Petroleum news

page 3 BP names Susan Dio to head its businesses in the United States

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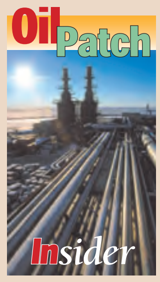
Final OK issued for Oil Search; Climate change writer in Nuiqsut?



OIL SEARCH, ALASKA'S NEWEST OIL AND GAS PLAYER, has received its final regulatory approval connected with the company's acquisition of an interest in Armstrong Energy's Pikka and Horseshoe leases on the western North Slope. The approval, effective March 15, came from Alaska Department of Natural Resources' Division of Oil & Gas Director Chantal Walsh.

Oil Search bought Armstrong and its minority partner's interests at the Pikka and Horseshoe prospects in late October.

At the time of acquisition, Oil Search said the deal was made on the basis of some 500 million barrels of recoverable oil, noting Armstrong estimates were more than 1 billion barrels.

The ASX-listed publicly traded company with offices in Sydney, Australia and Port Moresby, Papua New Guinea, told analysts Nov. 1 that it paid $400 million for a 25.5 percent

see **INSIDER** *page 11*

Furie plans Kitchen Lights well work, may drill exploration well

Furie Operating Alaska is planning a workover of the Kitchen Lights unit No. 3 well and the completion of the Kitchen Lights unit No. A-1 well in its Kitchen Lights gas field in the coming couple of months or so, Bruce Webb, Furie senior vice president, told Petroleum News in a March 19 email.

The work on the KLU No. 3 well will involve putting more perforations into the Beluga formation, to increase gas production, Webb said. Furie anticipates having all of the equipment needed for this operation on the Julius R. platform, offshore in Cook Inlet, by March 25. The work should take about 10 days to complete.

The completion of the KLU No. A-1 well will require the installation of the Moncla Offshore Operations LLC workover rig No. 301 on the platform. Webb said that Furie previously used the rig, operated by Moncla, for well work in 2016. Furie anticipates mobilizing the rig to the platform as soon as sea ice conditions in Cook Inlet permit. The well completion operation should take 40 to 45 days, with gas production from the well starting by

see **FURIE PLANS** *page 10*

State publishes credit payments totaling $75.4 million for 2017

For the second year the Alaska Department of Revenue has released the names and amounts of those from whom the department purchased transferable oil and gas tax credits in the preceding calendar year.

The release is based on a requirement in House Bill 247, passed in 2016, that added an annual reporting requirement.

In a letter to legislators conveying the information, Commissioner of Revenue Sheldon Fisher said $77 million was appropriated to the tax credit fund for fiscal year 2018, including $57 million from the operating budget and $20 million from the capital budget.

He said that per the department's regulations, that amount was used to pay a 16 percent proration of all certificates for which repurchase was requested in calendar year 2016, the bulk being carried forward annual loss credits for calendar year 2015. Fisher said there were a handful of certificates for which payment was not completed due to pending legal issues with the taxpayer, which accounts for the difference between the appropriation and the $75.4 million in purchases the department reported.

see **CREDIT PAYMENTS** *page 9*

FINANCE & ECONOMY

BP on energy trends

Tech Outlook evaluates how energy production, use, may evolve through to 2050

By ALAN BAILEY
Petroleum News

BP's 2018 Technology Outlook report, published recently, presents the results of studies into potential energy trends through to 2050 conducted by BP and eight partner organizations from research institutes. The report sees a future in which natural gas will play a key role, coupled with the growing use of renewable energy sources, improved energy efficiency and the increased use of electric cars. Digital technologies will play an increasing role in the efficiency of energy production and usage, the report says.

However, the report does not attempt to make an energy forecast but, instead, examines technology trends as a means of gaining insights into what might result from technological advances.

The report supports an International Energy Agency estimate that $600 billion per year in investment will be needed to offset oil and gas field decline and to meet growing demand.

In general, the analysis does not factor into its projections the impacts of government policies such as those for addressing climate change. The report does, however, suggest that reaching global climate change goals set in Paris in 2015 is techni-

see **ENERGY TRENDS** *page 12*

NATURAL GAS

BC LNG precarious

Green Party threatens to topple government if it continues to promote LNG

By GARY PARK
For Petroleum News

Whatever the socialist New Democratic Party government of British Columbia might proclaim about its support for LNG development, it is at the mercy of B.C.'s Green Party, whose three elected legislators in an 87-member assembly wield disproportionate clout.

That mathematical reality shapes the thinking of Premier John Horgan faced with an uncompromising stand by Green leader Andrew Weaver, who threatened in January to topple the NDP's minority government if it continued to promote the province's fledgling LNG industry by opening the way to further natural gas development and to exports of gas-based resources.

Meanwhile, the remaining active LNG proponents in B.C. are making little headway in seeking relief from Canadian government duties on imported steel, which would add a prohibitive cost to prefabricated LNG modules that would be constructed in Asia and assembled at terminal sites.

During a trade mission to Asia in January, when he met with Chinese, Japanese and South Korean partners in the Shell-backed LNG Canada project, Horgan effectively delivered the Green message that

see **LNG PRECARIOUS** *page 10*

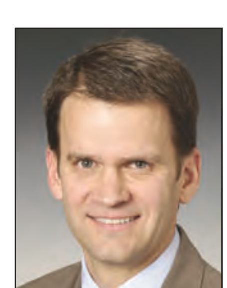
FINANCE & ECONOMY

Price up, production down

Spring Revenue Forecast estimates 11,600 fewer bpd than in fall, but price up $5

By KRISTEN NELSON
Petroleum News

The Alaska Department of Revenue highlighted changes in the spring revenue forecast from its fall forecast, including lower production for fiscal year 2018 — but a higher Alaska North Slope oil price for most of the 10-year forecast period — and lower expected North Slope operating and capital expenditures through 2027.



SHELDON FISHER

The result, the department said March 16, is higher unrestricted general fund revenue, an increase of $256 million for fiscal year 2018 and $212 million for FY 2019, with UGF revenue now forecast to be $2.3 billion in both FY 2018 and FY 2019.

The fall forecast for ANS production was 533,400 barrels per day in FY 2018; the spring forecast is 526,600 bpd, a drop of 11,600 bpd.

But the production drop between the fall and spring forecasts is only for FY 2018.

Beginning in FY 2019, the spring production forecast shows at least some increase over the fall forecast, ranging from a mere 100 bpd difference for FY 2027 to as high as 9,300 bpd in FY 2020. The FY 2019 spring-over-fall increase is 1,000 bpd.

In March 19 presentation to the Senate Finance Committee, Revenue Commissioner designee

see **SPRING FORECAST** *page 6*

● PIPELINES & DOWNSTREAM

RCA grants permit for Cook Inlet pipeline

Temporary permit will enable laying of subsea line during open water season; commission still to rule on certificate changes

By ALAN BAILEY
Petroleum News

The Regulatory Commission of Alaska has issued a temporary construction permit to Hilcorp Alaska subsidiary Cook Inlet Pipeline Co. for the laying of the subsea Tyonek W 10 gas pipeline in Cook Inlet between the Tyonek platform and Ladd Landing on the west side of the inlet. The pipeline comes as part of a Hilcorp project to enable the shipment of crude oil by pipeline west to east under the inlet, thus eliminating the use of the Drift River oil terminal near the Redoubt Volcano.

Carry oil through CIGGS

The idea is to ship oil through one of the existing twin pipelines in the Cook Inlet Gas Gathering System under the inlet. The new Tyonek gas line will extend to the west side of the inlet the existing gas pipeline that connects the Tyonek platform to Nikiski on the Kenai Peninsula. Gas transmission capacity through the Tyonek line will replace the cross-inlet capacity lost through the conversion of one CIGGS line to the carriage of oil.

Although Cook Inlet Pipeline is the operator of the oil pipeline system on the west side of the inlet, the company plans to become operator of the Tyonek pipeline, a gas line. Similarly, Kenai Beluga Pipeline LLC, operator of CIGGS gas carrying system, will become operator for the carriage of oil through the CIGGS line. Hilcorp has said that the business structure and regulatory arrangements for the reconfigured pipeline system will result in the cost of the pipeline project being recovered through the rates for the transportation of oil, with the rates for the transportation of gas across the inlet not being impacted.

Three applications

Hilcorp subsidiaries have filed three applications with the commission, requesting approval of the necessary certificate changes associated with the rejigging of pipeline operatorships, and requesting approval for the pipeline modifications and additions. Presumably in reflection of the complexity of the proposed tariff changes, the commission has deferred decisions on the applications from March 8 to July 20.

But, in recognition of the need to accomplish pipeline construction projects during appropriate construction seasons, the commission has been granting temporary construction permits. In late December the commission approved construction work on the onshore components of the pipeline project. The commission is now allowing offshore pipeline laying to proceed during the Cook Inlet open water season.

Certificate changes needed

However, in its latest order, the commission cautioned that, regardless of the construction permits, the Hilcorp subsidiaries cannot take any action that impacts current or future gas flow in CIGGS, pending commission decisions on components of the applications that the commission is still considering. The granting of temporary construction permits does not prejudge the commission findings in response to these certificate change applications, the commission warned.

Hilcorp has told Petroleum News that it does not anticipate the deferral of the commission decisions into July impacting the pipeline project schedule. Hilcorp has previously said that it hopes to have oil flowing through the CIGGS line by the end of this year. ●

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● FINANCE & ECONOMY

Dio new chairman, president of BP America

Minge, US head for BP since early 2013, led BP in Alaska for 4 years; will chair CCUS study by the National Petroleum Council

By KRISTEN NELSON
Petroleum News

BP has named Susan Dio chairman and president of BP America Inc., succeeding John Minge, who will move to chair a study by the National Petroleum Council.

SUSAN DIO

Dio, a chemical engineer by training, has been chief executive of BP Shipping for the past three years, BP said in a March 20 statement, leading a review and reset of the organization's strategy and operations and overseeing the ongoing renewal of the fleet, a program which BP called the largest in its history.

In a 33-year career with BP and heritage companies, Dio held a series of senior commercial and operating roles in the United States, the United Kingdom and Australia, the company said.

Bob Dudley, BP group chief executive, said that Dio's "breadth of operational and commercial experience gained with BP around the world — including leading our global shipping business, running a major refinery, and managing a chemical plant — make her ideally suited for the key role of representing BP" in the United States. The U.S., Dudley said, is a "vital part of BP." He said the company has invested more than $100 billion in the U.S. since 2006, adding that all of BP's businesses — including exploration, refining and renewables — operate in the U.S. "and together they make up the largest portfolio of businesses we have anywhere in the world."

Minge

Minge, who headed BP America since early 2013, has been with BP for almost 35 years, holding executive and engineering posts in the U.S., UK, Vietnam and Indonesia.

"John has been a superb leader of BP America through a period of great challenge," Dudley said. "He has driven a culture of safe, reliable and compliant operations throughout our businesses, worked steadily to rebuild our reputation, and been a tireless advocate for BP and our industry" in Washington, D.C., and throughout the U.S.

Prior to leading BP America, Minge spent four years running BP's business in Alaska.

He will retire from BP in March 2019.

NPC study on CCUS

Minge will chair the National Petroleum Council study on pathways for commercializing carbon capture, utilization and storage.

The NPC study was requested by Energy Secretary Rick Perry last year.

Deputy Secretary of Energy Dan Brouillette noted in September at a meeting of the NPC that a single oil and gas company injects 26 times more carbon dioxide per day than is handled by the nation's largest and newest carbon capture and storage facility, illustrating why the oil industry is the right group to examine the CCUS issue.

In a letter to the NPC, Perry said the council is well positioned to provide advice to the Department of Energy on the development and deployment of commercial CCUS technologies because companies in the industry "have extensive core competencies in designing, constructing, and operating large-scale capital-intensive energy and industrial projects … (including) some of the world's largest facilities for carbon dioxide capture, processing, and use." ●

Contact Kristen Nelson at knelson@petroleumnews.com

LAND & LEASING

DNR evaluating Nenana exploration license

The Alaska Department of Natural Resources, Division of Oil and Gas, said March 15 that it intends to evaluate an oil and gas exploration license proposal for the Nenana area. The division put out a call for proposals for oil and gas exploration licenses in the Nenana area in January, following a preliminary determination at the end of November which identified acreage west of Nenana which would be available for exploration licensing. Proposals were due March 8. The division said it received a proposal and is now requesting additional proposals, with a deadline for a notice of intent to submit a proposal set for April 16 and proposals due May 14.

The division said it received a proposal and is now requesting additional proposals, with a deadline for a notice of intent to submit a proposal set for April 16 and proposals due May 14.

The division said that if competing proposals are received and the DNR commissioner finds an exploration license should be issued, he will request competitive sealed bids from each applicant.

Unlike the state's lease sales, with the state accepting bids on each tract and the winning bidder paying that money to the state, the applicant for an exploration license bids a dollar amount for work, such as seismic, that it proposes to do.

Exploration licensing is intended to encourage exploration in areas far from infrastructure, with unknown hydrocarbon potential and where there is a higher investment risk to the operator, the division says on its website. It does not apply to areas subject to areawide lease sales.

—PETROLEUM NEWS

GOVERNMENT

Interior considers reorganization

Wants to improve permitting efficiency by standardizing regional boundaries for all of its bureaus; considering other efficiency moves

By ALAN BAILEY
Petroleum News

The U.S. Department of the Interior is planning a re-organization aimed at improved permitting efficiency, Interior Secretary Ryan Zinke told the U.S. House Committee on Natural Resources on March 16, when responding to questions on the proposed new budget for his department. The idea is to establish unified regional boundaries across the department's bureaus, thus enabling the bureaus to talk to each other and work together in a consistent manner, Zinke said.

Based on science and activities

The proposed new regions are defined on the basis of science, using watersheds, ecology, trail systems and wildlife corridors, facilitating a focus on recreational use of national lands, administration of the National Environmental Policy Act and the permitting of activities, Zinke said.


RYAN ZINKE

By way of illustrating the type of problem being addressed, Zinke commented that an activity impacting a waterway carrying trout and salmon, with an upstream dam, a downstream irrigation system, and passing through a National Forest holding, might need permits from five or more agencies: the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Army Corps of Engineers, the Bureau of Reclamation, the U.S. Department of Agriculture and, possibly, the Bureau of Indian Affairs.

"You could have literally multiple biological opinions produced independently by bureaus that don't have the same regions, or don't talk," Zinke said.

13 regions

He said that the U.S. Geological Survey had made a first pass at defining new regional boundaries and had proposed 13 regions. A review by senior executives in Interior then resulted in some adjustments to this initial effort. Communication with state governors over the proposal indicated a strong opinion from the states that there should be a continuing role for Bureau of Land Management state directors, a role that the proposed reorganization would not impact.

According to a document posted on the Interior website, the reorganization will likely to take several years to accomplish. The document says that the current idea is to first launch the concept in Alaska, given the size of the state, the fact that most bureaus are active in the state, regional offices are in a single city, and there is only one state government with which to interact.

However, the boundaries of the 13 new unified regions should take effect in the first half of 2019.

Matrix management

It appears from the Interior document that the proposed new organization will have a matrix structure, with national bureau directors having authority over national issues such as national policies, the budget and workforce planning, while new regional directors for the 13 regions will take responsibility for coordinating functions that are common to multiple bureaus within individual regions. Although regional supervisors within individual bureaus will continue to report to the bureau directors, the regional directors will make the ultimate decisions for each region, taking into account the advice of each bureau's chain of command.

Hub cities

Each regional organization, under a regional director, will be established in a regional hub city. Hub cities have yet to be identified but Zinke suggested to the House Natural Resources Committee that Interior is considering locations where the cost of living is reasonable, so that new, young Interior employees, expected to replace upcoming retirees, can enjoy affordable lifestyles.

And the delegation of more responsibility to the regions under the proposed reorganization should improve relationships between Interior and state and local governments, the Interior document says.

Permitting efficiency

Zinke said that Interior is also looking at other ways of improving permitting efficiency. He commented that, given that the government tends to lag behind innovation, it is important that the regulatory framework incorporates best science and best practices, while also ensuring that there is a threshold for safety, reliability and stewardship.

"It is clear with horizontal drilling and some of the innovations on wind and solar as well that our regulatory framework is not capable of keeping pace with industry innovation, and in many ways innovation improves reliability and safety," he said.

One issue, for example, concerns the permitting of multiple wells in a single oil and gas basin, where all of the wells involve the same regulatory issues. Rather than treating the permitting of each well as an individual project, it may be possible to avoid the repetition of permitting work that is common to all of the wells, Zinke said.

Interior is also investigating the possibility, subject to the constraints of the law, to work in a more integrated fashion with state regulators. For example, rather than repeating actions already taken by state regulators, the federal regulators may be able to assign the front end of a permitting process to the state and then simply complete the tail end of the process, Zinke commented. ●

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● GOVERNMENT

DNR wants protective order authority

Backlog of audits prompts department to ask Legislature for help in dealing with confidential issues arising from royalty disputes

By KRISTEN NELSON

Petroleum News

The Alaska Department of Natural Resources has a backlog of royalty audit disputes awaiting agreement on sharing of confidential data and is asking an authority, similar to that which the Department of Revenue has, for the commissioner to issue protective orders.

The companion bills, House Bill 330 and Senate Bill 175, were referred to the Judiciary and Resources committees in the two bodies; in the House the bill has moved through, and been amended, in both committees, and as Petroleum News went to press HB 330 was in the Rules Committee. A first hearing was scheduled on SB 175 in Senate Judiciary for March 21.

In his transmittal letter Gov. Bill Walker said the department had a "long-standing dilemma" in handling oil and gas sales price information, which is confidential under Alaska law.

The governor said that "impedes the department's ability to effectively audit and enforce royalty payments when multiple companies working the same lease negotiate different prices." Sales contracts provided to DNR by one party cannot be shared due to confidentiality, and DNR "faces administrative obstacles in finalizing the royalty audits."

Multiple owners, different contracts

Ed King, special assistant to the DNR commissioner, told House Judiciary that a section within the Division of Oil and Gas performs audits to make sure the state is receiving its due share based on lease agreements.

Where there are multiple owners the division looks at different contracts and calculates the average of the three highest payments. King said the problem is that the division can't provide contracts to the company being audited because of confidentiality.

The issue relates to royalty in value: When producers sell the oil and pay the state for its royalty share.

There are seven royalty audits pending in the commissioner's office, some $39 million, he said, because in recent years some leaseholders have objected to disclosure to other leaseholders.

King said DNR believes it has the authority to share the contracts, but if there was objection and a court ruled against DNR, it would carry criminal consequences for the person revealing that confidential data. What is being requested, he said, is explicit permission to reveal that information in the context of an audit or an appeal.

He said three departments already have the right to issue protective orders and courts issue them when confidential data arises. They are a common tool used by courts, arbitrators and other agencies, King said.

By providing information under protective order the ability to use the information would be limited and the authority would be discretionary, with the commissioner issuing orders only when necessary to deal with appeals.

Issues

The original bill was general and Usibelli Coal Mine objected, concerned that if an anti-coal mining group were to appeal one of the company's permits it could get confidential financial information on the company.

House Judiciary wanted to have input from industry, and Michael Hurley, director of government relations for ConocoPhillips in Alaska, responded to questions. He told House Judiciary that giving DNR authority to provide protective orders would be helpful. He said it is ConocoPhillips' goal to pay royalties when they are due because DNR has an 11 percent interest rate which accrues on unpaid royalties. Protective orders would be a tool for DNR to be able to share data from other producers, so an average price can be calculated and paid as accurately as possible.

He said there was concern about the broad nature of the authority in the original version of the bill, which could include geological and geophysical information, which is very confidential for companies within a competitive business. Hurley said there were instances when a court has intervened and information has been provided, but he said the process envisioned in the bill would be simpler and wouldn't require taking a dispute to court, which would allow payment in a timely fashion.

House Judiciary amended the bill to limit disclosures to oil and gas. King said that would address Usibelli's concerns. A further amendment limited disclosures to royalty or net profit share audits or appeals, removing the issue of disputes based on geological or geophysical data. King said with that change DNR would have to go to court to get a protective order for geological or geophysical information.

In House Resources

Kara Moriarty, president and CEO of the Alaska Oil and Gas Association, testified when the bill came up in House Resources. She said the House Judiciary schedule came up so quickly that AOGA members didn't have a chance to fully analyze the bill while it was in that committee.

Moriarty said AOGA would like to see royalty settlement agreements exempted because those are contractual. She also said those with access to information should be limited to those directly involved in royalty audits or appeals.

The bill was amended in House Resources to limit those with access to "legal counsel, consultants, employees, officers, or agents of a party" and also to specify that the protective order would only "allow a person to access the information under this sub-paragraph if it is necessary for the person to know the information in connection with the royalty or net profit share audit or appeal" and limit "use of the information to matters related to the royalty or net profit share audit or appeal." ●

EXPLORATION & PRODUCTION

Work moves ahead at Nicolai Creek field

Aurora Exploration is moving ahead with planned development activities in its Nicolai Creek gas field on the west side of Cook Inlet. The company completed the purchase of the field from the bankrupt Aurora Gas at the beginning of January (Aurora Exploration and Aurora Gas are completely separate companies with different ownerships and management).

Scott Pfoff, president of Aurora Exploration, told Petroleum News in a March 19 email that his company has completed the repair of a compressor in the field and that, consequently, gas production has doubled. The company plans the next phase of its development plan, the use of coiled tubing to clear sand from some key wells, in the second quarter of this year. The company expects the well clean out to triple production, Pfoff said.

The development plan for the field also envisages the drilling of an additional development well in the field later in the year.

—ALAN BAILEY

continued from page 1

SPRING FOREACST

As of Jan. 1, the commissioner said, repurchase had been requested for $806,913,934 in tax credit certificates, $398,307,172 for 2016 certificates, $330,140,114 for 2017 certificates and $78,466,648 for conditional 2017 certificates.

As of Jan. 1, there was also $78,320,293 in certificates outstanding, which fall into one of three categories, Fisher said: received by companies but repurchase not requested by Dec. 31, transferred or sold to another taxpayer who intends to use them to offset production liability or held by a taxpayer ineligible for cash reimbursement because that taxpayer produced more than 50,000 taxable barrels of oil per day.

Purchases from 27 in 2017

The department's report included payments made in 2016, when credit certificates were purchased from 12 taxpayers. In 2017, credit certificates were purchased from 27 taxpayers.

see **SPRING FORECAST** *page 9*

● LAND & LEASING

Court rejects motions to dismiss OCS case

Parties have 2 weeks to prepare briefing schedule in case challenging Trump's order opening Chukchi and Beaufort seas for leasing

By ALAN BAILEY
Petroleum News

A judge in the federal District Court in Alaska has rejected motions to dismiss a court case challenging President Trump's order canceling President Obama's withdrawal of large areas of the Chukchi and Beaufort seas from oil and gas leasing.

In October the state of Alaska and the American Petroleum Institute, supported by the federal administration defendants, had filed motions to dismiss the case, with the court subsequently hearing oral arguments in November. On March 19 Judge Sharon Gleason issued an order, rejecting the dismissal motions and setting an expedited schedule for having the parties in the case file a proposed schedule for briefings for a summary judgment.

Trump canceled Obama's order last April, thus opening the way for the possibility of federal outer continental lease sales encompassing areas beyond the nearshore region of the Beaufort Sea that the Obama order did not withdraw. A group of environmental organizations subsequently filed suit in the District Court, challenging the legality of Trump's order.

No one disputes the legal basis for Obama's order. The withdrawal was carried out under the terms of section 1341(a) of the Outer Continental Shelf Lands Act. This section of the act states that "the president of the United States may, from time to time, withdraw from disposition any of the unleased lands of the outer continental shelf." Unfortunately, however, the act makes no statement regarding under what circumstances, if any, a land withdrawal of this type may be reversed.

Plaintiffs in the case argue that Trump did not have the legal authority to reverse the land withdrawals and that his order was unconstitutional under the separation of powers between the president and Congress.

Motions to dismiss the case revolved around whether there is a sufficient legal issue and a sufficiently credible complaint to warrant an appeal against Trump's order, and over whether the District Court has jurisdiction to deal with the case. The federal administration also argued that the plaintiffs do not have the legal right to pursue the case and that, under the separation of powers, the president is immune from this type of legal challenge. The administration also argued that the plaintiffs have not demonstrated an immediate harm that would result from Trump's order.

Judge Gleason, citing various legal precedents and the circumstances surrounding the case, rejected the arguments for case dismissal. Gleason now requires that a schedule for briefings for a summary judgment in the case be shortened to 14 days from the 45-day schedule previously agreed by the parties involved.

"The court is not persuaded that 45 days is necessary for the task," Gleason wrote. ●

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● NATURAL GAS

DNR updates lawmakers on AKLNG work

Commissioner Mack tells Senate Resources department disbanded dedicated gas team in 2016, working with consultants, existing staff

By KRISTEN NELSON

Petroleum News

The Alaska Department of Natural Resources is working with the Alaska Gasline Development Corp. on the Alaska LNG project, Commissioner Andy Mack told the Senate Resources Committee March 21, but on a smaller scale than during the producer-led AKLNG project.

Mack said that when he became commissioner in 2016 DNR had an eight-person team dedicated to gas commercialization, positions budgeted specifically to that task. After the producers indicated they didn't think the project would pass muster as an equity-based project, 2016 became a transition, Mack said. The members of the dedicated team were moved to other positions or laid off.

ANDY MACK

Steve Wright, formerly working interest owner representative for Chevron on the North Slope, was retained as senior advisor and consultant to the commissioner's office, along with Black & Veatch.

Individuals within the department working on gas commercialization, such as DNR's gas commercialization advisor Ed King, also have other duties, Mack said.

King and Wright joined Mack in the Senate Resources presentation.

RIK/RIV decision

Mack said one of DNR's primary responsibilities is the royalty-in-kind vs. royalty-in-value decision.

The statute establishing the state's role, passed as Senate Bill 138 in 2014, specifies that DNR will elect to receive Alaska LNG royalty gas in kind, unless the DNR commissioner finds that taking gas in value would be in the best interest of the state.

Mack said that before entering a contract to take gas as royalty-in-kind the department would issue a preliminary best interest finding, take comments from the public and the Royalty Oil and Gas Development Advisory Board, and then obtain legislature approval before issuing a final best interest finding.

Any royalty-in-kind finding as to come to the Legislature for ratification — that's been the process since there have been royalty contracts in the state, Mack said, and a RIK finding for a gas sale would follow the same process.

A BIF includes an analysis of impacts on Alaska consumers, the Alaska economy and state revenues.

Modeling

Resources Chair Cathy Giessel, R-Anchorage, said legislators would be interested in seeing the modeling the department uses in making its decision, and asked if the department would be able to provide the ranges of gas price and project cost the department was considering. Mack said there would be an opportunity in confidential hearings for legislators to look at the data and for DNR to describe it privately.

Mack said there would be an opportunity in confidential hearings for legislators to look at the data and for DNR to describe it privately.

That would be prior to publication of the BIF, Mack said, adding that he imagined the co-chairs of Senate Finance would also be interested.

Royalty gas disposition

Wright said that under the current project structure, led by AGDC, if DNR elects to take the gas as royalty in kind, the state could sell the royalty gas, and the taxes as gas, to AGDC.

King said the state's royalty share averages 14.5 percent at Point Thomson; at Prudhoe Bay all the leases have a 12.5 percent royalty. There is also the tax component, referred to as TAG, taxes as gas. King said the combination of the two works out to more than 24 percent of what is produced belonging to the state.

Wright said custody transfer of the gas to a buyer would be at the wellhead or at the inlet to the gas treatment plant and said DNR is engaged with AGDC on discussions for a gas sales agreement, which would require a recommendation from the royalty board and legislative approval.

King said that royalty in value would let the producers sell gas for the state. The state would then receive the same value the producers receive, with value determined at the wellhead, less allowable deductions.

Giessel asked if field cost allowances would come before the Legislature for approval. Mack said field costs are negotiated and that many are part of settlement agreements, which means DNR, the producers and the court all play a role.

Benefits, risks

Wright reviewed the benefits and risks of RIK and RIV.

For RIK, AGDC's purchase of royalty and TAG gas would support AGDC's Alaska LNG marketing relationships and the state wouldn't have to audit the producers' gas sales. The risks of RIK include cost allocation for handling and disposing of carbon dioxide produced with the gas, locking in RIK for an initial project term and field cost allowance related to gas processing.

For RIV, the state would have no exposure to negative netback risk and receive value based on the price the producers get. Risks for RIV future uncertainties could include commodity prices and transportation deductions.

On the disposal issue, Wright said that under the producer-led project disposal at the Prudhoe Bay unit had been discussed, with compensation to the unit owner. He said some modeling had been done on reinjection for recovery, or disposal into shallow reservoirs for sequestration, but said that reservoir engineering work had not been completed when the state took over project leadership. ●

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PIPELINES & DOWNSTREAM

Alyeska has 22 million cyberattacks a day

Alyeska Pipeline Service Company's chief information officer said his team fights off about 22 million cyberattacks per day.

Bill Rosetti said that at the Anchorage headquarters for the trans-Alaska pipeline, his team is kept busy by mass, automated attacks — often from servers overseas, Alaska's Energy Desk reported March 14.

"It can be 6 or 7 million some days and 45 million the next," Rosetti said. "I wish I could tell you why it changes that way, but I really don't know."

Rosetti said that Alyeska has never been breached, but the challenge is growing. The rate of cyberattacks has roughly doubled in the last five years, he said.

"The idea here is that we are looking for things to be normal," Rosetti said. "And anything that's not normal is something that needs to be investigated."

Rosetti said a successful cyberattack could interrupt the flow of oil down the pipeline.

Last year, the Department of Homeland Security and the FBI issued a warning that sophisticated cyberattackers have targeted the U.S. energy sector.

Jim Guinn leads the company Accenture's cybersecurity business for the energy, utilities, chemicals and metals and mining industries. Guinn said that as far as he's concerned, the potential consequences of a major cyberattack should be the No. 1 thing keeping energy executives up at night — if it isn't already.

"It could be anywhere from a spill, to loss of the command of the plant itself, to explosion, to loss of life," he said. "It would be no different than losing a platform in the Gulf of Mexico or in the North Sea."

Guinn couldn't speak specifically to the cyber threat facing the trans-Alaska pipeline. But he said the risk isn't going away.

"The reality is, as long as these assets are attached to networks and they are managed the way that they are today, there is a real threat that they could be manipulated for malintent," Guinn said. "It's just the unfortunate world that we live in."

—ASSOCIATED PRESS

GOVERNMENT

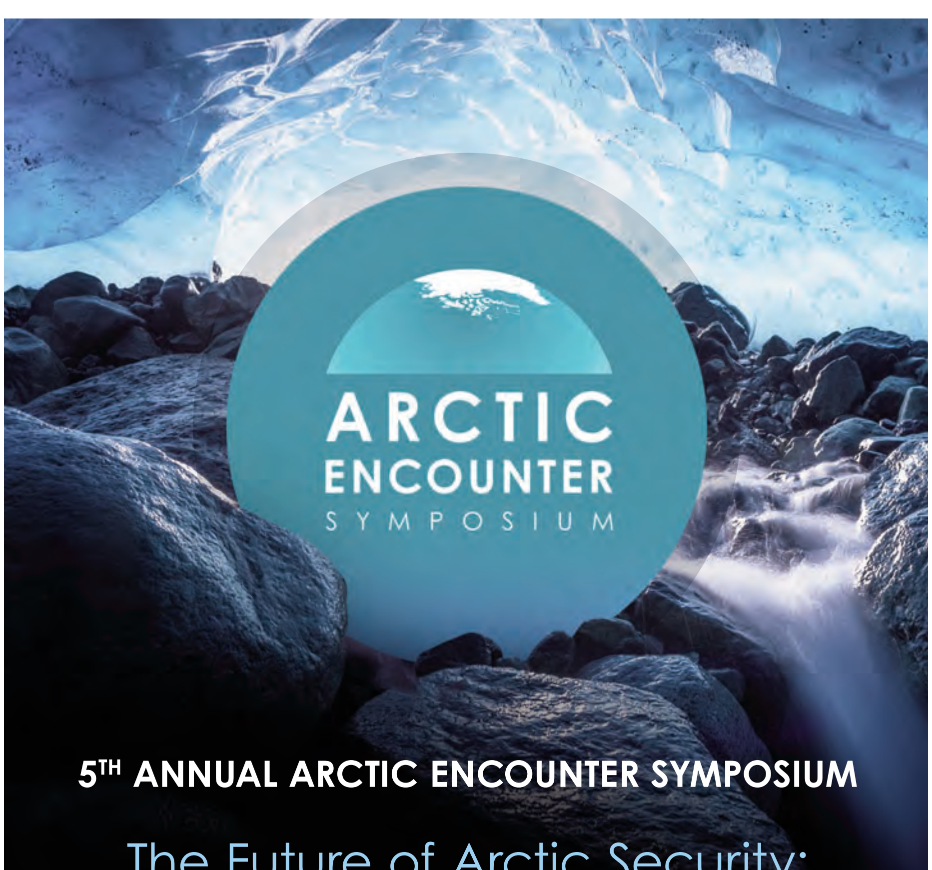
BSEE touts improved inspection efficiency

The Bureau of Safety and Environmental Enforcement has announced efficiency improvements that will enable increased offshore facility inspection time while also reducing the cost of the inspection program. Starting at the beginning of April, the agency's inspectors will access offshore electronic records from onshore, thus freeing up more time for physically checking on offshore operations at the 2,200 Gulf of Mexico facilities, while also reducing helicopter operating expenses by 15 percent, BSEE says. The agency says that the efficiency gains can be achieved without any adverse impacts on safety and environmental protections.

The anticipated cost savings are $20 million over three and a half years.

"This approach greatly improves our inspectors' efficiency, increasing safety oversight at OCS facilities," said BSEE Director Scott A. Angelle. "Our team developed a smarter, safer strategy that provides more physical inspection time offshore and reduces government costs. This makes sense for the American taxpayer and increases our ability to ensure safe operations offshore."

—ALAN BAILEY



● ENVIRONMENT & SAFETY

Feds reconsidering critical habitat rule

Parties agree on dismissal of court case challenging February 2016 change to Endangered Species Act regulations

By ALAN BAILEY
Petroleum News

The federal government is reconsidering its rules for designating critical habitat under the Endangered Species Act, the Alaska Department of Law has announced. The reconsideration follows a November 2016 lawsuit in the U.S. District Court for the Southern District of Alabama, in which Alaska and 19 other states had challenged changes to the regulations, under which the National Marine Fisheries Service and the U.S. Fish and Wildlife Service identify a species' critical habitat, following a listing under the Endangered Species Act.

A critical habitat designation is important in determining what activities a federal or state agency will permit within a region associated with a listed species.

New rule

Contention arose over a rule, issued in February 2016, in which the federal agencies expanded the definition of what could be considered to be critical habitat. The lawsuit challenged that rule, saying that the rule was inconsistent with the terms of the Endangered Species Act and that the rule would expand critical habitat designations into areas not important to a species' survival.

In February 2017, following the change of federal administration in late 2016, NMFS and Fish & Wildlife filed an unopposed request for a stay of the court case, to allow new federal officials to become familiar with the case. On March 15, following a request by all parties, Judge Callie Granada dismissed the case. Apparently the federal agencies have agreed to reconsider the 2016 critical habitat rule.

"We are encouraged that the agencies have agreed to revisit these rules which threaten the use of any land and waters that the federal government arbitrarily decides an endangered species might ever inhabit," said Alaska Attorney General Jahna Lindemuth. "These rules were over broad and contrary to both the spirit and the letter of the Endangered Species Act. The act recognizes the rights of states to be involved in such regulations."

Because state governments must comply with the Endangered Species Act when overseeing activities carried out within states, an expansion to the manner in which the Endangered Species Act is applied impacts the states' sovereign rights, the filing says.

Critical habitat definition

According to the plaintiffs' initial court filing, the Endangered Species Act defines critical habitat as specific areas within the geographical area occupied by a species, within which are found physical or biological features that are essential to the conservation of the species and that may require special management considerations or protection. Other areas unoccupied by the species may trigger an additional conservation requirement, if the government agency can determine that such areas are essential for the conservation of the species.

The filing claims that the new February 2016 rule illegally enables the federal government, without limitation, to designate areas that a listed species does not currently occupy as critical habitat. The rule also enables a government agency to determine that a proposed activity would destroy or adversely impact critical habitat, on the basis that the activity might prevent the eventual development of habitat features that would support a listed species, the filing says.

Because state governments must comply with the Endangered Species Act when overseeing activities carried out within states, an expansion to the manner in which the Endangered Species Act is applied impacts the states' sovereign rights, the filing says. ●

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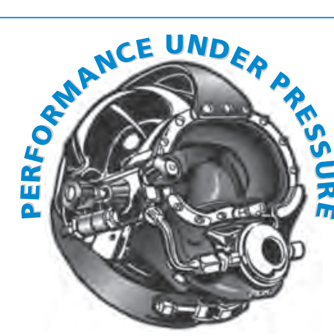

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SPRING FORECAST

Sheldon Fisher said the spring-over-fall change does not reflect a long-term decline in production, but occurred because weather has been warmer than expected, reducing production, along with events impacting specific fields.

Dan Stickel, Revenue's chief economist, said production from Kuparuk was up, while on the down side, Prudhoe was impacted by warm weather, and there were compressor issues at Point Thomson and technical issues at Alpine, so real data for the first part of the fiscal year is being projected out for the remainder of the fiscal year.

ANS oil price

In the fall forecast Revenue expected an ANS oil price of $56 per barrel for FY 2018; the spring forecast is $61, an increase of $5 per barrel. The price forecast is also up for most of the rest of the forecast period, starting at an increase of $6 per barrel and dropping to $2 per barrel, for FY 2019 through FY 2026; by FY 2027 the two forecasts are the same.

The department, Nymex, the EIA short-term and the EIA annual, as well as averages from analysts, range from a low of $60 per barrel in FY 2019 (EIA short-term), to $80 a barrel in FY 2021 from the EIA annual outlook.

Fisher said the department does a broad survey of what others have done. That survey, he said, reflects a narrower consensus around demand than around supply. There is agreement around growing demand, he said, citing a range of projections from analysts as well as from the U.S. Energy Information Administration.

He said the real difference on the supply side is between projections which expect a supply blowout based on strong production growth in the U.S. and Organization of the Petroleum Exporting Countries vs. those that see flat U.S. shale production and disruptions elsewhere — the range among analysts. The EIA has both short-term and long-term cases, with the short-term supply forecast based on declining global petroleum inventories and the long-term EIA reference case based on flat OPEC production with the U.S. the largest contributor to new non-OPEC production.

Cost forecast

The change in North Slope cost projections is a drop from the fall forecast.

Stickel said that compared to fall, the department has reduced the capital forecast for the next several years based on continued cost containment by existing producers and on some delays in projects by nonproducers. He said the department is not forecasting less work by existing producers, just reduced costs to do that work.

ANS capital lease expenditures were projected at $1.812 billion for FY 2018 in the fall forecast; that amount is now forecast to be $1.446 billion. The reduction in forecast capex lease expenditures continues through the 10-year forecast period.

On the operating side, there is a reduction from a forecast $2.746 billion in the fall for FY 2018 to $2.642 billion in the spring forecast, but starting in FY 2021 that flips, with the spring forecast showing higher opex through FY 2023, and then reduced opex through the remainder of the forecast period.

Stickel said the increase reflects operating expenditures once new fields come online.

ANS transportation costs show a decline in the spring forecast beginning in FY 2018 and continuing through the end of the forecast period in FY 2027. Stickel said this is due to a trans-Alaska oil pipeline settlement which reduced the tariff by about $1 a barrel. With the transportation cost reduced, that is an increase to the state, he said. ●

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CREDIT PAYMENTS

Repsol E&P USA topped the 2017 list with $17.8 million in certificate purchases by the state, followed by Caelus (multiple subsidiaries) at $16.9 million and Cornucopia Oil & Gas Co. at 16.3 million. Repsol is a partner at the Pikka discovery on the North Slope; Caelus is the operator at Oooguruk but drilled two exploration wells at Smith Bay in 2015; Cornucopia is the primary working interest owner in Furie Operating Alaska's Kitchen Lights.

BlueCrest Energy, operator at Cosmopolitan on Cook Inlet, was fourth at $6.4 million, followed by Great Bear Petroleum Operating at $5 million, and Mustang Operations Center 1, in which Alaska Industrial Development and Export Authority is a participant, at $3.1 million.

Of those three, BlueCrest is in production, Great Bear is exploring on the North Slope and Mustang is a development not yet in production on the North Slope.

At seventh and eighth in dollar volume, both Caracol Petroleum and TP North Slope Development are involved in the Mustang Development. Caracol sold certificates worth $1.9 million to the state in 2017, TP North Slope certificates worth $1.6 million, bringing Mustang-based state certificates purchases, including the Mustang Operations Center, and a $370,353 purchase from MEP Alaska, to almost $7.1 million.

Other purchases of more than $1 million include from Accumulate Energy Alaska at $1.2 million — the company is exploring on the North Slope; from NordAq Energy at $1.4 million — that company is an original owner and investor in the Smith Bay exploration; and Petro Canada (Alaska) at $1.1 million.

A variety of smaller payments fill out the list.

Ten small working interest owners at the ExxonMobil-operated Point Thomson sold certificates to the state for a combined $341,944.

—KRISTEN NELSON

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LNG PRECARIOUS

LNG projects will first have to meet his province's environmental standards, establish First Nations' partnerships and create jobs and benefits for British Columbians.

He gave no indication if and when Asian buyers might be able to anticipate the first LNG shipments from British Columbia — further proof to many observers that the drain of foreign investment from B.C. will continue unabated.

Mostly negative signals

Since getting elected 10 months ago, the Horgan government has delivered mostly negative signals to LNG proponents, canceling an international LNG conference that had been planned for November 2017, advising delegates and exhibitors that there was "not enough time to deliver an event of this size."

When Malaysia's Petronas announced last July that it was walking away from the Pacific NorthWest proposal, the NDP government was quick to absolve itself from any part in the demise of the C$36 billion project.

Energy Minister Michelle Mungall said Petronas was "very clear ... this was a decision they made because of the economic challenges in the global energy marketplace. The Pacific NorthWest project as proposed was uneconomical."

Backing away from export hopes

Those decisions and the government's lukewarm view of the outlook for LNG send out a clear message that B.C. is backing away from LNG export hopes while creating a global market vacuum that the U.S. is vigorously pursuing.

A month ago, Cheniere Energy signed a 25-year LNG supply deal with state-owned China National Petroleum Corp. for 1.2 million metric tons a year from its facilities on the Texas Gulf Coast, starting this year.

The U.K.-based Financial Times said the transaction is "the first, direct long-term supply contract ... between a Chinese company and a U.S. LNG supplier. Chinese demand for LNG is expected to grow sharply as Beijing looks to cut its coal usage as the country's main source of heating and is set to become the world's top LNG importer by 2030."

Amid an increasingly bleak outlook, B.C. is left clinging to hope that LNG Canada will proceed, encouraged by Shell's recent announcement that it has short-listed two international engineering and construction consortiums for the design, production and construction of a multibillion dollar facility near Kitimat on the northern B.C. coast, promising a final investment decision in the second half of 2018.

Thread of hope

In addition, Shell dangled a thread of hope in Houston earlier in March when its chief executive officer Ben van Beurden told oil and gas executives that his company was eager to invest in LNG.

He reiterated Shell's view that global LNG markets face a supply shortfall by 2020 at the same time U.S. and Canadian gas production is ramping up.

"This is not a bad time to start thinking about LNG investing again," van Beurden said, pointing to signs that the market cycle is beginning to turn.

That presents one of the few threads of hope for Canadian natural gas producers who are desperate to see an LNG project completed in B.C. at a time when pipeline bottlenecks, along with contracting and maintenance issues, have driven Alberta gas prices into negative territory at different times over the past year.

Shell, the world's largest LNG supplier since a US$50 billion merger with BG Group two years ago, published a global LNG outlook in February that forecast a supply shortage of 275 million metric tons over the next few years.

The LNG Canada project could take a 10 percent bite out of that shortage by exporting as much as 26 million metric tons a year.

Cost overruns in Australia

Interest in B.C. has also been attracted by a prospective shuffle of assets involving Chevron and Australia's Woodside Petroleum, which are looking for a way out of the huge cost overruns they have accumulated at the Gordon LNG and Wheatstone LNG joint ventures in Australia.

Woodside said earlier in March that it has axed plans to build a plant at Grassy Point, 20 miles north of Prince Rupert, opting instead to concentrate on its 50-50 Kitimat LNG venture operated by Chevron.

Woodside said it has decided not to renew its rights to develop Grassy Point to export 20 million metric tons a year "after careful consideration of our long-term development strategy in Canada."

The exclusive rights to develop the 1,700-acre site at Grassy Point were won by Woodside, which beat out South Korea's SK E&S Co. and a team of ExxonMobil and its Canadian unit, Imperial Oil.

Chevron has told industry sources it is not contemplating ownership changes in the short-term at Kitimat LNG, but those sources told Reuters that the company is exploring options to sell a minority stake to parties that include Petronas.

The sources also said Chevron is weighing the sale of a stake to a financial investor such as a Canadian pension fund or a private equity firm.

A deal with Petronas could include a commitment to supply gas feedstock over 20 to 25 years to produce 10 million metric tons a year of LNG.

Chevron refused to comment on "commercial matters, rumors or speculation."

Meanwhile, the remaining active LNG proponents in B.C. are making little headway in seeking relief from Canadian government duties on imported steel, which would add a prohibitive cost to prefabricated LNG modules that would be constructed in Asia and assembled at terminal sites. ●

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FURIE PLANS

mid-June, Webb said.

Furie is still evaluating plans for the drilling of the KLU No. 6 exploration well into a deep Jurassic target, Webb said That project would require use of the Randolph Yost jack up drilling rig, which has been moored at Nikiski on the Kenai Peninsula since Furie last used it in 2016. The well is planned for the southwest block of the Kitchen Lights unit.

The Kitchen Lights unit is currently producing gas from two wells: the initial KLU No. 3 discovery well, drilled in late 2015, and the KLU No. A-2A well, drilled in 2016. In 2016 Furie also drilled the KLU No. A-1 well into productive zones but did not have time to complete the well before the end of the drilling season. The well is required under the terms of a gas supply agreement with Enstar Natural Gas Co.

Furie did not drill in 2017 — the company said that the failure by the state to pay tax credits owed to the company, coupled with financial uncertainty associated with state budget negotiations, had compromised the funding for the drilling.

—ALAN BAILEY

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INSIDER

interest in the Pikka unit and adjacent exploration acreage and 37.5 percent interest in the Horseshoe block and the Hue shale.

Oil Search has the option, exercisable until June 30, 2019, to purchase all of Armstrong and its partner's remaining interest in the Pikka unit and the Horseshoe block (another 25.5 percent and 37.5 percent respectively) as well as an additional 25.5 percent interest in adjacent exploration acreage and 37.5 percent in the Hue shale.

In her decision Walsh said the division's approval was contingent on approval by Arctic Slope Regional Corp. Teresa Imm at ASRC was copied on the division's decision.

In a March 21 phone call with Imm, she told PN, "Yes, we're going to approve it, effective March 15."

KEIRAN WULFF

In a Nov. 1 presentation to analysts Oil Search officials said the company planned takeover operatorship from Armstrong in June, a process dependent on the closure of the purchase and related regulatory approvals, but in January, company executive Keiran Wulff, who heads up Oil Search in Alaska and has relocated to Anchorage, said it would likely be sooner.

Oil Search, which operates oil fields in Papua New Guinea, and is a partner in the PNG LNG project with Exxon and Repsol, said the Alaska purchase would be funded from its existing cash position; that there would be no requirement to raise equity.

The company has the option, exercisable until June 30, 2019, to purchase all of Armstrong and its partner's remaining interest in the Pikka unit and the Horseshoe block (another 25.5 percent and 37.5 percent respectively) as well as an additional 25.5 percent interest in adjacent exploration acreage and 37.5 percent in the Hue shale.

Repsol continues to hold as much as a 49 percent interest in Pikka and Horseshoe acreage, depending on the lease.

Armstrong/Oil Search partnership still strong

As reported previously in PN, Bill Armstrong and his company will continue to work in Alaska as Oil Search's partner. The Denver-based independent has turned its offices in Peterson Towers in downtown Anchorage over to Oil Search.

In its initial release of information about the acquisition Oil Search said it "will form a long-term partnership with Armstrong, leveraging its technical capabilities and experience in the identification of additional potential growth opportunities in Alaska," a relationship later confirmed in a meeting between PN, Wulff and Bill Armstrong, founder and president of the Armstrong group of companies.

Oil Search has deeper pockets than Armstrong to fund major exploration and development projects, but the flexibility to move quickly and decisively on opportunities — in other words, an excellent match for Armstrong.

Has anything changed since PN reported on the Oil Search/Armstrong alliance?

No, nothing has changed, Bill Armstrong told PN in a March 20 email.

"Alaska is one of the last best places for opportunities in an otherwise playing field with very little grass on it. Not to say by, any means, that it is easy," he added.

Armstrong's success with revolutionizing exploration in northern Alaska has opened up more possibilities in previously unexplored or barely explored parts of Arctic Alaska, essentially launching a rethink of the potential for finding oil and gas in the Brookian sequence, the youngest of the major petroleum bearing rock sequences (see article about Dave Houseknecht and U.S. Geological Survey on page 1 of the Nov. 17 issue of Petroleum News).

Climate change advocate visits Nuiqsut

ACCORDING TO A PN SOURCE CLOSE TO NUIQSUT, Sabrina Shankman, author of the book "Meltdown: Terror at the Top of the World" and a reporter for InsideClimate News, recently visited the village (unconfirmed by Shankman or InsideClimate News).

Meltdown tells the story of seven American hikers who went on a wilderness adventure in Canada's Arctic — "polar bear country" — and came back with a "tale of terror," per the book's sales description on Amazon, which also said: "Based on interviews with all seven hikers as well as many of the world's experts on polar bears and sea ice, Meltdown tells the story of the hikers' harrowing encounter with a polar bear; the plight of the polar bear in general, facing starvation and extinction as the sea ice melts and its habitat disappears; and of the Arctic meltdown, an advanced symptom of man-made climate change that is touching everyone, everywhere."

One reviewer said the book was a "call for dramatic action on climate change."

On its website, InsideClimate News says it is "committed to establishing a permanent national reporting network, to training the next generation of journalists, and to strengthening the practice of environmental journalism."

Blodgett's work draws attention

ALASKA GEOLOGIST ROBERT BLODGETT is making headlines this year.

A PowerPoint talk he gave at the American Association of Petroleum Geologists in 2011 on the early history of oil exploration in southern Alaska has made the current issue of the Alaska Geological Society's newsletter (pages 6-15).

Plus, part of an article on the North Slope Stinson well that Blodgett and Steve Sutherlin, chief executive of Strategic Action Associates in Anchorage, wrote some time ago showed up in the latest edition of AAPG's esteemed Explorers magazine, titled "Stinson well could be key to Alaska's ANWR."

"This is an excellent trend along the Northwest margin of ANWR, Blodgett told Petroleum News in an email.

Editor's note: Steve Sutherlin is a minority member of Petroleum Newspapers of Alaska LLC, owner of Petroleum News.

Joey Hall heads up Permian ops for Pioneer

FOR THOSE OF YOU WHO REMEMBER Joey Hall, Pioneer Natural Resources former operations manager in Alaska, Hall is currently executive vice president, Permian operations, for Pioneer and a member of the company's management team. He is responsible for planning, development and operations activities in the Permian basin, where the company has the largest Spraberry/Wolfcamp acreage position with decades of drilling inventory.

In Alaska, Hall was responsible for all drilling, production and construction activities. Under his leadership, Pioneer, which was the first company Armstrong Energy brought to the state as a partner, completed the Oooguruk development, establishing Pioneer as the first independent oil and gas company to produce on the North Slope of Alaska.

When Pioneer left the state, it turned its focus to developing its Eagle Ford assets and Hall was tasked with leading that capital-intensive development, beginning as vice president, Eagle Ford asset team, then as senior vice president of South Texas operations.

Hall's attention shifted to the Permian basin when he became executive vice president, Southern Wolfcamp operations.

In 2015, he assumed leadership over all of Pioneer's Permian operations.

So, his position with Pioneer today might be old information to his close friends, but it was news to PN.

—KAY CASHMAN

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ENERGY TRENDS

cally achievable but would require significant policy intervention, to push technology change beyond what would happen otherwise. And, as part of its assessment the report has tried factoring a potential carbon price into its evaluation of evolving technologies around electrical power, transportation and heat generation, and the report does suggest energy technology trends that may result from a drive to reduce carbon emissions.

Wind and solar

The report anticipates rapid growth in the use of wind and solar power, with these technologies becoming major sources of electricity worldwide by 2050. The cost of the technologies is falling rapidly, driven by technical advances and economies of scale. Solar power, in particular, is growing in efficiency.

The downside to wind and solar is the intermittency of their power generation. Considerable cost will be incurred in managing this intermittency through the use of storage technologies such as batteries, and through the use of power from gas, coal or nuclear generation facilities.

Natural gas and oil

The most economical energy technology supporting reduced carbon dioxide emissions consists of the use of natural gas in combination with carbon capture, usage and storage, the report says. In fact, the report anticipates gas continuing to play a significant role as a source of power, for heating and as a transportation fuel in the transition to a lower carbon

The report anticipates rapid growth in the use of wind and solar power, with these technologies becoming major sources of electricity worldwide by 2050.

economy. However, demand for oil will likely remain robust. The report supports an International Energy Agency estimate that $600 billion per year in investment will be needed to offset oil and gas field decline and to meet growing demand.

There is the potential to achieve an around 30 percent savings in oil and gas development and production costs while also substantially increasing the volume of recoverable reserves through new technologies, the report says.

Other primary energy sources likely to remain in significant use include coal, nuclear and hydroelectricity.

The use of high temperature power plants can significantly improve the efficiency of coal-fired power generation, but the use of coal results in relatively high carbon emissions. The use of combined cycle gas-fired systems, with both gas and steam turbines, greatly improves the efficiency of gas fired power plants. Hydroelectric power is a mature technology with improvements likely to be incremental rather than transformational, the report says.

Carbon capture, use and storage technologies may come into use to reduce carbon emissions from fossil fuel plants.

Electricity storage

Technologies for storing electricity, in particular battery technologies, are advancing rapidly. The improved batteries can lower the cost of electric vehicles, while also increasing electric vehicle ranges. Battery technologies set to replace traditional lead-acid batteries may include high density lithium-ion, metal-air, solid-state and fluid-flow batteries. Hydrogen could also be used as an energy storage material.

The report suggests that, where extensive and interconnected power supply networks already exist, centralized power supplies will remain cheaper than distributed, small scale power generation systems. The use of digital technology to optimize power supply operations could create significant savings in the cost of power, while digital technology could also reduce power demand by optimizing power use, the report says.

Electric vehicles

The emergence of affordable and practical electric vehicles will probably transform ground transportation, with electric vehicles, together with hybrid vehicles, likely to account for a large proportion of the fleet of cars and other light vehicles by 2050, as the cost of these vehicles converges with the cost of internal combustion engine vehicles. The report suggests that electric car batteries are likely to fall in cost by three-quarters over that timeframe. The common use of self-driving cars and car sharing will likely impact car purchasing habits and fuel consumption. The use of liquefied natural gas will likely be competitive for trucks and some ships.

The widespread use of electric vehicles will impact power supply systems, both through increased electricity demand and through the need to be able to handle peaks in electricity usage.

The report suggests that bio-jet fuel may become a means of managing carbon emissions targets for the aviation industry. Liquid bio fuels could also be used in road vehicles, with sugarcane ethanol projected to be the cheapest biofuel option.

Heating and efficiency

Natural gas fueled systems are likely to continue to be the most common means of heating buildings. However, a push to reduce carbon emissions to limit global warming to 2 degrees C could cause an increased use of heat pumps, an electrically powered technology for transferring heat into a building. The solar heating of water could become competitive across Europe by 2050.

Energy efficiency will be key both to savings in primary energy use and to reducing carbon emissions. Efficiency improvements can come from vehicle efficiency, building design, the increased use of heat pumps and moving to the use of light emitting diodes for lighting, the report says. There is the potential to use improved efficiency to save about 40 percent of current energy use and reduce carbon emissions by up to 13.5 billion tonnes per year, the report says.

There are significant opportunities for improved efficiency in the production of industrial heat for, for example, iron and steel production. Waste heat could, for example, be recycled, the report says.

Digital technology

Continuing advances in digital technology underlie improvements in the efficiency of energy production and use. Advances in seismic data collection and processing and the use of computer-based analysis for field production optimization are rendering oil and gas production more cost effective. Technologies such as smart-grids improve power distribution and usage efficiency. Digital technology is moving along a path through increasing levels of automation and advanced networking towards autonomous machinery. Artificial intelligence appears set to open new avenues for energy production and usage efficiency.

The report also considers urban air pollution, assessing the causes of pollution in London, Los Angeles and Beijing, cities notorious for air quality problems. It turns out that the pollution arises from a variety of sources, both inside and outside the cities, including road vehicles; the use of gas for heating and cooking; and industrial sources. Diesel powered vehicles are a particular culprit in London. San Francisco has a more diverse spread of pollution sources, while in Beijing pollution comes from coal use in industry, power plants and heating, coupled with emissions from transportation.

Challenge for the future

The widespread use of energy in conjunction with industrialization has brought benefits "undreamed of by previous generations," the report says. But industrialization has also contributed to a growing world population facing increased greenhouse gas emissions, with many people living in overcrowded, polluted cities. The challenge now is to meet an increasing demand for energy while also reducing greenhouse gas emissions and managing water and air pollution. The use of technology for improved energy efficiency coupled with a shift to lower or zero carbon energy sources will be crucial to addressing this challenge, the report says. ●

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