



September 28, 2018

Andrew T. Mack, Commissioner  
Alaska Department of Natural Resources  
550 W 7<sup>th</sup> Avenue, Suite 1400  
Anchorage, AK 99501-3554

**VIA HAND DELIVERY**

Rex Rock Sr., President  
Arctic Slope Regional Corporation  
1230 Agvik St.  
P.O. Box 129  
Barrow, AK 99723-0129

**VIA HAND DELIVERY  
(ANCHORAGE OFFICE)**

**Re: Submittal of the Fourth Pikka Unit Plan of Exploration**

Dear President Rock and Commissioner Mack,

On September 29, 2017, Armstrong Energy, LLC, ("Armstrong"), as operator of the Pikka Unit ("PKU"), submitted the 2017-2018 Plan of Exploration ("POE") to the State of Alaska Department of Natural Resources, Division of Oil and Gas ("Division") and Arctic Slope Regional Corporation ("ASRC"). On November 6, 2017, the Division approved the 2017-2018 PKU POE for the period of December 1, 2017 through November 30, 2018.

Oil Search (Alaska), LLC, ("OSA") as successor operator of the PKU, hereby provides its PKU POE for the period of December 1, 2018 through November 30, 2019 as required by 11 AAC 83.341 and Article 8.1.1 of the PKU Unit Agreement.

During the 2017-2018 Plan Year, Armstrong and other PKU Working Interest Owner ("WIO") GMT Exploration, LLC entered into an agreement which brought OSA into the Unit leases as a WIO. These PKU WIOs, along with the other PKU WIO Repsol E&P USA Inc., designated OSA as successor operator of the PKU, effective March 15, 2018.

Since taking over operatorship of the PKU, OSA has furthered efforts to conduct the POE as laid out by Armstrong in the 2017-2018 Plan Year. Although the timing of the transition made completing a winter drilling program untenable, OSA has been and intends to continue working diligently with the Division and ASRC to complete its obligations under the 2019 PKU POE.

If you have any questions or concerns, please do not hesitate to contact me at 907-375-6920, or by email at [tim.jones@oilsearch.com](mailto:tim.jones@oilsearch.com).

Sincerely,



Tim Jones  
Land Manager

Cc: Chantal Walsh, Division of Oil and Gas  
Teresa Imm, ASRC  
Kevin Pike, Division of Oil and Gas (via email)

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# **Oil Search**

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## **2019 PLAN OF EXPLORATION**

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### **Pikka Unit**

**September 28, 2018**

# Table of Contents

Introduction and History.....	3
Annual Report .....	4
Updated Plan of Exploration .....	5
Statement of Operator.....	7

# Introduction and History

Oil Search (Alaska), LLC (“OSA”), as Operator on behalf of the Working Interest Owners (“WIO”) of the Pikka Unit (“PKU”), hereby submits this 2018-2019 4<sup>th</sup> Plan of Exploration (“POE” or “Plan”) in accordance with 11 AAC 83.341 and Article 8.1.1 of the Pikka Unit Agreement. This POE is for the period of December 1, 2018 through November 30, 2019.

The 2017-2018 PKU POE was submitted to the State of Alaska, Department of Natural Resources, Division of Oil and Gas (“Division”) and Arctic Slope Regional Corporation (“ASRC”) by the previous Operator, Armstrong Energy, LLC (“Armstrong”), on September 29, 2017. By letter dated November 6, 2017, the Division approved the 2017-2018 PKU POE for the period of December 1, 2017 through November 30, 2018.

Application to form the PKU was made by previous Operator Repsol E&P USA, Inc. on February 5, 2014. A Finding and Decision of the Director of the Division approved the formation of the PKU effective June 18, 2015.

Application to expand the PKU was made by Armstrong on September 19, 2016. A Finding and Decision of the Director of the Division approved the expansion of the PKU effective November 29, 2016.

By letter dated March 7, 2018, Armstrong submitted its resignation as Operator of the PKU. In the same letter, OSA agreed to fulfill the duties and assume the obligations as successor Unit Operator of the PKU effective March 15, 2018. OSA was approved as successor Unit Operator effective March 15, 2018 by letter from the Division on March 20, 2018.

Operations completed under previous Plans of Exploration include the following:

1. Niglig-Fiord and Tabasco North 3D pre-stack merging, which cover portions of the PKU; program included 3D de-multiple, 5D interpolation and OVT migration
2. Interpretation, amplitude/AVO analysis, rock physics, simultaneous elastic inversion, stratigraphic analysis, special core analysis, geo-mechanical analysis
3. Refining of reservoir modeling
4. Initiation of development project pre-FEED study

# Annual Report

The following is OSA's annual report as required by 11 AAC 83.341.

The exploration plans contained in the 3<sup>rd</sup> POE consisted of:

- On or about February 1, 2018, Armstrong intends to commence the Pikka 2 and Pikka 2A sidetrack wells in the southwestern portion of the PKU in sections 34 and 35 of T11N, R5E. No wells currently exist within the southern half of the planned Nanushuk development area. The Pikka 2 wells are critical to the delineation of this area, and have the potential to have significant impact on the subsurface basis of design. Acquisition of conventional core is planned in both wells along with a full suite of LWD and/or wireline logs, including fluid sampling where appropriate. A production test is planned for the Pikka 2A sidetrack, contingent upon results of the log evaluation.
- Routine and special core analysis (SCAL) is planned to be conducted on the conventional core acquired in the Pikka 2 and Pikka 2A wells. SCAL conducted on the nearby Qugruk 8 well has identified key uncertainties with respect to reservoir quality distribution and water saturation as predicted by capillary pressure experiments. The objective of the routine and SCAL work will be to reduce these uncertainties and narrow the range of outcomes in the Nanushuk reservoir model. In addition to a robust set of routine analyses, we plan to run a number of SCAL, including relative permeability, capillary pressure, fluid flow velocity, and fluid sensitivity analyses.
- Fluid sampling is planned for the Pikka 2A sidetrack via wireline-conveyed MDT. Single-phase fluid samples will be used to address key remaining uncertainties identified in the recent pre-FEED engineering study, including asphaltene precipitation and miscible gas injection. Initial modeling of enhanced recovery through miscible gas injection has been encouraging, but additional testing of single-phase oil samples is required to confirm the results.
- All data acquired in the Pikka 2 and Pikka 2A wells will be integrated into the existing reservoir model. Adjustments will be made to the stratigraphic framework and distribution of reservoir properties within the static model. Fluid analyses and SCAL will be integrated into the dynamic model through refinement of the relative permeability and capillary pressure curves.

The well results will also be integrated into our existing 3D seismic interpretation. If necessary, adjustments will be made to the existing elastic inversion and AVO models. The results of geophysical modeling will be used to guide the distribution of reservoir properties with the static reservoir model.

*(1) The extent to which the requirements of the previously approved plan were achieved*

- All planned activities for the 3<sup>rd</sup> POE Plan Year were based on the drilling of the Pikka 2 and Pikka 2A wells. The prior Operator did not drill any wells during the 3<sup>rd</sup> POE Plan Year, and therefore was unable to analyze the results of drilling.

*(2) Actual operations that deviated from or did not comply with the previously approved plan and an explanation of the deviation or noncompliance*

- A combination of factors resulted in deferral of drilling operations as proposed by the prior Operator for the 3<sup>rd</sup> Plan Year, including the then on-going negotiations with OSA around its acquisition of a working interest in the Pikka Unit leases and assumption of the Operator role, as well as continuing negotiations with Kuukpik Corporation (“Kuukpik”) in regard to a surface access agreement, which negotiations were necessarily extended as a result of OSA’s transition to Operator of the Pikka Unit.
- The other primary component of the 3<sup>rd</sup> POE was analysis of data collected through drilling. Since the Pikka 2 and 2A wells were not drilled, no data was obtained, and therefore the Operator was unable to meet this portion of the 3<sup>rd</sup> Plan.

## Updated Plan of Exploration

- OSA’s transition to the role of Operator is complete, and it is actively engaged with Kuukpik regarding a comprehensive Land Use Agreement (“LUA”) covering OSA’s planned Pikka Unit appraisal and development operations.
- On or about December 1, 2018, OSA will commence construction of ice roads and two ice pads, starting from the Mustang Pad located in the Southern Miluveach Unit to OSA’s planned drilling locations for the Pikka B and Pikka C appraisal wells.
- On or about January 15, 2019, OSA will mobilize two rigs from Deadhorse to the drilling locations.
- On or about February 1, 2019, OSA intends to commence drilling the Pikka B and Pikka C appraisal wells in the southern and central portions of the PKU, respectively. OSA also intends to drill one sidetrack from each well.
- OSA is currently in the pre-Front-End Engineering and Design (“FEED”) phase and is continuing to move engineering and contract negotiations forward for PKU development. The Pikka B and C wells are necessary to further appraise the Nanushuk reservoir prior to start of the FEED phase of the project, and will inform our subsurface basis of design for planning of development wells and production infrastructure.
- On or about February 1, 2019, OSA intends to commence drilling the Pikka B well to a depth of approximately 6,513 feet TVD, and Pikka B ST 1 deviated sidetrack well to a

depth of approximately 4,923 feet TVD in the southwestern portion of the PKU in sections 34 and 35 of T11N, R5E. No wells currently exist within the southern half of the planned Nanushuk development area. The Pikka B wells are critical to the delineation of this area and have the potential to have significant impact on the subsurface basis of design. Acquisition of conventional core is planned in both wells along with a full suite of LWD and/or wireline logs, including fluid sampling where appropriate. A production test is planned for the Pikka B ST 1 deviated sidetrack, contingent upon results of the log evaluation.

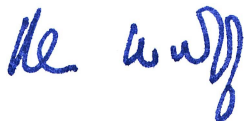
- Routine and special core analysis (SCAL) is planned to be conducted on the conventional core acquired in the Pikka B and Pikka B ST 1 deviated boreholes. SCAL conducted on the nearby Qugruk 8 well has identified key uncertainties with respect to reservoir quality distribution and water saturation as predicted by capillary pressure experiments. The objective of the routine and SCAL work will be to reduce these uncertainties and narrow the range of outcomes in the Nanushuk reservoir model. In addition to a robust set of routine analyses, we plan to run a number of SCAL, including relative permeability, capillary pressure, fluid flow velocity, and fluid sensitivity analyses.
- Fluid sampling is planned for the Pikka B ST1 deviated sidetrack via LWD MDT and/or samples collected during the well test. Single-phase fluid samples will be used to address key remaining uncertainties identified in the recent pre-FEED engineering study, including asphaltene precipitation and miscible gas injection. Initial modeling of enhanced recovery through miscible gas injection has been encouraging, but additional testing of single-phase oil samples is required to confirm the results.
- Simultaneously, on or about February 1, 2019, OSA intends to commence drilling the Pikka C well to a depth of approximately 4,919 feet TVD, and Pikka C ST 1 horizontal sidetrack well to a depth of approximately 4,175 feet TVD in the central portion of the PKU in sections 8, 9 and 16 of T12N, R6E. The Pikka C wells are critical to delineate the northern limit extension of the reservoir and have the potential to have significant impact on the subsurface basis of design. Acquisition of conventional core is planned in the Pikka C well along with a full suite of LWD and/or wireline logs, including fluid sampling where appropriate. In the Pikka C ST 1 horizontal well a full suite of LWD and a production test is planned, contingent upon results of the log evaluation.
- Routine and special core analysis (SCAL) is planned to be conducted on the conventional core acquired in the Pikka C. The objective of the routine and SCAL experiments will be scoped to investigate reservoir quality distribution, water saturation and capillary pressure to narrow the range of outcomes in the Nanushuk reservoir model. In addition to a robust set of routine analyses, we plan to run a number of SCAL, including relative permeability, capillary pressure, fluid flow velocity, and fluid sensitivity analyses.
- Fluid sampling is planned for the Pikka C ST 1 horizontal sidetrack on samples collected during the well test. Single-phase fluid samples will be used to address key

remaining uncertainties identified in the recent pre-FEED engineering study, including asphaltene precipitation and miscible gas injection. Initial modeling of enhanced recovery through miscible gas injection has been encouraging, but additional testing of single-phase oil samples is required to confirm the results.

- All data acquired in the Pikka B and Pikka C wells will be integrated into the existing reservoir model. Adjustments will be made to the stratigraphic framework and distribution of reservoir properties within the static model. Fluid analyses and SCAL will be integrated into the dynamic model through refinement of the relative permeability and capillary pressure curves.
- The well results will also be integrated into our existing 3D seismic interpretation. If necessary, adjustments will be made to the existing elastic inversion and AVO models. The results of geophysical modeling will be used to guide the distribution of reservoir properties with the static reservoir model.
- OSA will schedule a technical presentation with the Division to discuss this 4<sup>th</sup> POE in more detail. We look forward to working with the Division, ASRC, and other stakeholders to ultimately bring the PKU into production.

## Statement of Operator

OSA, as PKU Operator, respectfully submits this Annual Report and Update to the PKU under 11 AAC 83.341. The Operator believes this 4<sup>th</sup> POE satisfies the requirements of 11 AAC 83.341, including compliance with the provisions of 11 AAC 83.303.



Keiran Wulff

President