ALASKA STATE LEGISLATURE
SENATE RESOURCES STANDING COMMITTEE
January 23, 2023
3:31 p.m.

MEMBERS PRESENT

Senator Cathy Giessel, Co-Chair
Senator Bill Wielechowski, Vice Chair
Senator Scott Kawasaki
Senator James Kaufman
Senator Forrest Dunbar
Senator Matt Claman

MEMBERS ABSENT

Senator Click Bishop, Co-Chair

OTHER LEGISLATORS PRESENT

Representative Tom McKay

COMMITTEE CALENDAR

PRESENTATION: ALASKA NORTH SLOPE OIL AND GAS RESOURCES

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

JOHN BOYLE, Commissioner-Designee
Department of Natural Resources
Anchorage, Alaska
POSITION STATEMENT: Introduced the presentation on Alaska North Slope Oil and Gas Resources and answered questions.

DEREK NOTTINGHAM, Director
Division of Oil and Gas
Department of Natural Resources (DNR)
Anchorage, Alaska
POSITION STATEMENT: Delivered the presentation on Alaska North Slope Oil and Gas Resources.

JOHN CROWTHER, Deputy Commissioner
Department of Natural Resources
Anchorage, Alaska
POSITION STATEMENT: Responded to questions and provided information during the presentation on Alaska North Slope Oil and Gas Resources

ACTION NARRATIVE

3:31:19 PM
CO-CHAIR CATHY GIESSEL called the Senate Resources Standing Committee meeting to order at 3:31 p.m. Present at the call to order were Senators Kawasaki, Dunbar, Claman, Kaufman, Wielechowski, and Co-Chair Giessel.

PRESENTATION: Alaska NORTH SLOPE OIL AND GAS RESOURCES

3:32:11 PM
CO-CHAIR GIESSEL announced that the committee would hear a presentation on Alaska North Slope Oil and Gas Resources from the Department of Natural Resources (DNR). She listed the presenters and welcomed them to the table.

3:33:15 PM
JOHN BOYLE, Commissioner-Designee, Department of Natural Resources, Anchorage, Alaska, introduced himself and relayed that there is reason for optimism about North Slope activities. The on-scene operators have done a prodigious amount of in-field work to keep the production levels in the legacy assets at Prudhoe Bay, the Kuparuk River Oil Field and the Alpine Oil Field relatively stable. He noted that some of the steep declines seen in the past have stabilized and production levels are flat. He noted that for legacy fields that are close to 50 years old this is a significant outcome and indicative of the investment and work being done to bolster those fields.

COMMISSIONER-DESIGNEE BOYLE noted the increased activity in some of the newer developments. Late in 2022 Santos made its final investment decision on Pikka, which is located on state land. It is expected to come online in 2026 and produce 80,000 barrels per day. He noted that both Pikka and Willow target the Nanushuk formation, which is the geologic formation that is sparking a lot of interest in a number of companies doing exploration on the North Slope.

COMMISSIONER-DESIGNEE BOYLE noted that the most recent production forecast shows relatively stable production rates for the next decade with opportunities toward the end of that window as some of the new fields come online. On a final note, he mentioned the interesting opportunity associated with the demand and need for companies to offset carbon emissions. Several major oil companies have announced goals to limit their scope 1 and 2 emissions. Carbon capture, utilization, and storage (CCUS) in underground reservoirs is one method to offset their carbon emissions. Thus, in addition to looking at the underground resources, DNR is also looking at the space and ability to store carbon so that companies that want to come to Alaska and develop a new hydrocarbon project can do so and still attain a net zero emissions goal. DNR views this as an exciting opportunity for the state and looks forward to further discussions.

3:36:50 PM
CO-CHAIR GIESSEL asked if it was possible to use carbon storage for enhanced oil recovery on the North Slope.

COMMISSIONER-DESIGNEE answered yes there is the possibility of using carbon dioxide to enhance oil recovery, but he would defer to the experts in the room to explain how it works.

3:37:38 PM
DEREK NOTTINGHAM, Director, Division of Oil and Gas, Department of Natural Resources (DNR), Anchorage, Alaska, provided a short description of his professional background, including 24 years in the oil and gas industry and advanced degrees in petroleum engineering and business. He has been in his current position for about a year.

Following up on Commissioner-Designee Boyle's comments, he highlighted some of the things that framed activity on the North Slope. Coming out of Covid-19 in 2022, the topic of energy security rose in importance. The price of oil spiked to about $120 per barrel in the summer, interest rates started to climb, and then the price of oil fell toward the last of the year as the economy slowed. Environmental, social, and government (ESG) policies of North Slope companies started to affect activities. He agreed with the commissioner that carbon capture is one of the technologies that can help companies continue to develop the resources on the North Slope while meeting their ESG goals. He emphasized the exemplary track record for producing oil in an environmentally friendly and safe way. The rocks are great and the operators have achieved world class recovery in some of the

fields like Prudhoe Bay, Kuparuk, and Alpine. The expectation is for that to continue into the future.

3:40:42 PM
MR. NOTTINGHAM began the presentation with a review of the agenda listed on slide 2.

- Introduction
- Recap of the North Slope Resources and Activity
- Project Update on some of the more familiar projects
- Discussion about projects that are less familiar
- Methane Hydrates Test Project
- Natural Gas Trucking
- Willow and ANWR Updates
- Net Zero Goals and Carbon Capture, Utilization, and Storage

3:41:33 PM
MR. NOTTINGHAM reviewed the North Slope potential outlined on slide 3. He stated that the US Geologic Survey (USGS) estimates show that the Alaska North Slope has more oil than any other Arctic nation. He highlighted the following point:

- Nearly 19 billion barrels of oil have been produced. Significant amounts of oil are still coming from the legacy fields as well as the recent large discoveries like Willow and Pikka.
- The undiscovered oil resources on the North Slope are estimated to be more than 48 billion barrels. Combined, this is a total resource base of close to 70 billion barrels of oil.
- There is about 50 trillion cubic feet (TCF) of discovered gas on the North Slope, much of which is in the Prudhoe Bay gas cap in Point Thomson.
- Outside of those areas, the undiscovered conventional gas is estimated to be about 194 trillion cubic feet (TCF).
- Unconventional Gas such as methane hydrates and shale gas is estimated to be about 125 TCF.

MR. NOTTINGHAM stated that the point of slide 3 is to demonstrate that Alaska's North Slope is a huge resource basin. He agreed with the commissioner that despite the effects of Covid-19 and the difficulty in obtaining financing for Arctic investment, the interest in the North Slope has increased over the last several years. The incline in interest and activity has increased steadily over the last seven years. He relayed that the driver has been the recent finds in Pikka, Willow, and the

Nunushuk and Torok formations. The new data for those areas suggests enormous potential. He again agreed with the commissioner that the legacy fields at Prudhoe Bay and Kuparuk have done well enough to mitigate the declines seen earlier in this century and particularly over the last five or six years.

3:44:13 PM
MR. NOTTINGHAM pointed to the map on slide 4 that shows the oil fields on the North Slope from which the 18.7 billion barrels of oil have been produced. He noted that the units on the slide show millions of barrels of oil and reflect the cumulative amounts of oil produced off the North Slope over the last 45 years. He highlighted the following major units:

Prudhoe Bay: Cumulative production is about 13.9 billion barrels of oil. The field continues to produce over 200,000 barrels of oil while circulating about 8 billion cubic feet (BCF) of gas per day. A great deal of investment has gone into maintaining this operation. About 10 percent of the gas is carbon dioxide CO2. Responding to Co-Chair Giessel's previous question, he relayed that there is a significant amount of carbon dioxide within the Prudhoe Bay gas cap that can and has been used to enhance low oil recovery.

Kuparuk River Oil Field: Cumulative production is nearly 2.9 billion barrels of oil.

Alpine Field at Colville River: Cumulative production is over 600 million barrels of oil.

Endicott Duck Island: Cumulative production is 526 million barrels of oil.

Milne Point: Cumulative production is nearly 400 million barrels of oil.

MR. NOTTINGHAM described the foregoing as world-class oil fields that are very attractive to petroleum engineers.

3:46:42 PM
CO-CHAIR GIESSEL noted that Representative Tom McKay was in the audience.

SENATOR KAUFMAN asked how much water and other material is produced in order to produce one barrel of oil.

MR. NOTTINGHAM explained that to produce the more than 200,000 barrels of oil per day at Prudhoe Bay, it is necessary to move about 8 BCF of gas and nearly 2 million barrels of oil. To handle that volume, the facilities are enormous and the energy use is substantial.

3:47:59 PM
SENATOR DUNBAR asked why the cumulative production at Point Thomson is comparatively small when it has consumed so much media attention.

MR. NOTTINGHAM replied that in the mid-2010s there were significant issues with the compression equipment, but Exxon and Hilcorp, the former and current operators, have corrected the issue. Production from the field itself is between 8,000 and 10,000 barrels per day so it is a relatively small producer on the North Slope.

SENATOR DUNBAR asked if production can be expected to stay the same or increase in the future.

MR. NOTTINGHAM replied that is the steady state that is expected going forward. Some projects have been contemplated to increase volumes, but the latest production forecast does not indicate that will happen anytime soon. The field is limited by the amount of gas it can inject and the volume of gas it produces and injects is basically the yield for the 8,000 to 10,000 barrels per day.

CO-CHAIR GIESSEL recalled the original agreement was for a predominately gas field with some gas liquids that were to be produced. She asked if that was accurate.

MR. NOTTINGHAM answered yes; it is considered a retrograde condensate gas field. He explained that the in situ fluids are gas and as the gas is produced up the well bores the pressure drops and the liquids condense and are recovered and go down TAPS. The remaining gas is reinjected to maintain pressure.

CO-CHAIR GIESSEL asked if the liquids were still being produced.

MR. NOTTINGHAM answered yes.

3:51:28 PM
SENATOR WIELECHOWSKI asked what the terms of the settlement agreement were for Point Thomson.

MR. NOTTINGHAM recalled that it required the field to have the capability of producing 10,000 barrels of oil condensate per day, and perhaps injection of 200 million cubic feet per day. In the last five years Point Thomson has achieved the 10,000 barrels per day mark for several months, but not on a consistent basis.

3:52:21 PM
SENATOR WIELECHOWSKI asked if that would be deemed in compliance with the settlement agreement, and if there had been times when Point Thomson had been out of compliance.

MR. NOTTINGHAM said he was not aware that it had been deemed out of compliance.

SENATOR WIELECHOWSKI what the field cost allowances have been at Point Thomson.

MR. NOTTINGHAM offered to follow up with the information.

3:53:07 PM
CO-CHAIR GIESSEL requested an update on Point Thomson.

SENATOR WIELECHOWSKI requested an update on the road dispute between ConocoPhillips and Santos.

MR. NOTTINGHAM said he couldn't answer questions on that topic because he's involved in the ongoing litigation.

JOHN CROWTHER Deputy Commissioner, Department of Natural Resources, Anchorage, Alaska, explained that DNR made an administrative decision through the division. That decision was appealed to the commissioner's office and a decision on that appeal was issued recently. The parties have taken that final administrative action to court so the Department of Law (DOL) would have to comment on the state's position in that litigation.

3:54:18 PM
SENATOR WIELECHOWSKI asked: 1) whether the litigation has slowed production or development in the field, and 2) whether the state plans to intervene in the matter.

MR. CROWTHER said he couldn't comment on the first question due to the ongoing litigation, but DNR did see the public announcement that the components of the Pikka project had made a final investment decision. To the second question, he explained

that ConocoPhillips, the owner/operator of the Kuparuk River unit, has challenged the state's permit so the state is party to the litigation. He added that other parties may decide to intervene pursuant to the judicial process and rules.

3:55:22 PM
SENATOR WIELECHOWSKI asked whether Santos was building its own oil and gas processing facility at Pikka, or seeking a facility sharing agreement.

MR. NOTTINGHAM replied that Santos is building its own facility at Pikka.

SENATOR WIELECHOWSKI requested the status of the facility at the Willow project.

MR. NOTTINGHAM said ConocoPhillips is the operator of the Willow project and a subsequent slide may provide that information.

3:56:23 PM
MR. NOTTINGHAM turned to slide 5 that shows the working interest ownership of the North Slope units. He made the following points:

- On the west side, ConocoPhillips has a large working interest with Bear Tooth (Willow project) and Greater Mooses Tooth and Colville River (Alpine field).

- Also on the west side, the Pikka, Horseshoe, and Quokka units are recently formed and now owned/operated by Santos.

- The major fields in the middle region have varied working interests. The majority owner of Kuparuk River is ConocoPhillips while ExxonMobil and Chevron hold minor interests. ExxonMobil and ConocoPhillips each own 36 percent of Prudhoe Bay and Hilcorp, as the operator, owns 26 percent. Hilcorp owns 100 percent of Milne Point.

- The eastern North Slope operations are dominated by Hilcorp, whereas ConocoPhillips is the major player on the west side.

- To the south, companies like Great Bear are developing Alkaid and Talitha, and some nontraditional oil fields are being developed further south.

3:58:56 PM

SENATOR WIELECHOWSKI if the Prudhoe Bay operating agreement requires the consensus of all the operators before an investment decision is made, or if just a majority is required.

MR. NOTTINGHAM replied his understanding is that all operating owners from the Prudhoe Bay unit must agree.

SENATOR WIELECHOWSKI asked how much has been invested in Prudhoe Bay in the last three years.

MR. NOTTINGHAM said he didn't have the numbers.

SENATOR WIELECHOWSKI recalled reading, in a 2021 report, that $86 million was invested at Prudhoe Bay. He asked if that sounded about right.

MR. NOTTINGHAM said he didn't know.

SENATOR WIELECHOWSKI asked Chair Giessel if the committee could request the numbers.

CO-CHAIR GIESSEL requested the numbers on behalf of the committee. She asked whether DNR was the agency that would have the numbers.

MR. NOTTINGHAM said the Department of Revenue (DOR) may have the numbers.

CO-CHAIR GIESSEL said she would send the request to DOR.

4:00:18 PM
SENATOR WIELECHOWSKI asked, as the resource owner, whether the state had expressed concern about amount of investment in Prudhoe Bay in the last five years.

4:00:35 PM
MR. CROWTHER responded that as the new operator, Hilcorp has put significant effort and investment into understanding and optimizing facilities and processing capacities in the field. This includes things like water treatment, gas processing, and gas handling to increase the flow cycle rate. That has resulted in a flat or slight increase from the field. The department's perspective as the unit owner is that this is a significant accomplishment for a legacy field. He noted that the operator is looking at continuing infield drilling and making investments to maintain flat or potentially slight increases in production in the Prudhoe Bay and satellite units. He characterized this as a

dynamic and positive trend. He committed to work with DOR to provide the requested numbers.

4:02:27 PM
SENATOR CLAMAN asked how the revenue the state receives from Willow and Point Thomson compare to what it receives from Prudhoe Bay.

MR. NOTTINGHAM said the exact numbers are confidential, but one could get a sense of the numbers by comparing the production from Willow and Point Thomson to the production from Prudhoe Bay.

4:03:55 PM
SENATOR CLAMAN asked how the state's ownership position on Willow and Point Thomson compared to its ownership position on the legacy fields.

MR. CROWTHER explained that the royalty percentages on most state leases on state land, including Point Thomson, vary from 12.5 percent to 16.66 percent. The royalty ownership on Point Thomson is similar to Prudhoe Bay, but the lease composition may set slightly different royalty rates for different leases. That contrasts to Greater Moosses Tooth that is on federal land within the National Petroleum Reserve Alaska (NPRA). The federal government is the royalty owner of the field and the oil. Pursuant to federal law, 50 percent of the revenue from the field must be distributed to the State of Alaska. Pursuant to both federal and state law, those funds are allocated to the North Slope Community Impact Fund. That program is managed to administer the revenues from the royalties to impacted communities across the North Slope. He added that production tax, property tax, and corporate income tax also apply to the associated economic activities.

CO-CHAIR GIESSEL mentioned the added benefit that Willow will help reduce the tariff as its oil goes into the Trans Alaska Pipeline System (TAPS).

MR. CROWTHER agreed that it was a significant benefit. He said any additional production on the North Slope, especially something as significant as the Willow field, adds value to every barrel of oil and thus the state's royalty share for all produced fields.

SENATOR CLAMAN summarized that the volume of Willow oil in the pipeline essentially reduces the cost for all the other operators in the pipeline.

MR. CROWTHER said an oversimplification would be to say there is a variable cost associated with each barrel plus the significant fixed cost of running the pipeline that has to be paid regardless of the quantity that's shipped. So the more barrels shipped, the lower the cost per barrel. He said that is the royalty boost the state would receive from royalty oil for state royalty barrels.

4:07:39 PM
MR. NOTTINGHAM turned to slide 6 to discuss the exploration and drilling activity on the North Slope that occurred in 2022 and is planned to occur in 2023. He noted that he was moving from west to east on the map.

North Slope Energy announced plans to drill two wells in the NPRA prospect known as West Castle. It will target the Nanushuk formation. The wells are contemplated for 2023 or 2024.

88 Energy drilled the Merlin-2 exploratory well in 2022. The company reached the formation and got the needed date but found the rocks were not sufficiently permeable to generate an economic or commercial flow. It did not warrant a well test so the well was plugged and abandoned.

ConocoPhillips plans to drill the Bear 1 well in early 2023 to target Brookian topsets (the age of the rocks) in the Nanushuk and Torok formations as well as several other potential reservoir targets.

Great Bear Pantheon completed the Theta West-1 well in April 2022. The target was the Lower Basin Floor Fan and the Talitha-A well. The flow test was successful and the interval found light hydrocarbons in liquid form.

Great Bear Pantheon reentered the Talitha-A well that was drilled several years ago and was able to get successful flow rates from the Lower Basin Floor Fan in the slope fan intervals. The plan now is to drill the Talitha-B exploration well, targeting the Brookian formation.

GBP also completed the Alkaid 2 well in October 2022. This is a long, horizontal, hydraulically fractured well and the company is in the process of performing an extended flow test to

determine the commerciality. It has reported liquid hydrocarbon flow rates of greater than 500 barrels per day. The company also plans to drill the Alkaid 3 well, pending the Alkaid 2 test results.

88 Energy/Accumulate has applied for the Toolik River unit. It executed a contract to drill the Hickory 1 exploration well in early 2023. That will penetrate six reservoir targets including the Brookian section and Kuparuk formation to a depth of 12,500 feet. There are plans to flow test this well.

MR. NOTTINGHAM noted that the department also has formed the Horseshoe and Quokka units, both of which have commitments for further exploration.

4:11:48 PM
SENATOR DUNBAR asked how this exploratory drilling compares to the activity in the last 5-10 years.

MR. NOTTINGHAM said his sense is that there is a little more activity now, but he'd need to review the data to make sure that's accurate.

SENATOR DUNBAR asked what timeframe he was using when he says there's a small uptick in activity.

MR. NOTTINGHAM responded that the timeframe is the last five years.

4:13:03 PM
CO-CHAIR GIESSEL suggested that it would be helpful for the committee to see a diagram that shows the different levels of the various formations he mentioned.

MR. NOTTINGHAM agreed to provide the information.

SENATOR WIELECHOWSKI recalled that about 12 years ago Great Bear gave presentations that talked about billions of barrels of recoverable oil on the North Slope. That hasn't happened, but the company is still drilling so there must be something. He asked what's happened with Great Bear since it gave those presentations.

MR. NOTTINGHAM said it's typical for oil companies to reassess and adjust as it gathers geologic and engineering information and that's likely what's happened at Great Bear. The company is

making adjustments as it drills and learns the location of the formations that are likely to produce.

4:15:20 PM
SENATOR KAUFMAN said he was somewhat familiar with the work that had been done on subsea hydrates but he was less familiar with sub-permafrost hydrates. He asked if that work was new and leading edge.

MR. NOTTINGHAM confirmed that it was new and different. He said he didn't discuss the international hydrates test project that is ongoing in the western part of Prudhoe Bay because a subsequent slide will provide more information.

4:17:01 PM
MR. NOTTINGHAM turned to the chart on slide 7 that provides January 2022 and January 2023 status updates for five future projects on the North Slope. He described each of the following:

Pikka - The final investment decision was approved August 2022. Drilling will start summer 2023 and first oil is projected in 2026. Peak design capacity for Phase 1 is estimated to be 80,000 barrels of oil per day (BOPD).

Willow - ConocoPhillips cannot move forward with a final investment decision (FID) until the Bureau of Land Management (BLM) issues the Record of Decision (ROD) on the Supplemental Environmental Impact Statement (SEIS). If the project is approved, it will be six years before first production. The estimated peak rate is about 180,000 BOPD.

CRU Narwhal CD8 - This refers to the Colville River unit. Narwhal is the reservoir and CD8 is the pad. This project has been tested and produced 1,600 BOPD. The full project will have 20-40 wells and will require a new pad. This will start in 2028. DNR estimates peak rate of more than 32,000 BOPD.

MPU Raven Pad - This refers to Milne Point unit or R Pad development. This is similar to Hilcorp's 2018 Loose Pad development. Hilcorp has applied for approval to construct a new drilling pad. DNR estimates the peak flow of about 10,000 BOPD for that project.

KRU Nuna-Torok - This refers to the Kuparuk River unit. Rotary drilling is planned with an injector/producer pair for the Torok reservoir, which will inform future developments. The estimated peak rate is up to 25,000 BOPD.

MR. NOTTINGHAM relayed that the point of slide 7 is that while there is great interest in Pikka and Willow, these smaller and less glamorous projects are ongoing and have helped stabilize the production decline that's been seen over time.

4:21:02 PM
SENATOR DUNBAR asked what percentage the state earns on a barrel of oil from the legacy fields compared to what it earns on Pikka and on Willow. He clarified that he was asking about royalty plus tax plus anything else that might apply.

MR. NOTTINGHAM said the Department of Revenue (DOR) runs those calculations and would probably be better suited to answer the question.

COMMISSIONER DESIGNEE BOYLE added that an important difference between legacy and new production is that the royalty rate on most legacy fields is about 12.5 percent, whereas the newer fields such as Pikka that are on state land pay the new 16.66 percent royalty.

4:22:45 PM
SENATOR KAWASAKI referenced Chapter 6 of the most recent Revenue Sources Book that provides a low case and a high case of oil production. He noted that [for Pikka] the peak rate for Phase 1 is estimated to be 80,000 BOPD. He asked when DNR estimates that peak rate if first oil is in 2026.

COMMISSIONER DESIGNEE BOYLE said that the expectation at Pikka is that production will start at 80,000 BOPD and continue for several years before declining. Phase 2 forecasts 120,000 BPOD once the additional drill pads come online. The future production profile depends heavily on whether the company makes the investment and the rocks produce as the geologists anticipate. He added that these fields are considered conventional, which means they can maintain a consistent level of production for some time before they begin to decline. This is different than the shale plays in the Lower 48 that might spike and significantly decline in a short timeframe.

4:25:24 PM
SENATOR WIELECHOWSKI asked whether all these projects were included in DNR's baseline forecast.

MR. NOTTINGHAM answered yes.

SENATOR WIELECHOWSKI asked what year Willow is expected to reach its estimated peak rate of 180,000 BOPD.

MR. CROWTHER answered that these projects are in DNR's production forecast, but they're smoothed according to their likelihood over time and their likelihood of coming in on schedule and at volume. DNR estimates Willow likely will start production in 2028, 2029, or 2030, but not at 180,000 BOPD. It's risked and allocated based on expert assessments. That same methodology is applied to all these projects. A project like Pikka that has a FID and has made progress in contracting will show as more of a peak in the forecast, but it is still smoothed. If initial production activities proceed on time, it will be less smoothed and thus show up as a more discrete increase in the forecast. Similarly, if Willow receives a positive FEIS and ROD and the company makes a final investment decision, there would be less risk weighting in how it would be portrayed in the department's forecast.

SENATOR WIELECHOWSKI asked what year the department had modeled the peak rate of 180,000 barrels for Willow into the forecast.

4:27:44 PM
MR. CROWTHER said a subsequent slide shows the under evaluation projects and how they contribute in the base case forecast. It shows over 200,000 barrels of additional production in 2029 and 2030. While that is not exclusive to Willow, in aggregate a project like Willow is contributing significantly in the out years. ConocoPhillips' public statements about their timeline and expectations would be reliable indicator of a reasonable base case for the timeline and volume.

SENATOR WIELECHOWSKI asked whether the department's methodology for calculating the production forecast had changed in the last year or so.

MR. NOTTINGHAM replied there were minor tweaks this year.

SENATOR WIELECHOWSKI asked what the tweaks were.

MR. NOTTINGHAM answered that adjustments were made to start the production forecasting on the same date and to ensure that the forecasting for currently producing fields does not include any development drilling.

SENATOR WIELECHOWSKI how much those changes in methodology increased or decreased the production forecast in the next five years.

MR. NOTTINGHAM said he didn't believe it changed it at all.

SENATOR KAWASAKI asked if he was saying that if Pikka produces 80,000 barrels of oil per day starting in 2026, production would have dropped by 80,000 barrels per day in the other ANS petroleum production forecasts, so there's basically no change.

MR. NOTTINGHAM said what's happening over time is the existing production is declining and the development activities in the near term are replacing the decline. Pikka factors into that.

4:32:32 PM
SENATOR CLAMAN asked what start of production timeline DNR is using for both Pikka and Willow.

MR. NOTTINGHAM said DNR references the operator's production forecast. DNR's technical staff of 24 then assesses and risk weights the start date. This generates a smooth production profile that shows an increase in the late 2020s.

SENATOR CLAMAN asked for his understanding of the date of first production and oil entering TAPS from Pikka and Willow.

MR. NOTTINGHAM said if he were part of that technical group he would vote for 2026 for Pikka and 2029 for Willow.

4:34:23 PM
MR. NOTTINGHAM displayed slide 8 and explained that it is a summary of the methane hydrates test project that was previously mentioned. It's located on the west side of Prudhoe Bay. He paraphrased the following points:

- Japanese Organization for Metals and Energy Security (JOGMEC) and U.S. Department of Energy (DOE) funded program
- Program seeks to determine long-term production potential of methane hydrate reservoirs
- ASRC Energy Services (AES) is performing operations which are occurring on the 07-11-12 pad on the west side of Prudhoe Bay
- Objectives are to drill a monitoring well and two production test wells, production testing from April through December 2024

- The Geologic Data Well and Production Test Well 1 are complete. AES is currently drilling Test Well 2
- Production Test scheduled to start in April 2023 and will run through December 2024.

MR. NOTTINGHAM explained that the chart on the bottom left of the slide refers to a US Geodetic Survey (USGS) study that describes the hydrate potential on the North Slope as containing undiscovered conventional resources on a mean basis of about 54 trillion cubic feet (TCF).

4:36:10 PM
SENATOR DUNBAR requested the context to understand the significance of 54 TCF relative to other locations; the amount of revenue the state potentially might realize; and when these gas hydrates might be expected to go to market.

MR. NOTTINGHAM suggested that to understand the commerciality of methane hydrates from the North Slope, it's important to factor in the existing conventional resource. The known gas in the Prudhoe Bay gas cap is in the vicinity of 40-50 TCF, and the mean resource of 54 TCF for this test project is on that order of magnitude. He said the reality is that the conventional gas is much easier to produce and would have a substantial life before the methane hydrates from this test project are likely to become economic. He noted that this project is working to understand this resource in conjunction with JOGMEC and DOE because the Japanese and Asian markets are in pursuit of a domestic supply for energy. Although it will be far into the future, he said he believes methane hydrate gas will have a similar royalty rate as conventional North Slope gas.

SENATOR WIELECHOWSKI asked whether methane hydrates could be shipped through TAPS or the gasline that is envisioned in the future.

MR. NOTTINGHAM explained that methane hydrate is methane that is in the form of ice. It forms in the presence of water, low temperature, and pressure. It's produced much like natural gas, but with a lot of water that must be separated. Methane hydrate gas could be shipped through a gas line but probably not TAPS.

SENATOR KAUFMAN asked whether the technology was the same to produce subsea hydrates and sub-permafrost hydrates.

MR. NOTTINGHAM said he thought the production methodology was transferable, but in a deep water environment there would be

more factors to consider in order to make a project commercial. He described the North Slope as a good place to test the concept and production methodology.

4:40:56 PM
MR. CROWTHER added that the state of Alaska is uniquely positioned to be the first participant should there be large-scale commercial developments of hydrates. It is one of the few places in the world that has subsurface and surface accumulation of hydrates coexisting with oil and gas operations.

SENATOR KAUFMAN commented that the state was leveraging its unique circumstances to gain a technological advantage in this area by participating in this research and development (R&D) project.

MR. CROWTHER agreed.

4:42:01 PM
MR. NOTTINGHAM turned to slide 9 to discuss trucking natural gas to market. He paraphrased the following points:

Agreement between Hilcorp North Slope LLC and the Interior Gas Utility

- Hilcorp subsidiary Harvest Midstream to produce LNG from Prudhoe Bay gas
- Facilities to produce 150,000 gallons/day to be built and online in October 2024
- 20-year contract with opportunity to increase term and capacity
- Plans to truck LNG from Deadhorse to Fairbanks

MR. NOTTINGHAM stated that the benefit of supplementing Interior gas from the North Slope alleviates some of the pressure to supply gas from Cook Inlet.

CO-CHAIR GIESSEL advised that the committee had plans for Golden Valley Electric Association (GVA) and Hilcorp Harvest Group to present on this topic in the future.

4:43:21 PM
MR. NOTTINGHAM turned to slide 10 and provided a brief update on the Willow project. He paraphrased the following points:

Permitting

- Comment period for Draft Final Supplemental Environmental Impact Statement (EIS) closed August 29, 2022
- Preliminary Final SEIS January 2023
  This review is only cooperating agencies (includes SOA)
- Public review of the Final SEIS: March/April 2023
- Record of Decision (ROD): June/July, 2023
- Permits to the State Pipeline Coordinator's Section (SPCS)
  Pre-application discussions for pipelines already begun

Construction

- Begin staging and early construction works for winter of 2023-2024

Anticipated performance

- Expected peak production of 180,000 barrels of oil per day (BOPD)
- 600 million barrels of oil estimated (mmboe) total production over project life
- $8-17 billion in royalty and property tax payment to State of Alaska, US, and municipal governments

4:45:09 PM
SENATOR DUNBAR asked whether the state would receive production tax from Willow and other projects.

MR. CROWTHER clarified that all oil production on the North Slope is subject to both severance tax and property tax on the infrastructure.

4:45:37 PM
MR. NOTTINGHAM turned to slide 11 and provided a brief update on the ANWR leases that were up for lease sale. He noted that the blue shading on the map on the right reflects the Alaska Industrial Development and Export Authority's (AIDEA) suspended leases. He paraphrased the following points:

- AIDEA's leases remain suspended pending completion of the SEIS. The other two lessees relinquished their leases, so AIDEA's are the only remaining (blue in lease pam).
- Lease suspension litigation is in briefing cross-motions for summary judgment

    - Plaintiffs' and State's opening briefs were filed December 5, 2022
    - BLM's response is due February 3, 2023
    - Briefing should conclude in mid- to late-March
- The leasing program litigation remains stayed pending completion of the SEIS
- Next status report is due April 28, 2023

4:46:52 PM
SENATOR CLAMAN asked if the foregoing was only about the AIDEA leases since the other two lessees relinquished their leases.

MR. NOTTINGHAM answered yes; the only remaining leases in the Arctic Coastal Plain belong to AIDEA.

SENATOR DUNBAR asked why the other two lessees relinquished their leases.

MR. NOTTINGHAM said he didn't know.

MR. CROWTHER relayed that it was clear from the start that the current federal administration intended to limit development on the Coastal Plain and to change existing federal law that requires development.

4:49:09 PM
MR. NOTTINGHAM explained that slide 12 was intended to illustrate the net zero greenhouse gas (GHG) initiatives of the companies operating on the North Slope. The major multinational companies have developed initiatives that target net zero emissions by 2040 to 2050. The scope 1, 2, and 3 benchmarks outline the path to achieve net zero emissions by mid-century. He noted that Hilcorp is privately owned and has not set a goal of being net zero by a particular date. However, Hilcorp's CEO issued the following statement:

> We have to operate to the same high standards as everyone else. We may be private, but we have capital providers, we have partners, we have lots of other people involved in business with us. They're feeling those pressures (i.e. ESG, emissions reductions), and we have to be responsive to those as well. — Greg Lalicker, Hilcorp CEO.

CO-CHAIR GIESSEL commented that it was an interesting slide.

MR. CROWTHER added that these companies are partners and/or customers of state programs and to achieve their goals they will be purchasing carbon capture projects somewhere to offset their missions. DNR sees Alaska as a place to develop hydrocarbons and oil & gas resources, and it is also a place to offset them. DNR views this as a synergy and potentiation for investments and activity, if the state is able to offer the needed carbon management products.

4:51:56 PM
MR. NOTTINGHAM turned to the last slide that has several maps showing areas in Alaska that have potential for carbon capture utilization and storage. He directed attention to the map on the lower left and paraphrased the following:

Alaska's storage resources

- Approximately 50 gigatons (GT) of storage potential in unmineable coals of Cook Inlet region
- Additional storage capacity in depleted fields and saline aquifers
- Significant tertiary recovery opportunities through CO2 flood [both on the North Slope and Cook Inlet]

Subsurface data available to the public for project planning

- Search inventory map at dggs.alaska.gov hosted by the Division of Geological and Geophysical Surveys
- Request well data at commerce.alaska.gov from the Alaska Oil and Gas Conservation Commission (AOGCC)

Exploration opportunities on state land

- Large, contiguous blocks of state land ownership at tidewater in key storage basins
- 2023 Carbon Storage bill will address state leasing regime, Underground Injection Control (UIC) Class VI primacy, pore space access, and long-term liability

CO-CHAIR GIESSEL noted that the committee would hear more about carbon storage when the governor's bill is introduced.

4:54:43 PM
SENATOR KAUFMAN offered his understanding that on the North Slope the state was not anticipating commercial storage from outside sources. Rather, it will be storage of what is produced through production and separation, which is about 12.5 percent of the volume.

MR. NOTTINGHAM said that's correct in the near future, but the department doesn't want to exclude any opportunity to import CO2 to the North Slope at some point in the future. For that reason the governor's bill will be broad in application.

4:55:39 PM
SENATOR KAWASAKI referenced the slide that addresses the agreement between Hilcorp and the Interior gas utility to truck natural gas to market. He asked what went into the decision to produce 150,000 gallons/day and whether it was constrained due to the enhanced oil recovery.

MR. NOTTINGHAM said it's actually a relatively small volume of gas per year and similar small sales of gas have occurred over time. The Prudhoe Bay owners are cognizant of this, and it likely has little effect on the recovery in the reservoir.

4:57:09 PM
CO-CHAIR GIESSEL thanked the presenters.

4:57:45 PM
There being no further business to come before the committee, Co-Chair Giessel adjourned the Senate Resources Standing Committee meeting at 4:57 p.m.