

PRUDHOE BAY UNIT

APPLICATION FOR
THE FIFTH EXPANSION OF THE UNIT AREA
AND
FORMATION OF THE MIDNIGHT SUN PARTICIPATING AREA

FINDINGS AND DECISION OF THE COMMISSIONER
ALASKA DEPARTMENT OF NATURAL RESOURCES

MARCH 10, 2000

Table of Contents

I. INTRODUCTION AND BACKGROUND.....	1
II. APPLICATION FOR THE FIFTH EXPANSION OF THE PRUDHOE BAY UNIT AREA AND FORMATION OF THE MIDNIGHT SUN PARTICIPATING AREA	1
III. DISCUSSION OF DECISION CRITERIA AND FACTORS CONSIDERED	3
(a) Decision Criteria	4
1. Promote the Conservation of All Natural Resources	4
2. The Prevention of Economic and Physical Waste.....	5
3. Protection of All Parties	6
(b) Factors Considered	6
1. The Environmental Costs and Benefits of Unitized Exploration and Development	6
2. The Geological and Engineering Characteristics of the Proposed Prudhoe Bay Unit Expansion Area and Midnight Sun Participating Area.....	8
3. Prior Exploration Activities	9
3.1. Drilling History	9
3.2. Production History.....	9
4. The Applicant's Plan for Development of the Midnight Sun Participating Area.....	10
5. The Economic Costs and Benefits to the State and Other Relevant Factors	10
5.1. Facility Sharing, Production Allocation and Metering	10
5.2. Gas Disposition	11
5.3. Tract Allocation Schedule	11
5.4. Field Costs.....	12
IV. FINDINGS AND DECISION	13
V. ATTACHMENTS.....	17
1. Map of the Midnight Sun Participating Area	17
2. Midnight Sun Participating Area Tract Allocation Schedule.....	18
3. Sliver Ratios.....	19

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FIFTH EXPANSION OF THE UNIT AREA AND FORMATION OF THE MIDNIGHT SUN PARTICIPATING AREA

I. INTRODUCTION AND BACKGROUND

On July 1, 1999, ARCO Alaska, Inc. (ARCO) and BP Exploration (Alaska) Inc. (BPXA), as the Prudhoe Bay Unit operators, applied to expand the Prudhoe Bay Unit (PBU) area and form the Midnight Sun Participating Area (MSPA) within the expanded unit area (the Application). The proposed MSPA includes portions of three leases for a total of approximately 3,113 acres. The proposed expansion area includes approximately 762 acres within two leases. The total unit area, after the expansion, would include all or part of 109 leases and be approximately 245,677 acres.

The proposed MSPA surrounds two wells drilled and completed by ARCO in the Kuparuk geologic formation during the 1997/1998 and 1998/1999 drilling seasons. The geologic, well, and production data that ARCO submitted justifies the formation of the MSPA and expansion of the PBU. The data indicate that the Midnight Sun Kuparuk hydrocarbon accumulation (Midnight Sun reservoir) is capable of producing or contributing to the production of hydrocarbons in paying quantities.

The Department of Natural Resources (DNR), Division of Oil and Gas (the Division), approves the expansion of the PBU and formation of the MSPA. The Division also approves the proposed tract allocation schedule for the MSPA submitted on February 9, 2000. The effective date of the PBU expansion, formation of the MSPA, and the MSPA Tract Allocation Schedule is October 1, 1998.

II. APPLICATION FOR THE FIFTH EXPANSION OF THE PRUDHOE BAY UNIT AREA AND FORMATION OF THE MIDNIGHT SUN PARTICIPATING AREA

On July 1, 1999, the PBU operators submitted an application to simultaneously expand the PBU area and form the MSPA. The proposed 3,113 acre MSPA is comprised of portions of three leases: ADL 28277 (Tract 25), ADL 28299 (Tract 26) and ADL 28300 (Tract 27). BPXA owns 100% working interest in Tract 25 and ARCO and Exxon Corporation (Exxon) each own 50% working interest in Tracts 26 and 27. All three leases were acquired in State Lease Sale Number 14 held on July 14, 1965. The state issued the leases on state lease form DL-1, revised October 1963, which provides for a ten-year primary term and 12.5 percent royalty to the state. ADL 28277 had an effective date of September 1, 1965 while the other two leases were effective October 1, 1965. ADL 28277 and ADL 28299 are currently partially within the PBU and the Application proposed adding approximately 762 additional acres from these two leases to the unit area. The PBU operators requested an effective date of October 1, 1998, for the PBU expansion and the MSPA.

The Division determined that the application was incomplete and requested supplemental information on July 19, 1999. ARCO provided additional information on September 7, 1999, and requested a meeting to discuss further submittals. Division staff met with the Midnight Sun working interest owners on September 14, 1999, to discuss specific technical data requests the Division deemed necessary for consideration of the Application. In a letter dated September 24, 1999, the owners agreed to submit the additional technical data. However, they still had to resolve their equity, terms for facility sharing and the Midnight Sun Special Supplemental Provision to the PBU Operating Agreement (Special Supplemental Provisions). ARCO stated that Midnight Sun working interest owners would provide the Kuparuk Gross Oil and Gross Gas Isochore maps, Net Sandstone and Net Pay maps after they resolved the final equity issue.

On October 1, 1999, ARCO submitted the Midnight Sun Interim Facility Sharing Agreement (Interim Facility Sharing Agreement) in response to the Division's July 19, 1999 request. The Midnight Sun working interest owners presented the Division with supplemental information supporting the application on October 5, 1999.

By letter dated October 14, 1999, the Midnight Sun working interest owners notified the Division that they had reached agreement on key commercial terms for development of the Midnight Sun reservoir including: final equity, source water availability, facility access, issues related to the Special Supplemental Provisions, and a long term metering plan. They expected to finalize the necessary agreements and provide DNR with copies within a few months. The Division and the PBU operators agreed that the Midnight Sun working interest owners would provide the equity maps by November 17, 1999, and the Midnight Sun Facility Sharing Agreement and Special Supplemental Provisions by January 15, 2000.

ARCO submitted the equity maps on November 17, 1999. On November 18, 1999, the Division received the Midnight Sun Production Metering Plan, which superseded the PBU Satellite Interim Production Metering Plan submitted with the Application.

Other exhibits submitted in support of the Application included: maps and legal descriptions of the proposed unit expansion area and MSPA, geologic data, a proposed plan of development for the MSPA, a proposed interim tract allocation schedule for the MSPA, and a copy of the Midnight Sun Interim Operating Provisions.

With the submittal of the final equity maps, the Division determined that the PBU expansion application was complete and published a notice in the *Arctic Sounder* on December 9, 1999 and in the *Anchorage Daily News* on December 5, 1999, as required by 11 AAC 83.311. Copies of the public notice were provided to interested parties in conformance with 11 AAC 83.311. These parties included the North Slope Borough; Arctic Slope Regional Corporation; the Alaska Department of Environmental Conservation; the Alaska Department of Fish and Game; the Alaska Department of Natural Resources, Division of Land; and the Alaska Oil and Gas Conservation Commission (AOGCC). The public notices invited interested parties and members of the public to submit comments by January 7, 2000. The Division did not receive any comments on the PBU expansion application.

The attachments to the application described 1,120 acres in the unit expansion area and 3,840 acres in the proposed MSPA. Article 5.3 of the PBU Agreement describes the lands to be included in a PBU participating area. Article 5.3 reads in part:

The lands to be included shall be based on such subdivisions of the public land surveys as may be approved by the Director, but not less than the area approved by the well-spacing order affecting such lands for such Reservoir.

The Midnight Sun working interest owners have yet to apply to the AOGCC for Midnight Sun reservoir pool rules, but have represented to the Division that the pool rules application will request 80 acre spacing as the well spacing for the Midnight Sun reservoir. At a December 10, 1999 meeting with Division staff, the Midnight Sun working interest owners agreed to reduce the size of the proposed PBU expansion area and MSPA to be consistent with Article 5.3 of the PBU Agreement and the proposed 80-acre well spacing. The final configuration of the proposed unit expansion area and the proposed MSPA include 762 acres and 3,113 acres respectively. A map of the proposed MSPA is Attachment 1 to this Finding and Decision.

On January 14, 2000, ARCO submitted the Midnight Sun Special Supplemental Provisions to the PBU Operating Agreement (Special Supplemental Provisions) to replace the Midnight Sun Interim Operating Provisions. Article 137.02 of the Special Supplemental Provisions designates BPXA as the operator of the MSPA. However, BPXA and the Midnight Sun working interest owners delegated the rights and obligations of the MSPA operator to ARCO and ARCO accepted those responsibilities under Article 137.04 of the Special Supplemental Provisions. ARCO is the bottomhole operator for the Midnight Sun reservoir, while BPXA, as the PBU Western Operating Area Operator, operates the surface. North Slope protocols for this arrangement have been signed. On February 9, 2000, ARCO submitted a revised plan of development and a revised tract allocation schedule for the proposed MSPA. ARCO submitted the Midnight Sun Facility Sharing Agreement on February 15, 2000, which superseded the Midnight Sun Interim Facility Sharing Agreement received on October 1, 1999.

III. DISCUSSION OF DECISION CRITERIA AND FACTORS CONSIDERED

The Commissioner of the Department of Natural Resources (the Commissioner) reviews applications to expand units and form participating areas under AS 38.05.180(p) and 11 AAC 83.303 et. seq. By memorandum dated September 30, 1999, the Commissioner approved a revision of Department Order 003 and delegated this authority to the Director of the Division of Oil and Gas. He will approve the proposed fifth expansion of the PBU and formation of the MSPA if he finds that they will conserve the natural resources of an oil or gas reservoir and are necessary or advisable to protect the public interest.

A participating area may include only land reasonably known to be underlain by hydrocarbons and known or reasonably estimated through the 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).

“Paying quantities” means quantities sufficient to yield a return in excess of operating costs, even if drilling and equipment costs may never be repaid and the undertaking considered as a whole may ultimately result in a loss; quantities are insufficient to yield a return in excess of operating cost unless those quantities,

not considering the costs of transportation and marketing, will produce sufficient revenue to induce a prudent operator to produce those quantities.

11 AAC 83.395(4). A participating area application must be evaluated under these standards, as well as those of 11 AAC 83.303.

(a) Decision Criteria

The Commissioner will approve a proposed unit expansion and formation of a participating area upon a written finding that they will: 1) promote the conservation of all natural resources; 2) promote the prevention of economic and physical waste; and 3) provide for the protection of all parties of interest, including the state. The following evaluates the proposed MSPA and fifth expansion of the PBU under these criteria.

1. Promote 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. Without unitization, the unregulated development of reservoirs tends to be a race for possession by competing operators. The results can be 1) overly dense drilling, especially along property lines; 2) rapid dissipation of reservoir pressure; and 3) irregular advancement of displacing fluids. These all contribute to the loss of ultimate recovery or economic waste. The proliferation of surface activity; duplication of production, gathering, and processing facilities; and haste to get oil to the surface also increase the likelihood of environmental damage. Requiring lessees to comply with conservation orders and field rules issued by the AOGCC would mitigate some of these impacts without an agreement to unitize operation. Unitization, however, provides a practical and efficient method for maximizing oil and gas recovery, and minimizes negative impacts on other resources.

Expansion of the PBU and formation of the proposed MSPA will provide a comprehensive plan for developing the Midnight Sun reservoir and exploration of all reservoirs within the expanded PBU. The proposed plan of development for the MSPA provides for an efficient, integrated approach to development of the Midnight Sun reservoir.

Expansion of the PBU will promote the conservation of both surface and subsurface resources through the unitized (rather than lease-by-lease) development. Unitization allows the unit operators to explore the area as if it were one lease. Expansion of the PBU and formation of a participating area over the Midnight Sun reservoir will allow this area to be comprehensively and efficiently explored and developed. Adoption of the Special Supplemental Provisions, the Midnight Sun Facility Sharing Agreement and a plan of development governing production will help avoid unnecessary duplication of development efforts on and beneath the surface. Facilities can be located to maximize recovery and to minimize environmental impacts, without regard for individual lease ownership.

Producing hydrocarbon liquids from the Midnight Sun reservoir through the existing PBU production and processing facilities will reduce the incremental environmental impact of the

additional production. The planned Midnight Sun reservoir development will use the existing PBU western operating area infrastructure of pipelines, roads, pads and processing facilities. Initial development of the Midnight Sun reservoir is from PBU E-Pad using the existing production gathering lines from that pad to Gathering Center No. 1.

2. The Prevention of Economic and Physical Waste

Traditionally, under unitized operations, the assignment of undivided equity interests in the oil and gas reservoirs to each lease largely resolves the tension between lessees to compete for their share of production. Economic and physical waste, however, still could occur without an equitable cost sharing formula, as well as a well-designed and coordinated development plan. Consequently, unitization must equitably divide costs and production, and maximize physical and economic recovery from any reservoir. It must also treat the royalty owner fairly.

An equitable allocation of hydrocarbon shares among the working interest owners discourages hasty or unnecessary surface development. Similarly, an equitable cost-sharing agreement promotes efficient development of reservoirs and common surface facilities and encompasses rational operating strategies. Such an agreement further allows the working interest owners to decide well spacing requirements; scheduling, reinjection and reservoir management strategies; and the proper joint-use of surface facilities. Unitization prevents economic and physical waste by eliminating redundant expenditures for a given level of production, and by avoiding loss of ultimate recovery by adopting a unified reservoir management plan.

Unitized operations greatly improve development of reservoirs beneath leases that may have variable productivity. Marginally economic reserves, which otherwise would not be produced on a lease-by-lease basis, often can be produced through unitized operations in combination with more productive leases. Facility consolidation saves capital and promotes better reservoir management by all working interest owners. Pressure maintenance and secondary recovery procedures are much more predictable and attainable through joint, unitized efforts than would otherwise be possible. In combination, these factors allow less profitable areas of a reservoir to be developed and produced in the interest of all parties, including the state.

The lessees in the proposed unit expansion area and MSPA have signed the PBU Agreement, the Special Supplemental Provisions, and the Midnight Sun Facility Sharing Agreement agreeing to share the existing PBU production capacity and the PBU infrastructure. Using the PBU infrastructure and facilities eliminates the need to construct stand-alone facilities to process the recoverable hydrocarbons from the Midnight Sun reservoir. Facility consolidation will save capital and promote better reservoir management through pressure maintenance and enhanced recovery procedures. In combination, these factors allow the Midnight Sun reservoir within the PBU to be developed and produced in the interest of all parties.

Expanding the PBU, forming a participating area over the Midnight Sun reservoir, and allowing this area to access existing unit facilities and infrastructure prevents economic and physical waste.

3. Protection of All Parties

The proposed fifth expansion of the PBU and formation of the MSPA seek to protect the economic interests of the Midnight Sun working interest owners as well as the royalty owner. Combining interests and operating under the terms of the PBU Agreement, the Special Supplemental Provisions, and the Midnight Sun Facility Sharing Agreement assures each individual working interest owner an equitable allocation of costs and revenues commensurate with the value of its lease(s).

Because hydrocarbon recovery will be maximized and additional production-based revenue will be derived from the Midnight Sun reservoir, one aspect of the state's economic interest is promoted. Diligent development and exploration under a single approved unit plan without the complications of competing leasehold interests is certainly in the state's interest. It promotes efficient evaluation and development of the state's resources, yet minimizes impacts to the area's cultural, biological, and environmental resources.

There is another aspect of the state's economic interest that needs consideration. The Division is concerned that expanding the PBU to include the proposed MSPA could subject the state's royalty share of production from the Midnight Sun reservoir to a deduction for field costs under the 1980 Prudhoe Bay Royalty Settlement Agreement (1980 Agreement). Under the terms of the 1980 Agreement, the state currently allows the working interest owners to deduct field costs from their royalty payments to the state at a rate of \$ 0.87 per barrel for every barrel of in-kind and in-value royalty oil taken from the PBU. If the 1980 Agreement was made applicable to the proposed MSPA or the state otherwise agreed to allow the field cost deductions, the state would bear a significant cost.

This dilemma is similar to the situation arising from the 1993 application for the third expansion of the PBU and formation of the Pt. McIntyre Participating Area (PMPA). The state and Exxon are still in litigation over whether Exxon has the right to deduct field costs from the state's royalty share of oil and gas from the PMPA.

To resolve the field cost issue for the proposed MSPA, the state and the Midnight Sun working interest owners came to an agreement. The agreement regarding the deduction of field costs from the MSPA royalties will be discussed in section III (b) 5.4 below.

(b) Factors Considered

The Division considered the following factors when reviewing the above criteria:

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

State regulation 11 AAC 83.303(b)(1) requires the Commissioner to assess the environmental costs and benefits of the proposed PBU expansion and MSPA formation. DNR's approval of an initial plan of development is only one step in the process of obtaining permission to drill a well or wells or develop the known reservoirs within the unit area. The unit operator also must obtain

permits from various agencies before drilling a well or wells or initiating development activities to produce known reservoirs within the unit area. And the operator must obtain DNR's approval of a plan of operations.

State unitization regulations require the Commissioner's approval of a plan of operations before the unit operator performs any field operations. 11 AAC 83.346. A proposed plan of operations must describe the operating procedures designed to prevent or minimize adverse effects on natural resources. When reviewing a proposed plan of operations, the Division will consider the unit operator's ability to compensate the surface owner for damage sustained to the surface estate and the plans for rehabilitation of the unit area.

ARCO applied for and received the permits and authorizations necessary to drill the Midnight Sun wells including DNR's approval of a plan of operations and a permit from the North Slope Borough.

When the lessees propose further exploration and development of the expansion area, DNR will ensure that an updated unit plan of operations complies with the lease stipulations and lessee advisories developed for the most recent North Slope Areawide lease sale. DNR develops lease stipulations through the lease sale process to mitigate the potential environmental impacts from oil and gas activity. These mitigation measures address such issues as the protection of primary waterfowl areas, site restoration, construction of pipelines, seasonal restrictions on operations, public access to, or use of, the leased lands, and avoidance of seismic hazards. Additionally, lease operations may be subject to a coastal zone consistency determination and must comply with the terms of both the state and North Slope Borough coastal zone management plans as appropriate for the proposed activity.

Ongoing mitigation measures such as seasonal restrictions on specific activities in certain areas can reduce the impact on bird, fish and mammal populations. Designating primary waterfowl areas is one method of protecting the bird habitat. Regulating waste disposal is another way to limit environmental impacts. DNR also requires consolidation of facilities to minimize surface disturbances. With these mitigating measures, the anticipated exploration and development related activity is not likely to significantly impact bird, fish, and mammal populations.

Area residents use the proposed expansion area for subsistence hunting and fishing. Expanding the PBU to including additional acreage within ADLs 28277 and 28299 will not result in additional restrictions or limitations on access to lands or public and navigable waters used for subsistence purposes. Oil and gas activity may impact some wildlife habitat and some subsistence activity. The environmental impact will depend on the level of development activity, the effectiveness of mitigation measures, and the availability of alternative habitat and subsistence areas. In any case, the anticipated activity under the expanded PBU will impact habitat and subsistence activity less than if the lessees developed the leases individually. Unitized exploration, development and production will minimize surface impact.

2. The Geological and Engineering Characteristics of the Proposed Prudhoe Bay Unit Expansion Area and Midnight Sun Participating Area

The Midnight Sun field is one of many Kuparuk 'C' sandstone hydrocarbon accumulations along the Barrow arch, north of the Prudhoe Bay bounding fault. Several major east-west trending down-to-the-north normal faults, with a component of sinistral strike-slip motion, dominate the structure of the area north of the Prudhoe Bay field. In response to regional tectonic stresses, movement along these major faults has resulted in the formation of a relay ramp structural system composed of normal faults that form grabens, half-grabens and horsts.

The Kuparuk formation of Early Cretaceous age has a unique and complex depositional history. The lower 'A' and 'B' sandstone members were derived from a subaerially exposed northern provenance which foundered during Late Jurassic - Early Cretaceous time. As the northern source terrain subsided the primary source of the Upper Kuparuk 'C' and 'D' sediments, in this area, became the local Prudhoe Bay structural high. The transition between northern and local source areas and the associated regional tilting resulted in formation of the Lower Cretaceous Unconformity (LCU) following the deposition of the Kuparuk 'B' sediments.

The Kuparuk 'A' sandstone units are predictable, continuous, coarsening-upward marine sequences that were deposited over large contiguous areas. The LCU progressively truncates the 'A' and, where deposited, 'B' sandstone members in a predictable manner. The Kuparuk 'C' and 'D' members are deposited on top of the eroded irregular topography created by the LCU and represent the first sediments sourced from the local structural highs. The most productive 'C' sandstone areas tend to be associated with thicker sand intervals deposited in paleo-topographic depressions on down-thrown fault blocks. The Kuparuk 'C' sandstone appears to have been deposited in a tidally influenced setting, primarily as sediment gravity flows. Kuparuk 'C' sandstone is absent by erosion or non-deposition on paleo-topographic highs.

The Kuparuk field produces oil out of the Kuparuk 'A' and 'C' sands. The Milne Point field produces oil out of the Kuparuk 'A,' 'B,' and 'C' sandstones. The West Beach, Niakuk, Pt. McIntyre, and Midnight Sun fields produce oil out of thickened Kuparuk 'C' sandstones that were preserved in fault-bounded grabens and structural lows on the downthrown north side of the Prudhoe Bay bounding fault.

The Midnight Sun reservoir is located just north of E-Pad in the PBU. The field is fault bounded on three sides: to the south by the North Prudhoe bounding fault, to the west by the Prudhoe Bay mid-field fault; and to the north by a minor down to the south fault (named the Sambuca fault by ARCO).

Two wells have been drilled in the field: the Sambuca No. 1 well (PBU E-100) and the Midnight Sun well (PBU E-101). Depending on reservoir performance, the two wells already drilled may be the only wells that will produce the Midnight Sun reservoir. It is unclear whether more Kuparuk reservoir sand exists north of the Sambuca fault, which is currently mapped as the northern boundary of the accumulation.

ARCO is applying for a participating area for the Kuparuk formation. The MSPA operator has provided adequate geological and geophysical information in support of the proposed MSPA, including maps, cross sections, seismic lines, and well logs surrounding the Midnight Sun

Kuparuk hydrocarbon accumulation. The size of the hydrocarbon accumulation is constrained by faults on the north, south, and west and by non-deposition or erosion along the North Prudhoe structural high to the east-northeast. The configuration of the requested participating area conforms to the shape of the mapped hydrocarbon accumulation encompassed within 80-acre subdivisions of the public land survey.

3. Prior Exploration Activities

3.1. Drilling History

On December 5, 1997, BPXA requested approval of the Sambuca-01 Well Operation. On December 9, 1997, DNR conditionally approved BPXA's plan to drill the PBU E-100 well with 120 online days of testing, evaluation, and pilot production during the first 12 months after the well is spud. ARCO spudded the PBU E-100 well on October 25, 1997, from the existing E-Pad in the PBU. It reached a total depth of 13,282 feet (measured depth) (9,423 feet (true vertical depth)) on November 23, 1997. ARCO completed drilling the PBU E-100 well on December 20, 1997. ARCO perforated and tested the PBU E-100 wellbore in both the Ivishak and Kuparuk intervals. ARCO perforated and tested the Ivishak interval between December 20, 1997 and January 5, 1998, and the Kuparuk interval between January 20 and February 7, 1998.

On February 13, 1998, ARCO publicly announced that the PBU E-100 well was a 'double discovery.' In its press release ARCO labeled the Kuparuk accumulation as the "Midnight Sun field" and the Sag/Ivishak accumulation as the "Sambuca field." ARCO reported that the PBU E-100 well encountered a 100-foot vertical section of oil and gas-bearing rock in the Kuparuk formation at a measured depth of 11,622 feet and a 160-foot vertical section of the Sag/Ivishak formations at a measured depth of 12,965 feet. The Kuparuk formation tested approximately 4,000 BOPD (barrels of oil per day) of 29° API gravity oil and 1.5 million standard cubic feet of gas per day. The Sag/Ivishak formation test indicated flow rates of 1,400 BOPD of 24° API gravity oil and 490,000 standard cubic feet of gas per day. ARCO publicly announced that estimated recoverable reserves from the combined reservoirs were around 30 - 50 million barrels of oil.

On August 3, 1998, the Midnight Sun working interest owners requested Division approval to drill the PBU E-101 well to delineate the Kuparuk Midnight Sun accumulation and initiate pilot production operations from the Midnight Sun reservoir. They wanted to obtain an understanding of the producing characteristics of the reservoir, identify pressure support requirements, and obtain the information necessary to design and size any processing equipment. On August 31, 1998, the Division conditionally approved the Sam #1 (Lease) and MS #1 (Tract) Well Operations (Lease/Tract Well Operations) for 9 months from the start of production. ARCO spudded the second well, PBU E-101, on September 19, 1998 and completed it on November 1, 1998.

3.2. Production History

Midnight Sun reservoir pilot test production from the Lease/Tract Well Operations commenced on October 2, 1998. In its first month of production, October 1998, the PBU E-100 well produced 58,197 barrels of oil, 644 barrels of water, and 137,748 MCF of gas. Over the next

three months oil production declined and gas production increased. ARCO reported the following production volumes from the PBU E-100 well for December 1998: 40,085 barrels of oil, 366 barrels of water, and 202,324 MCF of gas. The PBU E-100 well produced a total of 147,556 barrels of oil; 1,054 barrels of water; and 521,834 MCF of gas in the three-months before the well was shut in at the end of December 1998. The well flowed for 17 days in March of 1999, producing 26,517 barrels of oil; 66 barrels of water; and 104,014 MCF of gas. The PBU E-100 well has been shut in since then and is currently being used as a pressure monitoring well.

The PBU E-101 well was placed on production in November 1998. Cumulative production for the PBU E-101 well through 1999 is 1,903,563 barrels of oil; 3,516 barrels of water; and 3,858,738 MCF of gas. Currently, the only production from the Midnight Sun reservoir is from the PBU E-101 well.

4. The Applicant's Plan for Development of the Midnight Sun Participating Area

The PBU operators submitted an initial plan of development for the Midnight Sun reservoir on July 1, 1999. ARCO supplemented the initial plan of development in a letter dated January 27, 2000. Production from the two existing wells, PBU E-100 and PBU E-101, will be commingled with PBU Initial Participating Areas (IPA) production on E-Pad and processed through the IPA production facilities. Gas from the Midnight Sun reservoir that is not used in operations as fuel, flared or lost will be injected into the Prudhoe Bay (Permo Triassic) reservoir.

The Midnight Sun working interest owners are evaluating the need for additional wells or sidetracks. An additional upstructure production well, PBU E-102, is contemplated in the future as part of the base development plan for the Midnight Sun reservoir. The MSPA operator plans to initiate a waterflood program by the third quarter of 2000. A midfield waterflood configuration is planned with the conversion of PBU E-100 well to water injection service. Source water for the injection program will be obtained by drilling local source water wells from E-Pad.

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

As discussed in section III (a) 3 above, increased production and revenues, in and of themselves and without consideration of other relevant factors, may not always be in the state's best interest.

5.1. Facility Sharing, Production Allocation and Metering

ARCO represented to the division that development of the Midnight Sun reservoir is possible because it will share the existing PBU facilities and infrastructure. Under the proposed plan of development, MSPA production will be commingled with IPA production and potentially with that from other reservoirs in the PBU production gathering system before any production passes through a custody transfer meter. ARCO initially proposed using the Prudhoe Bay Satellite Interim Production Metering Plan, dated June 9, 1998 (Interim Metering Plan), as the methodology for allocating production from the Midnight Sun reservoir through the shared IPA facilities. The Division approved the Interim Metering Plan when it approved the Lease/Tract Well Operations on

August 31, 1998. The Interim Metering Plan uses a fixed allocation factor of 1.0 and wellhead pressure and a deliverability curve to determine the daily oil production. The method works well where there are stable free flowing wells, tested at an increased frequency with rates adjusted for header leaks. However, rapidly increasing gas/oil ratios caused the monthly production from the E-100 and E-101 wells to vary greatly and it was impossible to maintain a valid deliverability curve for the wells.

In the Application ARCO proposed modifications to the Interim Metering Plan to more accurately allocate Midnight Sun reservoir production. The modifications include a minimum of two well tests per month with an allocation factor of 1.0 and daily production based on straight-line interpolations between valid well tests. The Midnight Sun working interest owners requested approval of the modified Interim Metering Plan until a long-term production measurement plan is approved by the Division and implemented by the Midnight Sun operator.

The Midnight Sun working interest owners used the modified production measurement methodology for the last six months and demonstrated that it is an acceptable method for allocating Midnight Sun production through the shared PBU production facilities.

In a letter dated November 9, 1999, BPXA and ARCO supplemented the Application by proposing a long-term production measurement plan for the Midnight Sun reservoir. They proposed continuously measuring the production from all Midnight Sun wells through a new metering skid. The Division will defer a decision on the proposed long term metering plan until DNR and AOGCC have adequately evaluated the proposal. It will be considered in a separate decision.

5.2. Gas Disposition

Among themselves and in their agreements the Midnight Sun working interest owners agreed to consider all Midnight Sun reservoir gas delivered into IPA production facilities as having been used in operations as fuel, flared or lost. However, we recognize that there may be more gas produced beyond that used as fuel, flared or lost. In the proposed plan of development for the MSPA, the Midnight Sun working interest owners state that Midnight Sun reservoir gas not used in operations as fuel, flared or lost, will be injected into the Prudhoe Bay (Permo-Triassic) reservoir. DNR acknowledges that for royalty reporting purposes, the natural gas liquids (NGLs) removed from MSPA produced gas will be accounted for and reported as indigenous IPA fluids. Any residue gas from the MSPA injected into the Prudhoe Bay (Permo-Triassic) reservoir will be treated as indigenous IPA natural gas for royalty reporting purposes. DNR will allow the Midnight Sun working interest owners to give the MSPA gas and NGLs to the IPA and the IPA working interest owners will be responsible for royalty payments when the gas is ultimately sold. DNR will allow this arrangement for the MSPA because it would be burdensome for the Division and the Midnight Sun working interest owners to track and report the relatively small amount of gas produced from the Midnight Sun reservoir. DNR will consider whether to require a gas disposition report for other participating areas on a case by case basis.

5.3. Tract Allocation Schedule

ARCO submitted a tract allocation schedule that prescribes how the Midnight Sun working interest owners plan to allocate the production and costs between the leases in the MSPA as required by 11 AAC 83.371 (Attachment 2 to this Findings and Decision). Under the proposed tract allocation

schedule, ARCO and Exxon each own 48.625% of the production from the proposed MSPA and BPXA owns the remaining 2.75%. The proposed tract allocation schedule is hereby amended to correct two errors. ARCO did not include the MSPA tract numbers on the tract allocation schedule. The three tracts listed are Tract 25, Tract 26 and Tract 27 respectively. The total acreage within Tract 26 is corrected to read 1,753 acres. The proposed allocation schedule distributes working interest equity among the lease tracts based on the working interest owners' initial assessment of original oil in place. All of the leases within the proposed MSPA reserve a 12.5% royalty to the state and the state is the sole royalty owner of the leases in the MSPA. Based on the above, ARCO's proposed tract allocation schedule is acceptable for allocating production and costs among the leases within the MSPA.

5.4. Field Costs

To resolve the issue on whether the Midnight Sun working interest owners have the right to deduct field costs from the state's royalty share of oil and gas from the proposed MSPA, the Application was made with the understanding that the 1980 Agreement will continue to apply to all leases currently within the PBU, including all production attributable to Section 36 of Tract 25, Sections 29, 31, and 32 of Tract 26, and Section 28 of Tract 27 (the MSPA Slivers). Determination of the production attributable to the MSPA Slivers for field cost purposes will be done in a similar manner to that set forth in paragraph (b) of the Amended Application for Proposed Pt. McIntyre Participating Area Prudhoe Bay Unit Expansion, dated October 13, 1993.¹ Further, the Midnight Sun working interest owners propose, and the Division agrees, that the 1980 Agreement applies to production attributable to Section 25 of Tract 25 and Section 30 of Tract 26, which are currently outside the PBU, subject to disallowance of any field cost deduction taken for production allocated to these two sections if the state ultimately prevails in litigation of the field cost dispute between Exxon and the DNR currently being pursued through the case of Exxon Corporation v. State of Alaska, No. S-9164 ("Pt. McIntyre litigation"). This case is pending before the Alaska Supreme Court. The disallowance of field costs if the state prevails in the litigation of the field cost dispute will apply equally to ARCO and BPXA despite the fact that ARCO and BPXA are not parties to that dispute. Payment for any amounts due the State because of any disallowed deductions will include interest at the applicable rate.

If the state prevails in the pending Pt. McIntyre litigation, field costs deductions will be disallowed for sections that were not included within the original PBU boundaries. Final resolution of the field cost allowance issue will apply retroactively from the start of the pilot test production operations.² If the state prevails, the MSPA operator and the working interest owners

¹ The field cost deduction for oil produced from the MSPA Slivers shall equal the volume of MSPA oil production attributable to the MSPA Slivers times the field cost deduction for oil under the terms of the 1980 Agreement. The volume of oil production attributable to the MSPA Slivers shall be calculated for each affected tract by multiplying the total volume of MSPA oil allocated to the tract by a ratio, the numerator of which is the surface area of the reservoir within the MSPA Sliver and denominator is the total surface area of the reservoir on the tract as depicted in the oil pore foot map submitted with the MSPA application. A determination has been made and agreement reached among the parties regarding the ratio values to be used in determining the volumes of hydrocarbon liquid production attributable to Tract 25 and 26 in the MSPA. The ratio values to be used to calculate the allowable field cost deductions for the MSPA production is set forth in Attachment 3 to this Findings and Decision.

² See working interest owners' December 5, 1997 request for Sambuca Well Operations and the Division's December 9, 1997 conditional approval of the Sambuca-01 Well Operation. ARCO perforated and tested the Ivishak interval in the Sam #1 (PBU E-100) well between December 20, 1997 and January 5, 1998, and tested the

must submit revised production and royalty reports from the start of the pilot test production through resolution of the litigation. This resolution of the field cost issue for the MSPA protects the state's interest.

IV. FINDINGS AND DECISION

Considering the facts discussed in this document and the administrative record, I hereby make findings and impose conditions as follows:

1. The expansion of the PBU and the formation of the MSPA are necessary and advisable to protect the public interest. AS 38.05.180(p) and 11 AAC 83.303.
2. The available geologic data, production well data and development plans justify the inclusion of the proposed lands within the PBU. Under the regulations governing formation and operation of oil and gas units (11 AAC 83.301 - 11 AAC 83.395) and the terms and conditions under which these lands were leased from the State of Alaska, the following lands are added to and included in the PBU area:

Tract 25, ADL 28277

T. 12N. R. 13E., Sec. 25: S1/2, 320 acres; and

Tract 26, ADL 28299

T. 12N. R. 14E., Sec. 30: S1/2, S1/2N1/2, 442 acres.

The total PBU expansion area includes approximately 762 acres.

3. The unitized development and operation of the leases in this unit 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 interference with subsistence activity is in the public interest.
4. Expansion of the PBU will not diminish access to public and navigable waters beyond those limitations (if any) imposed by law or already contained in the oil and gas leases in the expansion area.
5. The available geological and engineering data demonstrate that a paying quantities certification is appropriate for the tracts proposed for the MSPA. The data also indicates that the acreage is underlain by hydrocarbons and known and reasonably estimated to be capable of production or contributing to production in sufficient quantities to justify the formation of the MSPA within the PBU.

Kuparuk interval between January 20 and February 7, 1998. See the working interest owners' Application for Lease/Tract Operation-ADL 28299 Sam #1 (Lease) and MS #1 (Tract) Wells, Midnight Sun Accumulation, dated August 3, 1998, and the Division's conditional approval of the Lease/Tract Well Operations, dated August 31, 1998. Pilot test production from the Midnight Sun reservoir under the Lease/Tract Well Operations commenced on October 2, 1998.

6. The available geological and engineering data justify the inclusion of the proposed tracts within the MSPA. Under the regulations governing formation and operation of oil and gas units (11 AAC 83.301 - 11 AAC 83.395) and the terms and conditions under which these lands were leased from the State of Alaska, the following lands are included in the MSPA:

Tract 25, ADL 28277

T. 12N. R. 13E., Sec. 25: S1/2, 320 acres;

Sec. 36: N1/2, SE1/4, E1/2SW1/4, 560 acres;

for a total of 880 acres.

Tract 26, ADL 28299

T. 12N. R. 14E., Sec. 29: All, 640 acres;

Sec. 30: S1/2, S1/2N1/2, 442 acres;

Sec. 31: N1/2, SW1/4, N1/2SE1/4, 511 acres;

Sec. 32: NW1/4, 160 acres;

for a total of 1,753 acres.

Tract 27, ADL 28300

T. 12N. R. 14E., Sec. 28: W1/2, W1/2E1/2, 480 acres;

for a total of 480 acres.

The total area within the MSPA is approximately 3,113 acres.

7. The formation of the MSPA equitably divides costs and allocates produced hydrocarbons, and sets forth a development plan designed to maximize physical and economic recovery from the Midnight Sun reservoir within the approved MSPA.
8. Pursuant to 11 AAC 83.351(a) and 11 AAC 83.371(a), the Division approves the allocations of production and costs for the tracts within the MSPA under the terms and conditions of Section III (b)(5) of this Findings and Decision.
9. Within 30 days of this decision the MSPA operator must submit a tract allocation schedule with the correct acreage figure for Tract 26 and a revised map of the MSPA. The tract allocation schedule and the MSPA map shall indicate the appropriate MSPA Tract numbers.
10. The production of MSPA hydrocarbon liquids may be commingled with other PBU production in surface facilities before custody transfer. Facility sharing reduces the environmental impact of the additional production. Utilization of existing facilities will avoid unnecessary duplication of development efforts on and beneath the surface.
11. The proposed modifications to the Interim Metering Plan, discussed in Section III (b) 5.1, are acceptable for royalty allocation purposes and for allocating the commingled gas and hydrocarbon liquids production among the other participating areas within the PBU. The Division reserves the right to review the well test allocations to insure compliance with the methodology prescribed in this decision. Such review may include, but is not limited to, inspection of facilities, equipment and well test data.

12. The MSPA operator shall provide the division with monthly production allocation reports and well test data for the MSPA wells by the 20th of the following month. The reports shall include a summary of the production allocated to each well for the month and specific well test data for all tests conducted during the month. The Division reserves the right to request any information it deems pertinent to the review of those reports. Moreover, this approval of the allocation methodology is conditioned upon the operator's agreement to reply promptly and fully to any such requests.
13. The MSPA is assigned account code PBMS for royalty accounting purposes and, all operator reports and royalty reports must reference the new account code. ARCO shall submit revised operator reports to allocate all pilot test production from the Lease/Tract Well Operations to the MSPA. The revised operator reports should zero out production from the Midnight Sun reservoir under account codes X007 and X013 and reallocate the production to account code PBMS for the period October 1, 1998 through the present. The Midnight Sun working interest owners shall submit corresponding revised royalty reports for account codes X007 and X013 and new royalty reports for PBMS for the same time period.
14. Resolution of the field cost issue is discussed in section III (b) 5.4 above. The Midnight Sun working interest owners have the right to deduct field costs from the state's royalty share of oil and gas from the proposed MSPA pending resolution of the Pt. McIntyre litigation. If the state prevails in the Pt. McIntyre litigation, field costs deductions will be disallowed for sections that were not included within the original PBU boundaries. Final resolution of the field cost allowance issue will apply retroactively from the start of the pilot test production operations.
15. Diligent exploration and delineation of the Midnight Sun reservoir underlying the approved MSPA is to be conducted by the MSPA operator under the plans of development and operation approved by the state. Before undertaking any specific operations the unit operator must submit a plan of operations to the DNR and other appropriate state and local agencies for review and approval. All agencies must grant the required permits before drilling or development operations may commence. DNR may condition its approval of a unit plan of operations and other permits on performance of mitigating measures in addition to those in the leases if necessary or appropriate. Requiring strict adherence to the mitigating measures will minimize adverse environmental impacts.
16. The Initial Plan of Development for the MSPA meets the requirements of 11 AAC 83.303 and 11 AAC 83.343. However, ARCO did not specify a term or expiration date for the MSPA initial plan of development. The plan is approved for a one-year period from April 1, 2000 through March 31, 2001. The second plan of development for the MSPA will be due on January 2, 2001, 90 days before the initial plan expires. The second plan must describe the extent to which the requirements of the initial plan were achieved and, if actual operations deviated from or did not comply with the previously approved plan, an explanation of the deviation or noncompliance must be included. It must also provide detailed plans

for the term of the second plan and long range development plans for the MSPA.
11 AAC 83.343.

Article 5.4 of the PBU Agreement provides that a participating area will be effective on the first day of the month following approval by DNR or any other date agreed to by DNR and the working interest owners. DNR's August 31, 1998 approval of the Lease/Tract Well Operations provided that the effective date for any participating area for the Midnight Sun reservoir would be retroactive to the start of pilot test production from the Lease/Tract Well Operations. Pilot test production from the Lease/Tract Well Operations began on October 2, 1998. In the Application, the unit operators requested an effective date of October 1, 1998 for the PBU expansion and the MSPA. Approval of the fifth expansion of the PBU, formation of the MSPA, and the MSPA tract allocation schedule are effective October 1, 1998.

A person adversely affected by this decision may appeal this decision, in accordance with 11 AAC 02, to John Shively, commissioner, Department of Natural Resources, 550 W. Seventh Avenue, Suite 1400, Anchorage, AK 99501. Please include the appeal code number provided below. Any appeal must be received at the above address, or received by being faxed to 1 (907) 562-4871, within 30 calendar days after the date of "delivery" of the decision, as defined in 11 AAC 02.040.

Patrick J. Langhin for
Kenneth A. Boyd, Director
Division of Oil and Gas

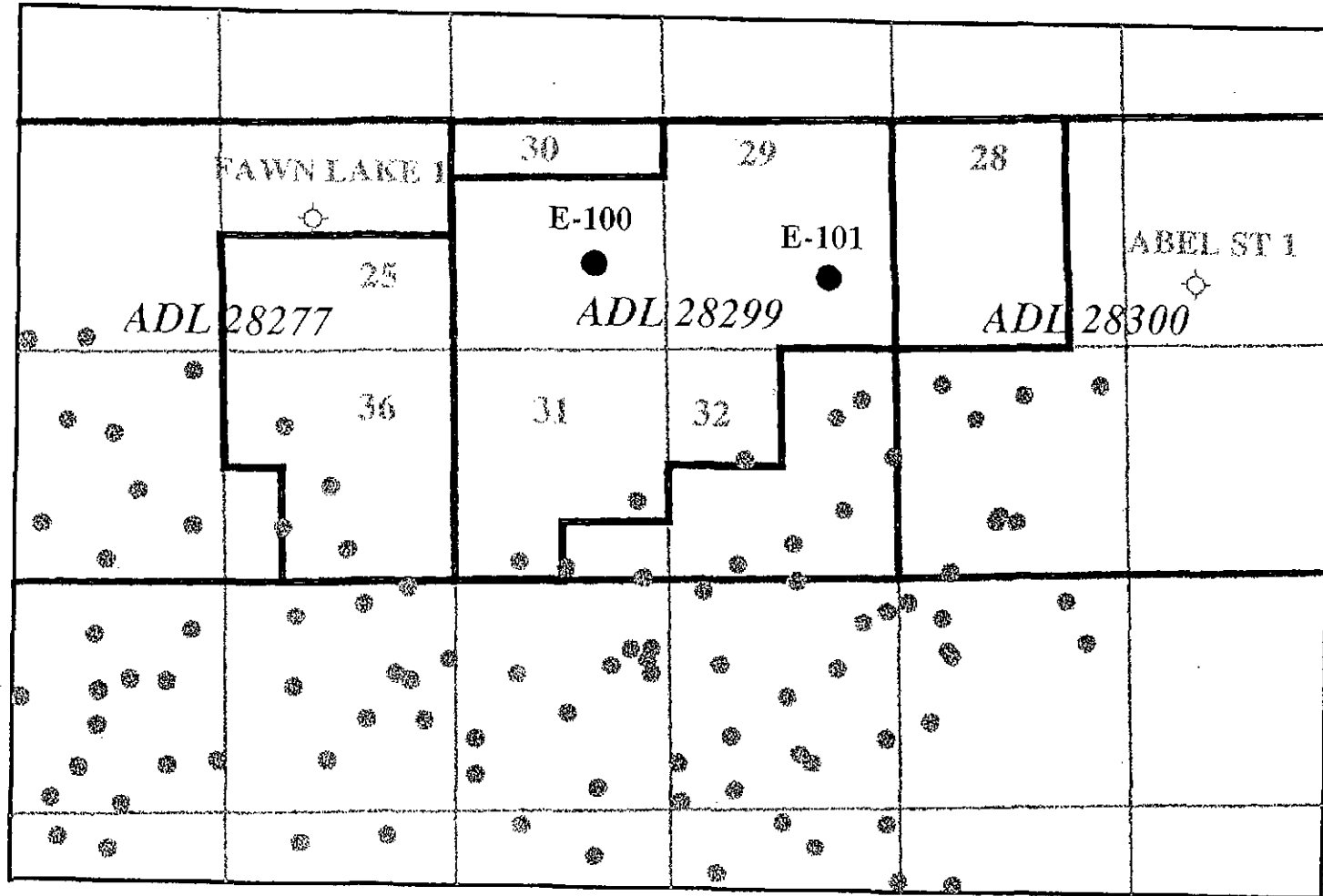
3.10.00
Date

Appeal Code: OG030900PBUMSPA

Attachments: 1) Map of the MSPA
2) MSPA Tract Allocation Schedule
3) Sliver Allocation

MSPA-PBU Expansion-final 3.9.00.doc

BOUNDARIES OF THE MIDNIGHT SUN PARTICIPATING AREA



Attachment 2

TRACT PARTICIPATION WITHIN THE MIDNIGHT SUN PARTICIPATING AREA

<u>Description</u>	<u>Acreage</u>	<u>ADL</u>	<u>Basic Royalty</u>	<u>Lessee of Record</u>	<u>WI Ownership</u>	<u>Tract Participations</u>
T12N-R13E, Sec 25: S1/2	880	028277	1/8	BP	100%	2.75%
Sec 36: N1/2 SE1/4 E1/2 SW1/4		Tr. 25				
T12N-R14E, Sec 29: ALL	1758	028299	1/8	ARCO Exxon	50% 50%	89.15%
Sec 30: S1/2 S1/2 NE1/4 S1/2 NW1/4		Tr. 26				
Sec 31: N1/2 SW1/4 N1/2 SE1/4						
Sec 32: NW1/4						
T12N-R14E, Sec 28: W1/2 W1/2 NE1/4 W1/2 SE1/4	480	028300	1/8	ARCO Exxon	50% 50%	8.1%
		Tr. 27				

Attachment 3

Sliver Ratios

<u>Tract #</u>	<u>Lease #</u>	<u>Sliver Area</u>	<u>Total Area</u>	<u>Ratio Value (Sliver Area/Total Area)</u>
25	ADL 28277	106.1 acres	125.67 acres	.8443
26	ADL 28299	656.06 acres	952.32 acres	.6889

27