and our jobs, telling the world that we are not only open for business, but ready and eager to work as partners to help business thrive?

Or do we continue with business as usual, a path that has led to decline, recession, loss of jobs and outmigration of families, and an oil industry that sees unpredictable risks cancel out the attraction of big rewards?

Alaska has the rocks, we have the resources, we have a governor and administration willing to make the difficult decisions necessary to help Alaska thrive. And as we saw in Houston, we have the eyes of the world oil industry willing to turn our way. The question is, do we have the will to step up and make Alaska's potential oil renaissance a reality?

Editor's note: Corri A. Feige is a geophysicist and engineer.

88 Energy looks to drill North Slope Icewine wells

While Winx well data being evaluated and next western well might be drilled closer to Horseshoe, Stony Hill wells, Yukon Gold excitement grows

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By KAY CASHMAN
Petroleum News

The busiest of 88 Energy Alaska Inc.'s subsidiaries during the North Slope's winter off-road drilling season of 2018-19 was Captivate Energy Alaska Inc. with the drilling of the Winx 1 exploration well.

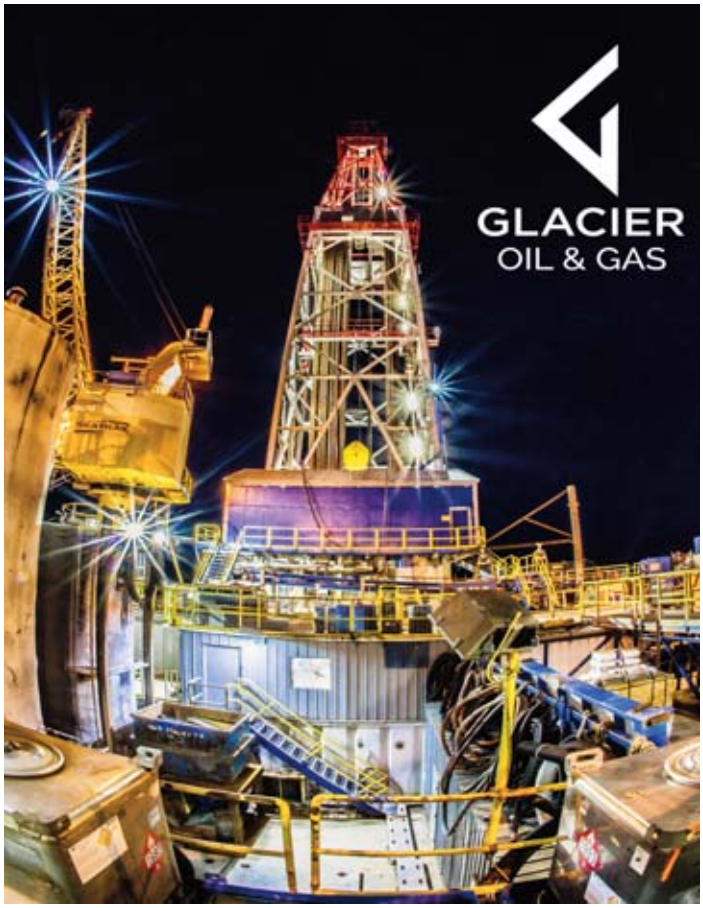
The focus in the coming year, spring 2019 through spring 2020, will likely be a different 88 Energy Alaska subsidiary, Accumulate Energy Alaska Inc.

But there will be work behind the scenes at Captivate and another subsidiary, Regenerate Alaska Inc.

Accumulate is looking to drill two wells for conventional oil with a new farm-in partner at Project Icewine and is looking for a farm-in partner for a work program for Icewine's unconventional HRZ source rock resources.

First a little background.

88 Energy Alaska is a subsidiary of Australian independent 88 Energy Ltd., a West Perth-based ASX and AIM listed firm. 88E's Alaska arm has three fully owned subsidiaries doing business in the northernmost state — Accumulate, Captivate and Regenerate.



In its 2018 annual report released in February, 88E touted the state of Alaska's leasing program, noting the primary term for leases was now 10 years with a 16.5% royalty. The company also spoke of recent North Slope exploration successes as more and more missed oil is found and the resultant entry of new players such as Oil Search, one of Australia's leading oil companies.

"Bill Armstrong (who brought in Oil Search as a partner), one of North America's most successful explorers has described the source rocks of Alaska as unbelievably rich and prolific, having generated and expulsed about 1.5 trillion barrels of oil. Yet only a small fraction of that 1.5 trillion barrels has been found, leaving vast potential remaining to be discovered. Almost all the remaining fields in Alaska are stratigraphic traps rather than anticlines and require a subtler exploration approach, which 88E is pursuing as it targets reservoirs adjacent to those same source rocks," 88E's Chairman Michael Evans wrote in the annual report.

88E's top executive in Alaska for Captivate and Accumulate is Anchorage-based general manager of operations Erik Opstad, a state of Alaska certified professional geologist, who has worked the North Slope for 34 years, including a stint with BP in various roles and as a principal and general manager of Savant Alaska.

David Wall, managing director of 88 Energy Ltd, directly oversees Regenerate.

Morocco to Alaska

In late 2014 and early 2015, the young Tangiers Petroleum swapped the warm waters off Morocco for Alaska's onshore Arctic, changing its name to 88 Energy during the same period.

In November 2014, Tangiers joined forces with Burgundy Xploration, the agent and high bidder on almost 87,000 acres in the state of Alaska's North Slope areawide lease sale that year. Tangiers took an 87.5% interest in the leases, which the partners named Project Icewine, today operated by Accumulate.

Since that time 88 has expanded Icewine to approximately 525,000 gross contiguous acres (349,108 net).

Both the Dalton Highway, providing year-round operational access, and the 800-mile trans-Alaska oil pipeline run through the leases, which lie south of the Prudhoe Bay unit.

Yukon Gold expands

The company diversified its North Slope portfolio in 2017 by successfully bidding on 14,194 gross contiguous acres on state land on the eastern North Slope, adjacent to the ANWR 1002 area. The Yukon Gold Block includes an historic oil discovery, the Yukon Gold 1 exploration well. Operated by Regenerate, 88E holds a 100% working interest in this acreage.


ERIK OPSTAD

In a state areawide lease sale in November 2018 Regenerate bid on an additional contiguous lease of about 1,920 acres, which brought its Yukon Gold position to approximately 16,114 acres.

Third block to west

In June 2018, 88E picked up a third acreage block, referred to internally as its Western Block, entering into an agreement with Great Bear Petroleum Ventures II LLC (now merged with newcomer Pantheon Resources Plc) to acquire the majority working interest in four state of Alaska leases — ADL 391718, 391719, 391720 and 391721.

Also subject to the agreement was a consortium involving Captivate, Otto Energy

continued on next page

88 ENERGY *continued from page 13*

Ltd. and Red Emperor Ltd.

The agreement included drilling the Winx 1 exploration well on a lease four miles to the east of, and adjacent to, the Horseshoe 1/1A well lease, a 2017 oil discovery by operator Armstrong Energy and partner Repsol.

Horseshoe extended the proven Nanushuk play fairway some 20 miles south of the Pikka unit where the initial discovery had been made.

The well targeted stacked Brookian and deeper objectives.

In payment the consortium had to provide a performance bond to the state of Alaska for $3 million; drill the exploration well by May 21, 2019; free-carry Great Bear for a 10% working interest for the initial test well; cover all associated costs such as permitting, an 11-mile ice road, an ice pad, and production testing; as well as pay Great Bear $1 million.

The consortium also gave Great Bear, now Pantheon, a back-in right to acquire an additional 10% working interest prior to the spud of the initial test well by paying the pro rata share of all costs of the initial test well, including all associated costs, or if exercised within six months of completing the initial test well by paying 200% of the pro rata share of all costs. (As of April 1, 2019, that had not happened.)

Otto said it was covering 25% of the well costs to earn a 22.5% working interest in the leases. 88E's Captivate had a 36% interest and Red Emperor 31.5%.

Winx 1 results disappointing

On March 13, 2019, 88E, Otto, Red Emperor and Pantheon said in individual releases that the Winx 1 exploration well will be plugged and abandoned.

88E's Alaska arm has three fully owned subsidiaries doing business in the northernmost state — Accumulate, Captivate and Regenerate.

The partners said the comprehensive wireline logging program was successfully completed, but provisional petrophysical analysis of the program indicated "low oil saturations in the primary Nanushuk topset objectives." Testing and fluid sampling indicated that "reservoir quality and fluid mobility at this location is insufficient to warrant production testing, despite encouragement from oil shows" and data acquired through logging while drilling.

There were also zones of interest in the Torok formation, and the partners said those objectives, identified on wireline logs, "similarly exhibited low oil saturations and did not flow hydrocarbons during the Modular Formation Dynamics Test … pressure testing and fluid sampling program."

Early indications from Winx 1 were encouraging enough that a comprehensive wireline program was undertaken, "designed to fully evaluate and quantify the reservoir potential and associated shows in the Nanushuk topsets."

Provisional results of the wireline program indicated "low oil saturations in the Nanushuk topsets not conducive to successfully flowing the formation," they said, a conclusion borne out by the Modular Formation Dynamics Test.

"Reservoir properties appear to be compromised by dispersed clay in the matrix at Winx-1," the partners said, noting that clay is often present in successful Nanushuk wells "but in discrete lamina-

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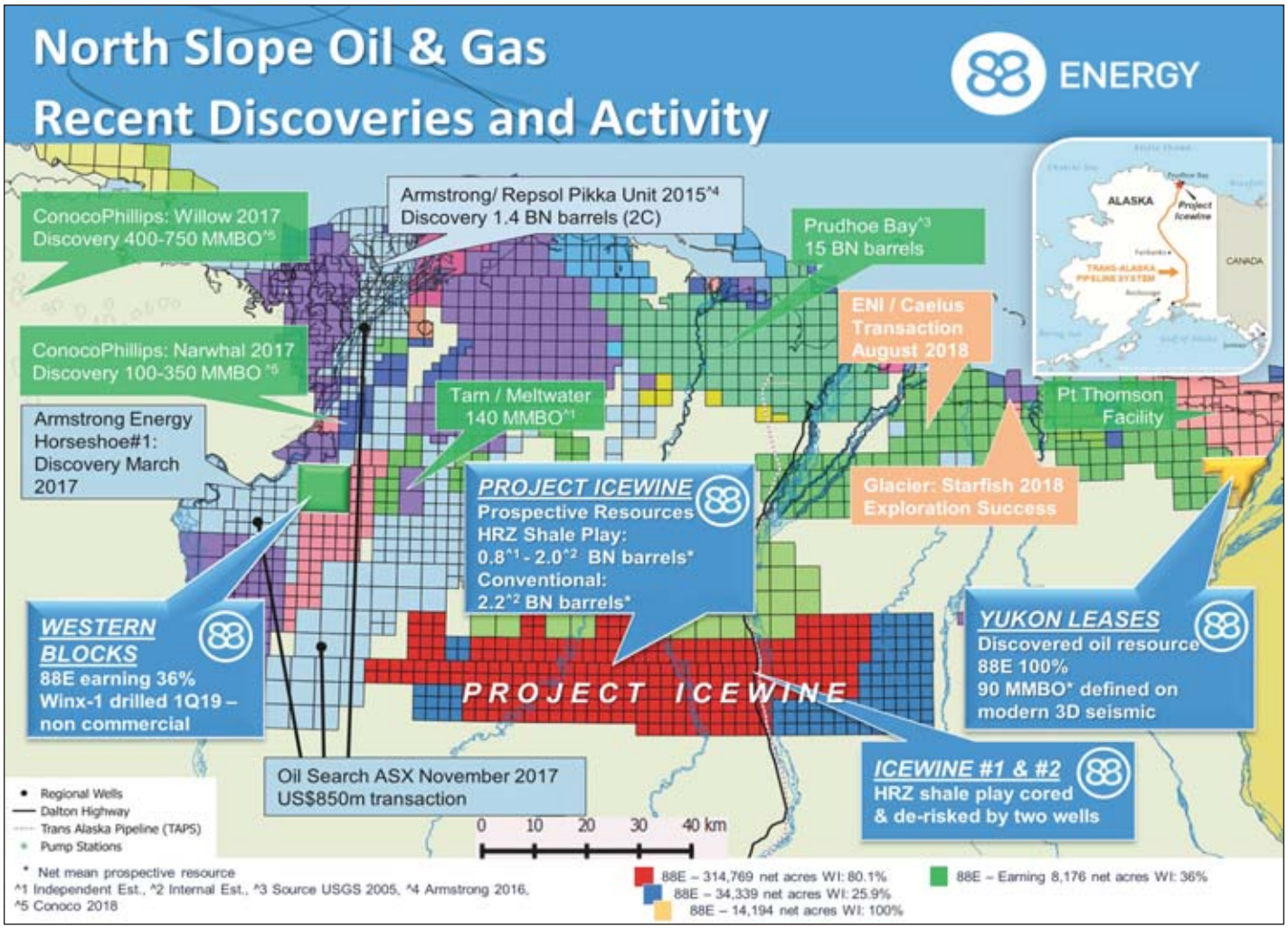
North Slope Oil & Gas
Recent Discoveries and Activity
ENERGY
ConocoPhillips: Willow 2017
Discovery 400-750 MMBO^5
Armstrong/ Repsol Pikka Unit 2015^4
Discovery 1.4 BN barrels (2C)
Prudhoe Bay^3
15 BN barrels
ENI / Caelus
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August 2018
ConocoPhillips: Narwhal 2017
Discovery 100-350 MMBO^5
Armstrong Energy
Horseshoe#1:
Discovery March
2017
Tarn / Meltwater
140 MMBO^1
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Facility
Glacier: Starfish 2018
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PROJECT ICEWINE
Prospective Resources
HRZ Shale Play:
0.8^1 - 2.0^2 BN barrels*
Conventional:
2.2^2 BN barrels*
WESTERN
BLOCKS
88E earning 36%
Winx-1 drilled 1Q19 –
non commercial
YUKON LEASES
Discovered oil resource
88E 100%
90 MMBO* defined on
modern 3D seismic
PROJECT ICEWINE
ICEWINE #1 & #2
HRZ shale play cored
& de-risked by two wells
Oil Search ASX November 2017
US$850m transaction
ALASKA
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Project Icewine
Regional Wells
Dalton Highway
Trans Alaska Pipeline (TAPS)
Pump Stations
0 10 20 30 40 km
* Net mean prospective resource
^1 Independent Est., ^2 Internal Est., ^3 Source USGS 2005, ^4 Armstrong 2016,
^5 Conoco 2018
88E – 314,769 net acres WI: 80.1%
88E – 34,339 net acres WI: 25.9%
88E – 14,194 net acres WI: 100%
88E – Earning 8,176 net acres WI: 36%

88 ENERGY *continued from page 14*

tions with decent quality, high resistivity, oil saturated sandstones in between."

The clay binds much of the fluid in place so it cannot flow, 88E said, and also occupies pore space within the formation. "This means that, whilst oil is present in the reservoir, there is less of it and it is not mobile."

The Torok Channel Sequence had better reservoir performance than the Nanushuk in the Winx 1, but wireline logging showed oil saturation in the Torok zone of interest was also low and not conducive to flow.

Data acquired in the Winx 1 will be further evaluated and integrated with the Nanuq 3-D seismic to evaluate remaining prospectivity on the Western Block leases, 88Energy said.

"There are several working theories that will be assessed over the coming months, including whether there is potential for better-developed sands updip and in closer proximity to the successful Horseshoe-1/1A and Stony Hill 1 wells," Red Emperor said in a later press release.

Activity at Icewine, conventional

Accumulate is pursuing both conventional and unconventional oil resources at Icewine. The Icewine 3-D seismic survey (approximately 185 square miles) targeting conventional resources was completed in March 2018 identifying several large prospects and leads previously identified on 2-D.

In August 2018, a revision of Icewine's conventional portfolio was announced "with multiple leads promoted to drillable prospects," 88E said, noting a gross mean prospective resource, unrisked, of 2 billion barrels across the Icewine acreage (1.5 billion barrels net); an increase of 50% from the previous estimate.

In its year-end 2018 report, 88E said Project Icewine 3-D "seismic inversion data was substantially complete at year end with discrete three-dimensional geobodies delineated in the Schrader topset play and the Torok slope and basin floor fan play. The 3-D seismic inversion calibrated by updated rock trending models highlighted better than anticipated reservoir potential within the Torok."

Permitting is in place to drill two exploration/appraisal wells in the winter drilling season of 2019-20.

The Project Icewine conventional portfolio farm out campaign started in mid-2018 with a data room opening. On March 20, 2019, 88E said it had selected a preferred bidder and negotiations with that company were underway, with the expectation of announcing a new partner by mid-2019.

"The progression of the farm-out process to the preferred bidder phase is encouraging but no deal is done until it is done," Wall said.

Activity at Icewine, unconventional

The Icewine 1 exploration well and the follow-up appraisal Icewine 2 well, both drilled from the Franklin Bluff gravel pad off the Dalton Highway, yielded positive results for unconventional oil and gas, 88E said.

Rock core from the Icewine 1 well demonstrated a "liquids rich resource play" in the HRZ, a prolific North Slope oil source rock.

88E said the partners believe Icewine 2 results supported potential economic viability of the HRZ source rock play "and are within the range of outcomes achieved at other early stage unconventional plays, despite not achieving a flow rate that is represen-

tative of the capability of the reservoir."

Work at Icewine 2 included acquisition of a more sophisticated logging suite to complement the core obtained from Icewine 1. Results from the well "provided the requisite data to confidently design a horizontal well with a multi-stage stimulation that can access the entire height of the formation," 88E said in July 2018.

Icewine 2 was suspended to allow future use of the wellbore, including a horizontal sidetrack with multi-stage stimulation.

Oil and gas service company Baker Hughes was then engaged, "bringing global experience from both longstanding and burgeoning unconventional plays to provide integrated geological, structural, petrophysical, and geomechanical interpretations for evaluation of the HRZ shale" source rock, 88E said.

Baker Hughes has recommended several new state-of-the-art lab tests to augment the current body of work.

88E informally launched a farm-out process in third quarter 2018 that was expected to yield announcement of a third partner to fund a work program for unconventional oil and gas.

In its March 20, 2019, update, 88E said Baker Hughes and the U.S. Geological Survey, or USGS, continue to apply advanced evaluation techniques to the HRZ shale play, including additional tests on both core and cuttings obtained from the drilling of the Icewine-1 and Icewine-2 wells.

"The company continues to receive third party interest in the HRZ shale project and anticipates being able to integrate the data from the current evaluation into a dataroom by mid-2019 in order to commence a formal farm-out process."

Activity at Yukon Gold

Yukon Gold, on state land adjacent the border of the ANWR 1002 area, includes an historic discovery well, the Yukon Gold 1 drilled by BP in 1993. Per the state of Alaska, recoverable reserves are 120 million barrels of oil. (In its 2018 annual report 88E said, "Provisional 3-D seismic mapping delineated 90 million barrels of oil of prospective oil resource to the company, net mean unrisked.")

In March 2018 Regenerate awarded a seismic contract to SAExploration to acquire 100km2 (roughly 39 square miles) of 3-D seismic, over the Yukon Gold leases. The fast-tracked seismic acquisition was completed April 1, 2018.

The data allowed an assessment of the volumetric potential of the untapped Yukon Gold oil discovery, as well as the broader lease position.

Processing and mapping were done to assess the resource associated with three sand bodies. The largest of these was the Cascade prospect, which 88E said contained approximately 92% of the "preliminary mapped resource" on the Yukon leases. The up-dip portion of the prospect was clearly identified as a channelized feature and is likely to contain thicker sands of higher quality, 88E said.

Cascade was "interpreted to have been intersected in a down-dip distal location by the vintage Yukon Gold 1 oil discovery well." That well also "discovered two oil saturated sands in the Canning formation with porosities exceeding 18%," 88E said, noting a Brookian turbidite fan play, with additional prospectivity mapped with 3-D seismic within the Staines tongue topset play.

Exciting news for Yukon Gold

"Up until the recent commissioning of infrastructure at the nearby Point Thomson gas/condensate/oil field in 2016 (operated by ExxonMobil), an accumulation of this size and location would have been considered stranded," 88E said of the Yukon Gold discovery. "Internal modelling suggests that break even development price is now less than $40 a barrel."

In-house evaluation of Yukon Gold leases continued through 2018.

On March 20, 2019, 88E said, "Final processing of the Yukon 3-D seismic is now complete, with interpretation and resource valuation currently underway on the inversion product."

Some of the most exciting news for Yukon Gold was Jade Energy's planned Sourdough field 2019-20 well under a farm-in agreement with Point Thomson operator ExxonMobil (see Jade story in this issue).

Sourdough is a 100-million-barrel discovery drilled by BP in 1997 before a pipeline system was in place to connect it to the 800-mile start of the trans-Alaska oil pipeline.

Less than 10 miles northeast of Yukon Gold, Sourdough will likely be developed and connected to the Point Thomson unit pipeline, bringing the eastern North Slope pipeline system to Yukon Gold's backyard. ●

Contact Kay Cashman
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Placer unit moves closer to development

AEX pursuing Kuparuk C and Nanushuk intervals at North Slope field: DNR Commissioner Feige intercedes in battle with state

By KAY CASHMAN
Petroleum News

ASRC Exploration completed its first operated exploration well in Alaska in early 2016, when it drilled the Placer No. 3 well. That same year AEX took over operatorship of the undeveloped Placer unit, which has two other wells drilled by former operator ConocoPhillips and is adjacent to the Kuparuk River unit on the east and borders the Pikka unit on the west.

AEX, which is a subsidiary of Arctic Slope Regional Corp., said it plans to produce from the prolific Kuparuk C sands at Placer and later potentially shallower intervals in the Brookian once the unit was online, sometime in 2019-20.

AEX told the Alaska Division of Oil and Gas June 11, 2018, that its proposed 2018-19 development plan included analysis of Brooks Range Petroleum Corp.'s proposed Southern Miluveach unit's early production facility to handle Placer's first production.


REX ROCK SR.

Placer and the Southern Miluveach's Mustang field are not adjacent but are close. The division had earlier approved a plan filed by operator BRPC to install a temporary production facility to allow some oil production to begin prior to permanent production facilities going into operation.

First oil from Mustang is anticipated on April 4, 2019, Bart Armfield, CEO of BRPC, told Petroleum News on Feb. 5, 2019.


THERESA IMM

New dataset, reservoir model

A Jan. 31, 2019, progress report to the division on AEX's current plan of development said AEX wanted to conduct an 18- to 20-day extended flow test of the Placer No. 3 well starting no later than March 24, in addition to the previous work commitment of testing bottom hole pressure response. (An early March approval from the division gave AEX the greenlight to do the extended flow test.)

The testing project involved building an ice road from an ice road constructed by Oil Search for one of its winter drilling projects, as well as an ice pad.

In preparation for the 2018-19 winter field work, AEX had conducted aerial reconnaissance and surveyed well locations in the late summer of 2018.

In its Jan. 31 report, AEX said it had created a new dataset for the Kuparuk C reservoir by merging data from three 3-D seismic surveys. The use of this data to construct a static model of the reservoir led to a dynamic reservoir simulation model for the entire Kuparuk C oil accumulation. This simulation model was assisting an investigation of development alternatives for the field, AEX told the division, including the optimization of well placement and the running of economic scenarios.

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AEX said it also planned to further investigate the potential use of hydraulic fracturing for accessing the reservoir.

Based on the dynamic modeling results, AEX conducted a study into the design of horizontal development wells planned for the unit. Results from the reservoir simulation point to a need for two horizontal production wells and two horizontal injectors for effectively developing the Kuparuk C oil pool. Three of these wells would be drilled from a pad at the Placer No. 1 well location, while a single injector would be drilled from Placer No. 3.

Nanushuk formation

The Jan. 31 report also said that the company was evaluating oil shows in the prolific Nanushuk sandstones in the Cretaceous Brookian encountered by the Placer No. 1 and No. 2 wells.

The Nanushuk formation hosts the oil reservoir sands for the huge Pikka development that Oil Search was conducting not far from the Placer unit.

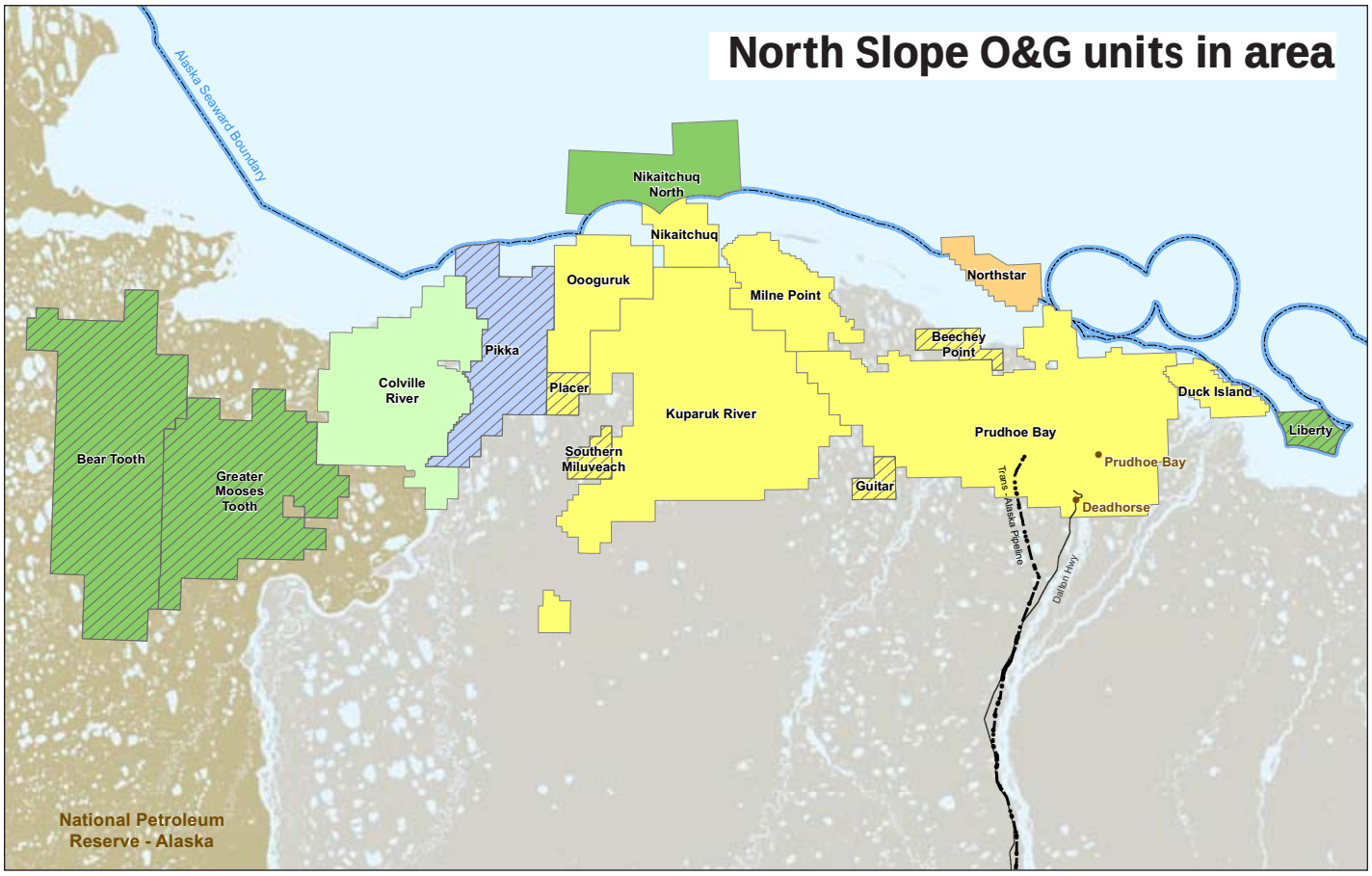
AEX said that its interpretation of the merged 3-D seismic data indicated that there was a major difference in the geologic settings in which the Nanushuk was formed, between the Pikka and Placer units. However, the company said there had been oil shows in the Nanushuk at Placer No. 1 and 2 wells and it was continuing its investigation and anticipated providing further details at a later date.

In state filings following completion of 2016 drilling for Placer No. 3, AEX had said that the nearly vertical 6,380-foot well had suggested there was potential for intervals in additional to the Kuparuk C sands, including the Cretaceous Brookian Moraine encountered in Placer No. 3.

History behind Placer

Eager to become an operator in its own backyard, AEX parent Arctic Slope Regional Corp., or ASRC, created a "mentoring" agreement for exploration with BP Exploration in the 1990s.

continued on page 20



STATE OF ALASKA

Yellow represents a state of Alaska unit; green a federal unit; orange a state/federal unit; pale green a state/federal/Native unit; blue-gray a state/Native unit.

AEX *continued from page 18*

Placer was the first project under the agreement. ConocoPhillips drilled the Placer No. 1 and Placer No. 2 exploration wells in early 2004. Through a farm-in agreement, ASRC acquired a 35.7% working interest in the Placer No. 1 well.

Despite promising results from the two-well program, ConocoPhillips and the other partners did not pursue development. But ASRC remained interested.

The regional Native corporation for northern Alaska acquired part of the Placer prospect in a March 2006 lease sale, the Placer No. 1 well in June 2010 and a license over an earlier seismic survey of the region by early 2011. It also created AEX, headed by Theresa Imm, to operate exploration and development work in the future.

In 2013, the Alaska Department of Natural Resources' Division of Oil and Gas and AEX disagreed about the size for the Placer unit. The company had wanted an 8,769-acre unit covering four leases. The state approved a 1,480-acre unit covering portions of four leases around Placer No. 1 in 2011.

AEX complained and after much debate, the state ultimately approved the larger unit boundaries in November 2014. The ruling required AEX to file a new plan of exploration by the end of the year, post a $2.5 million performance bond and meet a series of work commitments culminating in an exploration well by May 2016, all of which the company did.

The state certified the Placer No. 3 well as being capable of producing in paying quantities in December 2016. Well certification, often used to protect an individual lease from expiration, could also be used to protect an entire unit from expiration, so long as the state approved a plan of development with specific work commitments.

Extension requested

By the time AEX acquired the well and seismic information, its five-year leases were nearing expiration in September 2018. The company asked for a five-year extension, running through September 2021. Then DNR Commissioner Andrew T. Mack instead approved a two-year extension, saying it would balance the needs of the company with the needs of the state to promote competition.

In its request for the extension, AEX had proposed a two-year plan of development for the Placer unit. In the first year, the company would use data from all three Placer wells to determine the "extent, size and continuity of all producible reservoirs"; would initiate facility sharing agreements; would obtain data from the CGG Tabasco 3-D seismic survey and merge it into existing data; and would estimate infrastructure costs.

In the second year, the company would determine future well locations and infrastructure placement and would propose participating areas based on its ongoing reservoir studies.

Then division Director Chantal Walsh took issue with elements of the plan. Without a plan of development that included approved operations, she noted, a certified well could not be used to extend the term of a unit: "The fact that AEX has proposed no production or operations to extend the unit past September 7, 2018 makes unitized development highly unlikely," she said, referring indirectly to the ability to develop a lease without a unit.

The battle between the division and AEX continued. Walsh resigned from division for non-related personal reasons effective March 1, 2019.

Feige intercedes

The most recent state decision on the Placer unit came from DNR Commissioner Corri Feige on March 11, 2019, when she interceded in the battle between the division and AEX, writing to AEX that her office was currently adjudicating AEX's Sept. 28, 2018, appeal.

The term of the current Placer unit plan of development was one of two issues raised in AEX's appeal, currently set to expire in May 2019.

"I am aware of the deadlines this triggers for AEX (unit and lease expiration) and, accordingly, we are expediting our adjudication of the appeal," Feige wrote in a letter addressed to AEX President Theresa Imm.

Feige also said she was aware of the March 1, 2019, letter from Walsh providing AEX an extension until March 15, 2019 to submit its next, or fourth, plan of development.

"The March 15 extension deadline is hereby vacated. Future deadlines will be re-evaluated in the adjudication of your appeal," Feige wrote.

She thanked AEX for its patience as DNR works through its appeal, noting "We expect a decision soon." ●

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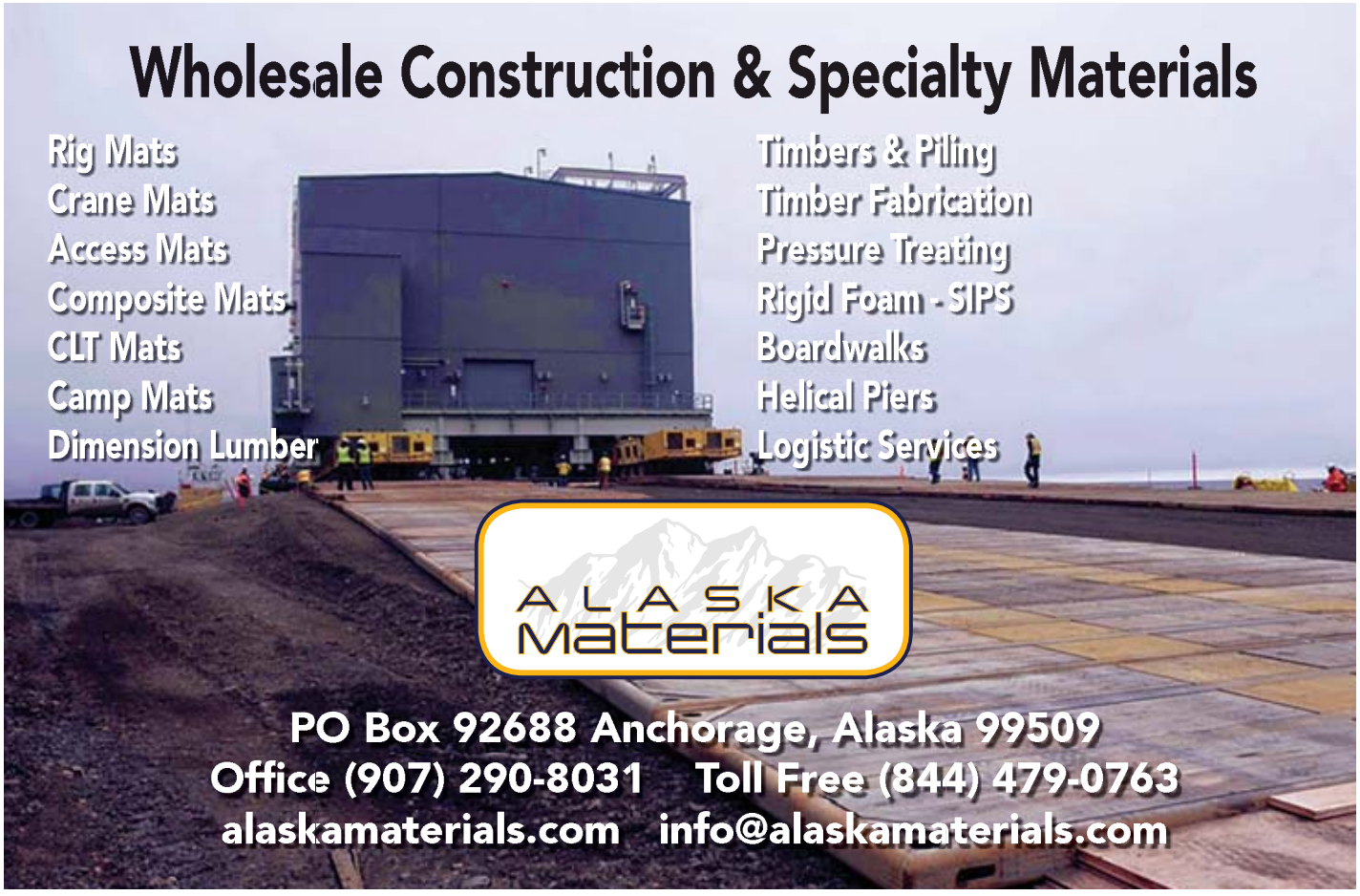

BlueCrest advances exploration, development of Cosmopolitan

Oil output continues to climb with successful application of new fishbone well design; gas campaign appears on hold

By KAY CASHMAN
Petroleum News


J. BENJAMIN JOHNSON

BlueCrest Alaska Operating LLC is methodically advancing both exploration and development at its four-lease Cosmopolitan offshore unit in Cook Inlet.

The local subsidiary of the Texas-based independent brought the offshore Cook Inlet unit into production in early 2016, after becoming operator in 2014 and after 49 years of failed attempts by previous operators.

But BlueCrest's development efforts hit technical snags, which it has since resolved with a custom-built drilling rig and an innovative new well design dubbed the fishbone.

A highly complex and compartmentalized reservoir, Cosmopolitan's Hansen field requires fracturing operations after drilling activities have been completed to open up impervious barriers in the reservoir rocks. The fractures are larger than previous Cook Inlet fracturing efforts and closer to developed areas than most Alaska operations.

Added to those complexities are operational challenges. Cos-

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mopolitan is an offshore reservoir being developed from onshore drilling facilities, requiring long directional wells. For example, its H-16 well was the longest extended reach well ever drilled in Cook Inlet — a 22,810-foot well that reached a vertical depth of just 7,089 feet.

JOHN MARTINECK

The unit's oil wells are being drilled approximately 3 miles out and 1.5 miles down to reach the edge of the reservoir. Then the wells traverse an additional 1.5 miles horizontally through the productive sands.

The powerful drilling rig, specially ordered and owned by BlueCrest, was built for this work.

BlueCrest Rig No. 1 began working in the unit in November 2016, allowing the company to tap offshore targets from an onshore drilling pad near the city of Anchor Point, and keeping its owners from having to build an offshore platform or contract a jack-up rig.

The rig has a 750-ton top drive and a 7,500-pounds-per-square-inch drilling mud system, making it capable of drilling 24,000-foot wells at a vertical depth of some 7,000 feet.

BLUECREST ENERGY

After several years as a partner at Cosmopolitan, and later as an operator in exploration and appraisal activities, BlueCrest brought the unit into production from an existing well in early 2016 and began development drilling with a custom rig in November 2016.

BlueCrest has Cosmopolitan oil production up from 275 barrels of oil per day in July 2017, to 801 bpd in June 2018, and to 1,425 bpd in January 2019.

The Cosmopolitan story

In September 2016, BlueCrest Director J. Benjamin Johnson gave a presentation in which he talked about Cosmopolitan's history.

When Pennzoil drilled the field discovery well in 1967, the well just clipped some oil at the side of the field. And the company, not having good well logs, abandoned the prospect, having concluded that the oil column was very thin, Johnson said. Then 25 years later ARCO, thinking that Pennzoil may have missed a large discovery, shot some seismic over the prospect. The seismic revealed a large 15,000-acre dome-shaped structure in the subsurface. But, with no equipment available for offshore drilling, the company was faced with the need to drill a fairly risky directional well from onshore.

continued on next page

A highly complex and compartmentalized reservoir, Cosmopolitan's Hansen field requires fracturing operations after drilling activities have been completed to open up impervious barriers in the reservoir rocks.

BLUECREST *continued from page 23*

In 2001, ARCO successor ConocoPhillips did drill a well from onshore, confirming the presence of oil in the prospect and showing the potential for more oil than previously thought. A further well drilled in 2003 included a somewhat horizontal section through the Hemlock formation — a relatively short horizontal section of the well produced 1,000 barrels per day of oil, Johnson said.

Pioneer Natural Resources then acquired the prospect, shooting a 3-D seismic survey to better define the Cosmopolitan structure. Although this survey provided a clear delineation of the scale of the structure, gas at the top of the structure disrupted the seismic signals, thus blotting out any image of the structure inside the dome. In fact, the seismic image suggested that the dome had caved in at the top.

Pioneer drilled a well into the structure in 2007 but this long, undulating horizontal well missed many of the reservoir sands, Johnson said.

BlueCrest's geophysicists had attributed the collapsed appearance of the structure to the distortions to the seismic imaging caused by a gas cloud in the subsurface, he said. A recalculation of the seismic results on the assumption of the presence of a gas cloud indicated the existence of a large geologic dome. The drilling of a well in 2013 from an offshore rig after BlueCrest had acquired 75% ownership of the Cosmopolitan prospect (Buccaneer was the operator) not only confirmed that this dome structure was present but also found a 5,000-foot thickness of gas-bearing sands.

Apart from a couple of water sands, everything else was filled with gas. Below the gas lay about 1,200 feet of oil sands, separated by some shales, Johnson said.

Johnson showed cross sections of the subsurface geology and the various well trajectories, showing that the earlier wells had hit the edges of the hydrocarbon pools, thus failing to reveal the full extent of the subsurface hydrocarbon resources. However, the well that Pioneer drilled in 2007 has turned out to have continuing value: BlueCrest converted this well into an oil production well, enabling the Cosmopolitan field to come online before the main development drilling program got underway.

BlueCrest bought out Buccaneer and today owns 100% of the unit.

Natural gas exploration?

Although Cosmopolitan has primarily been developed as an oil field and its exploration targets have been oil formations north and south of the primary producing wells in the center, it also has a substantial natural gas deposit overlying the oil reservoirs.

But exploration for gas would require a jack-up rig because the gas is too shallow to be accessed from onshore drilling and gas production would involve offshore production platforms.

BlueCrest has said nothing since 2016 about the possibility of

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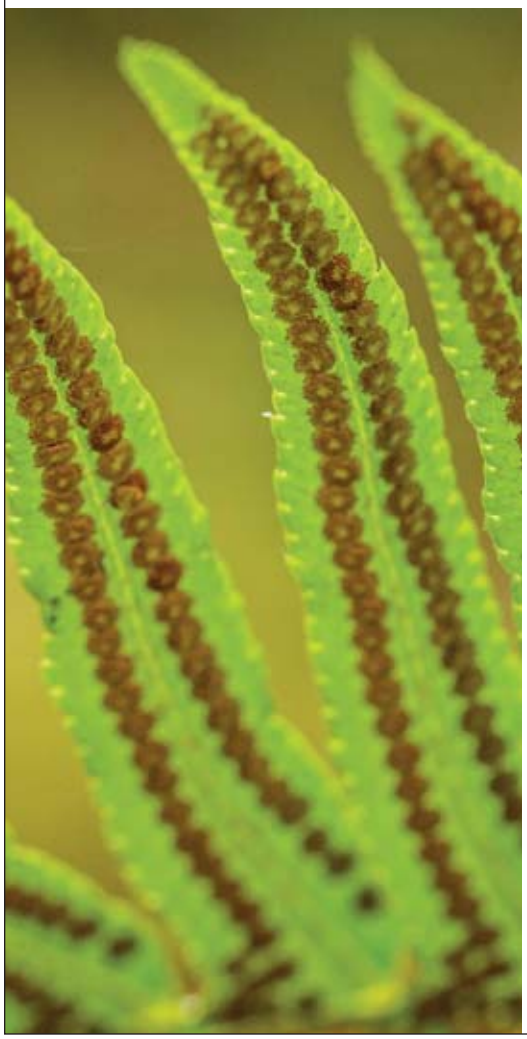
HEALTHY ENVIRONMENT. HEALTHY ECONOMY.



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BLUECREST *continued from page 24*

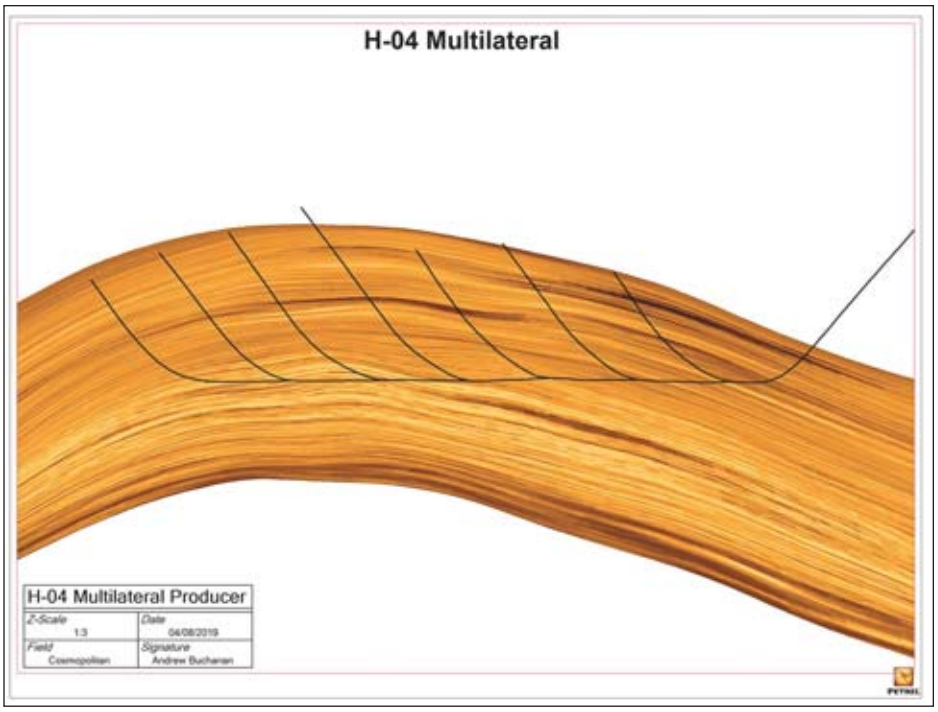
going after the natural gas in the Cosmopolitan unit.

Fishbone pattern

An examination of Alaska Oil and Gas Conservation Commission drilling data for Cook Inlet in recent years shows some interesting patterns, Petroleum News reported in its March 24, 2019, issue. The drilling of oil wells, in particular, has seen a steady climb since dropping to just one well in 2015, presumably partly in response to the low oil price at the time. Four development wells were drilled in 2016, 11 in 2017 and 17 in 2018.

BlueCrest's drilling of new development wells in its Cosmopolitan unit offshore the southern Kenai Peninsula represented a major component of the drilling increase. The company completed two wells in the unit in 2017 and 15 in 2018. Most of those 2018 wells were sidetracks, part of BlueCrest's development strategy of drilling a "fishbone" well pattern, with a single "spine" well running from the surface. That spine well is deviated to run through the lower part of the oil reservoir, with sidetrack "rib" wells drilled upwards every 800 feet into reservoir rock above the spine.

Seven years of oil drilling targets



BLUECREST ENERGY

BlueCrest said it has identified enough potential targets to justify seven years of expansion drilling at Cosmopolitan.

Its original development plan involved drilling five wells starting in early 2017: the H-16 well, the H-14 well and H-14L lateral, and the H-12 well and H-12L lateral. The company intended the five-well program to be the first stage in a full development program that would potentially require 20 wells over a seven-year timeline.

The facilities at the Cosmopolitan unit are capable of handling as much as 10,000 barrels per day.

The 38-acre onshore parcel for the Cosmopolitan development project is much larger than the existing pad and facility require and could easily accommodate expansion.

Drilling briefly suspended

BlueCrest briefly suspended drilling operations in early 2017, after the state of Alaska withheld between $75 million and $100 million in tax credits owed for previous work. The state policy decision under former Gov. Bill Walker's administration forced the privately owned company to raise significant additional funds.

The company drilled the first fishbone, the H-12 well, in 2018, under its fourth plan of development covering the 2018 calendar year. The H-12 consists of a wellbore with a long horizontal tail with seven vertical laterals rising up into the producing formation.

The H-12 fishbone well was put into production. Based on evaluation of that well, BlueCrest decided to re-drill the H-16 well in a similar fashion, with eight laterals.

Fifth plan of development

The fifth plan of development, or POD, covers the 2019 calendar year.

Another fishbone well was drilled, the H-4, some 3,200 feet south of existing Cosmopolitan wells and tested the southern extent of the reservoir BlueCrest told the state. It has eight laterals.

After evaluating results of the H-16a (the re-drill) and H-4 fishbone wells BlueCrest said in the POD it "will decide the best possible location for a possible second well in the 2019 drilling program."

Expected to be the H-11 Fishbone well that would step out to the north to evaluate the northern portion of the reservoir, the company instead filed permits for and got spacing exceptions for the H-13 (eight laterals) on Feb. 22, 2019, stepping out to the northwest.

Based on its success to date, it can be assumed BlueCrest will continue moving forward to make full use of its 10,000-barrel-a-day facility.

Fort Worth, Texas-based BlueCrest Energy Inc. is a privately held exploration and production company founded in 2011 and focused on the development of oil and gas resources in Alaska. ●

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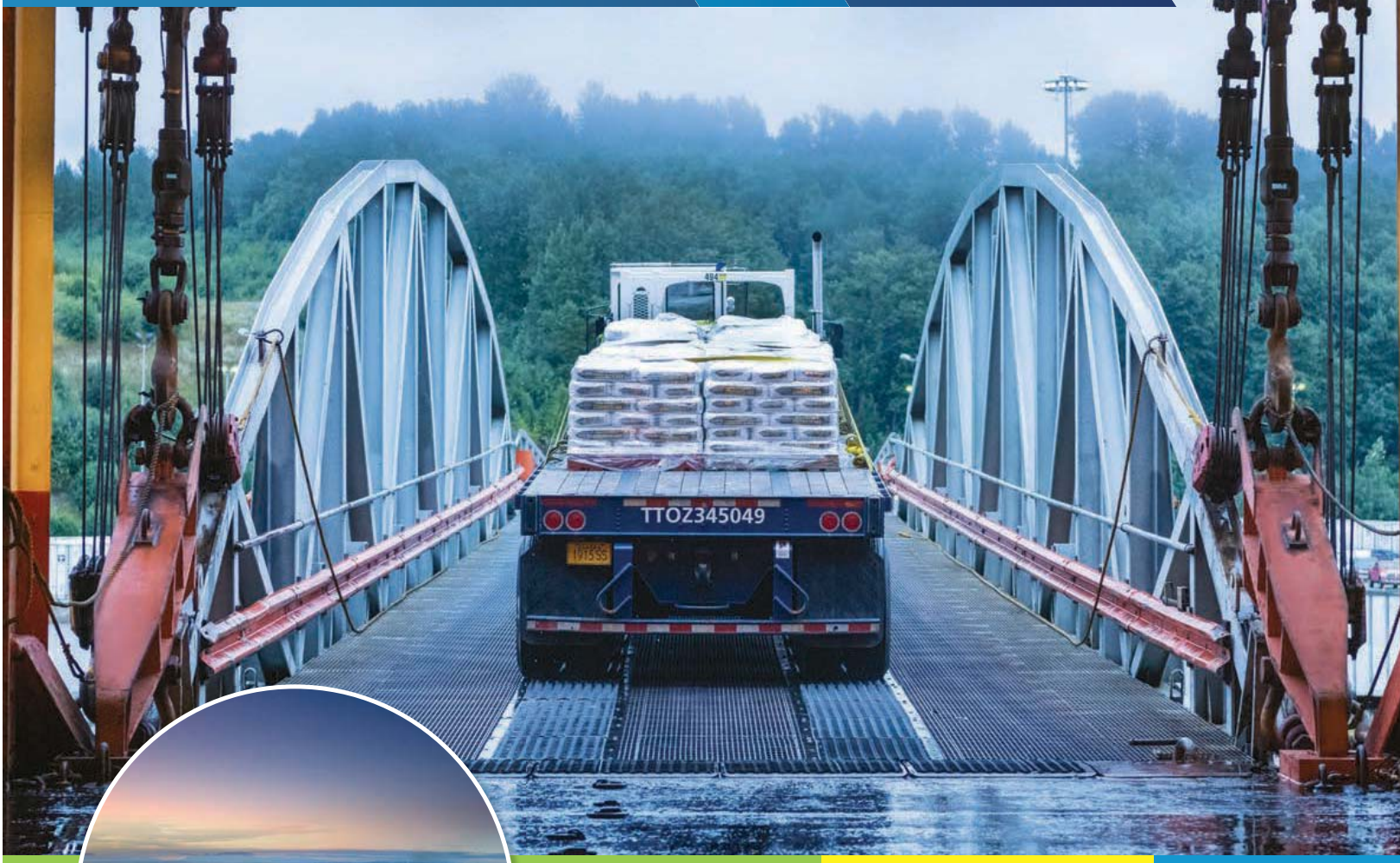

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BP re-exploring Prudhoe Bay

New high density broadband seismic data acquisition and analysis to locate, exploit remaining oil pockets

By STEVE SUTHERLIN
For Petroleum News


JANET WEISS

BP Exploration Alaska is setting the stage to comb the Greater Prudhoe Bay area for smaller oil pools it can target with advanced drilling techniques over the next decade or so, with an eye on adding new production in the 42-year-old field.

The key to the effort is a massive 3-D seismic survey Prudhoe operator BP describes as "high density broadband seismic," which will be acquired in the first half of 2019. The 455-square-mile seismic shoot will cover the majority of the Greater Prudhoe Bay area.

"That's the largest that we've ever done at Prudhoe Bay and we're using state-of-the-art technology, so we'll have the best image that we've ever had," Janet Weiss, president of BP Exploration Alaska said on Jan. 18, 2019.

The company has two drilling rigs active at Prudhoe Bay.

"We've restarted those rigs, getting our well locations identified, so that we have many, many more years of drilling in Prudhoe," Weiss said.

The new data — when combined with North Prudhoe seismic BP acquired in 2015 — will "provide a single continuous seismic image" across the unit, allowing for more efficient drilling. The company said this technology "enables denser and larger datasets to be acquired when compared to legacy methods."

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Technology key

As the Prudhoe Bay field matures, the use of modern technology has become critical to extending field life and to maintaining the field's economic viability, Fabian Wirnkar, BP vice president for reservoir development, said Oct. 5, 2018.

Locating and exploiting the remaining small pockets of oil in

continued on page 30

90,000 pound vibe truck sends surface generated vibrations thousands of feet below the surface. The vibration waves reflect back to the surface where they are measured by geophones

BP EXPLORATION (ALASKA)

BP EXPLORATION (ALASKA)

Rubber-tracked Tucker tundra vehicle can pull a ground penetrating radar unit to measure ice thickness and locate buried hazards, in addition to moving people and freight.

BLUECREST *continued from page 28*

the field requires state-of-the-art technology in the form of data acquisition, storage and analysis, and in the form of sophisticated drilling techniques.

Modern seismic surveying, produces crisp images of faults and other subsurface features, enabling the location of features where additional oil may be found. Multilateral wells, drilled out from single wells connecting to the surface, can thread though those remaining pockets of oil. At the same time, the seismic imaging can enable, for example, the precise injection of water into areas where it can be most effectively used.

2019 development drilling

The new upgraded seismic information will guide BP to more efficient development drilling in 2019 at Prudhoe Bay, the company said in its annual progress report for the initial participating area, or IPA, of the field covering the 2018 calendar year, and its plan of development for work from July 1, 2019, through June 30, 2020.

The new data will "underpin the reservoir management and development programs," BP said.

There remains an important role for development drilling among more than 1,400 existing wells at the field, BP said, adding that drilling "will continue at a pace consistent with the business environment and the ability to identify viable targets informed by ongoing surveillance, supplemented by new seismic data being acquired in the first half of 2019."

Production in 2019 "will largely be driven through continuing improvements in operating efficiency, optimizing base production and wellwork," the company said. Some 400 rate adding jobs and some 550 non-rate adding jobs are planned.

When Prudhoe Bay went into production in 1977, the initial estimated ultimate recovery was 9.6 billion barrels of oil. To date, however, the field has generated more than 13 billion barrels of oil, making it the most productive field in U.S. history.

IPA rotary penetrations are expected to be about the same as in 2018, between five and seven. Coil penetrations, however, will be increased from 10 in 2018 to 15-23 in 2019, with rig workovers expected to increase from two in 2018 to from two to eight in 2019.

BP said wellwork activity "remained at a high level in 2018 with 360 rate adding jobs done and about 900 total jobs performed."

In 2018 a coil rig and a rotary rig drilled 15 wells. There was a pause in drilling mid-year allowing BP to pursue cost and efficiency gains and evaluate future targets for drilling. "The coil and rotary rigs were brought back in service in December," BP said, with future drilling opportunities to "be identified by ongoing surveillance and utilizing the new seismic being acquired and processed in 2019-2020."

"As the IPA enters its 42nd year online, 31 years beyond the end of the field's production plateau, the PBU owners' key priority is efficient production of the existing wells and facilities," the company said. "Minimizing natural decline is the constant goal."

BP is transitioning to the use of what is termed "predictive maintenance analytics," a data intensive technology that enables the prediction of equipment failures before failures happen. This

approach improves efficiency by increasing equipment up time, Wirnkar said.

Exceeded expectations

When Prudhoe Bay went into production in 1977, the initial estimated ultimate recovery was 9.6 billion barrels of oil. To date, however, the field has generated more than 13 billion barrels of oil, making it the most productive field in U.S. history. According to BP, a bit more than 1 billion barrels of producible oil remain in the field.

At first, the field reservoir pressure was high and there was a 600-foot oil column; production over the years has lowered the pressure, while the remaining oil in place has fragmented into a series of relatively small pockets, Wirnkar said. Waterflood and gas injection have been used to sustain the reservoir pressure to levels where oil production can continue.

Currently BP recycles about 8 billion cubic feet of gas per day through the field reservoir — without that gas recycling and injection, the field would no longer produce any oil, Wirnkar said.

Continued operation depends on efficiently, economically and safely developing the resources that are known to exist, while also seeking new opportunities for growth, he said.

"There is still a lot that we can do here," Wirnkar said.

Recovery discovery

In addition to infield exploration, BP is seeking to capitalize on known but difficult to produce reserves in the IPA by developing creative production techniques based on data analysis and advanced production technology.

The company obtained Alaska Oil and Gas Conservation Commission approval in late 2018 to allow for commingled downhole production for wells completed in both the Prudhoe oil pool and the Put River oil pool which overlies the Prudhoe oil pool. The ruling allows production of some 6.9 million barrels of oil in place in Put River, which would otherwise be stranded.

Put River consists of three lobes — Central, Southern and Western — of the Put River sandstone, with a fourth lobe, the Northern, in hydraulic communication with the Prudhoe oil pool and included as part of the Prudhoe pool. The Southern lobe of Put River has had production since 1999 with an active waterflood.

Oil and gas condensate was identified through 2005 appraisal activities in the Western and Central lobes respectively, the commission said, "but further development was not pursued at that time in part due to low flowrates that resulted in operational challenges associated with hydrate deposition."

The Central lobe contains an estimated 1.1 million to 2.7 million barrels of oil in place and the Western lobe contains an estimated 69.6 billion to 104.4 billion cubic feet in place with a condensate yield of approximately 40 barrels per million cubic feet, with a condensate in place value of between 2.8 million and 4.2 million barrels of oil.

The commission said several wells penetrating the Prudhoe and Put River oil pools would be candidates for downhole commingling, which "should allow for increased flowrates and flow velocity in the tubing and reduce the potential for the hydrate deposition that is problematic in production from wells completed solely in the (Put River oil pool). Since standalone production of the Central and Western Lobes is not viable due to hydrate deposition those reserves are essentially trapped. Commingling of production with the (Prudhoe oil pool) will allow these resources to be recovered." ●

Contact Steve Sutherlin at stevepna@hotmail.com

ConocoPhillips boosts Alaska capex

Drills seven exploration wells in 2018-19, two from year-round pads, five from ice pads; company upbeat about 2020 and beyond

By KAY CASHMAN
Petroleum News


RYAN LANCE


SCOTT JEPSEN

ConocoPhillips said it planned to drill six to eight exploration and appraisal wells on Alaska's North Slope toward the end of 2018 and in the first few months of 2019. Having recently discovered approximately 1 billion barrels of light, sweet oil west of the central Slope and into the National Petroleum Reserve-Alaska, the company said 75% of its prospective exploration acreage had yet to be drilled. Plans were to drill it in 2018-19 and from 2020 onward, along with the development of several discoveries.

A new ultra-extended reach drilling rig, built by Doyon Drilling for ConocoPhillips, will be delivered in 2020, initially to assist with development of the Colville River unit's Fiord West prospect on the environmentally sensitive Beaufort Sea coast, the oil major said in September 2018. The high-tech rig will allow access to 154 square miles of subsurface from a 14-acre drilling pad.

"In 2020 we're bringing in the largest mobile extended reach drilling rig in North America and maybe the biggest in the world," ConocoPhillips COO Matt Fox said in a mid-March 2019 interview with Bloomberg anchor Alix Steel on Commodity in Chief, a program dedicated to the biggest names and news in the commodity world.

With its new drill rig ConocoPhillips will be able to "drill wells six to eight miles away from pads, minimizing the environmental imprint," Fox said.

At Willow, the largest new discovery to the west, ConocoPhillips hopes to build a new standalone production facility

NAME OF COMPANY: ConocoPhillips Co.
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which will be able to handle as much as 100,000 barrels of oil per day, the company has said, but Fox said they are "unsure," and still trying to determine just how much oil can be produced from the area, mentioning volumes of 100,000 and 140,000 bpd during the interview.

Fox was quick to point out that the 1 billion barrels of newly discovered "light, sweet" crude was "100% oil" and not oil equivalent, noting the wells all had a "high oily content," and contained very little natural gas. The gas that was found in the wells, he said, was reinjected. (In 2018 ConocoPhillips said crude oil from Willow area wells had an API viscosity in the range of 41-44 degrees.)

When asked whether ConocoPhillips was bringing the hydraulic fracturing and well technology it employed in tight oil plays in the Permian basin, Eagle Ford and Bakken to Alaska, Fox said not really, pointing out they were dealing with "conventional reservoirs" on the North Slope that did not require the "massive hydraulic fracturing we use in the Lower 48."

The North Slope wells were horizontals, he said, but their "native permeability" was high enough to flow without "massive stimulation." The wells, he noted, would be fracked, but not to the extent of horizontals in unconventional reservoirs in the Lower 48.

COURTESY OF CONOCOPHILLIPS CO. © JUDY PATRICK PHOTOGRAPHY

Located about three miles east-northeast from Nuiqsut, Kuukpik 5 rig at Putu during sunset.

In Steel's introduction of Fox, she said the new developments ConocoPhillips was pursuing on the North Slope had a return rate of 20% at a cost that ranged from the high $30s-to-low-$40s per barrel.

Alaska gets larger cut of capex

Near the end of 2018, ConocoPhillips said it would increase its capital expenditure in Alaska to around $1.2 billion for 2019. This figure, amounting to about 20%

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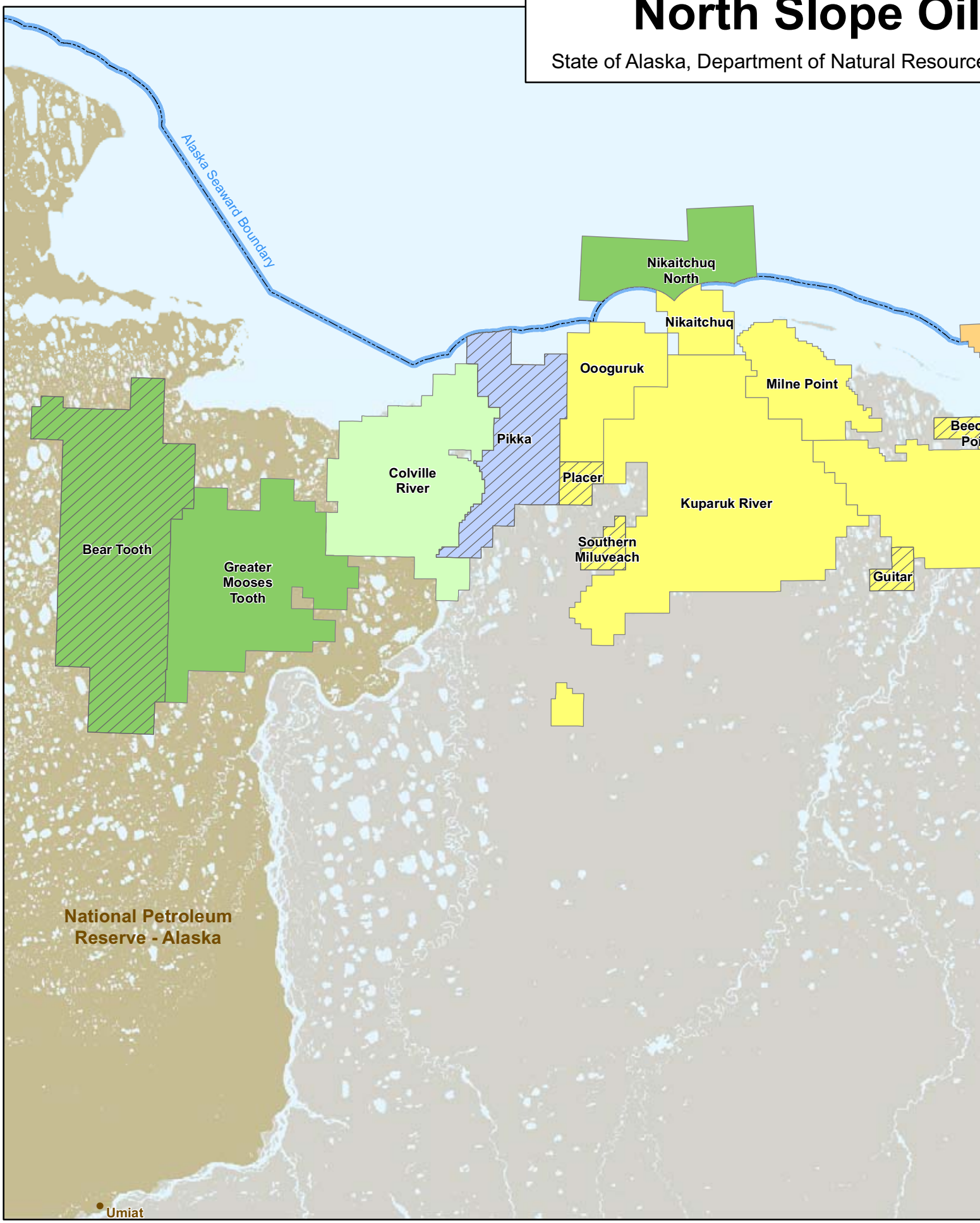
North Slope Oil
State of Alaska, Department of Natural Resource
Alaska Seaward Boundary
Nikaitchuq North
Nikaitchuq
Oooguruk
Milne Point
Pikka
Colville River
Placer
Kuparuk River
Southern Miluveach
Guitar
Bear Tooth
Greater Mooses Tooth
National Petroleum Reserve - Alaska
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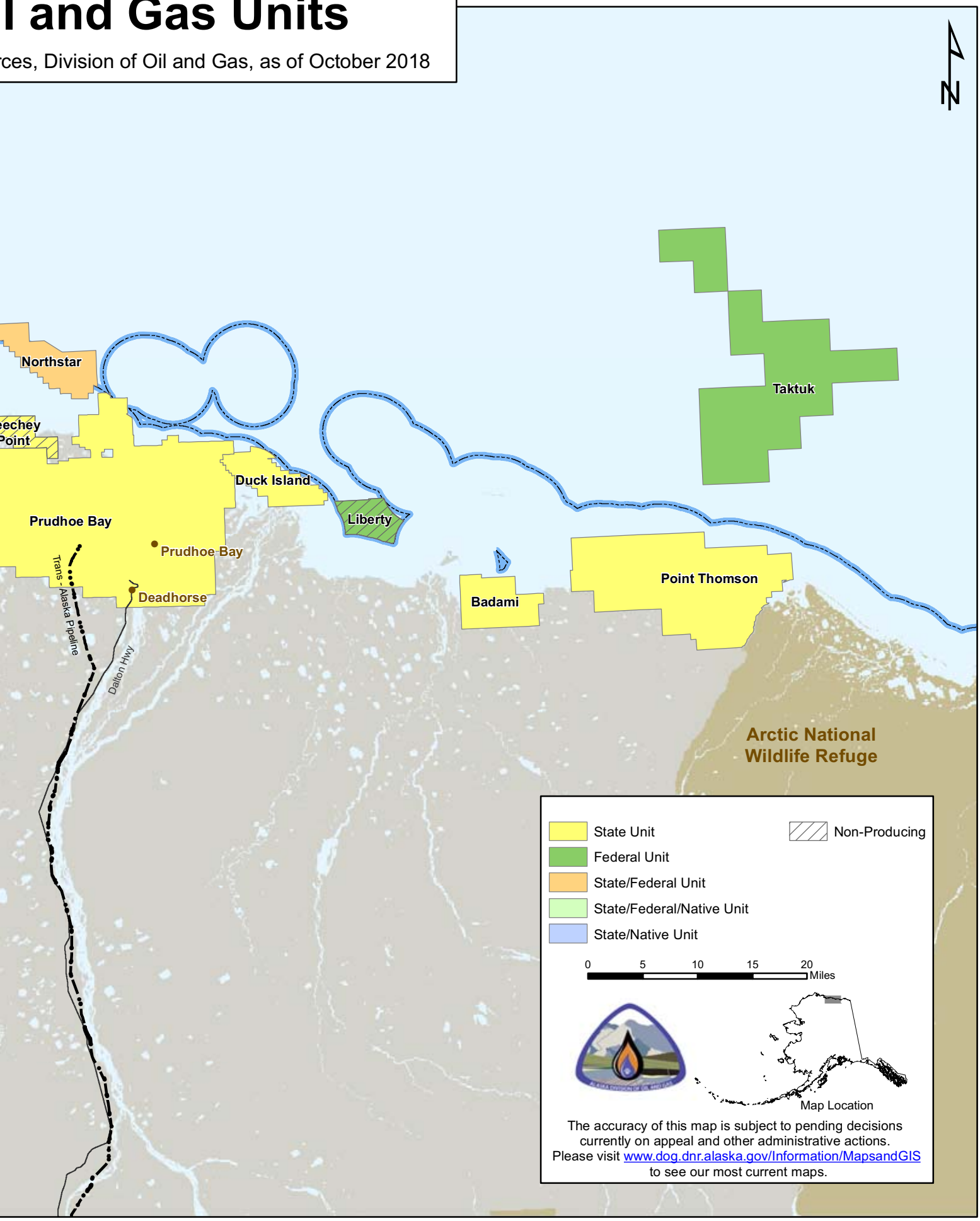
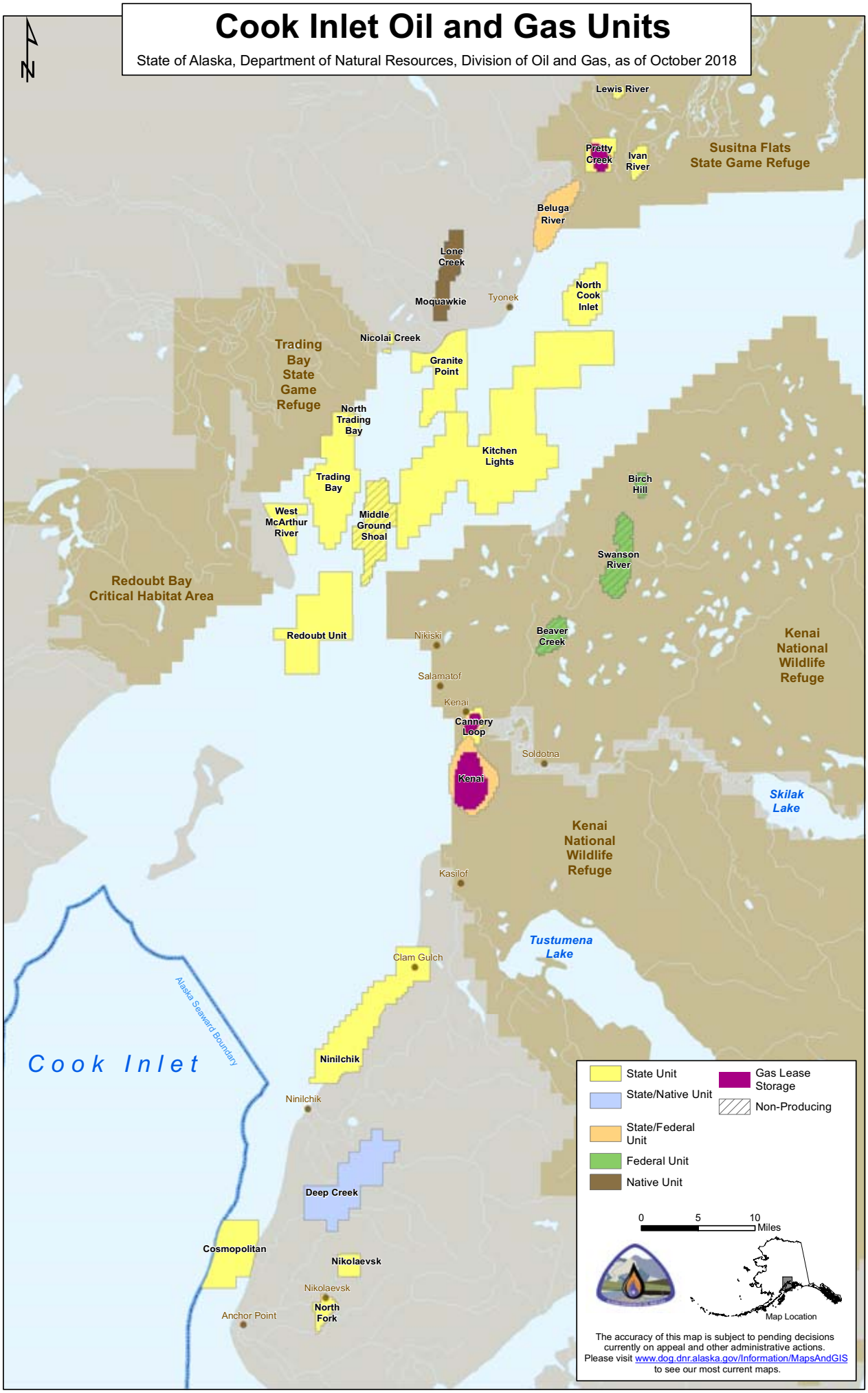


The accuracy of this map is subject to pending decisions currently on appeal and other administrative actions. Please visit www.dog.dnr.alaska.gov/Information/MapsandGIS to see our most current maps.

Cook Inlet Oil and Gas Units

State of Alaska, Department of Natural Resources, Division of Oil and Gas, as of October 2018



The accuracy of this map is subject to pending decisions currently on appeal and other administrative actions. Please visit www.dog.dnr.alaska.gov/Information/MapsAndGIS to see our most current maps.

CONOCOPHILLIPS *continued from page 33*

of the company's planned worldwide expenditure, compared with a capex level of approximately $900 million in 2018 in Alaska, excluding acquisition costs.

ConocoPhillips expected its 2019 worldwide capex to be about $6.1 billion, close to the same level as in 2018. So, the announced boost to Alaska investment represented an increased share of the company's global expenditure, a factor that company officials have said reflected ConocoPhillips' confidence in its Alaska ventures.

The increase in expenditure came from costs related to the advancement of Greater Mooses Tooth 2, or GMT-2; higher activity levels and higher working interests in existing fields; and further exploration activity on the North Slope, the company said.

The reference to higher working interests in Alaska referred to the acquisition of Anadarko Petroleum's interests in lease holdings, mainly west of the central North Slope into NPR-A, and the acquisition of BP's interests in the Kuparuk River field and Kuparuk pipeline system.

ConocoPhillips' enlarged working interests in these assets will increase the company's share of capital expenditure.

Big spend for Willow

Company officials have indicated initial development of Willow would likely cost $2 billion to $3 billion, with an additional $2 billion to $3 billion required for full field development, which will include not only the processing facility but gravel roads, pipelines, up to five drill pads and associated infrastructure.

The behemoth at the western end of the current chain of ConocoPhillips' NPR-A developments, Willow is in the Bear Tooth unit and alone expected to peak at a rate of 100,000 bpd, with first production anticipated around 2024-25, if the project goes ahead as anticipated.

Initially, the company was looking to send Willow oil to be processed at its Alpine facilities in the Colville River unit to the east, then through the Kuparuk pipeline system and on to the trans-Alaska oil pipeline for the 800-mile journey south to its terminus in the Port of Valdez. But after reassessment of seismic and drilling results, in mid-2018 ConocoPhillips increased the prospect's resource estimate from 300 million barrels of recoverable oil to between 400 million and 750 million barrels.

Multiple wells

The drilling results incorporated into the company's plans for Willow's development and standalone processing facility in 2018 were partly based the three-rig exploration and appraisal drilling

A new ultra-extended reach drilling rig, built by Doyon Drilling for ConocoPhillips, will be delivered in 2020, initially to assist with development of the Colville River unit's Fiord West prospect on the environmentally sensitive Beaufort Sea coast, the oil major said in September 2018.

in the winter season of 2017-18, the largest program conducted by ConocoPhillips on the North Slope since 2002.

Using the Doyon 141 rig, the company said four "exploration and appraisal" wells were drilled in and near Willow: Tinmiaq 7 (T7), T8, T9 and West Willow 1 (WW1), involving more than 37 miles of ice road and five ice pads.

Using the Kuukpik 5 rig, one slant and vertical well was drilled and tested at the Putu prospect, Putu 2 (PT2) and P2A, directly south of the Colville River unit. The program, on ASRC and state subsurface and Kuukpik surface acreage, involved one mile of ice road and an ice pad.

At the Stony Hill prospect, directly south of P2, Stony Hill 1 (SH1), a vertical exploration well was drilled with the Arctic Fox rig. Seventeen miles of ice road and one ice pad were laid. The well was tested.

Also, that season a 250 square mile 3-D seismic program was conducted, using a revolutionary new technology, ConocoPhillips' compressed seismic imaging, which enabled seismic data to be gathered four times faster than previously possible and produced better seismic images, Scott Jepsen, ConocoPhillips Alaska vice president of external affairs and trans-

continued on next page

Three key factors


JOE MARUSHACK

A competitive oil tax system, new technologies and management of production costs were all helping fuel a resurgence in oil exploration, development and production in Alaska, Joe Marushack, president of ConocoPhillips Alaska, said in an October 2018 presentation.

Recent years had seen an upsurge in new oil discoveries, new developments moving forward, and efforts to slow production declines from the legacy oil fields of Alpine, Kuparuk and Prudhoe Bay, he said.

Greater Mooses Tooth 1, ConocoPhillips' new drill site in the northeastern National Petroleum Reserve-Alaska, was about to go into operation and development plans for another drill site, GMT 2, were underway; and the company was planning the development of Willow, a major new NPR-A oil field that it anticipated bringing online in 2024-25.

Elsewhere on the North Slope, Oil Search was planning the Pikka development to go online in 2023; Brooks Range Petroleum was moving ahead with the development of the Mustang field; and Hilcorp Alaska was progressing plans to develop the Liberty field in the Beaufort Sea — to name a few.

Impact of SB 21

Marushack particularly cited changes to the 2013 Alaska oil production tax system under Senate Bill 21 as the prime factor behind the renaissance in Alaska's oil industry. Prior to the passage of SB 21, ConocoPhillips' long-range forecast for its North Slope oil production looked dire. The company was in maintenance mode, taking care of existing facilities and riding out the field decline curve, with little exploration or development, Marushack said.

"We had an uncompetitive tax structure. We had very, very high costs. We had very limited investment goals versus what we saw in the Lower 48, where the opportunities were much more robust," he said.

But SB 21 changed that, he said. And with the company having cut its costs to supply oil from its Alaska fields, ConocoPhillips now thought its Alaska operations could be

continued on next page

CONOCOPHILLIPS *continued from page 37*

portation, said in September 2018.

Putu, Cairn prospects

The Putu 2 and 2A wells successfully targeted two distinctive seismic amplitude anomalies, Jepsen said.

There was a third anomaly in the Putu prospect, he said, immediately west of the two tested anomalies — the company planned to drill into this third anomaly from the existing CD-4 pad in the Colville River unit before its 2018-19 ice road campaign began.

In a presentation about the company's 2018 earnings strategy in early 2019, Ryan Lance, chairman and CEO, said ConocoPhillips was advancing construction in the GMT-2 project in NPR-A and conducting another season of "exploration and appraisal" drilling on the North Slope.

He said the company had already drilled two wells in December 2018 from existing gravel pads, testing the Cairn prospect from Drill site 2S, or DS-2S, in the southwest corner of the Kuparuk River unit, and testing the seismic anomaly in the Putu prospect in a well drilled from CD-4.

The Putu prospect was in what ConocoPhillips dubbed the Narwhal trend (informal, not geologic term), the same trend as the Pikka Horseshoe discoveries, in which Oil Search and its partners Repsol and Armstrong Energy are exploring and developing in the prolific Nanushuk formation.

Mysterious Cairn

ConocoPhillips has said very little over the years about the Cairn prospect. In the southwestern corner of the Kuparuk River unit, Cairn was part of the Tarn oil pool, which predecessor ARCO discovered with the Bermuda No. 1 well in 1991. That well had five intervals of late Cretaceous-aged marine sandstone in the Seabee formation — from deepest to shallowest, the intervals were Iceberg, Arete, Cairn, Bermuda and C30.

Perforated in the Bermuda, the discovery well flowed at 1,900 barrels of oil equivalent per day after fracturing and produced 37-degree API gravity oil.

The Cairn interval was also present in the nearby Meltwater oil pool, which ARCO discovered in 2000 with the Meltwater North No. 1 exploration well drilled into the middle Cretaceous Seabee formation Bermuda/Cairn sands, the stratigraphic equivalent of Tarn. Meltwater went online in 2000.

ConocoPhillips and its predecessor companies, Phillips and ARCO, have talked about the Cairn gas accumulation for enhanced oil recovery within the Kuparuk unit. Government filings by the company described the Cairn interval as thinner than the Bermuda oil interval produced at Meltwater, noting the sandstone reservoirs were discrete from but analogous to the Tarn reservoir some 10 miles to the north.

In 2001 the company penetrated oil in the Cairn interval at the Tarn No. 4 exploratory well, but said the permeability was too low for economic development. Seismic data (3-D) shot a couple of years later suggested "a prospective channel feature in the Cairn interval existed in the Meltwater development area (and) … may have improved reservoir quality" compared to the interval in the Tarn No. 4 well.

Most recently, in its application for the 2018 Kuparuk plan of development with Alaska's Division of Oil and Gas, ConocoPhillips mentioned the 2N-310 Cairn test in 2008: "The Cairn interval was tested while drilling a Tarn reservoir development well

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Upcoming Exploration & Appraisal

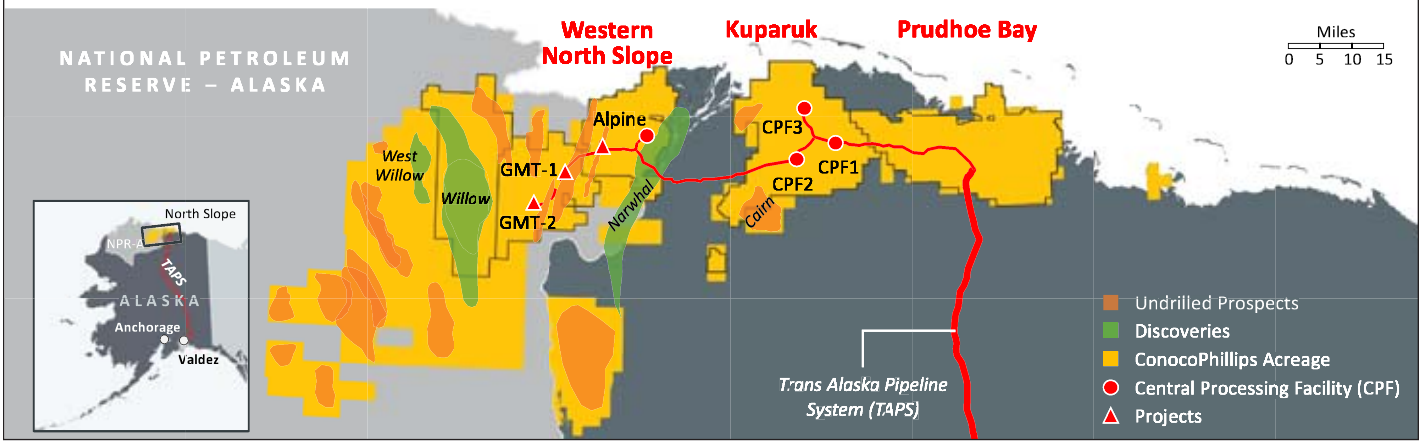
Late 2018 - 2019 Plan

6-8 WELLS
8-9 TESTS
2 RIGS

Late 2018 targets Cairn & Narwhal
2019 winter targets Greater Willow Area
Final well/test count depends on results/timing

2020+ Program Focused on Remaining Potential

Test Full Prospect Inventory



KEY FACTORS *continued from page 38*

competitive with the rest of the company's portfolio of operations in the Lower 48, Europe, the Middle East and Southeast Asia.

The consequence was that long-term production forecast for ConocoPhillips' Alaska operations reversed from a decline to growth, with production five years from October 2018 projected to be about double what the company had envisaged in 2013.

New technologies

Advanced technologies were helping create the new development opportunities that had been emerging, making otherwise marginal developments viable, he said, describing the new extended reach drill rig that ConocoPhillips had commissioned for 2020 (see adjacent story) as a game-changer.

Advanced data analytics also formed an emerging, game-changing technology, with major impacts on efficiency, he said.

New technologies brought down the cost of GMT-1 to $725 million from an original estimate of $900 million to $1 billion, Marushack said.

All told, developments being lined up across the North Slope, with potentially several hundred thousand barrels per day of additional oil production coming on line at various time over the next five to 10 years, represented perhaps $13 billion to $15 billion of new investment, he said.

—Petroleum News

CONOCOPHILLIPS *continued from page 38*

(an injector). Both gas and oil was discovered in the Cairn interval, and additional appraisal will be required to determine the Cairn development potential in this area."

But the company said, "no further exploration/delineation is planned in the Cairn or Bermuda sand intervals at this time."

That has obviously changed for the Cairn.

Seven total exploratory wells

The other promised four to six exploration wells making up the 2018-19 season were drilled using Doyon rigs 141 and 142. As of April 7, 2019, Rig 141 was on the West Willow 2 well and Rig 142 was on the Tinmiaq 13, both exploratory wells.

As of the same date, the Alaska Oil and Gas Conservation Commission, which among other things issues and tracks drilling permits, showed ConocoPhillips having completed three other exploration wells west of the central North Slope, including: Tinmiaq 10, completed March 4, 2019 (total depth 7,635 feet and true vertical depth 3,762 feet); Tinmiaq 15, completed Feb. 21, 2019 (total depth 4,052 feet and true vertical depth 4,052); and Tinmiaq 16, completed March 7 (total depth 3,950 feet and true vertical depth 3,950).

So it appeared the company will complete five exploration wells from off-road ice pads, plus the two wells it had completed from gravel pads DS-2S and CD-4, for a total of seven wells — all classified as exploratory by AOGCC, although ConocoPhillips referred to them as a mixture of exploration and appraisal wells. ●

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More wildcats possible in Eni's North Slope future

While CEO Descalzi talks about stepping up worldwide exploration, including in Alaska, fate of first wildcat in 11 years remains hush-hush

By KAY CASHMAN
Petroleum News


ROBERT PROVINCE

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After an 11-year hiatus Eni US Operating Co. returned to Alaska exploration in late December 2017 with the spudding of the first of two ultra-extended reach wells from a man-made Beaufort Sea island in the Nikaitchuq unit. The prospect is adjacent to, and directly north of, the Nikaitchuq unit.

The exploration program was expected to take two years. Due to a series of delays, as of early April 2019, the modified Doyon 15 drilling rig was still on the Nikaitchuq North No. 1 exploration well, or NN-01, with no more than hints from Eni on well results, starting with a May 2018 strategy meeting where Eni CEO Claudio Descalzi said the company was doing well in Alaska and planned to increase investment in the state.

No permit for a second well was filed with the Alaska Oil and Gas Conservation Commission, per its website, and no AOGCC update was available for the NN-01 well, which is listed as confidential.

The current plan approved by the state of Alaska and the federal Bureau of Ocean Energy Management said the drilling of the second exploration well, NN-02, "targeting the same seismic anomaly of the first well" was contingent upon NN-01 results.

The nearshore Nikaitchuq unit, which began producing oil in

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ENI *continued from page 41*

early 2011, lies north of the Kuparuk River unit, west of Prudhoe Bay, and northeast of the adjacent Oooguruk unit.

The Alaska subsidiary of the Milan, Italy-based major is looking for new oil reserves at Nikaitchuq North to take advantage of significant spare capacity in the standalone Nikaitchuq production facilities, which in late 2017 handled some 20,000 barrels of oil per day but had a capacity of 40,000 bpd and could be expanded to 50,000 bpd, according to Eni Alaska Vice President Whitney Grande.

Geological target speculation

The "seismic anomaly" from 3-D over Nikaitchuq North that was noted in the approved plan did not identify the target of the exploration program, but the Schrader Bluff formation that is produced from the Nikaitchuq unit is known to extend a long way north under the Beaufort Sea.

The previous unit operator, Kerr-McGee, also talked about the possibility of testing the Jurassic Nuiqsut sandstone and the Triassic Sag River sandstone to the north.

They said exploration and development drilling in the area of the Nikaitchuq unit "establishes an overall prospective trend for improved Sag River sand quality and thickness to the north/northwest over the northwest Milne structure and within our proposed Nikaitchuq exploration unit."

While everything about the target of Nikaitchuq North drilling was removed from the POD under its confidential status, there were some hints in the Oil Discharge Prevention and Contingency Plan application that appeared to be based on tapping the Jurassic Alpine sands, which would certainly qualify as an anomaly in the area.

Going back to 2018, in late August Eni announced it had acquired 350,000 undeveloped exploration acres from Caelus.

Whatever the case, the 25,957 bpd in the contingency plan application could not be referring to the heavy Schrader Bluff oil that can't flow unassisted.

Also, this and the measured depth and angle of the well suggest one of the Jurassic sands.

Federal block 50% owned by Shell

Although Eni spud the NN-01 well in late 2017, drilling did not get underway until February 2018 because of what the company said were "unforeseen impacts to the drilling schedule."

According to published plan, the well was to have a vertical depth of 8,131 feet and a measured depth of 34,150 feet, although more recently company officials talk in terms of 35,000 feet for the measured depth: "It will be the longest extended reach well in the state," stretching into federal Beaufort Sea waters, specifically Harrison Bay Block 6423, which is 50% owned by Shell, Grande said in November 2017.

Eni's initial plan was to complete the Nikaitchuq North prospect well in mid-February 2018, potentially conducting flow testing between mid-February and mid-March, but completion of the well was deferred to mid-summer. Later that year an Eni official told Petroleum News, "the NN-01 exploration well was not completed in 2018 and as such no flow test was performed. Drilling was suspended on Aug. 23 due to impending seasonal drilling restrictions. Eni intends to restart drilling in early 2019."

No exploration reservoir targets are allowed to be drilled during broken ice seasons, per Alaska's Division of Oil and Gas. Drilling can only take place during frozen ice conditions and during the summer open water season.

Adds production by Oooguruk acquisition

Eni, which was the fourth largest oil producer in Alaska in 2018, behind ConocoPhillips, BP and Hilcorp, at the end of that year held a working interest in two producing North Slope fields. It had a 100% interest in, and was operator of, the Nikaitchuq unit and was a 30% partner in Caelus Natural Resources Alaska's nearby Oooguruk unit, which is adjacent to the Pikka unit where the huge Brookian Nanushuk oil discoveries were made in the last few years by Armstrong and Repsol. The first Pikka development is slated to go online in 2023 under the operatorship of their partner Oil Search.

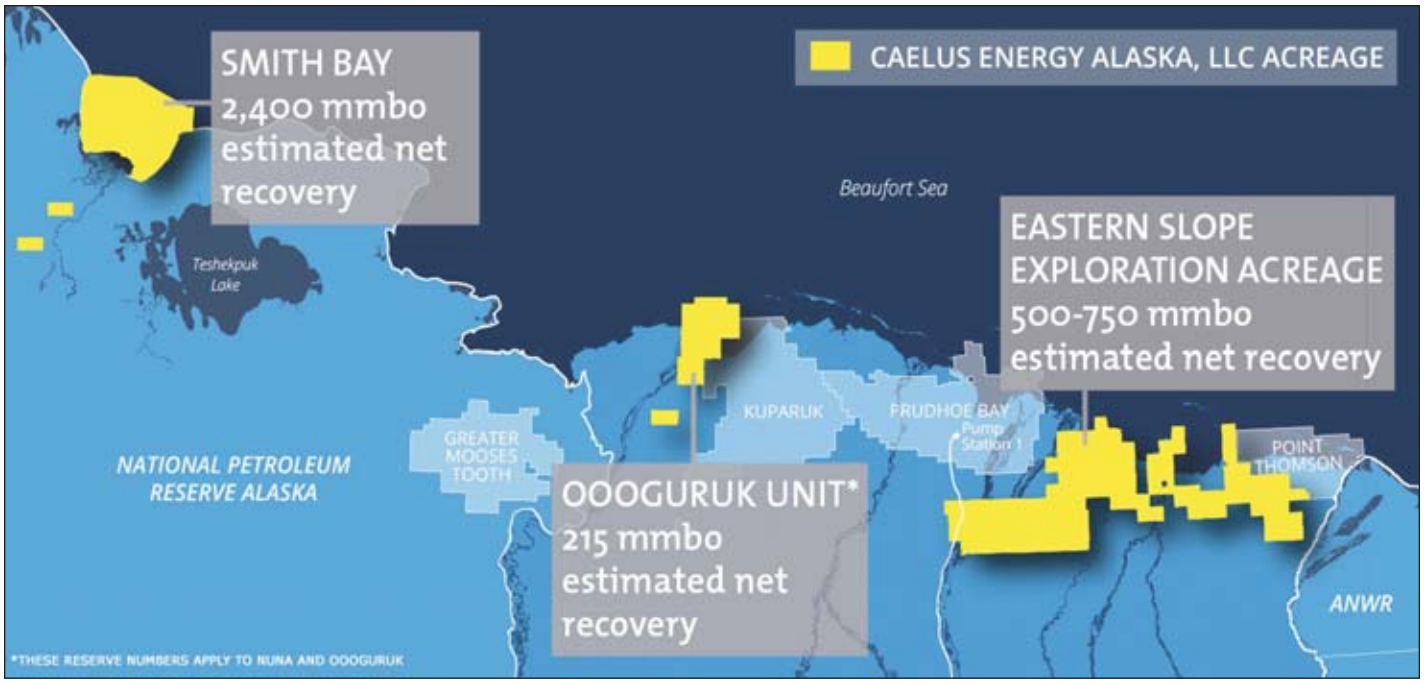
In January 2019, Eni said it had entered into an agreement with Caelus to acquire 70% and operatorship of Oooguruk.

The deal gave Eni approximately 7,000 barrels of oil per day and allowed it to "implement important operational synergies and optimizations" with nearby Nikaitchuq, which at the time produced 18,000 bpd.

In January 2019, the Oooguruk field averaged 9,336 bpd, down 5.8% from a December average of 9,909 and down 29.2% from a January 2018 average of 13,191 bpd.

Eni said it planned to drill more production wells in both units: Caelus drilled one production well and one injection well in the Oooguruk field in 2016, but thereafter suspended drilling. In response to the downturn in oil prices in 2014, Eni conducted minimal drilling in its Nikaitchuq field from 2015 to fourth quarter 2018.

In January 2019, the largest month-over-month Alaska production increase came from Nikaitchuq, which averaged 18,375 bpd, up



CAELUS ALASKA

As first reported in Oil Patch Insider in Petroleum News' Aug. 19, 2018, issue, Eni acquired Caelus Alaska's eastern North Slope acreage, which consists of 350,000 onshore acres between the Prudhoe Bay and Point Thomson units.

99.6% from a December average of 9,205, and down only 3.9% from a January 2018 average of 19,117 bpd. This increase was a return to a more normal level of production at Nikaitchuq, where production hit a low of 6,553 bpd in November 2018 when there were only 10 wells operating, due to shutdowns for flowline repair. By December, the number of wells producing crude was back up to 26 (25 in January), compared to 27 in January 2018.

Buys 350,000 undeveloped acres to east

Going back to 2018, in late August Eni announced it had acquired 350,000 undeveloped exploration acres from Caelus. The 124 state leases are on the eastern North Slope between Prudhoe Bay and Point Thomson.

The company said at the time that it planned to "apply its business model and experience," involving "fast-track exploration" and "a short time to market" for the "potential new discoveries."

The relatively unexplored acreage is close to existing infrastructure and to the trans-Alaska oil pipeline and approximately 20 miles southeast of Deadhorse, which is an unincorporated community consisting mainly of facilities for oilfield workers and firms that have contracts with the nearby oil fields, including Prudhoe. Deadhorse is accessible via the Dalton Highway and the Deadhorse Airport.

Multiple play types revealed on seismic

Shortly after acquiring the eastern North Slope leases in 2015, which are in two blocks, Caelus acquired 175 square miles of new 3-D seismic data and reprocessed another 275 square miles of existing 3-D to image prospects in the acreage.

"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."

Surrounding legacy wells "confirm deeper petroleum system elements and de-risked shallower Brookian reservoirs and hydrocarbon charge and phase within the area," Caelus said, much of which was mostly ignored in drilling until Armstrong and Repsol discovered big oil finds in the shallow Brookian Nanushuk at

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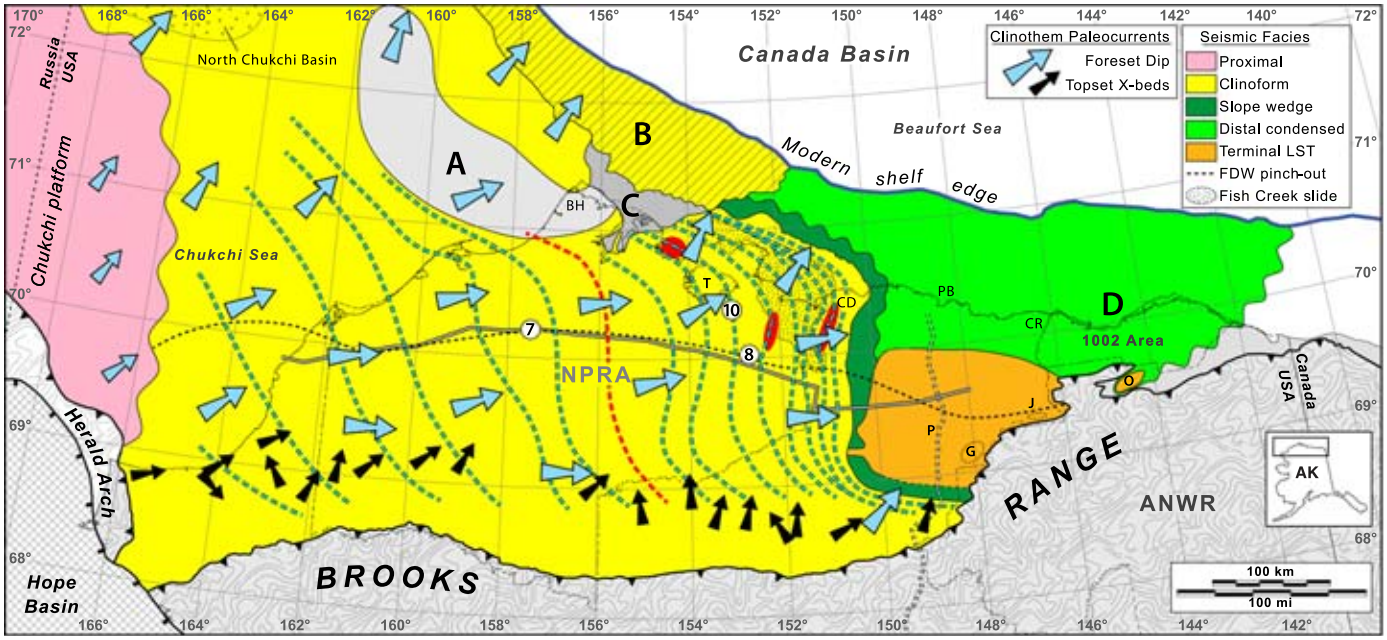

Figure 5. Map of Arctic Alaska showing seismic facies of the Lower Cretaceous clinothem. General trend and spacing of lowstand shelf margins indicated by dashed cyan lines; dashed red line is lowstand shelf margin marking change in shelf margin trajectory, from mainly progradational to the west and "sawtooth" to the east. Northward pinch-out of foredeep wedge (FDW) shown by dashed line. Locations of three new discoveries, indicated by red ovals, from east to west are Pikka (including Horseshoe and Narwal), Willow (including West Willow), and Smith Bay. A = Barrow high–Arctic platform domain of low accommodation and postdepositional erosion where the Nanushuk Formation is thin to absent and the Torok Formation is thin. B = Rifted margin growth-fault domain where clinothem is thick. C = Domain of deep incision during the middle–Late Cretaceous; clinothem absent by erosion across much of area. D = Lower–middle Cretaceous condensed shale, commonly absent by erosion east of Canning River, presence uncertain offshore. Gray line labeled "7" in a white circle is the location of composite seismic line shown in Figure 7. White circles with 8 and 10 are approximate locations of seismic images shown in Figures 8 and 10. Local names of terminal lowstand systems tract (LST) mentioned in text: Gilead sandstone (G); Juniper sandstone (J); Arctic Creek facies (O). ANWR = Arctic National Wildlife Refuge; BH = Barrow high; CD = Colville River delta; CR = Canning River; NPRA = National Petroleum Reserve in Alaska; P = Trans-Alaska Pipeline System (pump station no. 1 located at north end); PB = Prudhoe Bay; T = Teshekpuk Lake. Map modified from Houseknecht et al. (2009a).

ENI *continued from page 43*

Pikka and Horseshoe west of the central North Slope.

Stepping up exploration

Towards the end of first quarter 2019, Eni said it planned to spend $4 billion on drilling at least 140 wildcats worldwide over the next four years, targeting 2.5 billion barrels of resources each year, many in frontier basins.

In North America, wells are planned in Mexico and Alaska. Exploration wells will also be drilled in Norway, the UK and Cyprus.

Major resources are being targeted in the Middle East, while Africa — Algeria, Libya, Egypt, Ghana, Ivory Coast, Angola and Mozambique — will host multiple exploration campaigns.

Descalzi said three more exploration wells will be drilled over the next two years in Block 15/06 offshore Angola, where recent wells have discovered about 1.1 billion barrels of light oil.

Eni has drilled 21 exploration wells on Block 15/06, with an 86% success rate, finding a more than 4 billion barrels resource, with production currently running about 150,000 barrels per day.

Additional wells will be drilled in Pakistan, Vietnam and Indonesia.

Descalzi said the company will drill a total of about 40 wells per year, with an annual global spend of more than $1 billion.

Eni currently has access to approximately 177,607 square miles of net exploration acreage, up 37% from 2014, which Descalzi said could hold more than 12 billion barrels of estimated resource potential. ●

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Development Furie's focus at Kitchen Lights

One of the more intriguing exploration targets is oil in the deep Jurassic at 20,000-plus feet, making drilling expensive

By KAY CASHMAN
Petroleum News


SCOTT PINSONNAULT

With the seventh plan of development for its offshore Kitchen Lights unit not due until October 2019, Furie Operating Alaska has offered only a glimpse of its exploration plans for the gas producing Cook Inlet field beyond that time.

It is certain, however, that the Texas-based independent exceeded its exploration commitment in its current development plan by testing a seismic anomaly in the Tyonek, drilling an "exploration tail" from its A-4 development well into the formation, which was below the Beluga formation, from which natural gas production was to come.

Unfortunately, per a February 2019 Enstar Natural Gas Co. filing with the Regulatory Commission of Alaska regarding Furie's temporary problem in delivering gas to the Southcentral utility due to freezing water combining with gas to form solid hydrates, it appeared the drilling into the Tyonek formation proved disappointing.

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Story began with Escopeta

The history of the Kitchen Lights unit dates back to mid-2009 when the Alaska Department of Natural Resources' Division of Oil and Gas approved creation of the Kitchen Lights unit, combining the Kitchen, Northern Lights and Corsair prospects.

Unit approval was a culmination of efforts by leaseholders and the state over a number of years to find a way to get drilling done on a series of prospects in Cook Inlet, originally held by different leaseholders but by then consolidated with Escopeta Oil Co. under the leadership of Danny Davis.

At that time only one of the prospects, Corsair, had seen a drill bit.

Shell, Phillips and ARCO had drilled exploration wells in the Corsair prospect from 1962 to 1993. Four of the wells targeted oil; one targeted gas. The wells had gas shows — some also tested small quantities of oil.

The Northern Lights prospect, south of the North Cook Inlet unit along the anticlinal trend that connected it with the Corsair structure, was targeting a downdip extension of Tyonek Deep oil reservoirs encountered in most deep North Cook Inlet wells.

"The play depends on the Tyonek Deep sands extending some distance south of the North Cook Inlet unit and still remaining in the oil column," the division said at the time.

Internal changes aside, in 2011 Escopeta was essentially restructured and renamed Furie and came under different leadership.

A major milestone occurred later that year when the company announced the discovery of a large natural gas field during the drilling of the KLU No. 1 well from the Spartan 151 jack-up rig that Davis had brought to Alaska.

Furie's Alaska leadership changed again in 2018 when Scott Pinsonnault, the company's chief operating officer, took the helm. He has been augmenting the Anchorage staff, adding a new vice president of operations, an HSE official and contracted with Petrotechnical Resources of Alaska to manage Furie's capital program for 2018. PRA completed its contract commitment in December 2018.

Plans for 2019 exploration

According to a state notice approving the company's latest, and sixth, plan of development in December 2018, Furie completed its planned 2018 Kitchen Lights drilling program.

In 2017, the division had issued Furie a notice of default and opportunity to cure because, the agency said, the company had failed to meet drilling and development commitments.

But, in the new plan approved in December 2018, the division said that with Furie having complied with its commitments, the state was curing the default.

Completion of the A-1 and A-4 development wells in 2018 would allow the field to produce natural gas from four wells, a contractual requirement for Furie's gas supply agreement with Enstar. (Kitchen Lights' Julius R. platform has six well slots.)

In addition to development and maintenance activities in 2019, Furie would like to drill exploration wells in the Kitchen Lights unit but, to do so required additional financing and the payment of state tax credits it was owed, the plan of development approval said. (Following fiscal problems resulting from the plunge in oil prices in 2014, under the leadership of then-Gov. Bill Walker, the state delayed payment of production tax credits that were owed to companies such as Furie.)

"Exploration activities have been severely constrained by the state's lack of any meaningful payment for outstanding production tax credits for the last several years — and the absence of any payment for this fiscal year," the plan of development said.

By February 2019 the company had planned to mature two

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Resounding success at North Slope Badami well

Glacier Oil and state officials upbeat on Badami; Starfish prospect one of several new promising pods in Killian sands

By KAY CASHMAN
Petroleum News


PHIL ELLIOTT

Glacier Oil & Gas Corp. spent most of 2016 through 2018 methodically performing maintenance and well work at its four producing Alaska oil and gas units, as well as executing one of two exploration programs that might guide work in the years to come. The company's 2018 capital budget for Alaska was a conservative $20 million, representing Glacier's net working interest investment. (ASRC Exploration LLC, owned by the Native regional corporation for northern Alaska, Arctic Slope Regional Corp., holds a minority working interest in the Badami unit and surrounding leases.)

The first of those two exploration programs, the drilling of the B1-07 Badami well in early 2018, took the majority of its 2018 capex and resulted in an oil discovery in the undeveloped Starfish prospect southwest of the Badami development area in the Cretaceous Killian interval.

A turbidite sandstone reservoir slightly older than the Badami's Brookian reservoir, the Killian is immediately above the oil source rock and below the Badami sands that form the main reservoir for the Badami field. In early testing the B1-07 well produced 2,500 barrels per day.

Production of the eastern North Slope Badami unit, which is just west of Point Thomson, between it and Prudhoe Bay, was 879 bpd in November 2015 prior to Glacier assuming operatorship in January 2016.

By January 2019, Badami was producing 2,323 bpd, with B1-07 accounting for 1,604 bpd. It came as no surprise when Glacier President Phil Elliott told Petroleum News in an April 10, 2019, email that "The B1-07 well was an economic success and proved the prospective value of a Killian-focused drilling initiative," noting the well was expected to "pay out in less than 15 months."

Describing the Starfish project in September 2017, a Glacier official said, "If this well works close to what we think it will, it should open five to seven more prospects similar to it."

In its 2017 plan of development, or POD, filed with the Alaska Department of Natural Resources' Division of Oil and Gas, Glacier described Starfish as one of "several new target pods of interest" identified through a recent geologic and geophysical review of the Badami and Killian sands.

In her May 2018 approval of the Badami unit's 15th POD, then-Director Chantal Walsh said the division was "encouraged by the efforts undertaken" by Glacier "as shown through its continued production from Badami, its efforts to enhance production from existing wells, and its exploratory drilling."

A new POD that Glacier will file in mid-April 2019 (after the deadline for this edition of Explorers magazine), "speaks for itself," Elliott said in his April 10, 2019, email. The "basic plan calls for investing nearly $200 million (gross) to prosecute a Killian-focused drilling program over the next 3-4 years."

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Elliott did not indicate whether the company would be open to partners in that venture.

But it is interesting to note that within a year of the Starfish discovery, major North Slope exploration and development partners Oil Search and Armstrong Energy headed to the eastern North Slope to search for missed oil in a 195,000-acre block south and southwest of the Badami unit.

Fulcrum for development

Badami could serve as a fulcrum for future development in the area because its processing facilities were designed for production rates of up to 38,500 barrels of oil per day.

The Badami pipeline could transport oil from the region to the trans-Alaska oil pipeline — Hilcorp has already anticipated that crude production from its proposed Liberty field could use that pipeline. Hilcorp's plans for Liberty development include a small artificial gravel island in the Beaufort Sea, some five miles offshore, about 15 miles east of Prudhoe Bay, with a buried subsea pipeline carrying sales grade oil to shore to connect with the existing Badami pipeline between Prudhoe Bay and Point Thomson.

New pad at Badami?

On Feb. 1, 2019, Glacier applied to the U.S. Army Corps of Engineers for a permit to construct an additional gravel pad for the Badami field to accommodate the drilling of up to 10 new wells.

The pad would be located inland 1.3 miles from Mikkelsen Bay.

The application said that pad construction would involve excavating a 9.2-acre gravel pit, constructing an 800-foot access road and a 2.5-mile pipeline connecting the new pad to the existing Badami facilities. The pad itself would be square, with 660-foot sides, and would be within the Badami unit, due east of the existing Badami pad.

The Mikkelsen Bay pad proposal dates back to a unit expansion effort in late 2012, when Savant, then the Badami operator,

Through its subsidiary Savant Alaska, Glacier Oil and Gas drilled the B1-07 Badami exploration well with Nabors Rig 27E in early 2018 and has since announced the discovery in the Starfish prospect. In early testing the well produced 2,500 barrels per day, tapering off to a steady 1,600 bpd by 2019.

JUDY PATRICK

asked the state to add seven leases to the Badami unit, including six leases held by Alaska Venture Capital Group. Since that time AVCG has sold most of its interest in those six leases, with six companies now holding them, Caracol Petroleum being the largest leaseholder. Brooks Range Petroleum Corp. currently operates the leases.

The proposed lease expansion, which straddled the Beaufort Sea coast, would have extended the Badami unit east, closer to ExxonMobil's Point Thomson producing unit, the eastern-most producing unit on the North Slope, just to the west of the ANWR 1002 area.

1971 well tested at 700 bpd

The concept behind the lease expansion was to enable exploration drilling in the East Mikkelsen prospect that at the time underlay a combination of Savant and AVCG leases.

The prospect included the site of the East Mikkelsen Bay No. 1 well, drilled by Humble Oil (predecessor to ExxonMobil) in 1971. Using outdated technology, that well encountered oil in the Killian sands, above the Hue shale source rock, with a tested flow rate of 700 bpd of 24 degree API oil.

In March 2013 the division approved inclusion of parts of two of the leases into the Badami unit but declined to expand the unit across the remainder of the seven leases: The approved expansion included the Mikkelsen well. The state argued that only those lease portions met the qualifications for a lease expansion.

In April 2013, Savant appealed the state's decision, claiming that effective exploration of the prospect required access to all

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FURIE *continued from page 45*

prospects outside the Corsair block of the unit, and to present the results to the division, together with evidence that reasonable efforts were underway to drill exploration wells in 2019 or 2020. (The unit was divided into four blocks — Corsair, North, Central and Southwest — all offshore in Cook Inlet, with development drilling taking place in the Corsair block.

Unfortunately, hydrate blockages in the pipeline that delivered gas to shore from Furie's offshore platform although cleared out, apparently held up this process.

"We have safely restored utility and communication between our onshore natural gas processing plant and the Julius platform over this past weekend," Pinsonnault told Petroleum News in a March 19 email. He said Furie would spend the next few weeks making sure that the line was completely clear, functional and safe before restoring gas production from the field.

Drilling deep for oil

One of the more intriguing exploration targets in the Corsair block was oil in the deep Jurassic strata underlying the Tertiary rocks that host producing oil and gas fields in the Cook Inlet basin.

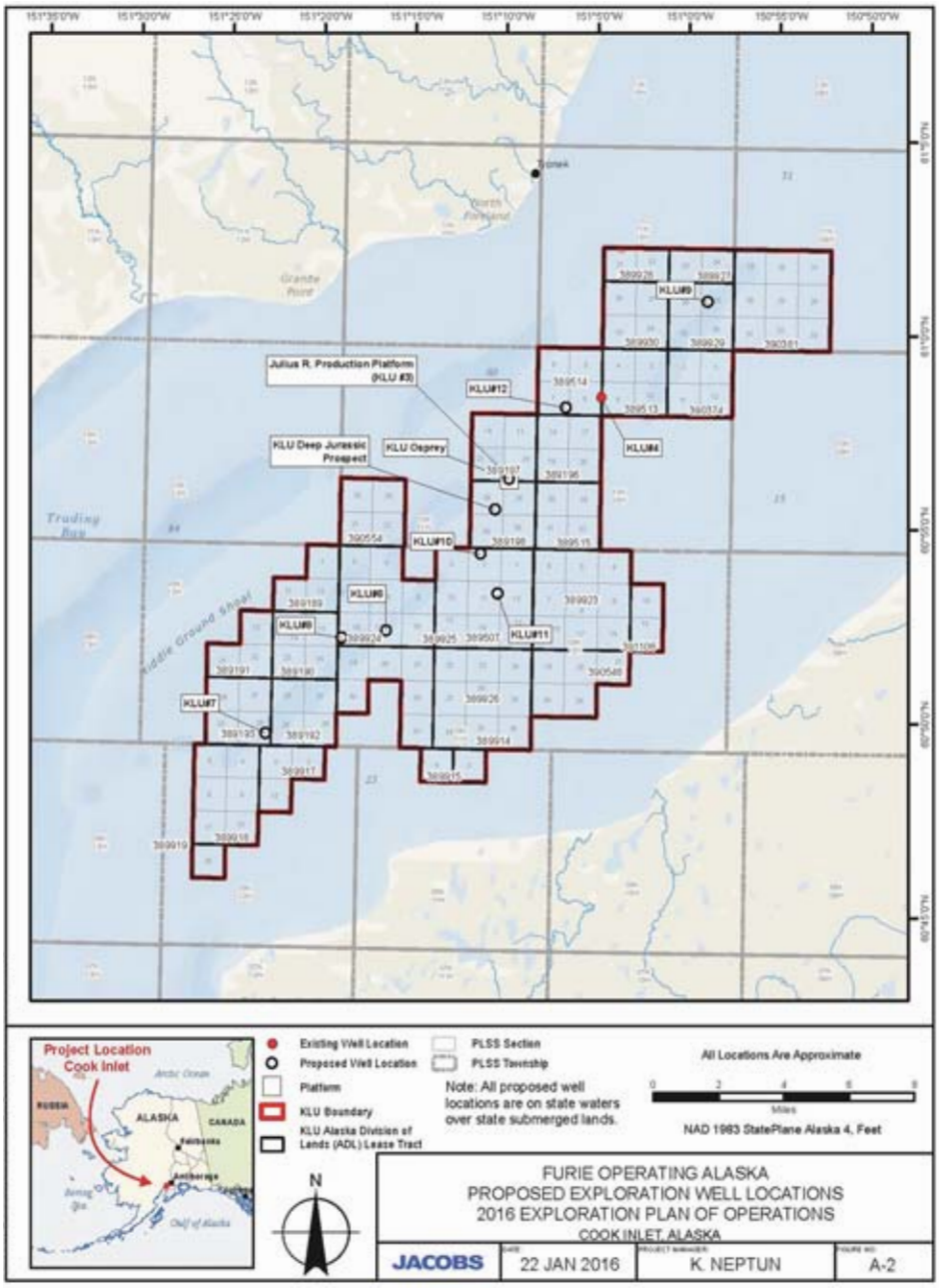
The proposed well, KLU No.6, would be drilled to a depth of approximately 24,000 feet previous company plans have noted.

But drilling that deep would be costly, part of the dilemma facing Furie.

In the Kitchen Lights, or KLU, unit sixth plan of development, approved in December 2018, Furie said it intended to continue exploration drilling throughout the KLU to the extent it could do so safely while continuing to develop and produce from the Julius R. Platform.

As to potential exploration well locations, Furie's plan said its technical team was analyzing 3-D and 2-D seismic and well data as part of an in-depth analysis of the entire KLU and anticipated it would propose an enhanced suite of targets outside the Corsair block for exploration drilling over the next few years. The analysis was expected to continue into 2019.

As of April 5, 2019, Furie had submitted no revisions to the well locations in its 2016 map (see map in this story) but it did say that it expected the vertical well "bottom hole locations will coincide with the tophole coordinates" provided in the 2016 map.



One of the more intriguing exploration targets in the Corsair block was oil in the deep Jurassic strata underlying the Tertiary rocks that host producing oil and gas fields in the Cook Inlet basin.

Accordingly, Furie proposed that by February 2019, provided additional financing was available, it would mature two prospects for exploration wells outside Corsair and present them to the division along with evidence that commercially reasonable efforts were underway to drill these wells in either 2019 or 2020.

The company reiterated that drilling one of these wells would greatly depend on the amount and timing of payments by the state for outstanding production tax credits.

The division's approval of the sixth POD also required Furie to submit a proposal to the division for the establishment of a participating area, or participating areas, in the KLU by March 1, 2019.

Per the division, Furie applied for two participating areas on March 1 — the Corsair Sterling PA and the Corsair Beluga PA. ●

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GLACIER OIL & GAS *continued from page 47*

seven of the leases that had been included in the unit expansion application.

The appeal remained in limbo until July 2, 2018, when then-DNR Commissioner Andy Mack sent a letter to Glacier telling it the department had reviewed Savant's appeal and was remanding the matter to the division for reconsideration.

As of April 5, 2019, the division had not yet made a decision.

The filing of Glacier's application for a Mikkelsen Bay pad does not represent any firm commitment as to when, or whether, the company will build the pad, Elliott told Petroleum News Feb. 6, 2019.

He said his company was still in the process of formulating future plans for Badami, noting a permit of this type would typically run for around five years.

Glacier's latest approved Badami POD, filed in April 2018, indicates the potential for further drilling at Badami, with an additional drilling pad likely to be needed to fully explore and delineate the unit.

Looking for Sabre partners

In addition to exciting Badami prospects on the eastern North Slope, Glacier's most interesting Cook Inlet exploration prospect is Sabre at West McArthur River in an offshore corner of the unit.

Identified by both former Cook Inlet operators Unocal and Marathon Oil Co., Sabre was given different names by each company and finally named Sabre by Forest Oil. (Forcenergy Inc. acquired West McArthur River in 1997. Forest Oil Corp. became the operator in late 2000 after acquiring Forcenergy. In 2007, Forest sold the unit to Pacific Energy Resources Ltd., which sold the unit to Cook Inlet Energy in 2009.)

Glacier subsidiary Cook Inlet Energy first discussed plans for a Sabre exploration well as early as late 2013 but delayed the project due to the logistics and the approximately $25 million cost and difficulty of drilling an extended reach well from onshore facilities.

The arrival of a jack-up rig in Cook Inlet after decades of failed attempts improved the economics of the well by allowing for vertical drilling from an offshore site, so Glacier has included Sabre as a potential target for 2017, 2018 and 2019 activities in various government filings.

The current plan calls for using the Spartan 151 jack-up rig.

Glacier said it is seeking partners in the Sabre prospect.

A former Cook Inlet basin operator, Forcenergy, shot 3-D seismic survey over Sabre, describing it as a 50-100 million barrel prospect.

The Alaska Department of Environmental Conservation issued a key permit for the Sabre project in mid-May 2018. The pollutant discharge elimination system individual permit allows the company to discharge certain waste fluids from the Spartan 151 into upper Cook Inlet during its operations. The permit expires June 15, 2023.

Taking more methodical approach

Glacier Oil was created through the bankruptcy of former Miller Energy Resources Ltd. Through Miller's subsidiary Cook Inlet Energy LLC, Glacier operates the Cook Inlet basin's West McArthur River unit and the Redoubt unit on the west side of Cook Inlet and the North Fork unit in the southern Kenai Peninsula. Through subsidiary Savant Alaska LLC, it also operates the eastern North Slope Badami unit, making Glacier the only operator aside from Hilcorp Alaska with production in Alaska's two major basins.

By January 2019, Badami was producing 2,323 bpd, with B1-07 accounting for 1,604 bpd. It came as no surprise when Glacier President Phil Elliott told Petroleum News in an April 10, 2019, email that "The B1-07 well was an economic success and proved the prospective value of a Killian-focused drilling initiative," noting the well was expected to "pay out in less than 15 months."

Unlike its predecessor Miller Energy, which had acquired multiple prospects throughout Alaska and eventually became overextended when commodity prices dropped, Glacier has been taking a gradual, more cautious approach by focusing on maintenance and workover activities to improve operations at existing wells. The company has reserved its larger resources for targeted projects such as drilling the B1-07 exploration well and taking on one of the largest infrastructure projects in the history of the West McArthur River unit by shifting processing to the Kustatan Production Facility.

Kustatan was newer and larger than the West McArthur River Production Facility and capable of handling greater production volumes. Glacier also discontinued use of high-pressure oil injection jet pumps at West McArthur, simplifying operations and increasing overall field safety. ●

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Hilcorp aims to drill in lower Cook Inlet

Despite delay in 3-D seismic survey to late August, lower CI, Iniskin Peninsula and Trading Bay exploration programs on track

MIKE DUNN

DAVE WILKINS

By KAY CASHMAN
Petroleum News

Prior to the 2011 entry of Hilcorp Energy into Alaska, the Cook Inlet basin's onshore and offshore oil production had declined to 8,900 barrels per day. At the same time, natural gas reserves were projected to soon be insufficient to meet continued local utility demand and aging platform infrastructure was considered to be nearing its functional end of life. Cook Inlet was considered a mature oil and gas province that had reached peak oil production in 1970 and peak natural gas production in 1994.

Fortunately, the privately owned Texas-based independent had a strong track record of entering mature hydrocarbon basins and making the necessary investments to produce more oil and gas.

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Initially, Hilcorp's local subsidiary, Hilcorp Alaska, accumulated a large portfolio of legacy assets in the Cook Inlet region and on the North Slope through separate deals with Marathon Oil Corp., Union Oil Company of California and BP Exploration

"This whole program, including getting the permits, and shooting the seismic, is about $15 million. … Hilcorp is paying 100% of that and we hope to get some partners to help us drill some wells if we do identify some prospects." —Mike Dunn

(Alaska) Inc.

Its focus on development for its first five years in Alaska, Hilcorp only used exploration to expand operations within existing units, particularly at the Ninilchik and Deep Creek units on the Kenai Peninsula. Even a foray beyond unit boundaries was closely tied to work at nearby units.

But the company took a somewhat more expansive approach to its exploration activities in the Cook Inlet region in 2017 by drilling 16 stratigraphic test wells at three prospects in the southern Kenai Peninsula — Pearl, Seaview and Deep Creek SW — during the latter half of the year.

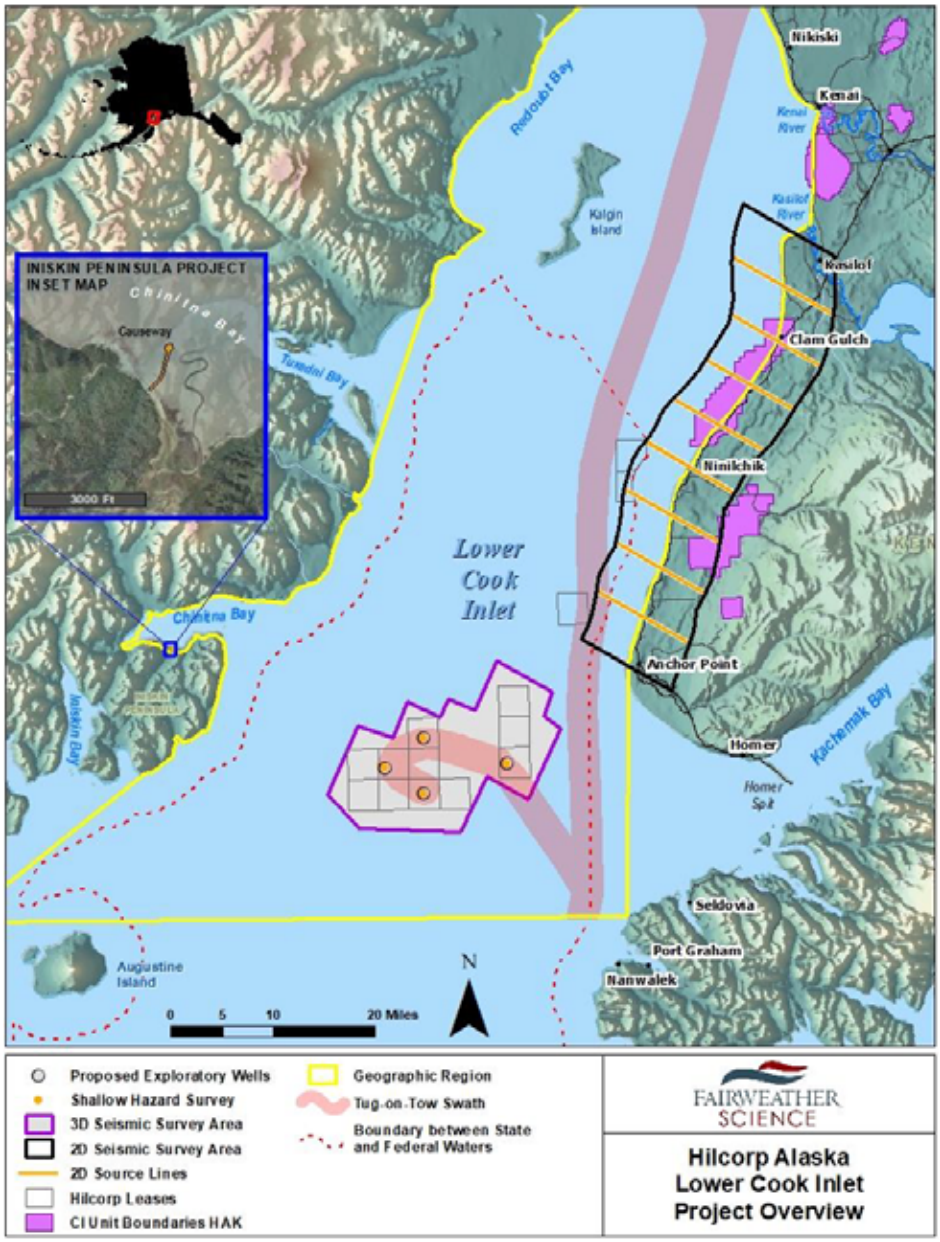
Possibilities for next five years

In April through October 2020, Hilcorp Alaska hopes to drill two to four exploratory wells in the untapped federal waters of lower Cook Inlet, pending the results of a 3-D seismic survey 20 miles due west of Homer halfway between Kachemak Bay in the lower Kenai Peninsula.

Potential Cook Inlet exploration and development plans for the next five years from April 1, 2019, through April 1, 2024, are listed in an application Hilcorp filed with the National Marine Fisheries Service for an incidental take authorization (the non-lethal unintentional taking of small numbers of marine mammals incidental to oil and gas exploration, development, and production activities).

The earliest activities described are the 374 square-mile lower Cook Inlet 3-D seismic survey in 2019, pending the receipt of a Bureau of Ocean Energy Management permit. Seismic will be followed by outer continental shelf geohazard and geotechnical surveys in the fall of 2019 or the spring of 2020, with the surveys site specific, determined by the number of potential exploratory drill sites in an area, and covering less than one lease block in a day.

Also slated to occur is the Iniskin Peninsula exploration and development program in both 2019 and 2020, from



April through October, and in 2020 a Trading Bay area geohazard survey, followed by the possible drilling of Trading Bay area exploratory wells.

In 2020 and 2021, Hilcorp's list of planned activities also includes a 2-D seismic survey in the marine, intertidal and onshore area on the eastern side of Cook Inlet from Anchor Point to Kasilof, with an area of interest some five miles on each side of the coastline.

Hilcorp says the methods for acquiring the seismic will be similar to those employed by Apache Alaska Corp. in 2011 and 2012, noting a single vessel can acquire a 2-D source line in some one to two hours, with only a single line acquired in a day, allowing for node deployments and retrievals and intertidal and land zone shot hole drilling. There are up to 10 source lines and the entire operation is estimated to take 30 days to complete, allowing for weather and equipment contingencies.

3-D survey over 8 OCS blocks

The 3-D seismic survey tentatively planned for May and June 2019 but in early April was postponed by Hilcorp per an email to Petroleum News that says "our team has made the decision to delay the survey until after the height of fishing and tourist season." The survey will be over eight of the 14 OCS lease blocks Hilcorp holds in lower Cook Inlet, including blocks 6357, 6405, 6406, 6407, 6455, 6456, 6457 and 6458. The new scheduling by the company suggests surveying will

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start in late August 2019.

In the application, Hilcorp says it will possibly drill wells to depths of 7,000 to 16,000 feet, depending on the well, each of which will likely take 40-60 days to drill and up to 10-21 days of well testing. If two wells are drilled, it will take some 80-120 days to complete the full program; if four wells are drilled, 160-240 days.

Hilcorp was the only bidder in BOEM's 2017 OCS Cook Inlet lease sale, taking tracts in federal waters off Ninilchik and Anchor Point, a three-tract block southwest of Anchor Point, and a block of eight tracts farther south and in the middle of the inlet.

In December 2017, Hilcorp applied to BOEM to collect airborne gravity and magnetic data in lower Cook Inlet over an area which generally overlaps the federal OCS waters of BOEM's lower Cook Inlet planning area, including aerial gravity and magnetic survey of all 14 lease blocks Hilcorp acquired in the 2017 sale.

Hilcorp also planned to have the surveys run over the Iniskin Peninsula. Fixed-wing aircraft were to be used offshore and rotor-wing aircraft onshore, with data collection expected to take two to three weeks. BOEM says the company notified it on Aug. 17, 2018, that the surveys had been completed.

On March 15, 2019, in Kenai, Mike Dunn, Hilcorp's development manager, said the lower Cook Inlet 3-D survey timelines had slipped from mid-April to May 3 (and since slipped again) because of the federal government shutdown at the end of 2018, but the company still expected to get the survey completed in the shorter timeline.

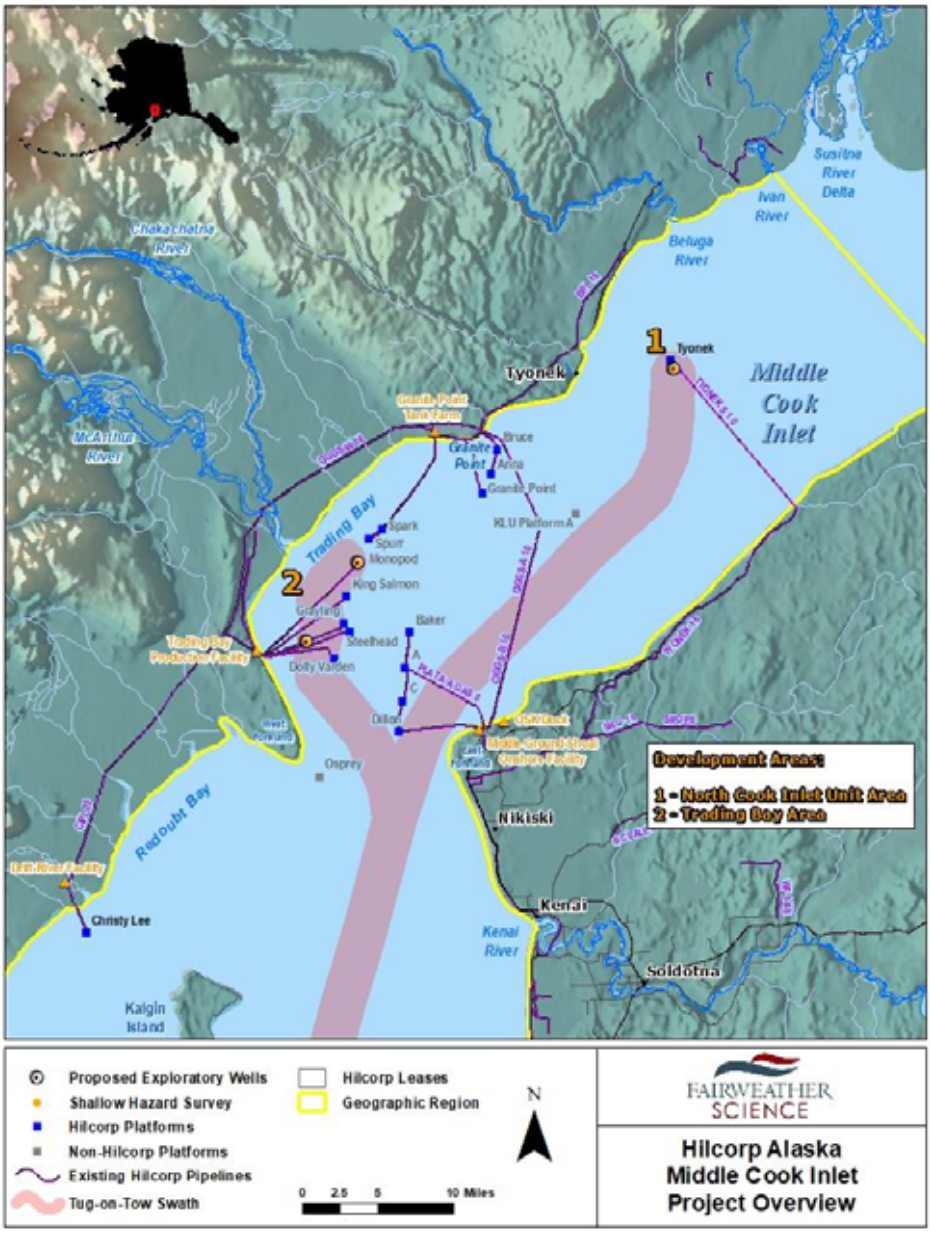
"If all were to go perfect, we'll be running about three lines per day; there's about 90 lines; we should be able to finish in 35 days," he says. "We've got some contingency, there will be some tangles, but the tides are not quite as bad down here as they are in the upper Cook Inlet."

With anticipated contingencies the entire shoot is likely to take 40 or 45 days, he said.

Possible new platforms, partner

Hilcorp will not use either of the jack-up rigs currently positioned in Cook Inlet should it proceed with exploratory drilling.

"The deepest water in that area is about 280 feet; you get to the edges, I want to say it's at least 180 to 190 feet of water," Dunn says. "A 300-foot jack-up rig will be able to drill the wells."



Hilcorp was the third largest oil producer in Alaska in 2018, behind ConocoPhillips and BP.

Both the Spartan 151 and the Randolph Yost jack-up rigs — now in Cook Inlet — are limited to a maximum water depth of 150 feet.

The cost of mobilizing a 300-foot jack-up rig to Alaska will raise the bar in terms of the quality of the targets the company must have to justify exploration drilling in the survey area.

"This whole program, including getting the permits, and shooting the seismic, is about $15 million," Dunn says. "Hilcorp is paying 100% of that and we hope to get some partners to help us drill some wells if we do identify some prospects.

"If we make some discoveries, we will do an environmental impact statement and hopefully set a couple of platforms," he says.

Iniskin Peninsula program

Hilcorp says it began baseline exploratory data collection in 2013 for proposed land-based oil and gas exploration and development on the Iniskin Peninsula near Chinitna Bay some 60 miles west of Homer on the west side of Cook Inlet in the Fitz Creek drainage. The 2-D program was proposed over 41 miles between Chinitna Bay and Iniskin Bay.

The lower Cook Inlet and the Iniskin

Peninsula area have known oil potential but as yet no commercial discoveries — the region has an active petroleum system, including excellent oil source rocks, but has been only very sparsely explored.

New project infrastructure proposed by Hilcorp for the Iniskin project includes material sites, a 4.3-mile access road, prefabricated bridges to cross four streams, an air strip, barge landing/staging areas, fuel storage facilities, water wells and extraction sites, an intertidal causeway, a camp/staging area and a drill pad, with construction anticipated to start in 2020.

Hilcorp says initial delivery will be by low-draft tug and barge vessels with barge landing/staging areas at Camp Point and Fitz Creek to be used for storage and stockpiling of supplies, equipment and fuel.

An intertidal rock causeway is proposed adjacent to the Fitz Creek staging area to improve accessibility of the barge landing. The causeway will extend seaward from the high tide line some 1,200 feet to a landing area 150 feet wide. Rock fill will be sourced from the Gaikema material site.

"The causeway will enable more consistent use of the Fitz Creek staging area to receive freight and fuel with fewer limitations due to short high tide windows and result in less dependency on the Camp Point staging area," Hilcorp said in the application, and will also enable quicker response to emergency incidents and reduce the risk associated with materials logistics and fuel deliveries.

When the causeway is no longer needed for the project, rock fill will be removed, allowing wave actions and currents to natural fill and cover the disturbed area.

"The project camp site is located along the historic road alignment at a location where bedrock can be quarried and the pad developed by cutting to grade and utilizing excavated rock for fill," the company said.

Seaview exploration

In fall 2018, Hilcorp received approval from the state of Alaska for a plan of operations for a two-well exploratory program at its new Seaview pad near Anchor River in the upper Cook Inlet basin, just onshore from the Cosmopolitan unit. The company drilled seven shallow stratigraphic tests in the undeveloped area in 2017.

The Seaview pad is on a private parcel off the Old Sterling Highway.

The two new exploration wells were to be the Seaview No. 8 and Seaview No. 9 wells within ADL 392667.

In its April 1, 2019 (North Cook Inlet unit) plan submittal Hilcorp says the "initial development plan for the deep oil prospect has been completed. Drilling of the first development well is expected in the 2020 timeframe. This oil development well will be drilled through the top of the Sterling and Beluga gas sands' structure and so will allow for evaluation of the remaining dry gas development potential."

Alaska Oil and Gas Conservation Commission records show the well was completed on Dec. 16, 2018, to a true vertical depth of 10,148 feet and a measured depth of 10,500 feet. The agency later reported testing had been completed.

There was no word as of April 5, 2019 on the results.

According to fall 2018 state documents, both Seaview wells were to be drilled directionally to measured depths of around 10,000 feet. The No. 8 well was to test oil and gas prospects, while the No. 9 well would target gas.

The division says the first 5,500 feet of the Seaview 8 will be perforated to evaluate gas zones, while the bottom-hole location will extend beyond ADL 392667 to explore for oil on fee simple land.

There are three separate stages for each well, beginning with the directional drilling and insertion of surface casing through subsurface of potential hydrocarbon-bearing zones within the Lower Sterling and Beluga formations, with well evaluation including downhole instrumentation. Well control equipment and casing was to isolate gas-bearing zones.

In stage two the well will be deepened beyond the state lease with a lateral horizontal evaluating the Lower Tyonek, Hemlock and deeper formations on fee simple lands.

The third stage will involve evaluating potential hydrocarbon reservoirs by perforating and flow-back testing, following which the well may be temporarily secured or formally suspended while data is evaluated.

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Deep oil at North Cook Inlet

Hilcorp did not plan any exploration or delineation activities at its North Cook Inlet unit in its plan of development that went through May 2019; nor did it have any planned in the next plan submitted April 1, 2018.

The company is redeveloping the unit, which it acquired from ConocoPhillips in late 2016 and got permission from the state to extend an existing plan of development to June 2018.

A plan of development filed in April 2018 represents the first full plan from Hilcorp since it took over the unit and takes a measured approach to activities at North Cook Inlet.

The company launched a "comprehensive field study" to evaluate the remaining potential of the Beluga and Sterling sands and to determine the need for future wells, sidetracks and perforations.

The most exciting exploration news in the plan: Hilcorp says it intends to study the potential of developing deep oil prospects at North Cook Inlet known as Tyonek Deep or Sunfish, which lie under the natural gas accumulation.

Over the years previous operators and farm-in partners have considered a similar venture, but Hilcorp went one step further by installing an eight-inch diameter subsea oil pipeline to the Tyonek platform, the production platform for the North Cook Inlet gas field, as part of its efforts to extend natural gas transmission across Cook Inlet. The new line enables the movement of oil west to east under Cook Inlet.

Hilcorp says the pipeline will not be used unless it makes an oil development decision. Laying of the oil line at the same time as the gas line presumably saves significant cost relative to laying the oil line separately.

In January 1999, having drilled three wells into the Tyonek Deep oil pool, ConocoPhillips pulled the plug on the project, saying that the project was not viable — oil prices were around $10 per barrel at the time.

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Dominant CI producer

Hilcorp is the dominant on and offshore oil and gas producer in the Cook Inlet basin, as of Jan. 1, 2019, operating about 19 fields and units — a number that seems to fluctuate each year due to acquisitions, consolidations and terminations.

On the west side of Cook Inlet, Hilcorp operates the Ivan River, Lewis River, Pretty Creek and Beluga River units.

Offshore, the company operates the North Cook Inlet unit (actually in middle Cook Inlet), the Granite Point unit, the Middle Ground Shoal unit, the Trading Bay unit, and the North Trading Bay unit (middle Cook Inlet) and associated McArthur River field.

On the southern Kenai Peninsula, Hilcorp operates the Ninilchik, Deep Creek and Nikolaevsk units. In the northern Kenai Peninsula, the company operates the Birch Hill unit, the Swanson River unit, the Beaver Creek unit, the Sterling unit, the Kenai unit and the Cannery Loop unit.

Active North Slope producer

On the North Slope, Hilcorp holds four primary properties, the Milne Point unit, the Endicott field at the Duck Island unit, the Northstar unit and the Liberty project which unlike the other three is not currently producing but it is gaining momentum again after several years of delays under its former operator, BP, Hilcorp's partner in the development.

Hilcorp expects Liberty to come online between 10,000 and 15,000 barrels per day, peaking at 60,000 to 70,000 bpd within two years. The company also expects the field to produce as much as 120 million cubic feet of natural gas per day. When actual construction will begin was not known as of April 1, 2019.

Although Hilcorp is a strong producer and a very active developer on the North Slope, it has not been an active explorer.

Hilcorp was the third largest oil producer in Alaska in 2018, behind ConocoPhillips and BP. ●

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Jade cuts deal with Point Thomson owners to drill Sourdough

First new well in eastern North Slope prospect along 1002 border scheduled for early 2020, ExxonMobil keeps 2% overriding royalty

By KAY CASHMAN
Petroleum News


ERIK OPSTAD

For years industry observers saw production at the untapped Sourdough oil discovery on state land next to the border of the Arctic National Wildlife Refuge as key to opening ANWR's 1002 area to oil and gas exploration and development because geologists thought the Sourdough oil pool ran under the border. The court-tested "rule of capture" law would have allowed a landowner such as the state of Alaska and its lessees to drill on a state Sourdough lease and have the right to what that drilling produced, even though it might be drained from adjacent, undrilled, federal land.

While the Trump administration took the first step by planning two 1002 lease sales, the first targeted for October 2019, it now appears a new Sourdough well and its approved state plan of development could be even closer to tapping federal oil, with the well scheduled for early in the winter of 2020.

The Sourdough lease and its two mid-1990's BP discovery wells lie in the North Slope's Point Thomson unit. In November 2018, PTU operator ExxonMobil assigned a 63% working interest in ADL 343112's Tract 32 to Alaska-based independent Jade Energy LLC, retaining a 2% overriding royalty.

This most southeasterly PTU lease with the legacy Sourdough discovery wells runs along the western edge of the 1002 area, which is a narrow strip of coastline set aside for potential development by Congress because of its hydrocarbon-rich geology.

Sourdough is estimated to hold 100 million barrels of recoverable oil, per a 1997 BP press release.

Minor POD problems

In its justification for requesting the divided interest assignment, Jade told Alaska Department of Natural Resources' Division of Oil and Gas it would "pursue drilling operations on the newly-created segment, as part of a farm-out agreement" with ExxonMobil, then-Division Director Chantal Walsh wrote in a Nov. 13, 2018, letter, noting Jade would also become a party to the Point Thomson Unit Agreement.

According to state Division of Corporations filings, Jade's members and managers are Anchorage-based Erik Opstad and Castle Rock, Colorado-based Greg Vigil, who each owned 50% of the company.

Opstad, who oversees Jade's operations in Alaska, is a state of Alaska certified professional geologist who has worked the North Slope for 34 years, including a stint with BP in various roles and as a principal and general manager of Savant Alaska.

The new plan of development, or POD, proposed for ADL 343112 was spelled out in the two-year Point Thomson Unit 2018 Area F POD, submitted Dec. 21, 2018, to the division by Jade. Although Walsh formally told the unit working interest owners — ExxonMobil, BP, ConocoPhillips, Colt and Jade — in a Dec. 27 letter that the POD "as submitted" was incomplete, that fact "in no way triggers the release of Area F acreage." She said Dec. 21, "remains the date of submittal" for purposes of the Point Thomson Unit Settlement Agreement with the state, which dates back to March 29, 2012.

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In other words, the Dec. 21, 2018, submittal satisfied the requirement that a POD be submitted for Area F before year-end 2018, per the unit's settlement agreement, even though the submittal was deemed incomplete.

Jade submitted an amended POD on Jan. 24, 2019, which the division deemed complete on Feb. 4, 2019. Jade provided a technical presentation on the POD on March 4, 2019, and submitted amended versions of both the public and confidential portions of the POD on March 19 and March 29, 2019, respectively.

An April 4, 2019, a division decision signed by James Beckham, acting director, approved the 2019 Area F POD for a period of one year.

More wells possible in 2020-21

Beckham noted that Area F consists of approximately 7,647 non-adjacent acres in the northeastern and southeastern corners of the PTU, reiterating that Jade was majority owner and operator of PTU Tract 32, ADL 343112 in the southeastern portion of Area F.

Based on analysis of the appraisal well data, he said, Jade "will move forward accordingly with additional development at Area F and adjoining areas in the 2020–2021 winter drilling season. Current plans include drilling an additional lateral into the Brookian reservoir and production testing. The need for additional delineation wells and the overall economic feasibility of a field development program at Area F will be considered following the 2020–2021 season."

Proposed early 2020 drilling

The POD turned in by Opstad called for targeting Brookian oil reserves, which was the kind of play found in the Sourdough prospect discovery wells.

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EXXONMOBIL ALASKA

The export pipeline from the Point Thomson field has the capacity to handle up to 70,000 barrels of liquids per day but can be expanded.

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Within the PTU, Brookian reservoirs were "generally interpreted as amalgamated lowstand channel fill and basin-floor fan deposits," the POD said, pointing out that "typically" these reservoir sands in the area were "predominantly" found onshore at depths between 11,000 feet and 12,000 feet true vertical depth, TVD.

New seismic 3-D data was acquired over the Sourdough area by Jade during the 2017-18 winter season, which the company was having evaluated, per the POD.

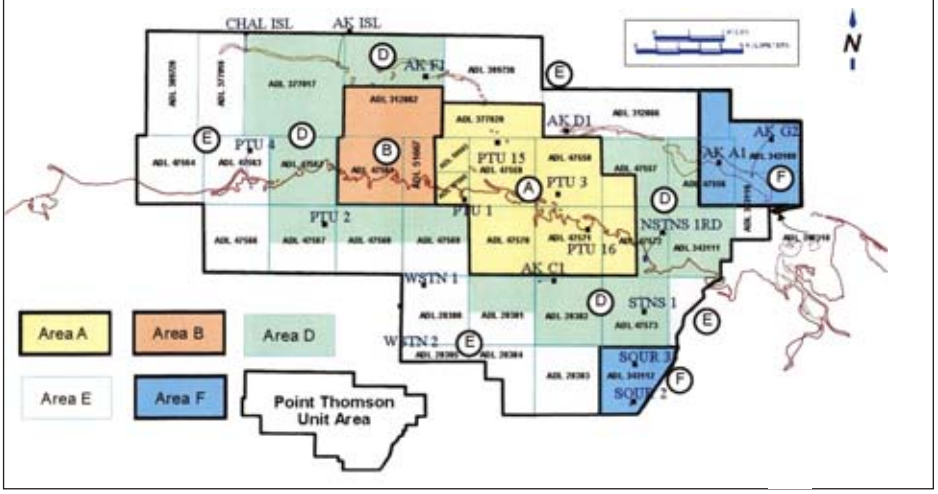
Jade was also "seeking to access additional seismic data and has engaged a well-known consultancy to assist interpreting that data."

When that work was finished the company said it would select an "optimized" well location "to further evaluate the deliverability of the Brookian reservoir," and further delineate "both the vertical and areal extent of the oil accumulation."

The well would be drilled in the first quarter of 2020 and access to the well site would require construction of an ice road. Jade told the division in updated filings it would utilize existing PTU infrastructure to conduct its operations, per an agreement with PTU operator ExxonMobil.

The company intended to gather data from the vertical pilot hole, such as mechanical drilling parameters, LWD data, wireline logs, sidewall and conventional cores, VSP and check-shot information or drill stem test data, the POD said.

Point Thomson Unit



JADE ENERGY

Such information would be "used to determine the suitability of the encountered stratigraphic reservoir section for horizontal well construction. Jade feels that that the deployment of horizontal production wells is a critical element in commercializing the Point Thomson unit Brookian opportunity in Area F, as well as its adjoining areas," the POD said.

"Once a vertical pilot hole is drilled, the well will be plugged back and drilled at a high angle into the Brookian reservoir for completion and an extended production test. Production data gathered at this time would be used to analyze the economic viability of a field development program," per the POD.

At the conclusion of this evaluation the well would be plugged and abandoned or suspended.

Upon completion of drilling and extended production testing, analysis of the data "will be integrated into the Jade 3-D Brookian seismic model."

With those results in hand, a second POD would be prepared and submitted by Jade to the division by Dec. 1, 2020.

Work done to date

As part of the development plan Jade outlined work done to date, noting the Brookian reservoir in Area F had been delineated and characterized by five wells that were drilled in and around the Point Thomson unit since the mid-1970s.

Three of the wells were in the northeast

New seismic 3-D data was acquired over the Sourdough area by Jade during the 2017-18 winter season, which the company was having evaluated, per the POD.

corner of the unit and were summarized as follows in the POD:

• Alaska State A-1 on ADL 047556 was drilled by Exxon and reached a 14,206-feet TVD in September 1975 and was plugged and abandoned. That data was available to the public from the Alaska Oil and Gas Conservation Commission, or AOGCC.

• Alaska State A-2 is immediately adjacent to Alaska State A-1 and was drilled as a cutting's disposal well by Exxon in 1995 to 2,364-feet TVD and was plugged and abandoned in March 2002.

• Exxon spud Alaska State G-2 from ADL 343110 and directionally drilled the well north to reach a bottom-hole at 14,340-feet TVD within ADL 343109 in August 1983. The well was subsequently plugged and abandoned, but AOGCC granted the well extended confidentiality.

The other two wells that characterized Point Thomson's Brookian reservoir were Sourdough 2 and 3 and were summarized as follows in Jade's POD:

• BP drilled Sourdough 2 to 12,562-feet TVD in March 1994 and the well was plugged and abandoned.

• In 1996, Sourdough 3 was drilled by BP reaching 12,475-feet TVD in March 1996. The well was suspended. AOGCC granted both wells extended confidentiality.

Vintage seismic

Various 3-D seismic surveys have been acquired and interpreted over acreage in Area F, including: Point Thomson 3-D in 1989, 70 square miles, with Exxon the operator; Yukon Gold 3-D in 1994, 95 square miles, with BP the operator; and Mammoth 3-D in 1997, 13 square miles.

"Generally speaking, the quality of all these data sets are good and they have been used by the working interest owners to gain a broad overview of the Point Thomson unit Brookian reservoir," the POD said.

Jade has had "access to the Point Thomson 3-D volume and has used that data set to help it characterize the Brookian opportunity at Point Thomson as well."

Stringing the pipeline pearls

A topic of conversation about the Eastern North Slope over the years has been the importance of Point Thomson and its pipeline infrastructure that connected it with the Badami line to the west and ultimately to the trans-Alaska oil pipeline at Pump Station No. 1.

Point Thomson was the most important pearl in a string of prospects between the central North Slope and the border of the 1002 area.

The pipeline infrastructure was especially important to leaseholders with undeveloped oil prospects farther east than Point Thomson, such as Sourdough, Yukon Gold, Stinson and ultimately any future activity in the ANWR 1002 area.

As of March 31, 2019, the PTU line was capable of shipping 70,000 barrels of liquids per day, but could be expanded, PTU owners have said. ●

Editor's note: See related story about 88 Energy and its Yukon Gold prospect in this issue of the Explorers magazine.

Oil Search leads North Slope renaissance

Tackles largest Alaska discovery in decades, ahead 3 more Horseshoe wells, Grizzly prospect evaluation, new exploration block to east

By KAY CASHMAN
Petroleum News


KEIRAN WULFF

The biggest news to come out of Oil Search just prior to this edition of Explorers magazine going into production on April 4, 2019, was a final flow rate potential estimate of 3,800 barrels per day for the newly drilled Pikka B well and sidetrack.

Oil Search said Pikka B/Pikka B ST1, its first of two North Slope wells with sidetracks in the off-road winter drilling season of 2018-19, was a resounding success. The well flowed at a stabilized rate of 2,410 barrels of oil per day, its flow restricted by the capacity of the testing equipment. Based on the productivity index calculated during the final flow test, the well flow rate potential was estimated at 3,800 bpd at a flowing well head pressure of 50 psi.

The Pikka B was spud Jan. 23 at the southern end of the Pikka unit, its target the Cretaceous Brookian Nanushuk formation. Its objective was to assist defining potential resource volumes and reservoir deliverability in the unit.

Challenge with Pikka C

The objective of the second well, the Pikka C/Pikka C ST1, in the central part of the unit was to reduce uncertainty on well deliverability.

During March, logging-while-drilling data was successfully acquired over Pikka C ST1. A flow test program began on March 14, including testing of six stimulation stages within the 3,800-foot-long horizontal section.

Mechanical problems with the test equipment delayed starting of the test and down-hole blockages restricted flow rates and the ability to clean the well out properly.

Despite the down-hole restrictions, stabilized rates of more than 860 bpd were established at 800 psi flowing bottom-hole pressure, with higher peak rates recorded during unloading the well. In addition, modeling of the geological properties recorded in the well indicate the potential for much higher flow rates than observed.

While unlikely to be indicative of the full potential of the well, Oil Search said the test data, combined with the comprehensive data suite acquired, would be fully evaluated and integrated into the forward planning ahead of the FEED decision for the first Pikka unit development project.

Oil Search had previously said it expected a FEED, or front-end engineering and design, commitment for the Pikka project by mid-2019, subject to an Environmental Impact Statement, or EIS, Record of Decision from the U.S. Army Corps of Engineers.

Three more Horseshoe wells

In its 2018 annual results presentation on Feb. 18, 2019, Oil Search said it planned to drill three Horseshoe wells and acquire new 3-D seismic in the area in the 2019-20 winter off-road season.

The wells would help the company decide whether to build a standalone processing facility for Horseshoe or tie it back to the 120,000-barrel-a-day Pikka unit facility, expected to come online in mid-2023.

The focus of the new 3-D seismic would be south of Pikka in the Horseshoe and Grizzly areas, likely seeking other geologic targets not yet encountered in drilling.

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A lot more prospects of interest

Grizzly, south and east of Horseshoe, is the next in a series of oil prospects being pursued by Oil Search.

Some of the other prospects named on a map in the presentation were Atlas A, Atlas B, Kachemach, Antigua, Thetis, Harrison Bay, and far to the east, the Hue Shale, which was part of the block Oil Search partner Armstrong Energy picked up in the November 2018 state of Alaska oil and gas lease sale under the name Lagniappe.

As of April 4, 2019, it was not known whether any of the prospects had since been rejected by the company or if any new prospects had been added since the map was created in the last quarter of 2018.

In its Feb. 18, 2019, presentation Oil Search said it expected to invest $3 billion net in the Pikka development from 2019 to production in mid-2023, increasing its stake to 30-35%. The $3 billion net estimate represented a 35% equity position, per company Chief Financial Officer Stephen Gardiner.

How thick is thickest?

In a presentation on Feb. 18, 2019, Oil Search said the Pikka B well and sidetrack had "intersected the thickest Nanushuk reservoir seen in the field."

Information previously released by state geologists and field operators Oil Search and ConocoPhillips about regional upper Cretaceous Brookian Nanushuk reservoirs showed net thicknesses of oil-bearing sands are some 200 feet at Pikka and 40 to

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Pikka first in series of developments

With more oil potential in the Nanushuk formation to the north and south of its Pikka development west of the central North Slope, Oil Search sees Pikka as the first of a series of potential developments in a fairway between the Colville River and Kuparuk River units, Richard D'Ardenne, Oil Search senior vice president of development, said Jan. 18, 2019.

The Nanushuk reservoir for Pikka actually extends more than 60 miles north to south. And, while the company has not explored the more northerly end of that trend, there is promising acreage to the south, in the area of the successful Horseshoe exploration wells drilled by Armstrong, he said.

The expectation for the Pikka project was an initial processing facility with capacity to handle 120,000 barrels per day of oil. The idea was to repeat that many times in the fairway over the next 10 years, with more projects coming down behind the one that was underway, D'Ardenne said.

—Kay Cashman

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70 feet farther west at Willow. The Brookian is the youngest and shallowest of the petroleum bearing rock sequences on the North Slope and its formations were generally ignored in earlier drilling across the North Slope as explorers drilled deep to find another Prudhoe Bay.

Bringing in another partner

Oil Search expanded its North Slope portfolio in 2018 with lease acquisitions covering more than 215,000 acres (see map) and confirmed that a third working interest partner would be brought into Pikka, Horseshoe and nearby leases as it moved forward in acquiring Armstrong's remaining working interest.

In one of the Feb. 18, 2019, presentation slides, Oil Search said work was underway on the "Horseshoe area Nanushuk reservoir model finalization and well location selections," as well as on a "seismic mega-merge reprocessing project."

"It's hard to believe that in this day and age … a play like this — Nanushuk — could lie essentially unexplored: onshore, shallow oil, near infrastructure with massive room to run and in, of all places, the United States. Who would have guessed?" —Bill Armstrong

Alpine interval at Pikka

Oil Search said it was reviewing Alpine reservoir targets in the Pikka unit to decide on an appraisal strategy. Several unit wells had encountered oil productive Alpine sand in excess of 95 feet thick at a depth of 6,500 feet. (The shallower Brookian Nanushuk wells appear to average 4,100-4,500 feet in depth.)

Armstrong, the initial partner that put together the joint venture with Oil Search and Repsol, started the revival of North Slope exploration by successfully looking for oil pools such as the Nanushuk that had been missed or ignored by previous explorers and developers. Company founder and top executive Bill Armstrong said from the start that there were at least six intervals in

Pikka wells that would eventually be tapped, the largest of which after the Nanushuk was Alpine.

The deeper Jurassic Alpine reservoir was the primary target farther west in ConocoPhillips' Colville River unit, which has been in production for approximately 20 years.

Exercising Armstrong option

As of April 4, 2019, Oil Search had a 25.5% interest in the Pikka unit and adjacent exploration acreage and a 37.5% interest in the Horseshoe block — all to the west of the central North Slope.

Below the Brookian reservoirs lies the Hue shale and HRZ, the source rock for Brookian oil. State geologists have said it appeared the oil migrated upwards from the source rock, along the sloping strata of the Torok and into stratigraphic traps in the Nanushuk.

Oil Search has the option until June 30, 2019, to purchase all of Armstrong and its minority partner's remaining working interest in the Pikka unit and the Horseshoe leases (another 25.5% and 37.5% respectively) as well as an additional 25.5% interest in adjacent exploration acreage for another $450 million. (The initial buy-in was $400 million.)

From state lease records it appeared that some of the lease transfers called for by the option agreement had begun in January 2019.

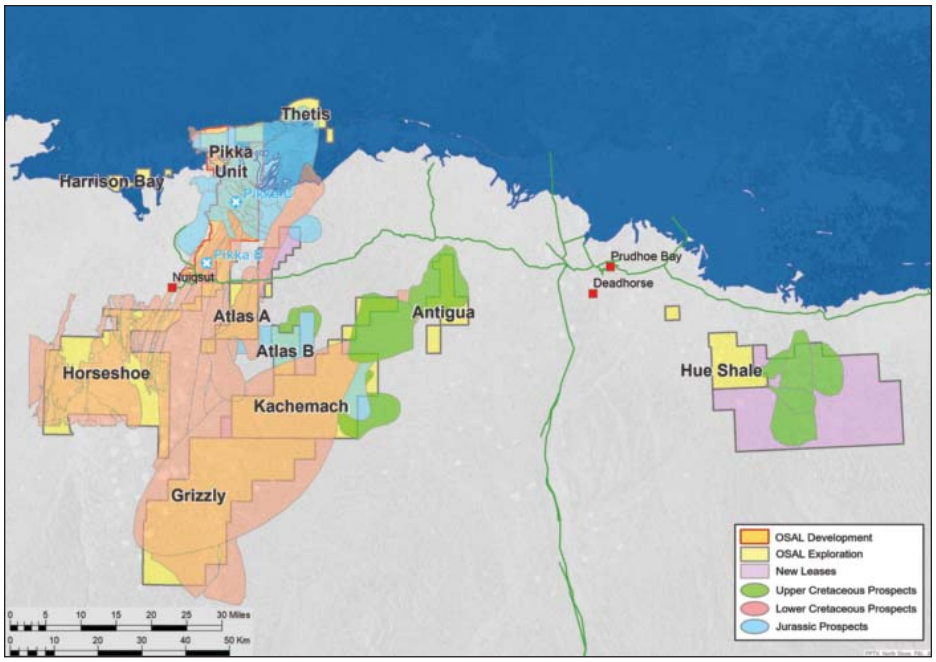
Repsol continued to hold as much as a 49% interest in the Pikka and Horseshoe acreage acquired from Armstrong and its minority partner, depending on the lease.

In summer 2018, Oil Search, aligning with Repsol, set up a data room and began to seriously evaluate companies that expressed interest in buying in as a working interest partner.

Peter Botten, managing director of Oil Search, said in the Feb. 18, 2019, presentation that the task of bringing in the third working interest partner was progressing smoothly with several companies on a "good short list," but the process of identifying potential partners was not yet complete, with the data room still open.

When asked whether they were considering different partners for Pikka and Horseshoe, he said no: "We'll progress it as a matter of urgency over the coming weeks. I think it's pretty clear though that the optimal value is delivered out of these assets by coordinating appraisal opportunities both at Pikka and Horseshoe and beyond."

Armstrong was expected to continue playing a role in Oil Search's exploration strategy, keeping an overriding royalty interest in leases.



OIL SEARCH

The Lagniappe acreage was identified in a regional study, conducted jointly by Armstrong and Oil Search in 2018, as being highly prospective for oil. ... "The leases … capture the entire prospective trend identified by the study, which contains two separate plays. One of the plays identified is analogous to the Pikka oil field, with similar potential materiality, while the other is also a proven and material play in the region." —Peter Botten

Exploring further east

In 2018 Armstrong took the partners to the eastern North Slope in their hunt for oil pools missed by previous explorers, picking up a 195,200-acre block of leases south east of Prudhoe Bay that had only been lightly explored by seismic or drilling.

Lagniappe Alaska, formed in Alaska by an Armstrong contractor just prior to the Nov. 15 bid opening for the 2018 state areawide North Slope oil and gas sale, was the high bidder on the 120 eastern North Slope tracts, bidding an average of more than $82 an acre for a total of $14.1 million.

When Petroleum News tracked down Bill Armstrong under a layer of paperwork concealing his identity, he said the block would be aggressively explored, which was exactly what his company did when it acquired what eventually became the Ooogu-ruk and Nikaitchuq North Slope producing fields, and what was happening at Pikka and Horseshoe. Armstrong has always brought in partners with deeper pockets and a shared interest in exploration and speedy development.

In exercising its option under an area of mutual interest agreement, Oil Search took over operatorship of the Lagniappe block, purchasing a 50% interest from Lagniappe, a 100% owned Armstrong company for approximately $8 million.

"We're trying to continue to make the play that we discovered to the west, the Nanushuk at Pikka," Bill Armstrong told Petroleum News Jan. 30, 2019, about the Lagniappe leases, although not naming the analogous, lookalike formation.

"It is a very subtle play; that's why it has been hidden for so long; it doesn't just jump out at you on seismic. … The amount of running room this concept has is just massive in Alaska. ConocoPhillips is chasing it west, which is great and we like what they are doing a lot, but going east from Pikka we also see the same thing. We're really excited. It's still a wildcat play. It still has risk, but it has huge potential," he said.

"Every well that has been drilled in the surrounding area has indications of hydrocarbons. So, what little well control there is is very encouraging."

Well control refers to the availability of data from wells to provide information

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about the subsurface geology and hydrocarbon potential. In other words, the availability of factual subsurface data from wells provides a level of control over subsurface models built from surface mapping and seismic data.

In addition to the Nanushuk lookalikes, Armstrong sees "a whole other idea that has never been chased that we like but is nothing like the Nanushuk. Yet, it too is exciting and wild and wide open," he said.

"There are so many zones, so many objectives out there on the North Slope that could work. You chase one thing and find another. So many discoveries have been found by accident."

For example, "we were pursing the Alpine and Kuparuk at Pikka and the Nanushuk was just a secondary objective, yet it was the one that worked the best — although the Kuparuk and Alpine worked too," Armstrong said.

"It's hard to believe that in this day and age … a play like this — Nanushuk — could lie essentially unexplored: onshore, shallow oil, near infrastructure with massive room to run and in, of all places, the United States. Who would have guessed?"

What's next for the eastern North Slope block? "Shoot a big 3-D. There's not enough well control and there's some 3-D seismic that has already been shot but we need more coverage, so next season (winter 2019-20) we're going to shoot a big 3-D and the season after that, we are hoping to start drilling," he said.

Exploration lease acquisition strategy

"We are delighted to be exercising our rights under the AMI (area of mutual interest agreement)," which was entered into "to ensure that Oil Search could continue to work closely with Armstrong, which has extensive knowledge of the Alaskan North Slope with a proven and successful exploration lease acquisition strategy," Botten said.

The Lagniappe acreage was identified in a regional study, conducted jointly by Armstrong and Oil Search in 2018, as being highly prospective for oil, he said.

"The leases … capture the entire prospective trend identified by the study, which contains two separate plays. One of the plays identified is analogous to the Pikka oil field, with similar potential materiality, while the other is also a proven and material play in the region," he said, noting leasehold had existing 2-D and 3-D seismic data and nearby wells and pipeline infrastructure.

The potential of the area "is very exciting and, as operator, we intend to explore it systematically," starting with reprocessing existing seismic data and then the acquisition of a new 3-D survey.

"This latest lease acquisition is part of a measured growth strategy in the region, targeting high quality, highly prospective, material value opportunities, which will position the company for a long for a long and successful future in Alaska," Botten said.

"For us, Alaska is a commitment. … We want to be here for a long period of time," Keiran Wulff, president of Oil Search Alaska said Nov. 14, 2018.

Wulff oversees the company's office in Alaska. ●

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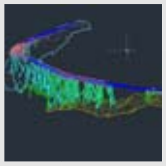

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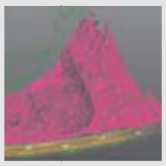

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Pantheon discovers oil at Alkaid

London firm merges with Great Bear, says Alkaid success in Brookian bodes well for nearby Phecda prospect, looking for partners

By KAY CASHMAN
Petroleum News


PAT GALVIN

On April 2, 2019, Pantheon Resources Plc said flow testing in the Alkaid No. 1 well has confirmed a new Brookian light oil discovery just west of the Dalton Highway and south of the Prudhoe Bay unit on Alaska's North Slope. The company is applying to the state for permission to suspend and freeze-protect the well for future use in a field development.

Moreover, Pantheon now views the nearby Phecda prospect as an appraisal well for the Alkaid discovery, rather than a standalone exploration well.

London-based Pantheon Resources, said Jan. 21, 2019, that it closed on its acquisition of two wholly owned subsidiaries of Great Bear Petroleum Operating LLC — Great Bear Petroleum Ventures I and Great Bear Petroleum Ventures II. The 250,000-plus acres of state of Alaska leases, 1,000 square miles of 3-D seismic and two discovery wells that are part of the deal will be operated by the company's newly formed Alaska subsidiary, Pantheon Alaska Petroleum Operating LLC.

Pantheon Resources also has a subsidiary in Texas, where it has operations in Tyler and Polk counties.

Pantheon Resources launched a share issue to raise $16 million, plus expenses, largely to help fund the acquisition and related exploration activities in Alaska.

Exploration, appraisal ahead

In a presentation at a Jan. 14, 2019, annual general meeting in which the 51/49% Pantheon/Great Bear merger was approved, Pantheon unveiled additional exploration plans for 2020-21 and beyond, saying its strategy in Alaska was "to prove up acreage … and sell at a significant premium to a larger company."

Pantheon said 2019-20 drilling will include the Talitha well, which is a re-drill of the 1986 ARCO Alaska discovery well, Pipeline State No. 1. Pantheon holds a 90% working interest in that lease.

The new well will appraise oil sands seen in the adjoining plugged and abandoned ARCO well and "test a topset exploration play analogous to recent major discoveries in the area," Pantheon said.

Extraction techniques "now far surpass what was available in the 1980s," the company noted, saying some 900 million barrels of oil in place had been discovered in three zones plus there was a 1.7 billion exploratory upside.

In 2020-21 and beyond Pantheon would like to drill exploration wells in leases where it now has between 75 and 90% working interest, including a well called Theta, which will test Kuparuk and Brookian (Nanushuk) zones.

Also listed for this time period are the Megrez, Tania and Alula wells.

The Alkaid No. 1 and these other prospects are either on 10 contiguous leases west of the Dalton Highway or five nearby leases straddling the highway.

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The Phecda prospect was also mentioned for this time period in the general meeting presentation, but that drilling appears to have been moved up with the Alkaid No. 1 test results.

Alkaid No. 1 drilled in 2015

Great Bear drilled the Alkaid well in 2015 as a vertical test well but was unable to conduct flow testing in the well because the drilling program was cut short by flooding on the Dalton Highway. The Alkaid well was suspended in to avoid equipment being stranded at location. All zones had been logged and sidewall cores had been taken at the deepest zones, confirming indications of oil in three major zones, from some 4,000 feet to 8,100 feet.

Great Bear had previously carried out an extensive program of 3-D seismic surveying on its acreage and had identified several oil prospects, including the Alkaid. The subsequent suspension of payments of state exploration tax credits under the administration of former Gov. Bill Walker — an action that hit small independents such as Great Bear particularly hard — resulted in a pause in the company's exploration program.

Meanwhile the Alkaid well was suspended until such time as testing could be done.

Alkaid, Phecda single development

The 2019 re-entry of Alkaid No. 1 resulted in a better-than-expected well test, with a flow of 80 to 100 barrels of 40 degree API oil per day from a vertical perforated interval through the reservoir. Horizontal wells will be used in field development, enabling much higher flow rates, Pantheon said.

The main zone of interest in the Brookian was estimated to have 240 feet of net pay within 400 feet of reservoir rock.

"Such flow rates are considered to be an excellent result and indicate the potential for materially higher flow rates when wells are drilled in the typical manner for Brookian wells in Alaska — horizontally, stimulated and with larger intervals perforated," Pantheon said in a March 24, 2019, statement.

Testing of two secondary targets in Alkaid No. 1 at shallower depths proved less successful, with brackish water being found in the West Sak and also inferred to be present in the Ugnu.

"These two projects (Alkaid and Phecda) will now likely be part of a single development plan, favorably located adjacent to the Dal-

ton Highway and TAPS pipeline," Pantheon said. "The better than expected results in the zone of interest will also impact the pre-drill P50 technically recoverable resource estimates which will be assessed in the near future."

Looking for partners

Based in Texas, Pantheon Resources Chief Executive Officer Jay Cheatham said April 2, 2019, "Alkaid has been a great success for Pantheon, exceeding our expectations in the primary target, and upgrading the adjoining Phecda prospect which appears analogous on seismic. … The company will immediately set about reworking and analyzing all key data from our Alaskan program which will include reviewing the pre-drill conceptual development plans on Alkaid as well as formulating plans for future farm out discussions."

Pantheon holds a 100% interest in the production testing operations at Alkaid No. 1. Joint venture partner Halliburton will kick in with a 25% share in the event of a plug and abandon operation, with Halliburton also having the right to buy pack into a 25% working interest in the prospect.

Winx well a disappointment

Four of the Great Bear leases acquired in the merger by Pantheon lie in a block to the west of the central North Slope, south of the Colville River unit and the village of Nuiqsut, and line up with the trend of recent major oil discoveries by ConocoPhillips and Armstrong/Repsol to the north. The area is underlain by the prolific Nanushuk sandstones.

In addition to the successful testing of the Alkaid well, the 2018-19 winter exploration season also included the drilling of the Winx 1 exploration well on the western block in which Great Bear cut a deal with three independents — 88 Energy, Otto Energy and Red Emperor Resources — to cover the cost of the drilling, retaining a 10% interest.

Because Great Bear was the operator of record on the leases, the permits were issued in its name, but the Winx program was actually operated by 88 Energy subsidiary Captivate Energy Alaska.

The Winx 1 was drilled into ADL 391720, the primary target was the Nanushuk with the Torok as a secondary objective.

88 Energy said provisional results of the wireline program indicated "low oil saturations in the Nanushuk Topsets not conducive to successfully flowing the formation. … Reservoir properties appear to be compromised by dispersed clay in the matrix at Winx-1," the company said, noting that clay is often present in successful Nanushuk wells "but in discrete laminations with decent quality, high resistivity, oil saturated sandstones in between."

The clay binds much of the fluid in place so it cannot flow, 88 Energy said, and also occupies pore space within the formation. "This means that, whilst oil is present in the reservoir, there is less of it and it is not mobile."

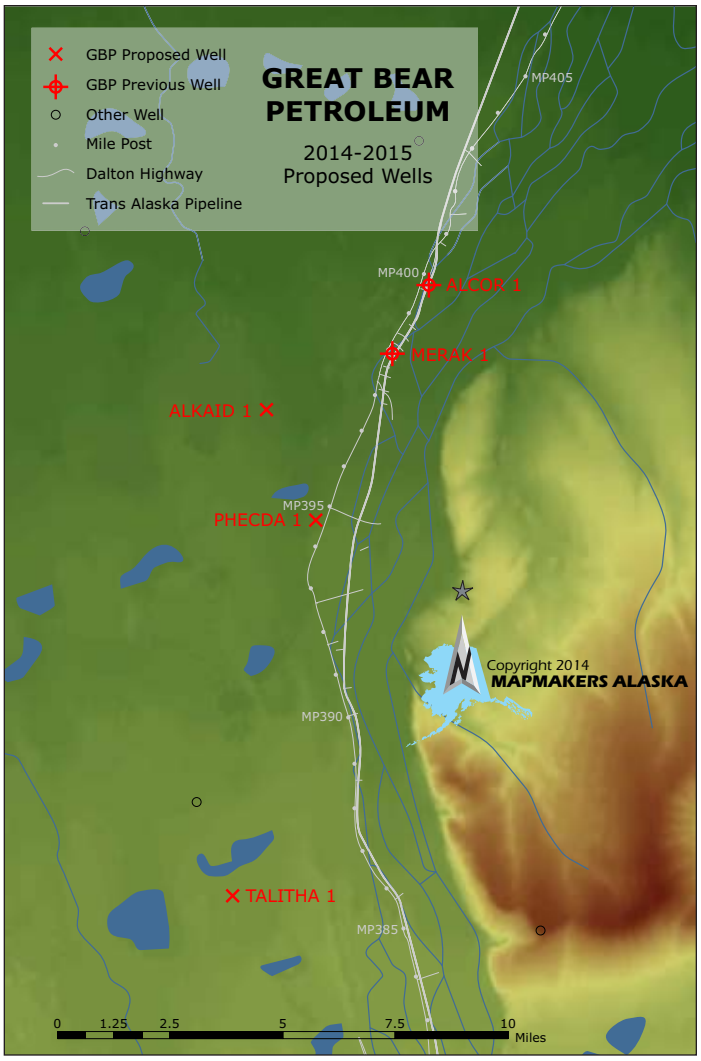
The Torok channel sequence had better reservoir performance than the Nanushuk in Winx 1, but wireline logging showed oil saturation in the Torok zone of interest was also low and not conducive to flow.

Data acquired in Winx 1 will be further evaluated and integrated with the Nanuq 3-D seismic to evaluate remaining prospectivity on the western lease block.

The well will be plugged and abandoned.

Galvin stays

Technically, Cheatham is manager of the company's Alaska subsidiary per Alaska Department of Commerce records.



Many of the wells and prospects on this map are still of interest to Pantheon/Great Bear in 2019. The Alkaid No. 1 well was drilled in 2015 but not tested until the first quarter of 2019.

At the January 2019 annual general meeting, in which a resolution to move forward with the Great Bear deal was approved, Phillip Gobe, a Pantheon executive director, was advanced to chairman.

Gobe has more than 40 years' experience in the U.S. and international oil and gas industry, including several senior positions with ARCO, such as operations manager of ARCO Alaska Prudhoe Bay. Currently Gobe is a non-executive director of former Alaska operator Pioneer Natural Resources and Scientific Drilling International, a provider of directional drilling and measurement equipment and operational services.

Anchorage-based Patrick Galvin, former commissioner of the Alaska Department of Revenue and Great Bear's chief commercial officer and general counsel, has assumed a similar title and duties for Pantheon Alaska Petroleum Operating, effectively running the company.

Founded in 2005, Pantheon is listed on the AIM Stock Exchange, a sub-market of the London Stock Exchange that allows smaller, less-viable companies to float shares with a more flexible regulatory system than that of the main market. ●

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