

OOOGURUK UNIT

APPROVAL OF THE APPLICATION TO  
EXPAND AND CONTRACT  
THE OOOGURUK-TOROK PARTICIPATING AREA

Findings and Decision of the Director  
of the Division of Oil and Gas  
Under a Delegation of Authority  
from the Commissioner of the State Of Alaska  
Department of Natural Resources

July 11, 2018

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## I. INTRODUCTION AND DECISION SUMMARY

The Division received the Application for the Contraction of the Oooguruk Torok Participating Area (Application) on June 20, 2017 from the Oooguruk Unit (OU) Operator, Caelus Natural resources Alaska, LLC (Caelus). The Application proposes removing some acreage from the southern end of the participating area and adding a small amount of acreage to the northern end of the participating area. The Division requested further information supporting the application on June 21, 2017 and Caelus responded on August 9, 2017.

A participating area “must be expanded to include acreage reasonably estimated through use of geological, geophysical, or engineering data to be capable of producing or contributing to the production of hydrocarbons in paying quantities, and must be contracted to exclude acreage reasonably proven through the use of geological, geophysical, and engineering data to be incapable of producing hydrocarbons in paying quantities, subject to approval by the commissioner.” 11 AAC 83.351(c).

Caelus submitted confidential and public information in the Application. The confidential geological, geophysical, and engineering data indicate that the acreage proposed for inclusion in the Oooguruk Torok Participating Area (OTPA) is producing or contributing to production of hydrocarbons in paying quantities, or is reasonably estimated to be capable of producing or contributing to production of hydrocarbons in paying quantities, and that a portion of the acreage is reasonably proven to be incapable of producing or contributing to the production of hydrocarbons in paying quantities.

The Division finds that the revision of the OTPA promotes conservation of all natural resources, promotes the prevention of economic and physical waste, and provides for the protection of all parties of interest, including the State. AS 38.05.180(p); 11 AAC 83.303. I approve the Application under the terms and conditions of Section III. The effective date of the revision of the OTPA is March 1, 2010.

## II. APPLICATION AND LEASE SUMMARY

The Application includes Exhibit C (Attachment 1), legally describing the proposed revised participating area, its leases, and ownership interests, and a map of the proposed revised participating area (Attachment 2).

Revisions to the participating area are summarized in Tables 1 and 2 below and described in detail in Attachments 1 and 2.

**Table 1: Leases Proposed for Expansion**

Unit Tract №	Lease №	Legal Description	Expansion Acres
13	355036	T. 13 N., R. 7 E., Umiat Meridian Section 14, Protracted, SW1/4SW1/4	40.00
14	355037	T. 13 N., R. 7 E., Umiat Meridian Section 9, Protracted, NW1/4NE1/4, SE1/4NW1/4	80.00
Upper Interval (i.e. the interval from the surface down to the stratigraphic equivalent of 8,373' (Driller's total depth +100') which is equivalent to 8,402' (Wireline Logger's total depth + 100') below the Kelly Bushing as shown on the Dual Laterolog Run #3 log dated April 5, 1992, in the ARCO-Kalubik #1 well located in Sec. 11, T.13 N., R. 7 E., U.M. known in the DNR computer records as "Segment 1" of the Lease.)			

**Table 2: Leases Proposed for Contraction**

Unit Tract №	Lease №	Legal Description	Contraction Acres
13	355036	T. 13 N., R. 7 E., Umiat Meridian	
		Section 10, Protracted, NW1/4NW1/4	40.00
		Section 15, Protracted, SW1/4SW1/4	40.00
14	355037	T. 13 N., R. 7 E., Umiat Meridian	
		Section 9, Protracted, SE1/4SW1/4	40.00
		Section 16, Protracted, W1/2NE1/4, NE1/4SE1/4	120.00
15	355038	T. 13 N., R. 7 E., Umiat Meridian	
		Section 22, Protracted, NE1/4, NE1/4NW1/4, E1/2SE1/4	280.00
		Section 23: Protracted, W1/2NW1/4, SE1/4NW1/4, SW1/4, W1/2SE1/4	360.00
		Section 26: Protracted, NW1/4NE1/4, N1/2NW1/4,	120.00

### III. DISCUSSION OF DECISION CRITERIA

The DNR Commissioner (Commissioner) reviews applications related to units, including participating area formations, expansions and contractions, under 11 AAC 83.303-395. By memorandum dated September 30, 1999, the Commissioner approved a revision of Department Order 003 and delegated this authority to the Division Director. The Division’s review of the Application is based on the criteria set out in 11 AAC 83.303 (a) and (b). A discussion of the subsection (b) criteria, as they apply to the Application, is set out directly below, followed by a discussion of the subsection (a) criteria. Analysis and discussion of subsection (b) requirements precedes and supports the findings under subsection (a).

#### A. Decision Criteria considered under 11 AAC 83.303(b)

##### 1. Environmental Costs and Benefits

Approval of the OTPA revision has no direct environmental impact. This decision is an administrative action and does not authorize any on-the-ground activity. The Unit Operator must obtain approval of a plan of operations from the State and permits from various agencies on State leases before drilling a well or wells or initiating development activities to produce reservoirs within the unit area. 11 AAC 83.346. Potential effects on the environment are analyzed when permits to conduct exploration or development in the unit area are reviewed. Caelus has obtained the required permits for the current OTPA wells and is operating under an approved plan of operations and plan of development. DNR considers environmental issues during the lease sale process and the unit plan of operations approval process.

##### 2. Geologic and Engineering Characteristics and Prior Exploration and Development Activities of the Torok Participating Area

###### Prior Exploration and Development activities

Many exploration wells were drilled in the Colville River Delta area between 1965 and the early 2000s. Several of these wells encountered prospective Torok Formation at depths between 4,000’ to 6,000’ true vertical depth subsea en route to deeper exploration targets such as the Kuparuk and Sadlerochit (Ivishak sandstone). Wells in the area that encountered significant Torok reservoir interval included: the Sinclair Colville 1 well drilled in 1965-1966; the Texaco Colville Delta 2 and 3 wells drilled in 1986; the ARCO Kalubik 1 well drilled in 1992; the ARCO Kalubik 2 well drilled in 1998; and the Oooguruk 1 and Ivik 1 wells drilled in 2003. Both the Colville Delta 2 & 3 wells produced completion fluids and minor oil (unstimulated) at very low

flow rates and at very low bottomhole pressures. Following moderate fracture stimulation, the Colville Delta 3 well did produce an average of 240 stock tank barrels of oil per day during an 84-hour flow period. The Kalubik 1 well produced (unstimulated) completion fluids and water during a 12-hour test. During 1998, a Modular Dynamics Tester (MDT) sample recovered from ARCO's Kalubik 2 well yielded an oil gravity value of 19.8 °API, but the well was not flow-tested. MDT measurements and fluid samples in the Torok interval in the Oooguruk 1 and Ivik 1 indicated that those wells were wet, establishing a highest known water in the Torok at -5,212 feet True Vertical Depth Sub Sea (TVDSS) in the Ivik 1 well. The Colville Delta 3 well tested oil down to a depth of -5,150 feet TVDSS.

In 2010 the Nuiqsut development well ODSN-45 was plugged backed and sidetracked due to operational difficulties and recompleted as a horizontal producer in the Torok Formation near the Kalubik 2 well. Sustained oil production from the Torok ODST-45A well began in March 2010 and averaged approximately 530 barrels of oil per day over the following year. Establishment of the Oooguruk-Torok Oil Pool and pool rules was approved by the Alaska Oil and Gas Conservation Commission (AOGCC) in May 2011.

The formation of the OPA in the OU was approved by the Division in June 2011 and includes horizontal production wells ODST-45A, ODST-39 and horizontal injection well ODST-46. In October of 2012 an additional horizontal Torok producer (ODST-47) was drilled south of the existing PA boundary onto OU lease ADL 355038. The OPA was expanded by the Division to incorporate the lands encompassing ODST-47 in March of 2013.

Due to mechanical failures in the wellbore during the completion and stimulation of the well, the ODST-47 producer was not capable of contributing to production beyond the approximately 716 barrels of oil recovered from an initial flowback over five days in May 2013.

As of July 31, 2017, The Torok PA has produced a cumulative volume of 860,000 barrels of oil. This production has primarily come from producers ODST-45A and ODST-39 with approximately 100,000 barrels of oil from the pre-production of the ODST-46 injection well. Currently ODST-45A is the only producer online and in July 2017 produced approximately 145 barrels of oil per day with a 52% water cut (the percentage of water production to total fluid produced).

### **Geology of the Torok Interval**

The Torok reservoir within the OU is a combination structural-stratigraphic trap. The Torok in this area is part of an eastward dipping monocline. There are several minor northwest trending normal faults in the area and a major down-to-the-east northwest-southeast trending fault between the Kalubik 1 and Colville Delta 2 wells. This major fault defines the northeast edge of the OPA and stratigraphically isolates the down dip water wet Torok formation east of the Texaco Colville Delta 2 well. The western edge of the OPA is defined by the stratigraphic closure due to sandstone onlap onto the toe of slope.

The Torok formation is a time transgressive unit of Albian to Cenomanian in age and forms a complex series of interbedded sandstone, siltstone, and mudstone deposits that record complex interaction of deposition, sedimentation, subsidence, sea-level changes, and erosion along a shelf edge margin during the middle Cretaceous. The resultant sedimentary deposits record the interplay of changes in sea level, subsidence, and sedimentation and accompanying depositional

patterns of progradation, regression, and aggradation. The entire Torok interval is generally around 250 feet thick in the Oooguruk area. The most prospective Torok reservoirs in the area represent toe of slope and basin floor fan sandstone deposits. Some composite sand packages greater than 35-40 feet can be recognized and mapped with 3D seismic. The AOGCC Conservation Order Number 645 defines the interval from 4,991 to 5,272 feet measured depth (-4,954 feet to -5,235 feet TVDSS) in the ARCO Kalubik 1 well as the type section for the prospective Torok reservoir in the OTPA.

Because the Torok reservoir consists of very finely interbedded sandstones, siltstones, and mudstones, it is difficult to correlate individual beds, but far easier to define and correlate the entire interval. Whole core data from Colville Delta 3 and Kalubik 1 and 2 and sidewall core data from Colville Delta 2, Thetis Island 1, Ivik 1, and Oooguruk 1 were analyzed to calculate porosity, water saturation, net pay, and hydrocarbon pore feet. Sands are composed of coarse silt to very fine sand sized grains with 20% to 50% quartz, 15% to 25% feldspar, 5% to 40% clay, 4% mica, metamorphic rock fragments, and minor amounts of carbonate. The net sand to gross thickness ratio of the Torok reservoir is typically 45% to 50%. Sandstone porosity is 12% to 26% with an average of 19%. Sandstone permeability ranges from 0.1 to 100 millidarcies (md), averaging 4 md. Routine core data suggests that 75% of the sand has a permeability greater than 1 md.

Oil production from the Torok Formation in both the OTPA and neighboring Kuparuk River Unit (KRU) to date is marked by elevated production of formation water. Water cut in the producing wells consistently ranges between 45% and 75%. No clearly-defined Oil-Water Contact (OWC) has been identified in the Torok Pool, the highest known water for the pool is established by MDT measurements in the Ivik 1 well at -5,212 feet TVDSS. The mobile water present may take the form of a single OWC or multiple OWCs, with a wide transition zone of mobile oil and water due to the very fine-grained nature of the reservoir. To date, there has been no observed flood response between all injecting and producing wells.

## **Conclusion**

Caelus submitted sufficient technical data to support a contraction and expansion of the OTPA. The data submitted included maps, digital map grids, well data, and well history information. As it currently exists, the ODST-47 wellbore is not capable of contributing to production. Remediation of the wellbore will require sidetracking the well, running new completions, and hydraulic stimulation of the new wellbore. Due to the limited number of drilling slots available at the offshore Oooguruk Drill Site (ODS), Caelus has demonstrated to the Division that repurposing the ODST-47 well slot to a bottom hole target in the Nuiqsut reservoir will provide greater production and reserves. For that reason, the lands of the Torok PA encompassing ODST-47 well will be contracted out of the PA. The ODST-46i wellbore was drilled after the last OTPA revision, expanding the drainage area of the OTPA. Because of this, the PA is expanded to the northwest.

The revision of the ONPA includes all quarter-quarter sections partially or totally within a 1,500-foot radius of the productive section of each operable ONPA well. This defines the estimated areal extent of the existing waterflood pattern drainage area. The allocation of production within the drainage area is based on original oil in place.

The Division reviewed Caelus’s geological, geophysical, and engineering data and found that the data submitted justifies the inclusion of the proposed acreage in the OTPA and that tract participations are consistent with ongoing production.

### **3. Plans of Development**

The Division approved the OU Twelfth POD on June 26, 2018, effective for the period September 1, 2018 through August 31, 2019. Caelus suspended drilling operations in April 2016 “due to market conditions,” however it conducted eight well workovers during the Eleventh POD period. Caelus has no plans for drilling additional wells during the current POD period, however it has plans to conduct ODSN well workovers which include casing repairs and recompletions with new electric submersible pumps during the Twelfth POD period. Caelus will also continue facility maintenance and optimization activities to maximize production.

### **4. The Economic Costs and Benefits to the State and Other Relevant Factors**

The revised OTPA will provide more accurate allocation of royalty payments on production. Because some of the acreage is already producing or contributing to production, though, there is no additional direct royalty benefit.

## **B. Decision Criteria considered under 11 AAC 83.303(a)**

### **1. Promote the Conservation of All Natural Resources**

The unitization of oil and gas reservoirs and the expansion and contraction of participating areas within unit areas to develop hydrocarbon-bearing reservoirs are well-accepted means of hydrocarbon conservation. Expansion and contraction of a participating area within an existing unit, with development occurring under the terms of a unit agreement, promotes efficient evaluation and development of the State’s oil and gas, and minimizes impacts to the area’s cultural, biological, and environmental resources.

### **2. The Prevention of Economic and Physical Waste**

The acreage within the revised OTPA already produces and contributes to production from the OU. Approval of the Application will prevent economic and physical waste because the approval will more accurately allocate production revenue under the approved OTPA tract allocations, and equitably allocate production revenues among the WIOs.

Revising the OTPA to include all areas capable of producing or contributing to the production of hydrocarbons allows the operator to place wells in the optimum location for recovery and prevents drilling unnecessary wells in an attempt to extend lease terms.

Annual approval of the OU development activities as described in future PODs must also provide for the prevention of economic and physical waste.

### **3. The Protection of All Parties of Interest, Including the State**

A participating area “must be expanded to include acreage reasonably estimated through use of geological, geophysical, or engineering data to be capable of producing or contributing to the production of hydrocarbons in paying quantities and must be contracted to exclude acreage reasonably proven through the use of geological, geophysical, and engineering data to be

incapable of producing hydrocarbons in paying quantities, subject to approval by the commissioner.” 11 AAC 83.351(c).

The Division reviewed confidential geophysical, geological and engineering data to determine if the proposed revision or acreage within the revised OTPA meet the above criteria. Caelus has demonstrated that the acreage proposed for the OTPA expansion is “reasonably estimated” to be capable of producing or contributing to production of hydrocarbons in paying quantities. At the same time, acreage within the initial OTPA “reasonably proven” to be incapable of producing or contributing to production is hereby contracted from the OTPA.

The revised OTPA will equitably allocate production from the PA and therefore protect all parties, including the State. The State is further protected as the OTPA only contains leases contributing to production, therefore allowing leases outside the OTPA to contract from the unit and potentially expire unless held by another means. The OTPA allocates production based on an original oil in place basis. The Division finds this to be an appropriate allocation methodology and supports the protection of all parties.

#### **IV. FINDINGS AND DECISION**

##### **A. The Conservation of All Natural Resources**

1. Revision of the OTPA under the OU Agreement will maximize the efficient recovery of oil and gas and minimize the adverse impacts on the surface and other resources, including hydrocarbons, gravel, sand, water, wetlands, and valuable habitat.

##### **B. The Prevention of Economic and Physical Waste**

1. Caelus submitted geological, geophysical, and engineering data to the Division in support of the Application, as approved. Division technical staff determined that the revised OTPA area is “reasonably estimated” to be capable of producing or contributing to production in paying quantities.
2. The available geological, geophysical, and engineering data justify committing the lands described in attachment 1 and 2 of this decision to the OTPA.

##### **C. The Protection of All Parties in Interest, Including the State**

1. The economic, geological, geophysical, and engineering data that Caelus provided reasonably justify the inclusion of the acreage into the revised OTPA under the terms of the applicable regulations governing formation, expansion, and operation of oil and gas units and participating areas (11 AAC 83.301–11 AAC 83.395) and the terms and conditions under which these lands were leased from the State.
2. The OTPA revision provides for the equitable division of costs and an equitable allocation of produced hydrocarbons under a POD designed to maximize physical and economic recovery from the reservoirs within the approved participating areas. The allocations of production and costs for the tracts within the revised OTPA are approved.



3. Whenever a participating area (or revision thereof) is approved pursuant to 11 AAC 83.351, Exhibits C, D, E, and F (when relevant) must be timely filed in accordance with the Division's instructions. These Exhibits constitute supporting documents for the purposes of filing NPSL reports prescribed by 11 AAC 83.245. The Division approves Caelus' submission of revised OTPA Exhibits C and D, reflecting the approved revision of the OTPA. Further, the Oooguruk working interest owners shall file Revised NPSL reports (Volume/Value report (VV), Account (AC), and Production Tax Lease Allowance Report (PT) forms) no later than 60 days after the date of this decision or the reports will be subject to an Administrative Fee pursuant to 11 AAC 245(h). The VV Form must be revised back to March 1, 2010 and the AC Form and the PT Form must be revised back to the date of the first capital expenditure. These reports are subject to audit under AS 38.05.036.
4. Caelus shall submit revised operator reports and the lessees shall submit revised royalty reports back to the month of first production from the OTPA, March 1, 2010. From this date forward production must be allocated to OTPA as set forth in the approved OTPA tract allocation schedule. Caelus and the lessees shall submit the revised reports within 60 days after the approval of the revision of the ONPA.

For the reasons discussed in this Findings and Decision, subject to the condition set forth above in section III.C, I hereby approve the OTPA Revision.

An eligible person affected by this decision may appeal it, in accordance with 11 AAC 02. Any appeal must be received within 20 calendar days after the date of "issuance" of this decision, as defined in 11 AAC 02.040(c) and (d), and may be mailed or delivered to Andrew T. Mack, Commissioner, Department of Natural Resources, 550 W. 7th Avenue, Suite 1400, Anchorage, Alaska 99501; faxed to 1-907-269-8918; or sent by electronic mail to [dnr.appeals@alaska.gov](mailto:dnr.appeals@alaska.gov). This decision takes effect immediately. An eligible person must first appeal this decision in accordance with 11 AAC 02 before appealing this decision to Superior Court. A copy of 11 AAC 02 may be obtained from any regional information office of the Department of Natural Resources.

If you have any questions regarding this decision, contact Kevin Pike with the Division at 907-269-8451, or by email at [kevin.pike@alaska.gov](mailto:kevin.pike@alaska.gov).

Sincerely,



Chantal Walsh  
Director  
Division of Oil and Gas

Date *July 11, 2018*

## V. Attachments

1. Oooguruk Unit, Revised Exhibit C
2. Oooguruk Unit, Revised Exhibit D
3. Oooguruk Unit, Revised Exhibit E
4. Oooguruk Unit, Revised Exhibit F

**Attachment One – Revised Exhibit C:  
Oooguruk-Torok Participating Area Tract Descriptions**

**Exhibit C**  
**Attached to and made a part of that certain Oooguruk Unit Agreement**  
**Torok Participating Area**

Unit Tract #	Lessor & Lease No.	Working Interest Owner	Working Interest	Effective Date	Description	Acreage	Royalty	TOTAL ORR Burden	Unit Tract Participation (OOIP)
13	State of AK ADL 355036 <b>UPPER INTERVAL</b>	Caelus Natural Resources Alaska, LLC Eni Petroleum US LLC  Upper Interval (i.e. the interval from the surface down to the stratigraphic equivalent of 8,373' (Driller's total depth +100') which is equivalent to 8,402' (Wireline Logger's total depth + 100') below the Kelly Bushing as shown on the Dual Laterolog Run #3 log dated April 5, 1992, in the ARCO-Kalubik #1 well located in Sec. 11, T.13 N., R. 7 E., U.M. known in the DNR computer records as "Segment 1" of the Lease.)	70.000000% 30.000000%	8-1-83	T13N., R7E. UMIAT MERIDIAN Sec 10: Protracted, SE/4 SE/4, W/2 SE/4, SW/4, S/2 NW/4 Sec 14: Protracted, W/2 W/2 Sec 15: Protracted, E/2, E/2 SW/4, NW/4 SW/4, NW/4	1,120.00	12.5%* 30% NPS	Total 5,021,390% See Details Below	90,180,32%
14	State of AK ADL 355037 <b>UPPER INTERVAL</b>	Caelus Natural Resources Alaska, LLC Eni Petroleum US LLC  Upper Interval (i.e. the interval from the surface down to the stratigraphic equivalent of 8,373' (Driller's total depth +100') which is equivalent to 8,402' (Wireline Logger's total depth + 100') below the Kelly Bushing as shown on the Dual Laterolog Run #3 log dated April 5, 1992, in the ARCO-Kalubik #1 well located in Sec. 11, T.13 N., R. 7 E., U.M. known in the DNR computer records as "Segment 1" of the Lease.)	70.000000% 30.000000%	8-1-83	T13N., R7E. UMIAT MERIDIAN Sec 9: Protracted, E/2, NE/4 SW/4, SE/4 NW/4 Sec 16: Protracted, E/2 NE/4	480.00	12.5%* 30% NPS	Total 5,076,7380% See Details Below	9,819,68%
<b>Total</b>						<b>1,600.00</b>			<b>100,000,000%</b>

**Exhibit C**  
**Attached to and made a part of that certain Oooguruk Unit Agreement**  
**Torok Participating Area**

**Working Interest Owners:**

Caelus Natural Resources Alaska, LLC  
 3700 Centerpoint Dr., Suite 500  
 Anchorage, AK 99503

Eni Petroleum US LLC  
 1201 Louisiana St., Suite 3500  
 Houston, TX 77002-5609

**Tract 13 is burdened by Overriding Royalty Interests ("ORRI") held by the following parties in the stated percentages :**

<b>Tract 13</b>	XH, LLC	0.252100%
<b>Segment 1 - Upper Interval</b>	1601 Elm Street, Suite 4700 Dallas, TX 75201	
	Eni Petroleum US LLC	0.514290%
	1201 Louisiana, Suite 3500 Houston, TX 77002	
	Caelus Natural Resources Alaska, LLC	1.200000%
	3700 Centerpoint Dr., Suite 500 Anchorage, AK 99503	
	ConocoPhillips Alaska, Inc.	2.500000%
	700 G Street Anchorage, AK 99501	
	William D. Armstrong**	0.404000%
	1421 Blake Street Denver, CO 80202	
	GMT North Slope Royalty Exploration Company LLC**	0.074000%
	1560 Broadway, Suite 800 Denver, CO 80202	
	Jesse V. Sommer**	0.012000%
	4531 West Geddes Avenue Littleton, CO 80128	
	Edgar Kerr**	0.012000%
	6750 Lemon Gulch Dr. Castle Rock, CO 80108	
	Jeffery A. Lyslo**	0.012000%
	91 Buckthorn Drive Littleton, CO 80127	
	Reed LJGC, LLC**	0.012000%
	P.O. Box 411 Franktown, CO 80116	

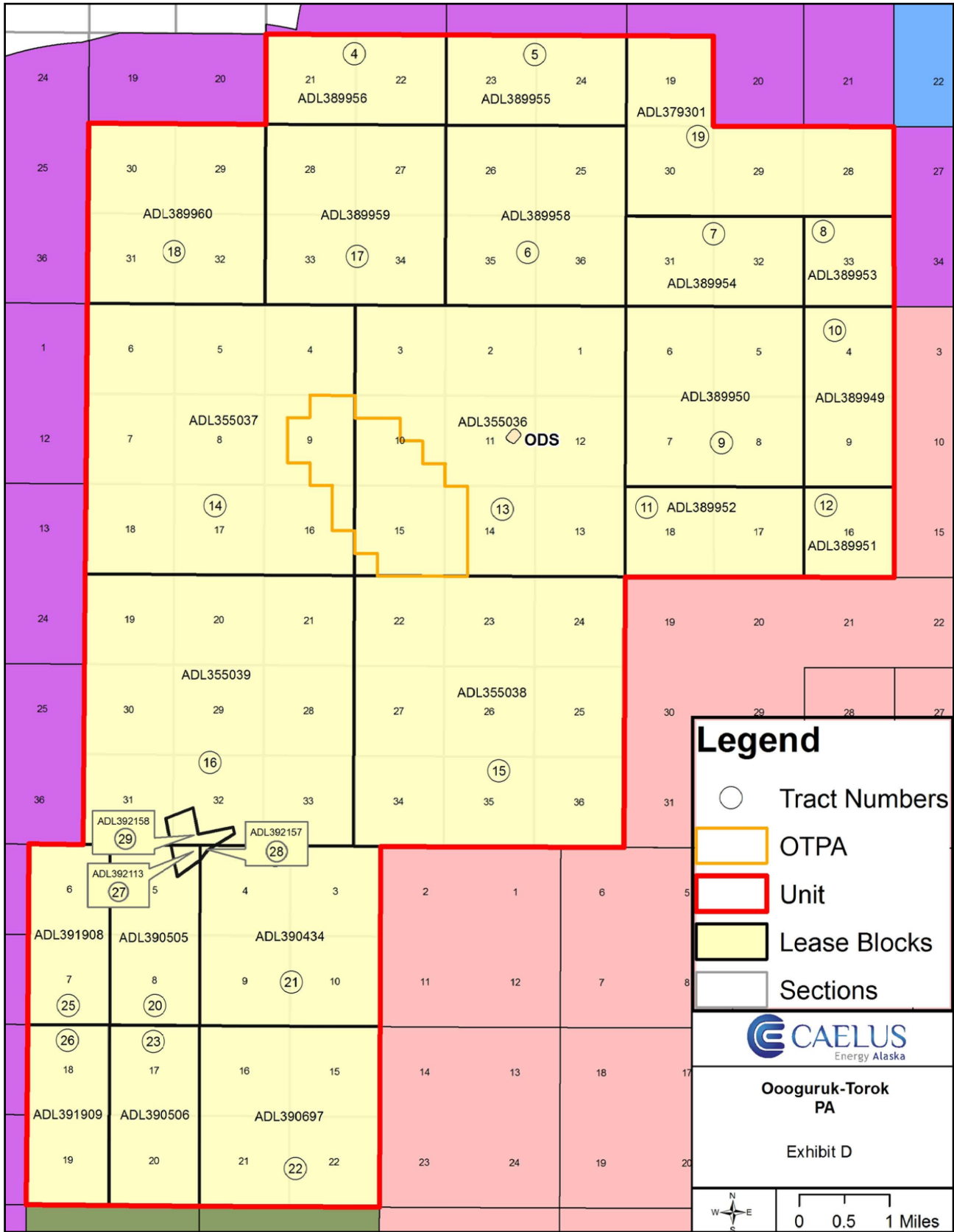
**Exhibit C**  
**Attached to and made a part of that certain Oooguruk Unit Agreement**  
**Torok Participating Area**

Matthew X. Furrin** 2001 South Madison Denver, CO 80210	0.012000%
Stuart W. Gustafson** P.O. Box 1466 La Conner, WA 98257	0.006000%
Macco Family Trust** P.O. Box 5 Edmonds, WA 98020	0.006000%
Chester E. Paris** 1208 Mesa Court Golden, CO 80403	0.005000%
<b>Tract 14 is burdened by Overriding Royalties ("ORRI") held by the following parties in the stated percentages :</b>	
Anadarko Petroleum Corporation P.O. Box 1330 Houston, TX 77251-1330	0.093548%
David L. Herbaly as Trustee of the David L. Herbaly Revocable Trust dated May 24, 2004 1420 W Canal Ct Ste 150 Littleton, CO 80120	1.350000%
XH, LLC 1601 Elm Street, Suite 4700 Dallas, TX 75201	0.126050%
George Alan Joyce, Jr. 3528 Eisenhower Lane Plano, TX 75023	0.150000%
Eni Petroleum US LLC 1201 Louisiana, Suite 3500 Houston, TX 77002	0.257140%
Caelus Natural Resources Alaska, LLC 3700 Centerpoint Dr., Suite 500 Anchorage, AK 99503	0.600000%
ConocoPhillips Alaska, Inc. 700 G Street Anchorage, AK 99501	2.500000%

\*The state's royalty interest in ADL 355036, ADL 355037, ADL 355038, ADL 389950, ADL 389952, ADL 389954, ADL 389958 and ADL 389959 is subject to that certain Final Findings and Determination of the Commissioner of DNR dated February 1, 2006 (modifying lease royalty in response to the Oooguruk Development Royalty Modification Application filed on May 20, 2005).

\*\*ORRI are borne exclusively by Eni Petroleum US LLC, considered Other Burdens as defined in Article 4.4 Oooguruk Unit Operating Agreement; not borne by Caelus Natural Resources Alaska, LLC.

**Attachment Two – Revised Exhibit D:  
Oooguruk-Torok Participating Area Map**



**Attachment Three – Revised Exhibit E:  
Ooguruk-Torok Participating Area Expense Allocation**



**Exhibit E**  
**Attached to and made a part of that certain Oooguruk Unit Agreement**  
**Torok Participating Area**

Unit Tract #	Lessor & Lease No.	Working Interest Owner	Working Interest	Effective Date	Description	Acreage	Royalty	TOTAL ORR Burden	PA Expense
13	State of AK ADL 355036 <b>UPPER INTERVAL</b>	Caelus Natural Resources Alaska, LLC Eni Petroleum US LLC Upper Interval (i.e. the interval from the surface down to the stratigraphic equivalent of 8,373' (Driller's total depth + 100') which is equivalent to 8,402' (Wireline Logger's total depth + 100') below the Kelly Bushing as shown on the Dual Laterolog Run #3 log dated April 5, 1992, in the ARCO-Katubik #1 well located in Sec. 11, T.13 N., R. 7 E., U.M. known in the DNR computer records as "Segment 1" of the Lease.)	70.000000% 30.000000%	8-1-83	T.13N., R.7E., UMIAT MERIDIAN Sec 10: Protracted, SE/4 SE/4, W/2 SE/4, SW/4, S/2 NW/4 Sec 14: Protracted, W/2 W/2 Sec 15: Protracted, E/2, E/2 SW/4, NW/4 SW/4, NW/4	1,120.00	12.5%* 30% NPS	Total 5.021390% See Details Below	90.18032%
14	State of AK ADL 355037 <b>UPPER INTERVAL</b>	Caelus Natural Resources Alaska, LLC Eni Petroleum US LLC Upper Interval (i.e. the interval from the surface down to the stratigraphic equivalent of 8,373' (Driller's total depth + 100') which is equivalent to 8,402' (Wireline Logger's total depth + 100') below the Kelly Bushing as shown on the Dual Laterolog Run #3 log dated April 5, 1992, in the ARCO-Katubik #1 well located in Sec. 11, T.13 N., R. 7 E., U.M. known in the DNR computer records as "Segment 1" of the Lease.)	70.000000% 30.000000%	8-1-83	T.13N., R.7E., UMIAT MERIDIAN Sec 9: Protracted, E/2, NE/4 SW/4, SE/4 NW/4 Sec 16: Protracted, E/2 NE/4	480.00	12.5%* 30% NPS	Total 5.0767380% See Details Below	9.81968%
<b>Total</b>						<b>1,600.00</b>			<b>100.000000%</b>

**Exhibit E**  
**Attached to and made a part of that certain Oooguruk Unit Agreement**  
**Torok Participating Area**

**Working Interest Owners:**

Caelus Natural Resources Alaska, LLC  
 3700 Centerpoint Dr., Suite 500  
 Anchorage, AK 99503

Eni Petroleum US LLC  
 1201 Louisiana St., Suite 3500  
 Houston, TX 77002-5609

**Tract 13 is burdened by Overriding Royalty Interests ("ORRI") held by the following parties in the stated percentages :**

<b>Tract 13</b>	XH, LLC	0.252100%
<b>Segment 1 - Upper Interval</b>	1601 Elm Street, Suite 4700 Dallas, TX 75201	
	Eni Petroleum US LLC	0.514290%
	1201 Louisiana, Suite 3500 Houston, TX 77002	
	Caelus Natural Resources Alaska, LLC	1.200000%
	3700 Centerpoint Dr., Suite 500 Anchorage, AK 99503	
	ConocoPhillips Alaska, Inc.	2.500000%
	700 G Street Anchorage, AK 99501	
	William D. Armstrong**	0.404000%
	1421 Blake Street Denver, CO 80202	
	GMT North Slope Royalty Exploration Company LLC**	0.074000%
	1560 Broadway, Suite 800 Denver, CO 80202	
	Jesse V. Sommer**	0.012000%
	4531 West Geddes Avenue Littleton, CO 80128	
	Edgar Kerr**	0.012000%
	6750 Lemon Gulch Dr. Castle Rock, CO 80108	
	Jeffery A. Lyslo**	0.012000%
	91 Buckthorn Drive Littleton, CO 80127	
	Reed LJGC, LLC**	0.012000%
	P.O. Box 411 Franktown, CO 80116	

**Exhibit E**  
**Attached to and made a part of that certain Oooguruk Unit Agreement**  
**Torok Participating Area**

Matthew X. Furrin** 2001 South Madison Denver, CO 80210	0.012000%
Stuart W. Gustafson** P.O. Box 1466 La Conner, WA 98257	0.006000%
Macco Family Trust** P.O. Box 5 Edmonds, WA 98020	0.006000%
Chester E. Paris** 1208 Mesa Court Golden, CO 80403	0.005000%
<b>Tract 14 is burdened by Overriding Royalties ("ORRI") held by the following parties in the stated percentages :</b>	
<b>Tracts 14</b>	
<b>Segment 1 - Upper Interval</b>	
Anadarko Petroleum Corporation P.O. Box 1330 Houston, TX 77251-1330	0.093548%
David L. Herbaly as Trustee of the David L. Herbaly Revocable Trust dated May 24, 2004 1420 W Canal Ct Ste 150 Littleton, CO 80120	1.350000%
XH, LLC 1601 Elm Street, Suite 4700 Dallas, TX 75201	0.126050%
George Alan Joyce, Jr. 3528 Eisenhower Lane Plano, TX 75023	0.150000%
Eni Petroleum US LLC 1201 Louisiana, Suite 3500 Houston, TX 77002	0.257140%
Caelus Natural Resources Alaska, LLC 3700 Centerpoint Dr., Suite 500 Anchorage, AK 99503	0.600000%
ConocoPhillips Alaska, Inc. 700 G Street Anchorage, AK 99501	2.500000%

\*The state's royalty interest in ADL 355036, ADL 355037, ADL 355038, ADL 389950, ADL 389952, ADL 389954, ADL 389958 and ADL 389959 is subject to that certain Final Findings and Determination of the Commissioner of DNR dated February 1, 2006 (modifying lease royalty in response to the Oooguruk Development Royalty Modification Application filed on May 20, 2005).

\*\*ORRI are borne exclusively by Eni Petroleum US LLC, considered Other Burdens as defined in Article 4.4 Oooguruk Unit Operating Agreement; not borne by Caelus Natural Resources Alaska, LLC.

**Attachment Four – Revised Exhibit F:  
Oooguruk-Torok Participating Area,  
Allocation of Unit Area Expense**

**Exhibit F**  
**Attached to and made a part of that certain Oooguruk Unit Agreement**  
**Torok Participating Area**

Caelus Natural Resources Alaska, LLC, as the Oooguruk Unit Operator, estimates the total Unit economic reserves will be contributed 88.80% from the Nuiqsut PA, 10.00% from the Kuparuk PA and 1.20% from the Torok PA. The current Unit Plan of Development contemplates the drilling a total of 36 wells for Oooguruk development; 5 wells in the Kuparuk, 28 in the Nuiqsut and 3 wells in the Torok. On a relative well count basis 13.889% of the unit wells will be drilled to produce Kuparuk reserves, 77.778% of the unit wells will be drilled to produce Nuiqsut reserves and 8.333% of the unit wells will be drilled to produce Torok reserves. Caelus Natural Resources Alaska, LLC proposes that expenses be broadly captured in four different cost centers and such costs be allocated as follows:

1. Well Costs – Will be first allocated to the specific Participating Area into which the wells are drilled (Kuparuk PA, Nuiqsut PA or Torok PA) and then to each Tract within a PA by the PA Tract Participation factor.
2. Oooguruk Drill Site (ODS) - Costs including all drillsite facilities, (i.e. well-bay modules, flowline manifolds, etc.) will be first allocated to the specific Participating Area by relative well count and then to each Tract within a PA by the PA Tract Participation factor.
3. Flowline Costs – Costs include all downstream of the ODS, include sub-sea three-phase production, gas, water and diesel flowlines, shore crossing and above ground vertical support member supported flowlines and all facilities at the Onshore Tie-in Pad (OTP). These will be first allocated to the specific Participating Area by relative total reserves contribution and then to each Tract within a PA by the PA Tract Participation factor.
4. Gas Injection Costs - Costs include compression and injection equipment and will be first allocated exclusively to the Nuiqsut PA and then to each Tract within said PA by the PA Tract Participation factor.

Unit Tract	Lessors & Lease	Working Interest Owner	Working Interest	Effective Date	Description	Acres	Royalty	TOTAL ORR Burden	Unit Tract OOIP Allocation	Relative Reserve Allocation (0.012 x Tract Allocation)	Well Count Allocation (3/36 x Tract Allocation)
13	State of AK ADL 355036	Caelus Natural Resources Alaska, LLC Eni Petroleum US LLC	70.000000% 30.000000%	8-1-83	T13N, R7E, UMIAT MERIDIAN Sec 10: Protracted, SE/4 SE/4, W/2 SE/4, SW/4, S/2 NW/4 Sec 14: Protracted, W/2 W/2 Sec 15: Protracted, E/2, E/2 SW/4, NW/4 SW/4, NW/4	1,120.00	12.5%* 30% NPS	Total 5.021390% See Details Below	90.18032%	1.08%	7.515%
<b>Segment 1</b> Upper Interval (i.e. the interval from the surface down to the stratigraphic equivalent of 8,373' (Driller's total depth + 100') which is equivalent to 8,402' (Wireline Logger's total depth + 100') below the Kelly Bushing as shown on the Dual Laterolog Run #3 log dated April 5, 1992, in the ARCO-Kalubik #1 well located in Sec. 11, T.13 N., R. 7 E., U.M. known in the DNR computer records as "Segment 1" of the Lease.)											
14	State of AK ADL 355037	Caelus Natural Resources Alaska, LLC Eni Petroleum US LLC	70.000000% 30.000000%	8-1-83	T13N, R7E, UMIAT MERIDIAN Sec 9: Protracted, E/2, NE/4 SW/4, SE/4 NW/4 Sec 16: Protracted, E/2 NE/4	480.00	12.5%* 30% NPS	Total 5.0767380% See Details Below	9.81968%	0.12%	0.818%
<b>Segment 1</b> Upper Interval (i.e. the interval from the surface down to the stratigraphic equivalent of 8,373' (Driller's total depth + 100') which is equivalent to 8,402' (Wireline Logger's total depth + 100') below the Kelly Bushing as shown on the Dual Laterolog Run #3 log dated April 5, 1992, in the ARCO-Kalubik #1 well located in Sec. 11, T.13 N., R. 7 E., U.M. known in the DNR computer records as "Segment 1" of the Lease.)											
<b>Total Acres</b>						<b>1,600.00</b>			<b>100.000000%</b>	<b>1.20%</b>	<b>8.333%</b>

**Exhibit F**  
**Attached to and made a part of that certain Oooguruk Unit Agreement**  
**Torok Participating Area**

**Working Interest Owners:**

Caelus Natural Resources Alaska, LLC 3700 Centerpoint Dr., Suite 500 Anchorage, AK 99503	Eni Petroleum US LLC 1201 Louisiana St., Suite 3500 Houston, TX 77002-5609
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**Tract 13 is burdened by Overriding Royalty Interests ("ORRI") held by the following parties in the stated percentages :**

<b>Tract 13 Segment 1 - Upper Interval</b>	<b>0.252100%</b>
XH, LLC 1601 Elm Street, Suite 4700 Dallas, TX 75201	0.252100%
Eni Petroleum US LLC 1201 Louisiana, Suite 3500 Houston, TX 77002	0.514290%
Caelus Natural Resources Alaska, LLC 3700 Centerpoint Dr., Suite 500 Anchorage, AK 99503	1.200000%
ConocoPhillips Alaska, Inc. 700 G Street Anchorage, AK 99501	2.500000%
William D. Armstrong** 1421 Blake Street Denver, CO 80202	0.404000%
GMT North Slope Royalty Exploration Company LLC** 1560 Broadway, Suite 800 Denver, CO 80202	0.074000%
Jesse V. Sommer** 4531 West Geddes Avenue Littleton, CO 80128	0.012000%
Edgar Kerr** 6750 Lemon Gulch Dr. Castle Rock, CO 80108	0.012000%
Jeffery A. Lyslo** 91 Buckthorn Drive Littleton, CO 80127	0.012000%
Reed LJGC, LLC** P.O. Box 411 Franktown, CO 80116	0.012000%

**Exhibit F**  
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**Torok Participating Area**

Matthew X. Furrin** 2001 South Madison Denver, CO 80210	0.012000%
Stuart W. Gustafson** P.O. Box 1466 La Conner, WA 98257	0.006000%
Macco Family Trust** P.O. Box 5 Edmonds, WA 98020	0.006000%
Chester E. Paris ** 1208 Mesa Court Golden, CO 80403	0.005000%
<b>Tract 14 is burdened by Overriding Royalties ("ORRI") held by the following parties in the stated percentages :</b>	
Anadarko Petroleum Corporation P.O. Box 1330 Houston, TX 77251-1330	0.093548%
David L. Herbaly as Trustee of the David L. Herbaly Revocable Trust dated May 24, 2004 1420 W Canal Ct Ste 150 Littleton, CO 80120	1.350000%
XH, LLC 1601 Elm Street, Suite 4700 Dallas, TX 75201	0.126050%
George Alan Joyce, Jr. 3528 Eisenhower Lane Plano, TX 75023	0.150000%
Eni Petroleum US LLC 1201 Louisiana, Suite 3500 Houston, TX 77002	0.257140%
Caelus Natural Resources Alaska, LLC 3700 Centerpoint Dr., Suite 500 Anchorage, AK 99503	0.600000%
ConocoPhillips Alaska, Inc. 700 G Street Anchorage, AK 99501	2.500000%

\*The state's royalty interest in ADL 355036, ADL 355037, ADL 355038, ADL 389950, ADL 389952, ADL 389954, ADL 389958 and ADL 389959 is subject to that certain Final Findings and Determination of the Commissioner of DNR dated February 1, 2006 (modifying lease royalty in response to the Oooguruk Development Royalty Modification Application filed on May 20, 2005).

\*\*ORRI are borne exclusively by Eni Petroleum US LLC, considered Other Burdens as defined in Article 4.4 Oooguruk Unit Operating Agreement; not borne by Caelus Natural Resources Alaska, LLC.