

NORTHSTAR UNIT

APPROVAL OF THE
HOOLIGAN PARTICIPATING AREA
FORMATION

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

February 24, 2015

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I. INTRODUCTION AND DECISION SUMMARY

This is the decision of the Director of the State of Alaska, Department of Natural Resources (DNR), Division of Oil and Gas (Division) pursuant to a September 30, 1999, delegation of authority from the DNR Commissioner on the application of BP Exploration (Alaska), Inc. (BPXA) to form the Hooligan Participating Area (HPA). On June 28, 2012, BPXA, on behalf of itself and Murphy Exploration (Alaska) Inc. (Murphy), applied to form the HPA within the Northstar Unit (NSU) on state and federal leases issued by the DNR and the federal Bureau of Safety and Environmental Enforcement (BSEE).

The Division finds that the formation of the HPA 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. DNR approves the Application in accordance with the criteria under 11 AAC 83.303. The effective date of the HPA is January 1, 2006.

II. APPLICATION FOR AND HISTORY OF PROPOSED AREA

The Division and the BSEE jointly manage the NSU. The NSU was formed effective January 24, 1990, and was comprised of five state oil and gas leases and two federal leases. The unit has gone through several contractions and expansions.

Effective July 13, 2001, the Division approved the first expansion of the NSU to include an additional federal lease. Effective November 2, 2005, a single state lease contracted from the NSU due to BPXA's failure to fulfill the drilling commitment tied to the lease. The NSU contracted again effective October 11, 2011 pursuant to Section 13.2 of the NSU Agreement because of BPXA's failure to submit a participating area formation application covering the NS-34A reservoir in that portion of the federal OCS-Y-0181 lease not included in an existing participating area. The Division approved a second unit expansion on October 16, 2014. The NSU currently covers approximately 20,135 acres.

The unit currently contains two participating areas. The Northstar Participating Area (NSPA) was approved by DNR and BSEE effective September 4, 2002. The NSPA went into production shortly after it was formed, and it remains in production today. The Fido participating area, comprised entirely of federal leases, was approved by BSEE effective June 22, 2012, and it is also in production.

On June 28, 2012, BPXA filed the Application to form the HPA partly within the NSU and partly on land BPXA proposed to be added to the unit. The proposed HPA targets the Kuparuk formation that BPXA has been producing since 2006 from the NSU as a tract operation, with sustained production since 2010. The proposed HPA is contained within four state oil and gas leases and two federal leases, as shown in Exhibits C and D, Attachments 1 and 2, and encompasses approximately 7,656.10 acres. The Application proposed that the unit be expanded to include ADL 312808 and ADL 312798 which are also proposed for inclusion in the HPA. On October 16, 2014, the Division approved the requested unit expansion. Effective November 1, 2014, BPXA assigned 100% of its interest in the NSU to Hilcorp Alaska, LLC (Hilcorp). Hilcorp

acquired Murphy's lease interests in the NSU effective December 1, 2014, and now holds 100% interest in all state and federal leases in the NSU.

In Exhibit C and Table 1 below display the unit tract numbers, legal descriptions, lease numbers, working interest ownership, royalty interest ownership, overriding royalty interest ownership, and unit tract participations for the HPA. Exhibit D is a map of the HPA.

Table 1. Leases for Proposed Hooligan Participating Area (HPA)

Unit Tract No.	Lease No.	Legal Description	Acres in HPA	Royalty Interest Owners hip (%)	Overriding Royalty Interest Owner	Working Interest Ownership (%)	Unit Tract Participation for HPA (%)
TR-1	OCS-Y-0179	<p>That portion of OCS-Y-0179 -- more particularly described as that portion of block 470 shown as Federal 8(g) Area B on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975, and lying southerly of line 11-12 and line 12-13 bisecting block 470, as shown on the Supplemental Diagram of the Supplemental Official OCS Block Diagram, dated 6/4/82, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975, and those lands lying between the two lines bisecting block 471 (further described as "disputed area"), containing approximately 611.95 hectares, as shown on the Supplemental Official OCS Block Diagram, dated 10/04/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975, and those lands lying northeasterly of the line bisecting block 515, containing approximately 190.97 hectares, as shown on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975, lying south of the line commencing at Easting, Northing UTM6 Meters, NAD27 435076.08, 7825840.36 and ending at Easting, Northing UTM6 Meters, NAD27 437600.00, 7824000.00, as shown on Exhibit D (dated 9/21/01) -- of Block 515, containing approximately 190.97 hectares (471.89 acres), as shown on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protection Diagram NR 6-3, Beechey Point, approved April 29, 1975; And that portion of Block 471 within S1/2SW1/4 and S1/2SW1/4SE1/4, containing approximately 99.83 hectares (246.68 acres), as shown on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975; And that portion of Block 470 lying south of the line commencing at Easting, Northing UTM6 Meters, NAD27 431762.97, 7825801.43 and ending at Easting, Northing UTM6 Meters, NAD27 432800.00, 7825812.71, containing approximately 15.01 hectares (37.09 acres), as shown on the Supplemental Diagram, dated 2/25/88, based on Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975.</p>	755.66	Federal: 100	None	Hilcorp: 100	0.353322

Unit Tract No.	Lease No.	Legal Description	Acres in HPA	Royalty Interest Ownership (%)	Overriding Royalty Interest Owner	Working Interest Ownership (%)	Unit Tract Participation for HPA (%)
TR-2	OCS-Y-0181	That portion of Block 516 within NW1/4SW1/4 and SW1/4NW1/4, containing approximately 267.28 hectares (660.45 acres), as shown on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975.	660.45	Federal: 100	None	Hilcorp: 100	3.019442
TR-101	ADL 312798	That portion of ADL 312798, more particularly described as those lands located Easterly of the West boundary of T13N, R13E, U.M. AK and T14N, R13E, U.M. AK, being the North-South line intersecting the North and South boundary of Block 470, within the offshore Three-Mile arc lines listed as State area of Block 470 "Supplemental Official O.C.S. Block Diagram" approved 10/4/79, and those lands in Block 514 Easterly of the West boundary of T13N, R13E, U.M. AK (being identical with Line 2-3 of Block 514) and that portion of Section 16, T13N, R13E, U.M. AK within the N1/2S1/2 (being Easterly of Line 3-4 of Block 514), being a portion of the listed State area of Block 514 on the "Supplemental Official O.C.S. Block Diagram" approved 12/9/79, lying within: T14N R13E, Umiat Meridian, Alaska, Section 32: E 1/2, Section 33 T13N R13E, Umiat Meridian, Alaska Section 4, Section 5: E 1/2, Section 8: NE 1/4, Section 9: N 1/2	1,186.21	State of Alaska: 100	None	Hilcorp: 100	5.954790
TR-102	ADL 312799	That portion of ADL 312799, more particularly described as those lands located in Block 471 within the offshore Three-Mile arc lines, listed as State area on the "Supplemental Official O.C.S. Block Diagram", approved 10/4/79, and those lands in N1/2, N1/2S1/2 of Block 515 within the offshore Three-Mile arc lines being a portion of the listed State area on the "Supplemental Official O.C.S. Block Diagram, approved 10/4/79, lying within: T14N R13E, Umiat Meridian, Alaska Section 33: S 1/2 S 1/2 OCS Block 470 Sections 34 and 35 T13N R13E, Umiat Meridian, Alaska Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, and 15	4,269.38	State of Alaska: 100	None	Hilcorp: 100	85.523202

Unit Tract No.	Lease No.	Legal Description	Acres in HPA	Royalty Interest Ownership (%)	Overriding Royalty Interest Owner	Working Interest Ownership (%)	Unit Tract Participation for HPA (%)
TR-103	ADL 312808	That portion of ADL 312808, more particularly described as those lands located in S1/2S1/2 of Block 514, within Sections 16 and 21, T13N, R13E, U.M. AK (being those lands lying Easterly of Line 3-4 on Block 514), a portion of the State area on the "Supplemental Official O.C.S. Block Diagram" approved 12/9/79, and those lands in S1/2S1/2 of Block 515, being a portion of the State area on the "Supplemental Official O.C.S. Block Diagram, approved 10/4/79, and those lands within Block 558 located in Section 21, T13N, R13E, U.M. AK (being the portion Easterly of Line 1-2 and Northerly of Line 2-3 Block 558), listed as State area on the "Supplemental Official O.C.S. Block Diagram" approved 12/9/79 and those lands in Block 559 lying Northerly of the South boundary of Sections 21, 22, 23 and 24, T13N, T13E, U.M. AK (being the Northerly portion of Block 559), listed as State area on the "Supplemental Official O.C.S. Block Diagram" approved 10/4/79, lying within: T13N R13E, Umiat Meridian, Alaska Sections 13 and 14, Section 15: E 1/2	732.74	State of Alaska: 100	None	Hilcorp: 100	4.895156
TR-104	ADL 312809	That portion of ADL 312809, more particularly described as those lands located in Block 516 within the Three-Mile arc lines, listed as State area on the "Supplemental Official O.C.S. Block Diagram" approved 10/4/79, and those lands in Block 560 lying Northerly of the South boundary of Section 24, T13N, R13E, U.M. AK (being identical with Line 4-5 on Block 560), and lying Easterly of the West boundary and Northerly of the South boundary of T13N, R14E, U.M. AK (being identical with Lines 5-6 and 6-7 on Block 560), within the offshore Three-Mile arc lines, listed as State area on the "Supplemental Official O.C.S. Block Diagram" approved 12/9/79, lying within: T13N R13E, Umiat Meridian, Alaska Section 13: N 1/2 S 1/2 OCS Block 516	51.66	State of Alaska: 100	None	Hilcorp: 100	0.254088
TOTAL			7,656.10				100

BPXA submitted confidential and public information with the Application. The confidential geological, geophysical, and engineering data support the Application and indicate that all the State leases proposed for inclusion in the HPA could contribute in paying quantities to production of hydrocarbons.

III. STATUTE, REGULATIONS, AND NSU AGREEMENT PROVISIONS RELEVANT TO EVALUATION OF THE APPLICATION

This section sets out the provisions of statute, regulations, and NSU provisions relevant to this decision.

A. Statute

Legislative intent regarding the State oil and gas leasing program is set out in AS 38.05.180(a). It provides:

AS 38.05.180. Oil and Gas and Gas Only Leasing.

(a) The legislature finds that

(1) the people of Alaska have an interest in the development of the State's oil and gas resources to

(A) maximize the economic and physical recovery of the resources;

(B) maximize competition among parties seeking to explore and develop the resources;

(C) maximize use of Alaska's human resources in the development of the resources;

B. Regulations

State regulation 11 AAC 83.303 sets out decision criteria for deciding whether to grant an application to a form participating area. It provides:

11 AAC 83.303. Criteria

(a) The commissioner will approve a proposed unit agreement for state oil and gas leases if he makes a written finding that the agreement is necessary or advisable to protect the public interest considering the provisions of AS 38.05.180 (p) and this section. The commissioner will approve a proposed unit agreement upon a written finding that it will

(1) promote conservation of all natural resources, including all or part of an oil or gas pool, field, or like area;

(2) promote the prevention of economic and physical waste; and

(3) provide for the protection of all parties of interest, including the state.

(b) In evaluating the above criteria, the commissioner will consider

- (1) the environmental costs and benefits of unitized exploration or development;
 - (2) the geological and engineering characteristics of the potential hydrocarbon accumulation or reservoir proposed for unitization;
 - (3) prior exploration activities in the proposed unit area;
 - (4) the applicant's plans for exploration or development of the unit area;
 - (5) the economic costs and benefits to the State; and
 - (6) any other relevant factors, including measures to mitigate impacts identified above, the commissioner determines necessary or advisable to protect the public interest.
- (c) The commissioner will consider the criteria in (a) and (b) of this section when evaluating each requested authorization or approval under 11 AAC 83.301 - 11 AAC 83.395, including
- (1) an approval of a unit agreement;
 - (2) an extension or amendment of a unit agreement;
 - (3) a plan or amendment of a plan of exploration, development or operations;
 - (4) a participating area; or
 - (5) a proposed or revised production or cost allocation formula.

The following regulations should also be considered in connection with the Application.

11 AAC 83.351. Participating area

(a) At least 90 days before sustained unit production from a reservoir, the unit operator shall submit to the commissioner for approval a description of the proposed participating area, based on subdivisions of the public land or its aliquot parts. The participating area may include only the land reasonably known to be underlain by hydrocarbons and known or reasonably estimated through use of geological, geophysical, or engineering data to be capable of producing or contributing to production of hydrocarbons in paying quantities. If any portion of a lease is included in a participating area formed under a unit agreement, the entire leased land will be committed to the unit and the lease will not be severed. Under 11 AAC 83.371(a), the unit operator also shall submit to the commissioner for approval of a proposed division of interest or formula setting out the percentage of production and costs to be allocated to each lease or portion of lease within the participating area. Upon approval by the commissioner, the area of productivity constitutes a participating area.

(b) A separate participating area must be established as provided in (a) of this section for each reservoir delineated, except that with the consent of the commissioner and all working interest owners, any two or more reservoirs or participating areas within the unit may be combined into one participating area. Separate participating areas may be established to distinguish between an oil rim and a gas cap within the same reservoir.

(c) 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 use of geological, geophysical, or engineering data to be incapable of producing hydrocarbons in paying quantities, subject to approval by the commissioner. A revised division of interest or formula allocating production and costs must be submitted for approval under 11 AAC 83.371 at the time of expansion or contraction of a participating area.

11 AAC 83.356. Unit area; contraction and expansion

(a) A unit must encompass the minimum area required to include all or part of one or more oil or gas reservoirs, or all or part of one or more potential hydrocarbon accumulations.

(b) 10 years after sustained unit production begins, the unit area must be contracted to include only those lands then included in an approved participating area and lands that facilitate production including the immediately adjacent lands necessary for secondary or tertiary recovery, pressure maintenance, reinjection, or cycling operations. The commissioner will, in the commissioner's discretion, after considering the provisions of 11 AAC 83.303, delay contraction of the unit area if the circumstances of a particular unit warrant. If any portion of a lease is included in the participating area, the portion of the lease outside the participating area will neither be severed nor will it continue to be subject to the terms and conditions of the unit. The portion of the lease outside the participating area will continue in full force and effect so long as production is allocated to the unitized portion of the lease and the lessee satisfies the remaining terms and conditions of the lease.

(c) Any expansion or contraction of the unit area must be based on legal subdivisions of land as defined in 11 AAC 88.185.

(d) No land will be excluded from a unit area due to the depletion of hydrocarbons.

(e) Not sooner than 10 years after the effective date of the unit agreement, the commissioner will, in the commissioner's discretion, contract the unit area to include only that land covered by an approved unit plan of exploration or development, or that area underlain by one or more oil or gas reservoirs or one or more potential hydrocarbon accumulations and lands that facilitate production as set out in (b) of this section. Before

any contraction of the unit area under this subsection, the commissioner will give the unit operator, the working interest owners, and the royalty owners of the leases or portions of leases being excluded reasonable notice and an opportunity to be heard.

11 AAC 83.395. Definitions

Unless the context clearly requires a different meaning, in 11 AAC 83.301 - 11 AAC 83.395 and in the applicable unit agreements

(1) "conservation of the natural resources of all or part of an oil or gas pool, field or like area" means maximizing the efficient recovery of oil and gas and minimizing the adverse impacts on the surface and other resources;

(9) "sustained unit production" means continuing production of oil or gas from a reservoir in the unit area into a pipeline or other means of transportation to market, but does not include testing, evaluation or pilot production.

11 AAC 83.343. Unit plan of development

(a) A unit plan of development must be filed for approval as an exhibit to the unit agreement if a participating area is proposed for the unit area under 11 AAC 83.351, or when a reservoir has become sufficiently delineated so that a prudent operator would initiate development activities in that reservoir. All development operations must be conducted under an approved plan of development. A unit plan of development must contain sufficient information for the commissioner to determine whether the plan is consistent with the provisions of 11 AAC 83.303. The plan must include a description of the proposed development activities based on data reasonably available at the time the plan is submitted for approval as well as plans for the exploration or delineation of any land in the unit not included in a participating area. The plan must include, to the extent available information exists

(1) long-range proposed development activities for the unit, including plans to delineate all underlying oil or gas reservoirs, bring the reservoirs into production, and maintain and enhance production once established;

(2) plans for the exploration or delineation of any land in the unit not included in a participating area;

(3) details of the proposed operations for at least one year following submission of the plan; and

(4) the surface location of proposed facilities, drill pads, roads, docks, causeways, material sites, base camps, waste disposal sites, water supplies, airstrips, and any other operation or facility necessary for unit operations.

C. NSU Unit Agreement

The NSU Unit Agreement provides, in relevant part:

ARTICLE 3. CREATION AND EFFECT OF UNIT.

3.3 Except as otherwise provided in applicable regulations, where only a portion of a State of Alaska lease is committed to this Agreement, the commitment constitutes a severance of the lease as to the unitized and nonunitized portions of the lease. The portion of the lease not committed to this Agreement will, be treated as a separate and distinct lease having the same effective date and term as the original lease and may be maintained thereafter only in accordance with the terms and conditions of the original lease, statutes, and regulations. Any portion of the State lease not committed to this Agreement will not be affected by the unitization or pooling of any other portion of the lease, by operations in the Unit Area, or by suspension approved or ordered for the unit under appropriate statutes and regulations. Except as otherwise provided in applicable regulations, where only a portion of a Federal lease is committed to the Unit Area, the lease will not be severed, and the portion of the lease outside the Unit Area will be extended so long as the portion inside the Unit Area is extended, but operations on the portion outside the Unit Area are not subject to the provisions of this Agreement.

3.4 Production from any part of a Participating Area shall be considered as production from each Unit Tract in the Participating Area and shall cause the portion of each lease that is either wholly or partially contained within the Participating Area to continue in effect just as if a well were producing from each Unit Tract in the Participating Area.

III. DECISION CRITERIA DISCUSSION

The Division's review of the Application is based on the criteria set out in state regulations including but not limited to 11 AAC 83.303 (a) and (b) which is the decision criteria for units, and 11 AAC 83.351 which is the decision criteria for participating areas. A discussion of the subsection (b) criteria is followed by a discussion of the subsection (a) criteria.

Decision Criteria Considered Under 11 AAC 83.303(b)

1. The Environmental Costs and Benefits of Unitized Exploration or Development

BPXA is currently producing from the reservoir underlying the proposed HPA. Formation of the HPA will enable BPXA to continue unitized development and operations of the proposed HPA area by ensuring production operations conform to state regulations that require a participating area be formed for producing unit areas. 11 AAC 83.351. Unitized development and operations

should provide an environmental benefit because it enables multiple leases to be developed through common facilities thereby reducing the impact on the environment. However, this decision does not authorize any specific activity or operation; BPXA must obtain additional permits and authorizations before conducting specific operations in the unit area.

A unit operator must obtain approval of a plan of operations from the State, and other permits from various agencies, before drilling a well or wells or initiating development activities. DNR considered environmental issues during the lease sale process, NSU formation, and NSU expansion. BPXA has obtained the required permits for the current HPA wells and is operating under an approved plan of operations.

BPXA has designed the development of the Kuparuk Reservoir within the NSU to minimize the amount of surface impact from the facilities necessary to develop using existing compact drill-site and existing NSU infrastructure. Formation of the HPA will promote efficient development of the State's resources, while minimizing impacts to the region's cultural, biological, and environmental resources.

2. Geological and Engineering Characteristics and Prior Exploration and Development Activities of the Proposed Hooligan Participating Area

A participating area "may include only the land reasonably known to be underlain by hydrocarbons and known or 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." 11 AAC 83.351(a). BPXA has drilled in the proposed HPA, and the area is in production.

Data and information submitted by BPXA to the Division in support of its application to form the HPA included geologic cross sections, analyses of well log, core, and fluid data, and regional structure maps. Some of the information and data BPXA submitted in support of its Application is confidential under AS 38.05.035(a)(8)(c) and 11 AAC 96.220, but the BPXA data indicates the proposed HPA area is underlain by hydrocarbons and will contribute to production. A broader discussion based on publically available information follows of the Kuparuk River formation (Kuparuk), which is the formation produced in the proposed HPA.

2.1 Prior Exploration and Development Activities

Early exploration wells in the NSU include Amerada Hess's Northstar #1 and Northstar #2 and Shell Oil Company's Seal Island #1, Seal Island #2, Seal Island #3, and Seal Island #4 wells. Additional exploration wells outside the NSU all contain Kuparuk sediments of reservoir quality, but not all wells encountered hydrocarbons.

Northstar #1 was drilled in 1985 and encountered what appears to be elevated resistivity in the Kuparuk C. The Kuparuk A sandstones are wet based on resistivity log readings. The Kuparuk C sandstone was partially cored (cores 2 and 3) and the C and A sandstones were tested together. Kuparuk C average core porosity and permeability in gross sandstone (less than 35% volume

shale) average 16% porosity and almost 200 millidarcies (md) permeability. Core descriptions for the Kuparuk C indicate dark brown sandstone with good porosity, spotty to yellow fluorescence and cut, and occasional bleeding oil. A drill stem test over both the Kuparuk C and A sandstones from 9,067 feet measured depth to 9,257 feet measured depth produced water with 2% to 3% oil that measured 30° API gravity. The Northstar #2 well penetrated the Kuparuk, but on a trip back into the hole the drill pipe stuck. The wellbore was plugged and abandoned. No electric logs were obtained below 6,700 feet measured depth.

The Seal Island wells were drilled by Shell Oil Company between 1983 and 1984. Although the target was the Ivishak sandstone, some data was collected from the Kuparuk. Seal Island #1 logs indicate the C sandstone is about 30 feet thick and contains hydrocarbons based on the deep resistivity log. There were no cores or tests in this well over the Kuparuk interval. Seal Island #2 St 1A was cored in the lower Kuparuk, but only the Kuparuk C is being developed in the proposed HPA. Well logs over the Kuparuk C are suspect as the well encountered logging problems before it was plugged and abandoned. Core descriptions available to the public describe hydrocarbons throughout the cored interval. Very good to good oil shows are described from the cores taken in glauconitic, clayey sandstones. The well was not tested over the Kuparuk interval. Seal Island #3 and #4 wells penetrated the Kuparuk down dip and are wet. Seal Island #3 was cored and tested in the Kuparuk C member. The test was conducted for 12 hours over interval 11,714 feet measured depth to 11,763 feet measured depth with 1,039 barrels of water and no oil recovered.

Public core data indicates the Kuparuk interval from 11,717 feet measured depth to 11,819 feet measured depth has porosity that ranges from 9.0% to 23% and permeability that ranges from 1md to 349md.

2.2 Geology of the Kuparuk Interval

The Kuparuk River formation is subdivided into four members: Kuparuk A, Kuparuk B, Kuparuk C, and Kuparuk D members. In general, the Kuparuk C, A, and at Milne Point Unit, the B members are of reservoir quality. The Kuparuk D is comprised of shale and shaley siltstone and in general does not contain reservoir quality sandstones.

The Kuparuk C member is the reservoir in the proposed HPA. The overall thickness of the Kuparuk River formation ranges from over 400 feet at Northstar #1 in the west to less than 200 feet in exploration well Seal Island #3, located in the southcentral part of the NSU. The Kuparuk C member is much thinner and ranges from 30 feet thick at Seal Island #3 to 40 feet thick at Northstar #1 in the west, to over 100 feet thick at Northstar development wells NS-12 and NS-30 located in the eastern part of the Northstar Unit. Net to gross within the Kuparuk C is highly variable.

Hydrocarbon-bearing sandstones in the Kuparuk C at the proposed HPA were noted when running uphole electric logs in Northstar development wells. The hydrocarbon accumulation is bounded by faults to the north, west, and south. Structural dip limits the accumulation to the east.

Over 30 exploration and development wells penetrate the Kuparuk and were used to delineate the hydrocarbon accumulation.

The Kuparuk C consists of bioturbated to burrowed glauconitic sandstones, shaley sandstones, siltstones, and carbonaceous, burrowed shales. Sandstone deposition occurred along a rift margin in an offshore to shelf depositional setting. Syn-depositional faulting most likely influenced sandstone dispersal, accumulation, and preservation. This makes correlating sandstones from well to well difficult and therefore sandstone continuity is questionable. Regional porosity and permeability are good in the Kuparuk C member except where siderite cemented. Siderite occurs as streaks and nodules within sandstones. Oil quality in the Kuparuk is very good and extracted oil gravity from core data at the Northstar #1 well measured 30 degrees API gravity.

Structural interpretation for the proposed HPA is based on well data and the Northstar 3D seismic survey acquired by BPXA in 1996 and 1997. The air gun sourced survey covers approximately 150 square miles and has been reprocessed since the original acquisition. BPXA has used the 3-D data to plan wells and has integrated the seismic data into a reservoir model.

Interpretation of the 3-D seismic shows that the structure near the Kuparuk C reservoir is a northwest to southeast trending anticline. While the central segment of the structure is relatively un-faulted, a network of large (up to 100 foot throw) normal faults separates the structure into three segments: the main structure including the crest of the anticline, which NS-08 produces from, and smaller segments to the north and south. The south segment is separated from the central segment by northwest trending faults, and is structurally deeper than the main segment. It is also bounded by faults on the south, separating it from the Prudhoe Bay Unit. Fault separation between the central and the north segment is less obvious. Large faults exist, but do not appear to be completely laterally continuous. It is likely that the faults continue to form a boundary, but are just below the limit of seismic detection.

The existing seismic data is not of sufficient quality to allow determination of lithology or fluid content or to identify fluid contacts. Well data such as mud-log reports, repeat formation test pressure measurements, and resistivity or neutron/density logs are required to map gas water contacts. Since only one well is producing from the Kuparuk reservoir, there are no multi-well interactions to aid understanding of pressure communication across faults segmenting the structure. The Kuparuk C reservoir mechanism is believed to be under natural pressure depletion with a possibility of aquifer support.

The NS-08 well is the only producing well within the Kuparuk C and has been on continuous production since November 2010 after being converted from an Ivishak producer. As of September 2014, NS-08 has produced 37.34 billion standard cubic feet of cumulative gas. This produced gas is injected into the Ivishak formation for pressure support. Additionally, NS-08 has produced 1.728 million barrels of cumulative gas condensate through September 2014. Currently, NS-08 is producing at a rate of approximately 46.5 million standard cubic feet per day of gas, and 1,849 barrels a day of gas condensate.

3. Plans of Exploration and Development for the Proposed HPA

One production well, NS-08, currently operates in the proposed HPA. Hilcorp plans to continue to produce from NS-08. There are no plans to convert additional wells from Ivishak production to Kuparuk production.

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

The HPA will provide economic benefits to the State through royalty and tax payments on production. BPXA submitted tract participation schedules for the leases in the proposed HPA as required under 11 AAC 83.351. The proposed allocation distributes expenses and production among the leases on an original gas in place (OGIP) basis. Future redeterminations of participation may not be adjusted because there is currently one well in the proposed participating area and no planned injection wells. As such, there is no need to examine a redetermination depletion strategy at this time. A review of the relevant technical information shows the proposed tract factors adequately protect the State's interest; BSEE did not propose tract factors.

4.1 Metering and Production Allocation

BPXA received approval under AOGCC commission order 551 and the Division to use multiphase flowmeters to measure and allocate oil for all pools within the Northstar field.

4.2 Tract Allocation and Redetermination Schedule

Article 6 of the NSU Operating Agreement states the allocation of unitized substances for participating areas will be provided for at the time such participating areas are formed. BPXA submitted a tract allocation schedule with its Application that describes how the NSU working interest owners plan to allocate the production and costs between the leases in the HPA as required by 11 AAC 83.371. BPXA stated tract allocation percentages are calculated dividing OGIP for each tract by the total OGIP. The calculated tract allocations are 3.37% for federal tracts, and 96.63% for the State tracts. Hilcorp agrees with this allocation schedule.

The Division has determined that from the start of production in January 2006, it collected excess royalty on barrels of oil, and an adjustment is necessary. True-up and redetermination methodology are not discussed in the Application, however the State, BPXA, and Hilcorp have discussed how to make an equitable adjustment. BPXA agrees to refile operator (O1 forms) and royalty (A1 forms) reports with the Division within 60 days from the date of this decision covering from January 2006 to October 2014. BPXA will zero out production from accounting unit code NS01 and include this production in the Hooligan PA. Murphy will also refile royalty reports (A1 forms) from January 2006 to November 2014, zeroing out production from accounting unit code of NS01 and including the production in the Hooligan PA. Hilcorp will refile operator (O1 forms) and royalty (A1 forms) reports with the Division within 60 days from the date of this decision for November 2014 through January 2015, zeroing out production from accounting unit code NS01 and including this production in the Hooligan PA.

Decision Criteria Considered Under 11 AAC 83.303(a)

5. The Promotion the Conservation of All Natural Resources

The unitization of oil and gas reservoirs and the formation of participating areas within unit areas to develop hydrocarbon-bearing reservoirs are well-accepted means of hydrocarbon conservation. Formation 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 resources, and minimizes impacts to the area's cultural, biological, and environmental resources.

6. The Prevention of Economic and Physical Waste

Approval of the formation of the HPA will promote prevention of economic and physical waste. Approval of the HPA will not result in economic waste given the current well spacing, market demand, and anticipated production rates. Annual approval of the HPA development activities as described in the future plans of development must also provide for the prevention of economic and physical waste. Using the existing infrastructure and facilities eliminates the need to construct stand-alone facilities to process production from the Kuparuk Reservoir; optimizing production while preventing economic and physical waste protects all parties.

7. The Protection of All Parties of Interest, Including the State

Formation of the HPA protects the economic interests of all parties. Combining interests and operating under the terms of the NSU Agreement and NSU Operating Agreement provides each individual WIO an equitable allocation of costs and revenues commensurate with the resources of its leases. Operating under the NSU Agreement ensures accurate reporting and record keeping, state approval of plans of exploration and development and operating procedures, royalty settlement, in-kind taking, and emergency storage of oil and gas, all of which will further the State's interest.

The people of Alaska have an interest in the development of the state's oil and gas resources to maximize the economic and physical recovery of the resources. AS 38.05.180(a). Diligent exploration and development under a single approved unit plan without the complications of competing leasehold interests promotes the State's interest. Approval of the HPA under the NSU 11th POD and future annually approved plans of development will provide for continued review and approval of BPXA's plans to develop the HPA in a manner which will maximize economic and physical recovery of the resources.

The formation of the HPA advances the efficient evaluation and development of the State's resources, minimizes impacts to the area's cultural, biological, and environmental resources which protect the State's interest.

IV. DECISION

The Conservation of All Natural Resources

1. The approval of the HPA will promote conservation of the natural resources of all or part of an oil or gas pool, field, or like area by maximizing the efficient recovery of oil and gas and minimizing the adverse impacts on the surface and other resources.
2. The development and operation of these leases under the NSU Agreement and the HPA will reduce the amount of land and fish and wildlife habitat that would otherwise be disrupted by individual lease development. This reduction in environmental impacts and preservation of subsistence access is in the public interest.
3. All unit development must proceed according to an approved plan of development. The State, Division, and local agencies have issued various approvals for NSU development. Future operations will require similar review and approval. DNR may condition its approval of a future unit Plan of Operations or permits on performance of mitigation measures. Compliance with mitigation measures will minimize, reduce or completely avoid adverse environmental impacts.

The Prevention of Economic and Physical Waste

1. With the approval of the NSU 11th POD, the Division considered the prevention of economic and physical waste criteria under 11 AAC 83.303(a)(2). The HPA development activities must be conducted under an annually approved plan of development, which will provide for the future promotion of prevention of economic and physical waste.

The Protection of All Parties in Interest, Including the State

1. The formation of the HPA meets the requirements of 11 AAC 83.351 for participating area formation because the proposed participating area is in production, and 11 AAC 83.371 because the proposed allocation of production is consistent with the data and adequately and equitably protects the public interest. Formation of the HPA is in the State's best interest.
2. The geological and engineering data provided reasonably justify the inclusion of the proposed acreage within the HPA under the terms of the applicable regulations governing formation and operation of oil and gas units (11 AAC 83.301 – 11 AAC 83.395). The terms and conditions under which these lands were leased from the state also justify inclusion because BPXA has worked to develop the unit and the proposed HPA.
3. The HPA overlies the Kuparuk Formation. The stratigraphic limits of the HPA are the depths common to and correlating with the interval from 9,625 feet measured depth to 9,670 feet measured depth recorded in the NS-08 well.
4. The Division approves the HPA tract allocation schedule effective January 1, 2006, for allocating production and costs among the leases in the HPA. Hilcorp will report production

from the HPA to royalty accounting unit code NSHO. Additionally,

- a. BPXA will refile operator (O1 forms) and royalty (A1 forms) reports with the Division within 60 days from the date of this decision covering from January 2006 to October 2014. BPXA will zero out production from accounting unit code NS01 and include this production in the Hooligan PA.
- b. Hilcorp will refile operator (O1 forms) and royalty (A1 forms) reports with the Division within 60 days from the date of this decision for November 2014 and through January 2015, zeroing out production from accounting unit code NS01 and including this production in the Hooligan PA.
- c. Murphy will refile royalty (A1 forms) reports covering time periods from January 2006 to November 2014.

For the reasons discussed in this Findings and Decision, formation of the HPA is approved, effective January 1, 2006.

A 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 Mark Myers, 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. 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.



Paul L. Decker, Acting Director
Division of Oil and Gas

2-24-15

Date

V. ATTACHMENTS

1. Exhibit C, HPA tracts/leases
2. Exhibit D, Map of the HPA within the Northstar Unit Boundary

1. ATTACHMENT ONE: Exhibit C, HPA Tracts/Leases

EXHIBIT C
Hooligan Participating Area (NHPA)
NORTHSTAR UNIT AGREEMENT
Effective December 1, 2014

Tract No.	Lease No.	Legal Description	NHPA Tract Acreage	Tract Participation (%)	Royalty (%)	ORRI (%)	Working Interest Owner and Ownership (%)
TR-101	ADL 312798	<p>That portion of ADL 312798, more particularly described as those lands located Easterly of the West boundary of T13N, R13E, U.M. AK and T14N, R13E, U.M. AK, being the North-South line intersecting the North and South boundary of Block 470, within the offshore Three-Mile arc lines listed as State area of Block 470 "Supplemental Official O.C.S. Block Diagram" approved 10/4/79, and those lands in Block 514 Easterly of the West boundary of T13N, R13E, U.M. AK (being identical with Line 2-3 of Block 514) and that portion of Section 16, T13N, R13E, U.M. AK within the N1/2S1/2 (being Easterly of Line 3-4 of Block 514), being a portion of the listed State area of Block 514 on the "Supplemental Official O.C.S. Block Diagram" approved 12/9/79, lying within:</p> <p><u>T14N R13E, Umiat Meridian, Alaska</u> Section 32: E 1/2 Section 33</p> <p><u>T13N R13E, Umiat Meridian, Alaska</u> Section 4 Section 5: E 1/2 Section 8: NE 1/4 Section 9: N 1/2</p> <p>As shown on Exhibit D.</p>	1,186.21	5.954790	20% + Supplemental Royalty	None	Hilcorp 100.00

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Tract No.	Lease No.	Legal Description	NSPA Tract Acreage	Tract Participation (%)	Royalty (%)	ORRI (%)	Working Interest Owner and Ownership (%)	
TR-102	ADL 312799	<p>That portion of ADL 312799, more particularly described as those lands located in Block 471 within the offshore Three-Mile arc lines, listed as State area on the "Supplemental Official O.C.S. Block Diagram", approved 10/4/79, and those lands in N1/2, N1/2S1/2 of Block 515 within the offshore Three-Mile arc lines being a portion of the listed State area on the "Supplemental Official O.C.S. Block Diagram, approved 10/4/79, lying within:</p> <p><u>T14N R13E, Umiat Meridian, Alaska</u> Section 33: S 1/2 S 1/2 OCS Block 470 Sections 34 and 35</p> <p><u>T13N R13E, Umiat Meridian, Alaska</u> Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14 and 15</p> <p>As shown on Exhibit D.</p>	4,269.38	85.523202	20% + Supplemental Royalty	None	Hilcorp	100.00
TR-103	ADL 312808	<p>That portion of ADL 312808, more particularly described as those lands located in S1/2S1/2 of Block 514, within Sections 16 and 21, T13N, R13E, U.M. AK (being those lands lying Easterly of Line 3-4 on Block 514), a portion of the State area on the "Supplemental Official O.C.S. Block Diagram" approved 12/9/79, and those lands in S1/2S1/2 of Block 515, being a portion of the State area on the "Supplemental Official O.C.S. Block Diagram, approved 10/4/79, and those lands within Block 558 located in Section 21, T13N, R13E, U.M. AK (being the portion Easterly of Line 1-2 and Northerly of Line 2-3 Block 558), listed as State area on the "Supplemental Official O.C.S. Block Diagram" approved 12/9/79 and those lands in Block 559 lying Northerly of the South boundary of Sections 21, 22, 23 and 24, T13N, T13E, U.M. AK (being the Northerly portion of Block 559), listed as State area on the "Supplemental Official O.C.S. Block Diagram" approved 10/4/79, lying within:</p> <p><u>T13N R13E, Umiat Meridian, Alaska</u></p> <p>Sections 13 and 14 Section 15: E 1/2</p> <p>As shown on Exhibit D.</p>	732.74	4.895156	20% + Supplemental Royalty	None	Hilcorp	100.00

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Tract No.	Lease No.	Legal Description	NSPA Tract Acreage	Tract Participation (%)	Royalty (%)	ORRI (%)	Working Interest Owner and Ownership (%)
TR-104	ADL 312809	That portion of ADL 312809, more particularly described as those lands located in Block 516 within the Three-Mile arc lines, listed as State area on the "Supplemental Official O.C.S. Block Diagram" approved 10/4/79, and those lands in Block 560 lying Northerly of the South boundary of Section 24, T13N, R13E, U.M. AK (being identical with Line 4-5 on Block 560), and lying Easterly of the West boundary and Northerly of the South boundary of T13N, R14E, U.M. AK (being identical with Lines 5-6 and 6-7 on Block 560), within the offshore Three-Mile arc lines, listed as State area on the "Supplemental Official O.C.S. Block Diagram" approved 12/9/79, lying within: <u>T13N R13E, Umiat Meridian, Alaska</u> Section 13: N 1/2 S 1/2 OCS Block 516 As shown on Exhibit D.	51.66	0.254088	20% + Supplemental Royalty	None	Hilcorp 100.00
SUBTOTAL OF STATE ACREAGE			6,239.99	96.627236			

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Tract No.	Lease No.	Legal Description	NSPA Tract Acreage	Tract Participation (%)	Royalty (%)	ORRI (%)	Working Interest Owner and Ownership (%)
TR-1	OCS-Y-0179	<p>That portion of OCS-Y-0179 – more particularly described as that portion of block 470 shown as Federal 8(g) Area B on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975, and lying southerly of line 11-12 and line 12-13 bisecting block 470, as shown on the Supplemental Diagram of the Supplemental Official OCS Block Diagram, dated 6/4/82, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975, and those lands lying between the two lines bisecting block 471 (further described as "disputed area"), containing approximately 611.95 hectares, as shown on the Supplemental Official OCS Block Diagram, dated 10/04/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975, and those lands lying northeasterly of the line bisecting block 515, containing approximately 190.97 hectares, as shown on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975, lying south of the line commencing at Easting, Northing UTM6 Meters, NAD27 435076.08, 7825840.36 and ending at Easting, Northing UTM6 Meters, NAD27 437600.00, 7824000.00, as shown on Exhibit D (dated 9/21/01) – of Block 515, containing approximately 190.97 hectares (471.89 acres), as shown on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protection Diagram NR 6-3, Beechey Point, approved April 29, 1975;</p> <p>And that portion of Block 471 within S1/2SW1/4 and S1/2SW1/4SE1/4, containing approximately 99.83 hectares (246.68 acres), as shown on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975;</p> <p>And that portion of Block 470 lying south of the line commencing at Easting, Northing UTM6 Meters, NAD27 431762.97, 7825801.43 and ending at Easting, Northing UTM6 Meters, NAD27 432800.00, 7825812.71, containing approximately 15.01 hectares (37.09 acres), as shown on the Supplemental Diagram, dated 2/25/88, based on Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975.</p>	755.66	0.353322	Fixed Sliding Scale (minimum of 16.66667%)	None	Hilcorp 100.00

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Tract No.	Lease No.	Legal Description	NSPA Tract Acreage	Tract Participation (%)	Royalty (%)	ORRI (%)	Working Interest Owner and Ownership (%)	
TR-2	OCS-Y-0181	That portion of Block 516 within NW1/4SW1/4 and SW1/4NW1/4, containing approximately 267.28 hectares (660.45 acres), as shown on the Supplemental Official OCS Block Diagram, dated 10/4/79, based on Official Protraction Diagram NR 6-3, Beechey Point, approved April 29, 1975.	660.45	3.019442	Fixed Sliding Scale (minimum of 16.66667%)	None	Hilcorp	100.00
SUBTOTAL OF FEDERAL ACREAGE			1,416.11	3.372764				
TOTAL PARTICIPATING ACREAGE			7,656.10	100.000000				

Working Interest Owners

Hilcorp Hilcorp Alaska, LLC

ATTACHMENT TWO: Exhibit D, Map of the HPA

