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Taking another look

USGS conducting new NPR-A assessment before also reviewing ANWR potential

By ALAN BAILEY
Petroleum News

Following a directive from Interior Secretary Ryan Zinke to update the estimates of undiscovered oil and gas resources in Arctic Alaska, the U.S. Geological Survey is conducting a new assessment of the National Petroleum Reserve-Alaska and has started the data processing for a new assessment of the coastal plain of the Arctic National Wildlife Refuge, USGS geologist Dave Houseknecht told the Resource Development Council on Nov. 2.

These revised assessments will be followed by a re-assessment of the central North Slope, and of other North Slope lands, Houseknecht said.

The Nanushuk and Torok

The NPR-A assessment is particularly focusing on the resource potential of the Nanushuk and Torok formations, the rock units at the center of recent major oil discoveries in the Pikka unit, at Willow and in South Bay. These discoveries have been made since the USGS last assessed the NPR-A in 2010 and have triggered a rethink of the potential for

Some changes needed

IGU asks for amendments to documents for purchase of Pentex from AIDEA

By ALAN BAILEY
Petroleum News

The Interior Gas Utility is asking the Alaska Industrial Development and Export Authority for some changes to the contractual documents for the sale by AIDEA of Pentex Natural Gas Co. to IGU. Jomo Stewart, CEO of IGU, told the IGU board on Nov. 7.

Robin Brena, counsel to IGU, told the board that IGU has been in discussion with AIDEA over the documentation and was expecting a response to IGU’s concerns. The plan is to have a revised version of the documentation before the IGU board, to enable a decision by the board no later than Nov. 28 on whether to authorize the Pentex purchase, Brena said.

Stewart said that IGU was in the process of organizing a public meeting in Fairbanks, to enable public comment on the proposed Pentex purchase before the board decision. There was dis-satisfaction among members of the IGU board with the proposed purchase.

AGDC signs with Chinese

Deal among 15 inked during Trump visit; agreement terms not revealed

By STEVE QUINN
For Petroleum News

Gov. Bill Walker and Alaska Gasline Development Corp. President Keith Meyer went to China to strike a deal to market liquefied natural gas and they got one — sort of. Alaska signed a development agree-ment with potential gas buyer Sinopec, a bank of China and investor China Investment Corp. Potential being the operative word. They did so in front of respective presidents Donald J. Trump and Xi Jinping. It was among 15 trade deals, according to a White House release.

“Support at the highest level from both countries is very, very important,” Walker said in a conference call with reporters. “It’s the beginning of what we hope is a long relationship between these companies and Alaska. This is the market responding.”

A lot of work remains between now and next year, said AGDC President Keith Meyer, who joined Walker in China and on the conference
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**Senate comments in conjunction with move to open refuge to oil, gas development to raise federal revenue, part of budget proposal**

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**ON THE COVER**

**Oil Patch Insider:** Bill Armstrong staying in Alaska  
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Talerico: Working group has promise

Healy Republican says time is right for the Legislature to get creative toward fostering a competitive oil and gas environment

By STEVE QUINN
For Petroleum News

House Rep. David Talerico may not be in the majority where he held a co-chair position but he’s still plenty busy as a committee member and with his spot on the recently formed oil and gas working group. Arriving to the Legislature with a mining background the Healy Republican has become a quick study on oil and gas, starting most days by checking the market price for Alaska North Slope oil and volume moved that day. Talerico, who is spending these days in Juneau for the special session on crime and tax bills, shared current thoughts with Petroleum News.

This interview took place before AGDC signed the development agreement with Chinese companies.

Petroleum News: Let’s start with the working group. You’re not the chair but nevertheless, a member. What would you like to see accomplished with this working group?

Talerico: Well, I think one of the things that I think we’ve been lacking for quite a few years is stability for our programs. It was mentioned by Rep. Tarr to have kind of an open mind to what else is outside of the realm of just the tax structure. Are there other things we can do on kind of a wide open field that will make it more attractive for industry to continue to expand and do things?

Most of our concern is based on budget and numbers, what the income is, what the output is. Of course, we dealt pretty heavily last session with tax incentives and got that to a point where I don’t know that everybody is completely satisfied with it, I don’t know that everybody is comfortable with it but at least it’s a plan to move forward on. I think the working group probably has an opportunity to look beyond the scope of is it just all about dollars or are there other things we can do.

Talerico: I appreciate that they’ve made good progress with something that’s a little firmer to happen. For me, as much as I’d really like to see this happen, I’ve got big concerns about whether this is economically viable. And I don’t think I’m the only one who shares those concerns.

Petroleum News: What did you see, other than FERC progress that gave you some optimism?

Talerico: I’ll give credit to the people who are involved in the project right now and their enthusiasm, and their professionalism has always been very good. If they lose their enthusiasm, then I’ll tell you what mine is out the window for sure.

Petroleum News: Well (AGDC board chair) David Cruz seemed to be especially bullish on the project during the last update. Did you see it that way, too?

Talerico: Mt. Crude definitely wants to press forward. He feels something is going to break loose here. From what I can tell by his testimony, I think he’s definitely feeling like we have room to advance this.

Petroleum News: A few weeks ago, you received an update from AGDC on the AKLNG project. First from a 30,000-foot view, what are your impressions of where the project stands?

Talerico: I think they have made good progress with FERC. I think that is critical. A FERC permit is absolutely essential to move forward with the project. I have concerns, though about the market, developments from other areas going on and not just onshore developments within our own country. Some things I’ve been going over, for example something I’ve been reading recently where Novatek Gas, a Russian company, and a deal they are striking with China right now for 17 million tons of liquid natural gas. It’s a $27 billion project which is less than our project would cost.

I know the Chinese have been interested to some degree in our project and I know there is some work being done on some letters of intent. I’m anxiously waiting for something that’s a little firmer to happen. For me, as much as I’d really like to see this happen, I’ve got big concerns about whether this is economically viable. And I don’t think I’m the only one who shares those concerns.

Petroleum News: What did you see, other than FERC progress that gave you some optimism?

Talerico: I’ll give credit to the people who are involved in the project right now and their enthusiasm, and their professionalism has always been very good. If they lose their enthusiasm, then I’ll tell you what mine is out the window for sure.
DNR refines Slope production forecast

In second year of in-house forecasts, Division of Oil & Gas notes changes made based on results from last year; production grows

By KRISTEN NELSON
Petroleum News

Alaska has now seen two consecutive years of crude oil production increases and appears to be on track to see a third year of increases, Ed King, special assistant to the Alaska Department of Natural Resources commissioner, told House Finance Oct. 25.

Production averaged 501,000 bpd in fiscal year 2015, he said, rose to 514,900 bpd in FY 16 and to 524,000 bpd in FY 17.

July-October FY 17 averaged 484,581 bpd, and July-October in the current fiscal year, FY 18, averaged 488,792 bpd. King illustrated the short-term forecast for FY 18 (July through June) compared to the FY 17 actuals and the July through October actuals for FY 18. He noted that the forecast varied from the actuals in July and August, but that September and October actuals were tracking the forecast.

King said major increases in FY 16 over FY 15 came from the Colville River unit, some 7,000-8,000 bpd, mostly reflecting CD-5 production. Prudhoe Bay had a similar year-over-year increase and that, he said, is mostly from operational efficiencies, what he called really good management by the operator. There was an increase at Nikanchar which came from new wells. FY 16 to FY 17 increases came from similar sources, with CD-5 continuing to be drilled out and continued efficiencies at Prudhoe.

Industry performance is impressive compared to previous trends, King said. Before the last two years, there was a production decline of about 5 percent a year, he said. FY 17 actual production compared to the trend shows Prudhoe By up some 27,000 bpd; Colville River up some 17,000 bpd, mostly from CD-5; the Kuparuk River unit up some 5,000 bpd, mostly from Drill Site 28. There were also smaller increases at Endicott, Milne Point and Northstar, where Hilcorp has recently taken over operations — and increasing production from older fields is a focus for Hilcorp, he said.

 Asked how much of the Prudhoe Bay increase was operational compared to rework and new wells, King said BP is running only one or two rigs, compared to five in previous years, so this isn’t new wells, it’s something else, describing it as five in previous years, so this isn’t new well. FY 16 to FY 17 increases an increase at Nikaitchuq which came from new wells. FY 17 actual production compared to the trend shows Prudhoe By up some 27,000 bpd; Colville River up some 17,000 bpd, mostly from CD-5; the Kuparuk River unit up some 5,000 bpd, mostly from Drill Site 28. There were also smaller increases at Endicott, Milne Point and Northstar, where Hilcorp has recently taken over operations — and increasing production from older fields is a focus for Hilcorp, he said.

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Asked how much of the Prudhoe Bay increase was operational compared to rework and new wells, King said BP is running only one or two rigs, compared to five in previous years, so this isn’t new wells, it’s something else, describing it as very effective base rate management and deferral management, doing more with that they have and more efficiencies. All the easy oil is gone now at Prudhoe, he said, it is mature and producing at a fraction of its peak rate, which makes it easier to manage the decline rate — you don’t need as much improvement to mitigate a lower decline, King said.

Forecast change

King compared the fall 2016 forecast with the preliminary fall 2017 forecast and talked to the changes. Last year, he said, we didn’t have the last 12 months of data. Analysts looked at what they did have — capital expenditures were down 44 percent and the price was down. He said the assumption was that with capital expenditures reduced (down 44 percent in 2016 compared to 2015) and fewer rigs operating, that the result would be an acceleration in the production decline.

What actually happened, he said, was that operators outperformed expectations — doing more with less.

Not only did production outperform the state’s forecast in FY 17, it outperformed the combined operator forecast, with the operators outperforming what they thought they could do.

By March, King said, it became evi-
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PRODUCTION FORECAST

dent there might be something wrong with the forecast and a revised forecast was issued with a shallower decrease.

King said last year was the first year DNR took over the forecast. Part of the forecast model incorporated some economic testing because the department wanted to make sure projects were profitable before they were plugged into the model. One thing they realized, he said, is that once projects are sanctioned they tend to go ahead. Now, he said, we’re starting to see operators able to find ways to improve — so the model is evolving.

Methodology changes

Paul Decker, a geologist and resource evaluation manager at DNR’s Division of Oil and Gas, noted that this was just the division’s second run through doing the production forecast.

The process was pretty sound last year, Decker said, but some things have been identified for change. Among them, last year future projects with first oil five years beyond the forecast were treated as a “pot of gold” — they were outside the official forecast and five years beyond the forecast were treated as a “pot of gold” — they were outside the official forecast and

excluded from the Revenue Sources Book.

There was also a near-term emphasis this year, whereas last year the focus was on improving long-term predictions. This year there is a near-term emphasis, he said, with attention to a realistic long-range outlook.

And last year some of the under evaluation projects, those not yet fully sanctioned, were not risked for chance of occurrence but counted at full face value. This year, under evaluation projects were risked for chance of occurrence within the 10-year forecast window, there was an estimate of the soonest the project might happen and also an estimate of a realistic delay based on personal experience and analysis of statistics on discovery to development of North Slope fields.

Decker said he was comfortable the division significantly improved the forecast in the way long-term projects are handled. He said time would tell if the details in how long-range projects are handled are correct.

Decker said there is a small uncertainty range for currently producing fields. The methodology for projects under development uses applied quantitative probabilistic ranges using type wells and some financial risk is acknowledged. These are projects detailed in plans of development or in confidential meetings with the Department of Revenue, Decker said.

And projects under evaluation have been announced but are premature for sanctioning, with applied quantitative probabilistic ranges using type wells and a financial risk using project breakeven price, as wells as uncertainties including the chance of occurrence and project timing risk.

Decker presented two forecast graphs: one only for currently producing fields — it doesn’t include under development — and a second graph showing years two to 10 of the forecast with new pools and expansion of some currently producing fields. The methodology for projects under development uses applied probabilistic ranges using type wells and financial risk using project breakeven price, as well as uncertainties including the chance of occurrence and project timing risk.

Decker said the forecast for producing fields shows an almost seamless merger between actual production and the fall of North Slope fields. He said the forecast for producing fields shows an almost seamless merger between actual production and the fall of North Slope fields.

The leak in question, a leak of oil and gas from the wellhead of well 02-03 on Drill Site 2, related to the wellhead geometry, in which the well’s outer casing was set in the permafrost. AOGCC has said, BP, operator of the well, has said that the well was a three-casing design. An investigation by the company determined that the thawing and subsidence of the permafrost around the wellhead had placed a load on the surface casing, causing the casing to break. Subsequently, the detached upper portion of the well had moved upwards, causing the wellhead to strike the wellhead housing, with consequent damage to the wellhead resulting in two leaks, one of oil and one of gas.

BP subsequently announced that it was shutting in all 14 of its wells that have the problematic wellhead. The leak was detected in the 14th of its wells that have the problematic wellhead.

As a further response to a leak of oil and gas from Prudhoe Bay well in April, the Alaska Oil and Gas Conservation Commission has proposed a change to the regulations for oil and gas well construction in Alaska. The proposed regulation would require a well surface casing to be set below the base of the permafrost. AOGCC requires comments on the proposed change by Dec. 20 and plans to conduct a hearing on the subject on Jan. 4.

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ANS oil production up 5% month over month

October averaged 538,206 bpd, up from 512,095 bpd in September; up 2.5% from October 2016; Cook Inlet up 8% September over August

By KRISTEN NELSON
Petroleum News

Alaska North Slope crude oil production averaged 538,206 barrels per day in October, up 5.1 percent, 26,111 bpd, from a September average of 512,095 bpd, and up 2.5 percent from October 2016, when production averaged 525,033 bpd.

The largest month-over-month percent barrel increase was at the BP Exploration (Alaska)-operated Prudhoe Bay field, where volumes averaged 307,086 bpd in October, up 6.2 percent, 17,815 bpd, from a September average of 289,271 bpd and up 3 percent from October 2016 when the average was 298,075 bpd.

Prudhoe Bay as reported by the Alaska Tax Division includes satellite production from Aurora, Borealis, Midnight Sun, Orion, Polaris, Sag River, Schrader Bluff and Ugnu; the Hilcorp Alaska-operated Endicott, Milne Point and Northstar fields; Endicott satellite production at Eider, Minke and Sag Delta; from Badami, operated by Glacier Oil & Gas subsidiary Savant Alaska; and the ExxonMobil Production-operated Point Thomson field.

The Tax Division consolidates North Point Thomson averaged 1,670 bpd in September, down 9 percent from an August average of 1,739 bpd.

Slope oil production by major facilities rather than reporting individual fields, providing daily production and monthly averages. More detailed data, including Cook Inlet and individual North Slope fields and pools, is reported by the Alaska Oil and Gas Conservation Commission on a month-delay basis.

The Tax Division has reported Endicott (including Eider, Minke and Sag Delta; Badami, and Point Thomson) as a separate item, but began reporting those volumes as part of its Prudhoe Bay category on Oct. 1.

AOGCC data show Badami averaged 831 bpd in September, down 3.9 percent from an August average of 867 bpd. Milne Point averaged 18,063 bpd in September, down 11 percent from an August average of 20,296 bpd, and Northstar averaged 7,419 bpd in September, up 7 percent from an August average of 6,929 bpd.

Point Thomson averaged 1,670 bpd in September, down 4 percent from an August average of 1,739 bpd.

ANS crude oil production peaked in 1988 at 2.1 million bpd; Cook Inlet crude oil production peaked in 1970 at more than 227,000 bpd.

Alpine includes satellite production from Fierd, Nanaq and Qannik.

Cook Inlet up 8 percent

With Hilcorp’s Middle Ground Shool field coming back into production, crude oil from Cook Inlet averaged 15,889 bpd in September, up 8.2 percent from August, even though Middle Ground Shool volumes for September were not back to what they had been before the Anna platform was shut down following a fuel gas leak discovered early in the year.

Hilcorp’s Beaver Creek field, Cook Inlet’s smallest, averaged 141 bpd in September, down 17.7 percent from an August average of 171 bpd.

Granite Point, also a Hilcorp field, averaged 2,339 bpd in September, up 0.7 percent from an August average of 2,322 bpd.

BlueCrest’s Hansen field, the Cosmopolitan project, averaged 316 bpd in September, down 8.1 percent from an August average of 344 bpd.

Hilcorp’s McArthur River field, Cook Inlet’s largest, averaged 5,699 bpd in September, up 12.7 percent from an August average of 5,056 bpd.

Middle Ground Shool, which Hilcorp brought back online in September, averaged 652 bpd, the field’s average, 1,750 bpd in January.

Glacier Oil & Gas’ Redoubt Shool averaged 1,702 bpd in September, down 3.2 percent from an August average of 1,759 bpd.

Hilcorp’s Swanson River field averaged 1,848 bpd in September, up 3.4 percent from an August average of 1,795 bpd.

Trading Bay, also a Hilcorp field, averaged 1,990 bpd in September, down 0.5 percent from an August average of 2,001 bpd.

West McArthur River, a Glacier Oil & Gas field, averaged 1,210 bpd in September, down 2.9 percent from an August average of 1,246 bpd.

ANS crude oil production peaked in 1988 at 2.1 million bpd; Cook Inlet crude oil production peaked in 1970 at more than 227,000 bpd.
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ously 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 the USGS on page 1 of this issue).

In its initial release of information 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 recently clarified in a meeting between Petroleum News and Oil Search’s new top executive for Alaska, Keiran Wulff, executive general manager for exploration and new business, Bill Armstrong, founder and president of the Armstrong group of companies; and other top officials with Armstrong and Oil Search.

Traded on the Australian Securities Exchange, 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.

Furthermore, both companies have proven efficient and capable operators.

Keep in mind what Oil Search’s top executive Peter Botten said in his company’s presentation to analysts Nov. 1: Oil Search is one of only two companies in the world where Exxon has ceded operational control of significant parts of its operations to another company (Papua New Guinea LNG).

“We’ve passed all our operating requirements, safety issues, compliance and overall process and development issues audited by Exxon,” Botten said.

The company will use that experience, apply it to, operations in Alaska, he said.

Finally, in its Nov. 1 presentation Oil Search officials spoke of bidding against other companies for Armstrong’s deal, including some that came in with higher bids. It wasn’t a formal auction — just a careful selection by Armstrong to identify the five companies best suited to be their partners in Alaska.

Bill Armstrong, who had been following Oil Search for almost three years, chose the ASX company because he thought it was the best choice to move Alaska exploration and development forward.

—KAY CASHMAN

ANWR LANGUAGE

The idea is that, by avoiding the risk of a filibuster associated with dedicated ANWR legislation, the inclusion of the ANWR provision within the budget reconciliation bill will enable the Senate to approve the opening of ANWR with just a simple majority of 51 votes. The Congressional Budget Office has estimated that the ANWR provision will raise $1.1 billion over the 10-year budget window.

The proposed legislation involves a royalty rate of 16.67 percent for oil production from ANWR, with 50 percent of the royalties going to Alaska and the remainder to the federal government. The secretary of the Interior must hold at least two areawide lease sales within the 10-year window, with the first sale taking place within four years of the legislation being enacted and each lease sale encompassing at least 400,000 acres, including areas with the highest potential for hydrocarbon discoveries. Total surface development on refuge land is limited to 2,000 acres.

The legislation also requires the secretary of the Interior to issue any necessary rights of way for access across the ANWR coastal plain for oil and gas related activities.

The Alaska congressional delegation has expressed its satisfaction with the ANWR proposal.

“This legislation is a tremendous opportunity for both Alaska and our country,” said Sen. Lisa Murkowski, chair of the Senate Committee on Energy and Natural Resources. “The legislation I released tonight will put us on a path toward greater prosperity by creating jobs, keeping energy affordable for families and businesses, generating new wealth, and strengthening our security — while reducing the federal deficit not just by $1 billion over ten years, but tens or even hundreds of billions of dollars over the decades to come.”

—ALAN BAILEY

Contact Alan Bailey at aballey@petroleumnews.com
Hecla Mining Company Nov. 7 said the zinc, lead and gold produced at Greens Creek more than paid for the production costs at the Southeast Alaska mine during the third quarter. As a result, the cost to produce an ounce of silver at Greens Creek was negative US$1.5 cents from July through September. This compares to US$4.80/oz during the same period last year. The all in sustaining costs to produce and ounce of silver at Greens Creek, after by-product credits, was US$4.47/oz during the quarter, compared to US$11.02 during the same period last year. The mine produced 2.3 million ounces of silver and 12,563 oz of gold during the third quarter of this year. This Southeast Alaska operation produced 6.2 million oz of silver through the first nine months of 2017, putting it on pace to produce around 8.5 oz for the year. Mill throughput at Greens Creek averaged 2,391 tons per day during the third quarter, the highest since the mine went into operation in 1989. Greens Creek, however, was not the lowest cost silver producer in Hecla’s portfolio. During the third quarter, the San Sebastian Mine in Mexico produced 880,885 oz of silver at negative US$3.12/oz after crediting for the 6,432 oz of gold also produced there. Hecla’s Casa Berardi Mine in Quebec produced 44,141 oz of gold during the third quarter, a record for the eastern Canada operation. A labor strike continues at Hecla’s Lucky Friday Mine in Idaho. "The third quarter continued Hecla’s strong operating performance, which coupled with higher zinc and lead prices, resulted in silver cash costs, after by-product credits, of negative US$6.1 cents per ounce, the lowest in seven years and allows us to lower our cost guidance," said Hecla President and CEO Phillips Baker Jr. "Both Casa Berardi and Greens Creek set records for throughput and San Sebastian had its strongest silver production of the year. The operating performance combined with lower capital expenditure allows Hecla to continue to generate positive cash flow and strengthen our balance sheet." With the addition of Mark Hamilton as executive vice president of external affairs, the Pebble Limited Partnership continues to build upon an impressive team of Alaska-based leaders as it prepares to advance the world-class Pebble copper mine project towards permitting. "I’m delighted to join the Pebble team as we begin the long and rigorous journey toward permitting a mine engineered to protect the environment and the world-class fisheries of Bristol Bay," Hamilton said. Hamilton is renowned in Alaska for the time he spent as president of the University of Alaska, where he implemented a highly successful program to entice Alaska’s brightest high school graduates to stay in Alaska with scholarships to those that chose UA to further their educations. "Mark Hamilton is among Alaska’s best known and most highly respected residents, in large part for his tremendous accomplishments and service to the state over 12 years as president of the University of Alaska," said Pebble Partnership CEO Tom Collier. While Hamilton’s 1998 to 2010 tenure as University of Alaska president earned him great respect in Alaska, his ability to broker peaceful resolutions in volatile situations during a 31-year career in the U.S. Army earned him high honors on the national level. Highlights from his distinguished Army career include playing a key role in negotiating a peaceful resolution to a 12-year civil war in El Salvador, while heading the US Military Group in the tumultuous country at the time. The following year, his negotiations with Somalian warlords allowed the U.S. to withdraw troops.
Growth of high-grade GT gold discovery continues

GT Gold Corp. Nov. 8 reported additional high-grade gold results from drilling the Saddle discovery at the company’s Tatogga property in the Golden Triangle region of northwestern British Columbia. Highlighted intercepts from the nine holes reported include: 2.59 meters of 42.55 grams per metric ton gold from a depth of 103.23 meters in hole TTD037; 6.6 meters of 12.64 g/t gold and 30.7 g/t silver from a depth of 95.45 meters in TTD040; and 6.87 meters of 10.18 g/t gold from a depth of 463.23 meters in TTD038. Hole 38 extends Saddle South to a depth of roughly 500 meters and the deposit remains open at depth and along strike. “Saddle South continues to deliver excellent high-grade results,” said GT Gold President and CEO Ron Thiessen.

In October, the Pebble Partnership strengthened it technical team with the additions of Stephen Hodgson as senior vice president of engineering and project director, and James Fueg as vice president of permitting. An engineer with more than four decades of consulting and management experience, Hodgson’s résumé includes feasibility-level design, implementation and mine operations at some of the most significant mineral development projects in the world. This list includes the Pine Point zinc mine in northern Canada, Red Dog zinc mine in Alaska, Antamina copper-per-gold mine in Peru, and the Oyu Tolgoi copper-gold mine in Mongolia.

Hodgson has led the engineering group at Northern Dynasty and played a central role on the engineering team for Pebble for more than a decade. In his new role, Hodgson will be responsible for all aspects of Pebble Mine project design, engineering and financial studies, and regulatory compliance. Fueg, an Alaska-based geologist and a geophysicist with more than 25 years of experience in mineral exploration and resource development, will manage all things related to Pebble’s permitting process. This includes management of environmental and socioeconomic studies, liaison with governmental agencies and management of Pebble’s forthcoming environmental impact statement, the key process to mine permitting under the U.S. National Environmental Policy Act.

Considering that Fueg played a similar role in managing EIS and NEPA permitting process for Donlin Gold, another world-class mine project in Alaska, the Pebble Partnership would be hard pressed to find a more qualified candidate.

Already through the most rigorous stages of the EIS processes, a final record of decision for Donlin is expected early in 2018. “We now have a dedicated leadership team in place in Anchorage that is not only committed to the financial and permitting success of the Pebble Project, but one that shares Alaskans’ interests in ensuring our project protects clean water, healthy fisheries and traditional ways of life, while making a profound positive contribution to the people and economies of the region and the state,” said Collier.

With its leadership team in place, the Pebble Partnership plans to initiate permitting for Pebble by the end of the year. “With respect to the other major objective Northern Dynasty has indicated it will achieve this year — that of securing a new major funding partner for the Pebble Partnership — we continue to work on and making excellent progress,” Thiessen said. “We will have more to report before the end of the year.”

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HAMPTON

He has become increasingly concerned about the “end of reason” when it comes to public discussions surrounding politics and resource development in the United States.

Pebble’s newest VP believes that people and governments oftentimes form strong opinions and then refuse to engage in informative and respectful dialogue on the subject — “a don’t confuse me with the facts, I already have my bumper sticker” dynamic. “I believe in reason,” Hamilton explained. “I believe in coming to the table to contest different opinions respectfully and honestly; refusing to hear the evidence that supports opinions contrary to our own signals of the dialectic and the end of reason.”

“That is where the Pebble Project, like so many contentious issues in American life today, stands today but I intend to appeal to my fellow Alaskans to rise above that caustic dynamic, and to consider this project based on its merits — on the facts, rather than on fear,” he added.

World-class team

Northern Dynasty President and CEO Ron Thiessen said the addition of an Alaskan of Hamilton’s stature and credibility is evidence of the Pebble Partnership’s commitment to assembling a world-class senior management and technical team in Alaska.

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NEWS NUGGETS

zinc-rich lower zone. The expansion drilling continued to encounter these zones over a wide area. Highlights from additional holes into the silver zone at AG include: 3.8 meters averaging 256 grams per metric ton silver and 1.1 g/t gold; 3 meters of 12.8 g/t silver and 1.7 g/t gold; 2.3 meters of 98 g/t silver and 3.2 g/t gold; and 120.1 meters of 31 g/t silver and 0.1 g/t gold. Highlights from drilling into the zinc zone at AG include: 30.5 meters of 7.3 percent zinc, 0.2 percent lead, 0.1 percent copper, 6.7 g/t silver and 0.1 g/t gold; 41.3 meters of 5.8 percent zinc, 0.2 percent lead, 0.1 percent copper, 9.7 g/t silver and 0.1 g/t gold; 7.8 meters of 6.7 percent zinc, 0.8 percent lead, 0.1 percent copper, 35.3 g/t silver and 0.3 percent gold; and 6.4 meters of 4.8 percent zinc, 1.5 percent lead, 0.1 percent copper, 46 g/t silver and 0.3 g/t gold. This year’s drilling and mapping provides Constantine with a better understanding of AG Zone geology. To date, drilling has defined this silver- and-zinc-rich zone over a strike length of 225 meters and a vertical dip length of 275 meters, with all edges open to expansion. The company said tight folding near to surface gives way to a steeply-dipping, vertically extensive mineral horizon at depth. This is significant as it opens a very large area for expansion of the zone at depth and along strike. The mineralization encountered at AG correlates with Waterfall and CAP, high-grade surface prospects located hundreds of meters along trend to the northwest and JAG to the southeast. The company said the potential for outlining mineral resources between these areas is excellent. “Drilling to date has demonstrated grade, scope, continuity, and, with all edges open to expansion, obvious potential for scale,” said Constantine President and CEO John Garfield MacVeigh. “The 2017 program provides proof of concept of Palmer’s potential to host multiple deposits, and we look forward to building this theme. We continue to advance the Palmer project with a focus on new discoveries, expansion of the AG Zone, expansion and upgrades of the South Wall-RW Zone, and carbon mineral resource.” All assays for the AG Zone drilling have been received. ●
approaching parity in size with these other deposits but with zones of consider-ably higher metal values,” said Seabridge Chairman and CEO Rod Segedin. “We now see the early development of Iron Cap as a high priority for further study due to its grade, location and size. Revising the project’s mine plan to reflect this thinking would likely have a positive impact on KSM’s projected economics.” The 2017 program at KSM included 10,383 meters of drilling in 11 holes test- ing Iron Cap. All 11 holes returned wide zones of significant grade. Early drilling suggested improving gold and copper grades trending to the west and the pro- gram was accordingly reoriented in that direction in mid-stride, resulting in the higher grades in the latter holes.

Victoria wraps de-risk program at Eagle Gold
Victoria Gold Corp. Nov. 7 said the C$40 million of pre-development activities at its Eagle Gold Mine project in the Yukon are nearly complete. This program, structured to de-risk the earthwork areas of the mine development project and to pre- pare the site for efficient construction activities, included: heap leach embank- ment preparation; control pond construc- tion; project access road and bridge upgrades; pioneering of site roads to the crush- er area and gold recovery plant; upgrades; pioneering of site roads to the main and 3.1 percent copper. Aben said the miner- alization at Boundary Zone remains open. “The success to date confirms our belief that the discovery of the Boundary North Zone could represent a sizable mineralized hydrothermal system,” said Aben CEO Jim Pettit. “Given the new and historic-high grade mineralization and numerous untested gold-in-soil anomalies we look forward to returning to the property next year to continue our exploration in order to unlock the full potential of the Boundary Zone.”

Drilling continues to grow Golden Saddle
White Gold Corp. Nov. 6 said its 2017 drill program continues to expand the Main and Footwall zones of the Golden Saddle deposit on its White Gold property in the Yukon. Highlights from the latest batch of results from Golden Saddle include: 109.7 meters of 1.33 g/t gold from a depth of 39.6 meters in hole WHTGS17RC-011, Main zone inter- cept; 111.3 meters of 2.61 g/t gold from a depth of 47.2 meters in WHTGS17RC-011, Main zone intercept; 34 meters of 1.19 g/t gold from 215 meters in WHTGS17DD-171, a Footwall intercept; 7 meters of 1.8 g/t gold from 205 meters in WHTGS17DD-172, Footwall inter- cept; 16.8 meters of 1.44 g/t gold from a depth of 134.1 meters in WHTGS17RC- 016, a Footwall intercept; 27.4 meters of 1.31 g/t gold from 149.4 meters in hole WHTGS17RC-009, Footwall intercept. White Gold said these results significant- ly extend the Footwall zone to the west, towards surface and down-dip, demon- strating the potential for additional near surface mineralization in undrilled and widely drilled portions of the deposit, as well as increased continuity of the GS Main Zone, and extension toward sur- face. White Gold holds claims covering roughly 1 million acres (390,000 hectares) of the White District. This includes the five claim blocks in the district previously held by Kinross Gold Corp. – White Gold, JP Ross, Black Fox, Yellow and Battle. The White Gold property hosts 9.79 million metric tons of indicated resource averaging 2.7 g/t (840,000 ounces) gold; and 2.17 million metric tons of inferred resource averag- ing 1.8 g/t (125,000 oz) gold, according to Kinross’ reserves and resource state- ment for the end of 2016. White Gold Corp., which closed the deal to acquire Kinross’ White Gold District portfolio in June, began drilling the White Gold property in September. This 4,432-meter program included 31 reverse circulation holes and four diamond holes. Assays are still pending from most of this work and the results will be included in an updated White Gold resource estimate slated for completion early in 2018.

Aben confirms new zone at Forrest Kerr
Aben Resources Ltd. Nov. 6 reported that drilling has encountered broad zones of copper-gold-silver mineralization in the Boundary zone at the company’s Forrest Kerr project in the Golden Triangle region of northwestern British Columbia. FK17-05, drilled in the recently identified Boundary North zone cut 122 meters averaging 1.2 grams per
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**AGDC DEAL**

A call. “We’ve got a year ahead of us where we are looking at moving into definitive agreements and carving out the role of each of the parties,” Meyer said.

Meyer added he believes AGDC could reach final investment decision by the first quarter of 2019 so construction can begin by the end of that year.

“Very important,” to moving into definitive agreements and carving out the role of each of the parties,” Meyer said.

He said he expects to release the newly signed development agreement sometime within a week.

What’s still missing are: an agreement to the scope of work to be done; funding — how much and from whom, including questions over whether the Legislature needs to appropriate more money at a time when they face a $2.8 billion budget gap; a lead engineering and procurement contractor, also known as an EPC; a specified volume of gas to be purchased because Sinopec is not expected to be the lone buyer, rather it will take between 10 to 20 buyers for a successful project.

Former federal pipeline coordinator Larry Persily said the deal is still akin to a memorandum of understanding — nonbinding.

“This is another one of those things where we are really holding hands and we aren’t going steady, but we are still walking in the same direction,” he said. “We aren’t holding hands and we aren’t going steady, but we are still walking in the same direction.”

“I’m not going to say it’s nothing because it’s nice to have potential partners, customers, and investors,” Persily said. “I think a lot of it was politics on the part of the Chinese. Regardless of what you think of communism, they know that making Trump happy makes their life easier.”

Meyer added he believes AGDC could reach final investment decision by the first quarter of 2019 so construction can begin by the end of that year: going to walk in the same direction,” he said. “We aren’t really holding hands and we aren’t going steady, but we are still walking in the same direction.”

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ANWR HEARING

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come through a supermajority of 60 votes, proponents of the ANWR opening see the possibility of passing an ANWR provision with a simple majority of 51 votes, a vote requirement that increases the odds of the bill’s passage.

Both the House and the Senate have passed a budget reconciliation bill that does not make any mention of ANWR but requires the Committee on Energy and Natural Resource to propose a means of raising the necessary revenue. If language to that effect is put into the bill, Murkowski said, presumably referring to the House and the Senate in January by the Alaska congressional delegation, limiting any surface impacts of development to a maximum of 2,000 acres. And the Congressional Research Service has estimated that the federal treasury could gain $48.3 billion to development on the ANWR coastal plain would be to deny Kaktovik, on the Beaufort Sea coast of Alaska, the right to economic self-determination on their own lands. This support for development comes against a backdrop in which drilling on the North Slope has disrupted caribou migration and behavior, Alexander said.

On the other hand, Matthew Ruxford, tribal administrator for the Native village of Kaktovik, on the Beaufort Sea coast of ANWR, told the hearing that the Native village, the Kaktovik Inupiat Corp. and the Voice of the Arctic Inupiat all support the opening of the ANWR 1002 area for oil and gas development. Ruxford said that the Inupiat have decades of experience of working with the oil industry to protect the lands of the region while, at the same time, the industry supports the local communities through jobs, business opportunities and infrastructure investments, including schools and hospitals.

And Richard Glenn, executive vice president for lands and natural resources for Arctic Slope Regional Corp., the Native regional corporation for the North Slope, said that to not allow safe and responsible development of the ANWR coastal plain would be to deny Kaktovik residents and Native landowners in ANWR the right to economic self-determination on their own lands. This support for development comes against a backdrop in which the Native people consider all of their lands to be sacred and in which the people of Kaktovik, like the Gwich’in, depend on the caribou for survival, Glenn said.

Environmental organizations opposed

Environmental organizations remain vehemently opposed to any oil and gas development on the ANWR coastal plain, saying that development poses too high a risk of damage to the region’s fragile environment. Oil exploration and production activities, even with the use of directional drilling, would substantially undermine ANWR’s purpose to protect the wilderness, wildlife and subsistence lifestyle of the region, Lois Epstein, Arctic program director for the Wilderness Society, told the committee hearing. The ANWR coastal plain forms the biological heart of the refuge and is one of the wildest and among the most beautiful landscapes in the country, Epstein said.

Epstein said that, as oil development expanded from Prudhoe Bay, caribou from the Central Alaska herd moved their calving grounds to the south, and that there is evidence of a decline in nourishment for caribou using land immediately east of the developments.
entourage. Does that contribute to your optimism?
Talerico: It’s certainly not going to hurt my optimism at some degree. The juncture may well very produce something, but when I read that Novatek is cutting a deal with China — in fact, the article said Novatek could supply that by next year — that gives me pause because when you are out on the open market and you need that product, you’re going to go with the best deal that it’s got. It sounds like they are doing that. It is a letter of intent with us a serious endeavor or a negotiation tool appropriate some degree to want to get deeper into that for sure and see where we are headed.

Petroleum News: What would you like to hear next from AGDC? I believe by year’s end they said they would have something more definitive for you.
Talerico: I would need something that is beyond a letter of intent to continue to look into the project. Is it a purchase agreement? Yeah, probably it is. Then, it’s probably all about volume. We have an idea of the expense on the project. There has to be that cut-off point where you have got to move so much now before it breaks even. Probably one of the most difficult things is long-term contracts might be necessary for a project of this size. I’ve seen spot market LNG sales out there flowing in a boat ready for a buyer. Some of the different contracts I’ve read about throughout the Pacific Rim, some of those are short-term contracts. I just can’t get that wrapped around my head as it’s really been. If there is potential for them to have that go well. It would be great news for us. Of course people are talking about the 90-10 split and the 50-50 split and all other things like that as well. But the development of that, as an Alaskan, I think it’s good. It’s like Alaskans going to work. It has to be done right. There is no question about it, it has to be done right. It’s an environmentally sensitive area. I think we have the technology to do it right. We have the ability to do things right. Talk about good government, you know sometimes it’s not just about state coffers. It’s about ability for us to have the ability to live. What I would hope is if we move forward, we have that opportunity to have more work for folks up on the North Slope.

Petroleum News: If things move forward, the state and federal government, as well as any developer, will be under heavy scrutiny. Is that how you’d want to operate?
Talerico: Not really. But I think everyone has grown accustomed to the fact that we have to be incredibly responsible when we do these things. You just can’t go out wholesale and do whatever it is you want to do. You have to consider the environment around you. No doubt if this moves forward we will be under a microscope. Whoever is operating out there will be under a microscope. Although the microscope is pretty big right now. There have been hiccups and little spills, but when you look at the volume that has been moved compared to the issues we’ve had, it’s very impressive. Technology has come a long way. It’s got a lot of innovative things, but you’re right: I think we’ll be under a microscope anytime we move into that area.

Looking at some of the operations reports and safety reports from people who have operated up there, particularly in the last several years, they are very capable of doing it in a sensitive area and operating really well. I think they’ve done a great job.

Petroleum News: Because of the proximity to Point Thomson, could Point Thomson become a nexus between the 1002 Area and the production facilities in Prudhoe Bay?
Talerico: I definitely do. If there is a discovery there and a responsible way of getting the results of that, I think it’s my understanding that the FERC permit has a shelf life. Say it went five or seven years and it expired, you would still have all of that data, all of your fee and you would be able to go to the approved permit stage. I hate to shelve it. I’d rather see it move forward. But if we can’t afford it and the gas price isn’t there, that’s okay. I think we would have to do it. It also gives us a previous history.

I understand we are trying to get into that market, we are looking for that customer and we are looking very hard, but as far as longevity of contract, those are big concerns for me.

Petroleum News: Speaking of a certain market, I may not want to be in a long-term contract, at least a minimal volume that is produced and you had some long-term contracts, at least a minimal volume that is produced and you would be able to sell that.

Talerico: That’s a great question. I’m still got a laundry list of different things of where we’ve been. So much of that is going to hinge on interest. There were recent lease sales that had a little bit closer than the state has in years.

Talerico: It does provide a lot of optimism. In fact, I think the state is as close as it’s going to be right now. We’re in a position to have a lot of oil. It would be great news for us. Of course people are talking about the 90-10 split and the 50-50 split and all other things like that as well. But the development of that, as an Alaskan, I think it’s good. I see Alaskans going to work. It has to be done right. There is no question about it, it has to be done right. It’s an environmentally sensitive area. I think we have the technology to do it right. We have the ability to do things right. Talk about good government, you know sometimes it’s not just about state coffers. It’s about ability for us to have the ability to live. What I would hope is if we move forward, we have that opportunity to have more work for folks up on the North Slope.

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Air Liquide signs contract with Kinetrex Energy

Air Liquide Engineering & Construction said it has been selected by Kinetrex Energy to upgrade their North Pole LNG production unit in Indianpolis, Indiana, by replacing the cold box with the SmartFin proprietary technology. This state-of-the-art, single mixed-refrigerant technology for small to medium scale plants will enable Kinetrex Energy to increase the plant capacity and leverage its existing assets for clean fuel solutions.

The upgraded LNG plant, using Air Liquide technology, is expected to start operation by the end of 2018.

As a pioneer in LNG, Air Liquide has delivered more than 20 LNG liquefaction facilities worldwide over the past 50 years. Air Liquide successfully re-entered the LNG market in 2015 and has achieved commercial successes by leveraging its strong expertise in cryogenics and gas treatment.

Kairos patents solution aimed at aging oil fields

Kairos LLC, a subsidiary of NANA WorleyParsons LLC, said it has developed and patented the mobile Arctic production system that aims to encourage oil exploration and development on the North Slope of Alaska. MAPS provides an ideal solution for marginal oil fields with smaller reserves that may not be economically viable to develop using conventional methods, or as an interim oil production solution prior to full project development.

MAPS was designed in response to the low price of oil and provides North Slope operators an option for developing oil reserves on the fringes of existing oil fields or other smaller deposits without a high-capital investment. Alaska is being drastically impacted by low oil prices and Kairos said it is confident that this approach to responsible Arctic development can grow existing investments and spur new investment in Alaska’s oil and gas industry. MAPS fills an untapped niche in our currently challenging economy as an innovative, sustainable solution, the company said.

Kairos will be showcasing MAPS at the Resource Development Council’s 38th Annual Alaska Resources Conference, scheduled for Nov. 15-16 at the Dena’ina Center in Anchorage.

Lynden Air Cargo answers the call for emergency aid

Lynden Air Cargo said recently that it answered the call on Sept. 8 to mobilize relief flights for Hurricanes Irma, Jose and Maria. “We began flights into the Caribbean on Sept. 17 once there was a clear identification of needs,” said Rick Zerkel, Lynden Air Cargo president. Lynden is currently under contract with Diplomat Freight Services to provide continued air support for sites in the Caribbean.

Lynden Air Cargo has been conducting flights through DFS, the Federal Emergency Management Agency, the Red Cross and other supporting agencies and governments to bring in food, water, trucks, fuel and other disaster response supplies. “We anticipate we will be flying continuously for quite some time — there is no indication that it will be slowing down any time soon,” said Zerkel.

As of late September, Lynden aircraft have flown to the following locations based out of Curacao, Aruba and Miami: St. Martin, San Juan, St. Thomas, St. Kitts, Anguilla, British Virgin Islands, St. Croix, Grand Turk Island and Providenciales Island. The company is especially grateful to their flight crews and flight operations staff who have performed admirably while working under constantly changing conditions with limited information.

Editor’s note: Some of these items will appear in the next Arctic Oil & Gas Directory, a full color magazine that serves as a marketing tool for Petroleum News’ contracted advertisers. The next edition will be released in March.
Therriault comments on Houston LNG

During public comments at the Nov. 7 board meeting of the Interior Gas Utility in Fairbanks, Gene Therriault, team leader of the Alaska Industrial Development and Export Authority’s Interior Energy Project, made a statement about a proposal by a group from Knikatnu Corp. to build an LNG plant next to a railroad spur near the town of Houston, for an increased supply of LNG to Fairbanks. As previously reported in Petroleum News, the Knikatnu group has been working with industrial manufacturing company Siemens on the Houston LNG concept, as an alternative to the expansion of an existing LNG plant owned by Pentex Natural Gas Co. near Point Mackenzie.

Knikatnu is the Native village corporation for the Knik and Wasilla areas.

The Knikatnu group and Siemens presented their concept to the AIDEA board during the public comment period of AIDEA’s Oct. 26 meeting. The group has said that it has been unable to obtain a slot in any AIDEA board meeting and that, as a result, it had to resort to providing a presentation as a series of three-minute comments by group members during the public comment period.

During the board meeting, the board and Therriault indicated that the Knikatnu group would have opportunity to submit their plan as an option, in response to a request for proposal the expansion of the Point Mackenzie plant. The plan to expand the existing plant derives from a request from AIDEA in 2015 for competitive bids for expanding natural gas or propane supplies for Fairbanks.

Met with group in 2016

In his comments to the IGU board, Therriault said that he had met with the Knikatnu group in October 2016 and viewed a short presentation on the Houston proposal. At that
A top down, bottom up approach in the NPR-A

As in all U.S. Geological Survey oil and gas assessments, the new assessment that the agency is conducting for the National Petroleum Reserve-Alaska will involve deciding on high level, major assessment units to use for evaluating resource quantities, and then using seismic data to identify potential hydrocarbon traps within each assessment unit. USGS geologist Dave Houseknecht told a public review meeting for the assessment in Anchorage on Nov. 7. By assigning potential ranges of hydrocarbon volumes to each possible trap and then using statistical techniques to combine the estimates for all of the traps, it becomes possible to derive an estimated range of volumes for each assessment unit, and then for the region as a whole.

An assessment unit consists of a geologic scenario with hydrocarbon potential within a defined geographic area. And USGS assesses volumes of resource that are technically recoverable, without considering any economic constraints on the feasibility of hydrocarbon production, Houseknecht explained.

Regional Nanushuk/Torok assessment

The new assessment will review all NPR-A hydrocarbon plays but anticipates much of the impact of the new assessment coming from the hydrocarbon potential of the Nanushuk and Torok formations, the two rock units involved in recent major oil discoveries on the North Slope. The plan, in fact, is to conduct a Nanushuk/Torok assessment for the entire region bounded by the landward limit of the outer continental shelf — total assessed hydrocarbon volumes will then be allocated between federal and other lands, Houseknecht said.

The USGS scientists are still determining what assessment units to use but anticipate having separate units for the Nanushuk and the Torok. Geographically, assessments units would be bounded to the east, in the area of the Canning River, by the maximum extent of the marine shelf margin over which the sediments that formed the rocks were laid down. Assessment unit boundaries to the north and west would be bounded by the start of the outer continental shelf.

To the south, a region immediately north of the Brooks Range is characterized by the likelihood of hydrocarbon traps formed structurally, from the folding and faulting of the rocks that are characteristic of this region. This region is also see NPR-A APPROACH page 20

Continued from page 1

another look

Finding oil and gas in the Brookian sequence, the youngest of the major petroleum bearing rock sequences in Arctic Alaska. In fact, the new oil discoveries had in themselves caused USGS to plan an updated NPR-A assessment, Houseknecht said.

In part, progress towards a new assessment depends on access to new data: New independent oil companies operating in Alaska are proving particularly helpful in giving the USGS scientists ready access to data and rock samples, Houseknecht said. The USGS has also been reviewing 3-D seismic data from NPR-A and is waiting for the release by the Alaska Department of Natural Resources of new data that becomes available as a consequence of tax credit rules.

NPR-A first

Currently the USGS scientists are in the process of gathering public input for their NPR-A assessment, before moving behind closed doors to conduct the assessment without external influence.

Houseknecht emphasized that, apart from an area along a geologic structure called the Barrow Arch, along the Beaufort Sea coast, Arctic Alaska remains essentially unexplored for oil and gas, with just a thin scattering of exploration wells. The offshore is also underevaluated by global standards, he said.

“It’s really an exceptionally immature area in terms of exploration density,” Houseknecht said of the region as a whole. The Barrow Arch, a structural high in the subsurface geology, has been a focus of exploration and development for good reason, given that it forms a kind of under ground ridge, towards the crest of which oil and gas migrates upwards from prolific source rocks to the north and south. And the earlier oil fields discovered on the arch have traps with strong structural components, in which the folding and faulting of the rock strata have juxtaposed reservoir rocks against strata that seal hydrocarbons from escape to the surface.

Stratigraphic traps

But the development of the Alpine oil field in the Colville River Delta region, together with the more recent Torok and Nanushuk discoveries, have demonstrated that stratigraphic traps in the region, traps formed from the geometry of the strata as they were deposited, also have huge hydrocarbon potential.

“This has really revolutionized exploration on the North Slope, in particular because everyone always thought the stratigraphic traps were too small to be economically viable,” Houseknecht said. “And what we know now, based on the discovery of Alpine and more recently some of the Nanushuk and Torok discoveries, is that these are not only economically viable, they represent the biggest three or four oil fields that have been discovered in Arctic Alaska.”

While smaller than the Prudhoe Bay field, new discoveries could approach the Kuparuk River field in scale, depending on how development progresses. And discoveries near to existing infrastructure appear economically viable. However, Houseknecht emphasized that, with little data yet released for the new discoveries, people do not truly know how big they are.

“We’re at the point of the blind man describing the elephant and we’re not sure whether we have a hold of the trunk or the
continued from page 18

ANOTHER LOOK

Estimation challenges

Analysis of available 3-D seismic data has revealed intriguing results, with dozens of potential exploration targets that have yet to be tested. Houseknecht showed an illustration of one seismic anomaly that covers about 44 square miles: No one knows whether this feature contains oil but, if oil is present, there could be 300 million barrels or more of recoverable resource.

“This is the kind of data we are in the process of reviewing, in order to update our assessment of the Nanushuk and Torok,” Houseknecht said, cautioning that this type of detailed seismic data is only available for the northeastern part of the NPR-A.

One general concern with the Nanushuk and Torok play is the potential for poor reservoir quality. The impact of the reservoir quality on oil recoverability will not be understood until some field development takes place, Houseknecht said.

ANWR coastal plain

Turning to the coastal plain of ANWR, Houseknecht commented that the region has not been re-assessed for about 20 years because no new data for the region has become available over that time. There are about 1,451 line miles of old 2-D seismic data of poor quality. As a precursor to its planned new assessment, the USGS is having this data reprocessed, to try to tease out more detail than is apparent in the processed data currently available. The USGS scientists anticipate conducting an interpretation of the reprocessed data soon, Houseknecht said.

However, given the wide spacing between the seismic lines, it would be possible to hide a stratigraphic trap on the scale of Willow or Pikka between the lines, he said. One area badly in need of better insights from seismic is the eastern part of the coastal plain, where large subsurface structures attracted exploration interest in the past and where, as a consequence, Arctic Slope Regional Corp. acquired some subsurface land. Given that geologists know that the Ellesmerian sequence, including the prolific Shublik source rock and Ivishak reservoir formation, has in the past been eroded out of much of the ANWR coastal plain, there is a critical question regarding whether the Ellesmerian sequence exists under the eastern structures. Sankuan fault blocks known to exist under the nearshore Beaufort Sea near ANWR have preserved the Ellesmerian sequence, Houseknecht said. But, do similar fault blocks exist under the eastern part of the ANWR coastal plain?

Aside from the question of the presence or otherwise of the Ellesmerian, the Broekian sequence shows much hydrocarbon potential in the ANWR coastal plain, Houseknecht said. There are structural hydrocarbon traps in the east, some oozing oil, while in the west there are stratigraphic traps, analogous to those in the Nanushuk and Torok of the NPR-A.

A range of possibilities

Houseknecht also cautioned that resource assessments can only estimate a range of possibilities for how much oil and gas may exist in a region. And that estimated range tends to change, as more information becomes available. For example, the estimate for NPR-A increased following the discovery of the neighboring Alpine oil field, decreased again when more gas than expected was discovered in subsequent NPR-A exploration drilling, and now seems set to increase again, following the Nanushuk and Torok discoveries.

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Stratigraphic trap region

To the north of this folded belt is a huge region in which hydrocarbon traps tend to be stratigraphic, formed from the geometry of the manner in which the rocks were laid down. This region, in the Nanushuk and Torok, is also thought to be oil prone, depending on how much gas may have flowed into the area from the south.

This huge area of stratigraphic plays may also be split into Nanushuk and Torok western and eastern assessment units, because of a distinctive difference in the character of the strata in the west and in the east. The western part was characterized by very rapid migration of the ancient marine shelf, as the marine basin was overwhelmed by an influx of sediment, while the eastern part saw slower migration, with a stronger influence of the ancient sea on the shelf margin.

Houseknecht said that USGS anticipates being able to release its assessment numbers late this year or in early 2018. The agency is hoping to be able to use some 3-D seismic that the Alaska Department of Natural Resources expects to release to the public soon as a consequence of regulations related to oil production tax credits. That seismic covers an area close to the eastern boundary of NPR-A and should provide some new insights into the subsurface geology of the refuge.

—ALAN BAILEY

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