

KUPARUK RIVER UNIT

THE SEVENTH
EXPANSION OF THE UNIT AREA AND FORMATION
OF THE MELTWATER PARTICIPATING AREA

FINDINGS AND DECISION OF THE DIRECTOR,
DIVISION OF OIL AND GAS,
UNDER DELEGATION OF AUTHORITY FROM THE COMMISSIONER
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

August 29, 2001

I. INTRODUCTION, BACKGROUND, AND DECISION SUMMARY

Phillips Alaska, Inc. (Phillips), as Kuparuk River Unit Operator, and on behalf of the Working Interest Owners (WIOs) in the Kuparuk River Unit (KRU), applied to expand the KRU and form the Meltwater Participating Area (MWPA) within the existing and expanded KRU. Phillips proposes to add two leases and approximately 11,367 acres to the KRU. Two leases within the existing KRU, ADL 373111 and ADL 373112, and the two proposed expansion leases, ADL 389058 and ADL 389059, include three Meltwater wells, drilled and completed by Phillips in the 1999/2000 winter drilling season, the proposed MWPA, and lands that Phillips views as having significant exploration potential in the same or similar geologic horizons as the Meltwater discovery. The proposed MWPA encompasses approximately 6,219 acres. Phillips provided geological, geophysical, and engineering data supporting the proposed KRU expansion and MWPA formation. The submitted data justifies the formation of the MWPA. The data indicate that the Bermuda and Cairn Intervals within the Meltwater Reservoir are capable of producing or contributing to the production of hydrocarbons in paying quantities.

For the reasons set out in the Decision, the Division of Oil and Gas (Division) approves the expansion of the KRU subject to the inclusion of both expansion leases in a participating area within three years of the effective date of this unit expansion. The WIOs agreed that the leases or portions of the leases not included in a participating area within three years of the effective date of the unit expansion would be automatically eliminated from the KRU.

The Division also approves Phillips' application to form the MWPA. The MWPA is limited to the area proposed by Phillips because that area is "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." 11 AAC 83.351(a). If additional data are obtained or submitted in the future, the boundaries of the MWPA may be revised. The Division also approves the Tract Allocation Schedule for the MWPA, Attachment 2 to this Findings and Decision. The tract allocation schedule adequately allocates production and costs among the leases in the MWPA.

The KRU expansion area leases, the MWPA leases and the tract allocation schedule, and a map of the proposed KRU expansion area and MWPA are Attachments 1, 2 and 3, respectively, to this Findings and Decision. The effective date of the unit expansion, the MWPA, and the MWPA Tract Allocation Schedule is June 1, 2001, the date proposed by Phillips.

II. APPLICATION FOR THE EXPANSION OF THE UNIT AREA AND FORMATION OF THE MELTWATER PARTICIPATING AREA

Phillips applied to expand the KRU and form the MWPA, within the existing and expanded KRU, on May 8, 2001. The WIOs in the expansion area leases and the MWPA are Phillips, BPXA, Unocal, Mobil, and Chevron. The two state oil and gas leases proposed for the KRU expansion are ADL389058 (KRU Tract 144) and ADL 389059 (KRU Tract 145). The proposed KRU expansion area covers approximately 11,367 acres, and the total unit area after the expansion would be approximately 384,539 acres.

The two proposed expansion leases were acquired in State Lease Sale 87 (North Slope Areawide) held on June 24, 1998. The leases were issued on state lease form #DOG 9609 (Rev.6/97) effective November 1, 1998, for a term of 7 years. The leases provide for a 12.5 percent royalty to the state. Meltwater North #1 is located on ADL 389058.

With the application to expand the KRU, Phillips applied to form the MWPA within the existing and expanded KRU. The proposed MWPA acreage encompasses the Bermuda and Cairn Intervals of the Meltwater Reservoir within the Meltwater Sands, which Phillips purports are capable of producing or contributing to the production of hydrocarbons in paying quantities. The proposed vertical definition for the MWPA is the sequence of oil-bearing sandstones and mudstones within the Bermuda Interval and the Cairn Interval of the Meltwater Reservoir (See Attachment 7 of the application). The proposed MWPA tract allocation schedule and a map depicting the proposed MWPA are included as Attachments 2 and 3, respectively, to this Findings and Decision.

Phillips filed several attachments in support of its application. These included: a proposed plan of development for the MWPA; a further plan of exploration for the KRU acreage outside and adjacent to the proposed MWPA; a map and legal description of the leases proposed for the KRU expansion and the MWPA; geological data supporting the proposed unit expansion and MWPA; a Meltwater Reservoir Paying Quantities Determination; a proposed methodology for allocating production from the participating areas that will share the Kuparuk infrastructure, facilities, and gathering system prior to any stream passing through a custody transfer meter; a copy of the Meltwater Special Provisions to the KRU Operating Agreement; and the initial tract allocation schedule for the MWPA. Phillips requested that the effective date for the Unit Expansion and MWPA be June 1, 2001.

Phillips submitted geological evidence to support the formation of the MWPA to develop the Bermuda and Cairn Intervals of the Meltwater Reservoir within the KRU under a unified plan of development. Phillips acquired 120 square miles of 3-D seismic data in early 1998 south of the Tarn Participating Area and drilled two wells and one sidetrack well in 2000 to evaluate the extent of the Meltwater Reservoir. The Meltwater Owners are currently developing the Cairn and Bermuda Intervals of the Meltwater Reservoir that they believe are commercially viable. The current development is planned to have one new KRU drillsite (DS 2P), approximately 26 wells, three pipelines (an 8" miscible injectant line, a 12" water line and a 24" production line), a road, and power lines.

The Division determined that the application was complete and published a public notice in the "Anchorage Daily News" on May 27, 2001, and in the "Arctic Sounder" on May 31, 2001, as required by 11 AAC 83.311. Copies of the public notice were also provided to interested parties in conformance with 11 AAC 83.311. These parties included the City of Barrow, the North Slope Borough, the Arctic Slope Regional Corporation, the Kuukpik Corporation, the Alaska Department of Environmental Conservation, the Alaska Department of Fish and Game, the Alaska Department of Natural Resources (DNR), 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 July 2, 2001. The Division received one comment from the public, interested parties, or state or

local agencies. That comment was from an individual who has hunted, fished, and guided in the area, and concerned continued access to the expansion area to conduct his guiding business and traditional subsistence hunting/fishing. This public comment is addressed in section III. A.1 of this Findings and Decision.

III. DISCUSSION OF DECISION CRITERIA

The Commissioner of the Department of Natural Resources (Commissioner) reviews unit-related applications, including expansion of units and the formation of participating areas, under AS 38.05.180(p) and 11 AAC 83.303--11 AAC 83.395. 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 (Director). The Division's review of Phillips' application is based on the criteria set out in 11 AAC 83.303 (a) and (b). A discussion of the subsection (b) criteria, as they apply to the application, is set out directly below, followed by a discussion of the subsection (a) criteria.

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

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

DNR develops lease stipulations, or mitigation measures, through the lease sale process to mitigate the potential environmental impacts from oil and gas activity. Alaska statutes require DNR to give public notice and issue a written finding before disposal of the state's oil and gas resources. AS 38.05.035(e); AS 38.05.945. In preparing a written finding before an oil and gas lease sale, the Commissioner may impose additional conditions or limitations beyond those imposed by law. AS 38.05.035(e).

DNR considered all comments filed before holding Lease Sale 87, when the KRU expansion leases were acquired. DNR included mitigation measures in all the leases. The proposed KRU expansion leases contain stipulations designed to protect the environment and address concerns regarding impacts to the area's fish and wildlife species, habitat and subsistence activities, and cultural resources and privacy. They 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. Including these leases in the KRU will not result in additional restrictions or limitations on access to the lands or to public and navigable waters. In addition, all lease operations after unitization are 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.

Ongoing mitigation measures, such as seasonal restrictions on specific activities in certain areas, can reduce the impact on bird, fish, and mammal populations. For example, DNR requires consolidation of facilities to minimize surface disturbances. With these mitigation measures, the anticipated exploration and development related activity is not likely to significantly impact bird, fish, and mammal populations. Area residents use the unit area for subsistence hunting and fishing. 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 KRU will impact habitat and subsistence activity less than if the lessees developed the leases individually because unitized exploration, development and production will minimize surface impact. Including the leases in the KRU will promote the conservation of both surface and subsurface resources through unitized (rather than lease-by-lease) development. The expansion of the KRU and the formation of the MWPA over the Meltwater Reservoir will provide for a plan of development governing that production that will help avoid unnecessary duplication of development efforts on and under the surface. Facilities can be located to maximize recovery and to minimize environmental impacts, without regard for individual lease ownership.

When the Division evaluated the Application for the Sixth Expansion of the Kuparuk Unit Area and Formation of the Tarn Participating Area in August-September 1998, a resident of the North Slope who has hunted, fished, and guided for nearly twenty years in the area around the KRU and the Prudhoe Bay Unit submitted a comment during the public comment period. At that time he expressed concern that “the oil fields are taking over the area” and “that one day I will be told that I can no longer utilize this land as I have in the past.” This same individual submitted similar comments regarding the Seventh KRU expansion application.

As was the case for the Sixth KRU expansion, the proposed Seventh KRU expansion leases contain stipulations designed to protect the environment and address any outstanding concerns regarding impacts to the area’s fish and wildlife species, habitat and subsistence activities, and cultural resources and privacy. The expansion leases address the issue of public access to, or use of, the leased lands. The Mitigation Measures and Lessee Advisories for Sale 87, provide the following: (1) no restriction of public access to, or use of, the leased area will be permitted as a consequence of oil and gas activities except in the immediate vicinity of drill sites, buildings, and other related facilities; (2) no lease facilities or operations may be located where they would block public access to or along navigable and public waters as defined in AS 38.05.965(13) and (17), if lease facilities will be located in the vicinity of these public waters, an easement will be reserved under AS 38.05.127 and 11 AAC 53.330 to ensure the right of public access; and (3) exploration, development or production operations must be conducted in a manner that prevents unreasonable conflicts between lease related activities and subsistence activities. Attachment 4 to this Findings and Decision contains the specific mitigation measures and lease advisories that address the concerns of the commenter. Including the leases in the KRU will not change these stipulations. The stipulations are in effect whether the leases are unitized or not.

State unitization regulations require the Commissioner to approve a Plan of Operations before the unit operator performs any field operations on the surface. 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 a unit operator proposes to explore or develop the unit area and submits a Unit Plan of Operations, the DNR will ensure that it complies with the lease stipulations and lessee advisories developed for Sale 87, or, if more appropriate, the lease stipulations and lessee advisories developed for the most recent North Slope areawide lease sale.

The approval of the KRU expansion and formation of the MWPA itself has no environmental impact. The unit expansion and PA formation do not entail any environmental costs in addition to

those that may occur when permits to conduct lease-by-lease exploration or development are issued. The Commissioner's approval of the unit expansion and PA formation is an administrative action that does not convey any authority to conduct any operations on the surface within the unit area. Unitization does not waive or reduce the effectiveness of the mitigating measures that condition the lessee's right to conduct operations on these leases. DNR's approval of the Unit Plan of Exploration and/or 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 must still obtain approval of a Plan of Operations from the state, and permits from various agencies on state leases before drilling a well or wells or initiating development activities to produce known reservoirs within the unit area.

With regard to the specific surface activities proposed for the MWPA, Phillips applied for permits and authorizations for the Meltwater Development Project from the various federal, state, and local agencies. Phillips has already received the permits and authorizations necessary for the construction of the Meltwater Development Project. These permits and authorizations include the approval of a Plan of Operations from the DNR, a final consistency determination by the State of Alaska-Division of Governmental Coordination that the plan of operations is consistent with the Alaska Coastal Management Program (ACMP) and issuance of a permit from the Corps of Engineers. A copy of the Phillips Meltwater Development Project, the Final Consistency Determination with the ACMP for the Project, and the DNR approval of the Meltwater Plan of Operations are available at the Division's Anchorage office.

2. The Geological and Engineering Characteristics of the Proposed Expansion Area and Participating Area

Phillips submitted geological, geophysical, engineering, and well data in support of the KRU expansion and MWPA formation application. These included:

- (1) Net pay maps for the Bermuda and Cairn Intervals – illustrating preliminary development drilling locations and exploration targets.
- (2) Representative strike and dip seismic lines over the MWPA and KRU expansion areas.
- (3) Annotated well logs for the Meltwater North #1, North #2 and North #2A wells.
- (4) Correlated and annotated well log cross-sections across the MWPA.
- (5) Structure, isochore, seismic amplitude, and net pay maps for the Bermuda and Cairn Intervals over the MWPA.
- (6) Porosity and permeability core data cross-plots for cored Meltwater wells.

A PA may include only 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). "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 as a whole may ultimately result in a loss; quantities are insufficient to yield a return in excess of operating costs 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).

The Meltwater oil accumulation has been mapped using 3-D seismic data. The Meltwater interval is bounded at the top by the T4.1 log marker and at the base by the C35 log marker. The top of the Meltwater Reservoir is separated from the Tabasco Sandstone equivalent, the first overlying potential reservoir zone, by a confining layer of approximately 3,000' of impermeable shale. The base of the Meltwater Reservoir is separated from the underlying Kuparuk River formation by approximately 500' of shale.

The Bermuda and Cairn Intervals are similar in age and depositional environment to the producing sands within the Tarn Participating Area to the north. The Bermuda accumulation, similar to Tarn, is a slope-apron fan deposit that is composed of generally discreet accumulations controlled by local accommodation space. No water or gas cap was encountered within the Bermuda Interval from the three successful exploration wells drilled. Evidence from the Tarn field suggests that there is a potential for individual lobes to be in fluid isolation. RFT data from both the Tarn and Meltwater wells suggest that the two accumulations are not in hydraulic communication. The trapping mechanism within the Bermuda Interval is stratigraphic; hydrocarbon distribution is controlled by sandstone distribution.

The vertical definition of the MWPA consists of a 400 foot stratigraphic section of two distinct, separate, and genetically unrelated marine sequences of reservoir sandstones, siltstones, and mudstones, and their lateral equivalents within the Cretaceous Torok Formation, first encountered in the Meltwater South well in 1999, that are informally referred to as the Meltwater sands. The Bermuda Interval is the primary reservoir and the overlying Cairn Interval is a more speculative secondary target.

Reservoir sands, which are locally developed within each interval, are lobate to linear in form, and are separated from adjacent reservoirs by mudstones and shales. The Meltwater Sandstones are Late Cretaceous (Cenomanian) in age. The type section is defined as the interval encountered between 4,958' and 5,368' tvdss depth in the Meltwater North #2A well. The Meltwater sandstones are fine-to very fine-grained and have common shale laminations and interbeds. The sandstones are compositionally immature litharenites-- the major components include quartz, heterolithic rock fragments, plagioclase and zeolite. Shale laminations are common.

Stratigraphic correlative markers T3 and T2 bound the net pay zone within the Bermuda Interval. Sandstone bodies within the Bermuda Interval consist of channel fill and lobate accumulations that were deposited in a marine slope-apron setting at the base of the Cenomanian-aged shelf.

The Bermuda sandstones were encountered between 5,187' to 5,297' tvdss in the Meltwater North #2A well. Hydrocarbon-bearing sandstones in this interval were encountered in both offset exploratory wells and the interval was flow tested in the Meltwater North #1 well, where it tested at flow rates of approximately 4,000 BOPD of 37 degree API oil. The Bermuda reservoir

sandstones are fine- to very fine-grained with porosity values around 20% and average permeability values that average around 15 millidarcies. No gas or water has been encountered in the Bermuda Interval sandstones in the Meltwater area.

Structural dip in the Bermuda Interval is generally to the east. Depths range from approximately 4,700' subsea in the west to 5,500' subsea in the east. The T3 surface, top of the Bermuda Interval, dips to the east-southeast at approximately 2-3 degrees in the vicinity of the Meltwater North #1 well. Complex faulting is present along the western (updip) edge of the Meltwater Oil Pool. The underlying topography created by earlier submarine fan complexes, slope failure and associated faulting, and early submarine canyon cutting and head ward erosion all contributed to the creation of the accommodation space needed for deposition of the Bermuda sands. Cairn-aged submarine channel systems cut through the T3 reservoir to the east acting as a lateral boundary. No faults are currently mapped within the main Bermuda reservoir trends.

The Cairn Interval is stratigraphically younger than the Bermuda Interval. The T3 and overlying T4.1 stratigraphic markers bound the Cairn Interval. The T4.1 marker appears to be a conformable contact. The Cairn interval sandstone bodies are linear to sinuous in form and generally trend north-south. These deposits are interpreted to represent marine channel fill deposits formed along the base of slope as part of a channel-levee submarine fan system.

The Cairn Interval is definitely a secondary exploration target within the Meltwater Reservoir. An oil-charged section and an interpreted gas/oil contact were encountered in the Cairn Interval in the Tarn #4 well, but the permeability of the Cairn sandstones was considered too low for economic development at that distal location. The presence of potential reservoir sands within the Cairn Interval is based on seismic attribute analyses that indicate the presence of a prospective long, sinuous channel complex. The Cairn prospect lies immediately to the east of the Meltwater Bermuda reservoir sandstones, trending to the north-northeast towards the Tarn #4 well for a distance of approximately 9 miles.

Structural depth of the Cairn Interval ranges from 4,800' to 5,500' subsea. Even though the Cairn Interval is stratigraphically younger (higher) than the Bermuda Interval, because of structural dip, the Cairn Interval is generally structurally level with or deeper than the Bermuda accumulation.

The Bermuda sandstones will be the primary targets of initial development plans within the Meltwater Reservoir. The first wells planned are in the Bermuda locations that demonstrate the best promise of good reservoir characteristics based on seismic, log, and core attributes. Potentially productive targets within the Cairn Interval are expected to be within 400' tvd depth of the Bermuda interval and may be tested en route to the Bermuda sandstones. These potentially productive zones may contain insufficient reserves to merit the expense of separate wells or extensive completion design modifications. Fracture modeling indicates that fracture stimulations within the Bermuda formation will only fracture around 100' upward and will not extend into the Cairn Interval. Therefore, any potentially productive Cairn sandstone pay zone can only be developed if it can be inexpensively commingled with Bermuda production.

The Meltwater slope-apron submarine fan complex was fed from at least two separate submarine

canyons through multiple channel systems. This created complicated internal reservoir geometry with localized sandstone accumulations that are not laterally continuous and with geometries that are difficult to predict. The sandstone and net pay distribution within the Bermuda Interval cannot be mapped with total certainty prior to extensive development drilling. Major flexibility is an integral part of the Meltwater development strategy in order to maximize oil recovery within the Bermuda sandstones. Net pay and well production and performance data obtained from wells will dictate how the producer-injector pairs are located. All development wells are planned with the same completions, in order to maintain the most flexibility to be able to convert wells to injection service if required to maximize reservoir production.

At this time, there is some uncertainty as to the areal extent of the Meltwater Sandstones that will contribute to production. Phillips' seismic amplitude analyses accurately define the prospective areas and roughly predict the gross thickness of the pay zones. The MWPA is based upon the relative net sandstone volume in the Bermuda Interval as depicted on the Meltwater Bermuda Interval Net Pay Map that Phillips submitted. One of the major uncertainties with the Meltwater Reservoir is predicting the internal geometry and continuity of reservoir sandstones.

The currently proposed drilling schedule justifies the size of the proposed MWPA. ADL 389058 and ADL 389059 are proposed for the KRU expansion. The northern half of ADL 389058 contains mapped Bermuda Interval net pay within the proposed MWPA. The Cairn Interval does not extend, as currently mapped, on either of these two leases. Delineation drilling will define whether the Bermuda sands extend onto these leases or whether productive Cairn sands are present on the leases.

Phillips has reasonably demonstrated by geological, geophysical, and engineering data that the Bermuda and Cairn Intervals within the proposed MWPA contain commercial hydrocarbons. Phillips has proposed expanding the current KRU to include the proposed MWPA and surrounding acreage--ADL 389059 and the southern half of ADL 389058-- that contain other potential Meltwater Sand interval exploration prospects within the Seabee Formation.

Results of development drilling within the MWPA will delineate the geometry and sandstone distribution of the individual Meltwater zones and more accurately define its true lateral extent. Exploratory wells drilled within the current and expanded KRU, but outside the MWPA, may lead to the expansion of the MWPA, or the creation of another separate PA in the future. Conversely, areas included within the proposed MWPA that are currently interpreted to be hydrocarbon-bearing may turn out to be disappointing because of the complex geometry and variable distribution of reservoir quality sandstones within the Meltwater slope-apron fan turbidite deposits. The areal extent of the productive intervals will be constrained at the conclusion of the delineation-drilling phase.

3. Prior Exploration Activities and the Applicant's Plan for Exploration or Development for the Expansion Areas

After the Tarn discovery wells were drilled in 1997, a 120 square mile 3-D seismic survey was acquired in early 1998, south of the Tarn field. The entire proposed KRU expansion area has 3-D seismic coverage. Three Meltwater penetrations, Meltwater North #1, Meltwater North #2 and

Meltwater North #2A, were drilled in 2000. Meltwater North #1 tested approximately 4,000 BOPD from the Bermuda Interval.

The Meltwater Owners are currently proceeding with development of the Meltwater Reservoir. The Bermuda Interval will be the primary target of initial development efforts, but potentially productive secondary targets in the Cairn Interval may be encountered during the initial development drilling. The MWPA development is planned to have one drillsite, KRU DS 2P, and approximately 26 wells. Development drilling, which started in April 2001, will be spread over two years. Approximately 17 wells are scheduled for 2001, and the remaining 9 wells are scheduled for 2002. Meltwater production start-up is scheduled for 4Q2001. Three pipelines, an 8" miscible injectant line, a 12" water line, and a 24" production line, a road, and power lines will serve Meltwater. The road and power lines will run approximately 10 miles and connect into the existing KRU infrastructure at DS 2N. Miscible Injectant (a mixture of natural gas and natural gas liquids) will initially be injected into the Meltwater Reservoir to maximize oil rate and recovery.

ADL 373111 and ADL 373112 were included in the KRU under the Findings and Decision of the Commissioner for the Sixth Expansion of the Unit Area and Formation of the Tarn Participating Area, dated September 4, 1998 (Sixth KRU Expansion Decision). The two ADLs were added to the KRU subject to the leases being included in a participating area within five years of the effective date of the Sixth KRU Expansion Decision. If the leases or portions of the leases were not included in a participating area within five years of the effective date, they would be automatically eliminated from the KRU. Most of ADL 373112 and none of ADL 373111 is included in the proposed MWPA, but ADL 373111 has Cairn Interval potential. Exploratory drilling targeting the Cairn Interval of the Meltwater Reservoir will be conducted concurrently with Meltwater Bermuda Interval development drilling operations. The Cairn Interval will be tested early in the development plan. Successful Cairn Interval drilling results may expand the Meltwater development project to include additional wells beyond the planned 26 wells.

Future exploration or delineation activities for the Seventh KRU expansion leases, ADL 389058 and ADL 389059, not included in the MWPA, will be subject to the success of the Bermuda and Cairn Intervals drilling results.

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

Phillips represented to the Division that development of the Meltwater Reservoir is possible because the existing KRU facilities and infrastructure will be shared. Meltwater production will be commingled with Kuparuk Participating Area (KPA) production, and the other reservoirs in the KRU production gathering system (all the Greater Kuparuk Area (GKA) Satellites (Tarn, West Sak, Tabasco, and Meltwater)), before any production stream passes through a custody transfer meter.

Phillips proposes to allocate the KRU gathering system throughput amongst the various streams based on an individual well test allocation methodology and variable allocation factors. More specifically, (1) each producing Meltwater well will be tested a minimum of two times per month; (2) the KPA and the GKA Satellites will have variable allocation factors, that is, the allocation factors will "float" every month; (3) if the overall allocation factor is less than or equal to 1.02, the KPA and all Satellites have the same allocation factor; (4) if the overall allocation factor is greater

than 1.02, then the allocation factor for the Satellites will be 1.02, and all residual production is allocated to the KPA; and (5) Phillips will submit monthly file(s) containing daily allocation data and daily test data for Division surveillance and evaluation.

Details of the proposed throughput allocation methodology and well testing procedures are set out in Attachment 16 to the May 8, 2001, application, and they were submitted to the AOGCC with the Testimony for Meltwater Pool Rules–Revision 1, dated April 26, 2001¹. Phillips provided this submittal to the Division as additional information regarding the MWPA application.

Phillips has had discussions with various state agencies, the Department of Revenue (DOR), the AOGCC, and the Division, regarding this new “floating” production allocation methodology for the KRU. The AOGCC conditionally approved this proposal with Conservation Order No. 456 for the Meltwater Oil Pool, dated August 1, 2001. The Division approves the revised production commingling, well allocation methodology and well testing procedures as they would apply to MWPA volume and royalty accounting with the following conditions: (1) the “floating” production allocation methodology will apply for the first year of MWPA production to evaluate the impact of the allocation factor cap of 1.02 on produced volumes allocated to the GKA Satellites and the KPA; (2) Phillips continue to submit the monthly allocated production reports for the KPA and GKA Satellites; (3) an allocation and well test review meeting be held with the Division, DOR, and AOGCC after 6 and 12 months of commingled production; and (5) after 12 months of commingled production, the “floating” production allocation methodology will be evaluated to determine the continued use of the “floating” allocation procedures.

Phillips submitted an allocation of production and cost schedule for the individual leases in the proposed MWPA (Attachment 2 to this Findings and Decision) as required by 11 AAC 83.371. The proposed allocation distributes working interest equity among the MWPA leases according to the relative net sandstone volume in the Bermuda Interval as depicted in Attachment 14 of the application. All the leases within the MWPA reserve a 12.5% royalty to the state and the state is the sole royalty owner of the leases in the MWPA. Furthermore, the MWPA leases provide for no field costs associated with the Meltwater production through the KRU facilities. Based on the above, Phillips’ tract allocation schedule is acceptable for allocating production and costs among the leases within the MWPA.

The MWPA will be the fifth participating area in the KRU that will share the KRU facilities and infrastructure. In order to properly allocate Kuparuk, West Sak, Tabasco, Tarn, Meltwater and any other KRU participating area produced gas, gas used for fuel, flare, gas reinjected into the KPA reservoir or any other participating area reservoir established in the KRU, and natural gas liquids that go through the KRU facilities, the MWPA Owners should continue to use the gas reserve and gas debit reporting procedures already established for the facility sharing at the KRU. The monthly gas reserves and gas debit report should be similar to the form approved for the West Sak Participating Area (WSPA). (See WSPA Decision and Findings, dated December 18, 1997)

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

¹ In particular, see Exhibit 18 to the Testimony for Meltwater Oil Pool Rules–Revision 1, dated April 26, 2001.

1. Promote The Conservation of All Natural Resources

The unitization of oil and gas reservoirs and the formation of PAs 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 competitive operators. This race can produce: (1) overly dense drilling, especially along property lines; (2) rapid dissipation of reservoir pressure; and (3) irregular advance 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 such as spills and other surface impacts. 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 operations. Unitization, however, provides a practical and efficient method for maximizing oil and gas recovery, and minimizes negative impacts on other resources.

Our concern about lessees competing for the same reservoir is less in the proposed KRU expansion area and MWPA because the WIOs -- Phillips, BPXA, Unocal, Chevron, and Mobil-- have already aligned their leasehold interests in the proposed expansion acreage and the existing KRU. The WIOs have executed various alignment agreements for the Greater Kuparuk Area that establish an area of common equity, establishing ownership percentages covering all horizons within the boundaries of the KRU, and certain adjacent areas, between the various WIOs. However, even with only one primary working interest owner group, expansion of the KRU and formation of the MWPA will provide a comprehensive plan for developing the MWPA and exploring all the reservoirs within the expanded KRU. The Meltwater Plan of Development and the planned exploration activities for the areas nearby the MWPA provide for an efficient, integrated approach to development of the Meltwater Reservoir.

The KRU expansion will promote the conservation of both surface and subsurface resources through unitized (rather than lease-by-lease) development. Unitization allows the unit operator to explore the area as if it were one lease. The expansion of the KRU and the formation of the MWPA over the Meltwater Reservoir will allow this area to be comprehensively and efficiently explored and developed. Adoption of an operating agreement and plan of development governing that production will help avoid unnecessary duplication of development efforts on and under 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 MWPA through the existing KRU production and processing facilities will reduce the incremental environmental impact of the additional production. The planned Meltwater development will include a new stand-alone drillsite, connecting road and pipelines, but will use the existing KRU processing facilities and infrastructure.

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, could still occur without an equitable cost

sharing formula, and a well-designed and coordinated development plan. Consequently, unitization must equitably divide costs and production, and plan to maximize physical and economic recovery from any reservoir. It must also treat the royalty owner fairly.

An equitable allocation of hydrocarbon shares among the WIOs discourages hasty or unnecessary surface development. Similarly, an equitable cost-sharing agreement promotes efficient development of reservoirs and common surface facilities and includes rational operating strategies. Such an agreement further allows the WIOs to decide well spacing requirements, scheduling, reinjection and reservoir management strategies, and the proper common, joint-use surface facilities. Unitization prevents economic and physical waste by eliminating redundant expenditures for a given level of production, and 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 WIOs. 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 leases and MWPA have signed the KRU Agreement, the KRU Operating Agreement, and the Greater Kuparuk Area Alignment Agreement and will share the existing KRU production capacity and the KRU infrastructure. Using this infrastructure and facilities eliminates the need to construct stand-alone facilities to process the volume of recoverable hydrocarbons from the unit expansion area and the MWPA.

Facility consolidation will save capital and promote better reservoir management through pressure maintenance and enhanced recovery procedures. In combination, these factors allow the Meltwater reservoirs within the KRU to be developed and produced in the interest of all parties.

Expanding the KRU and forming the MWPA to include the leases that contain productive Meltwater reservoirs and allowing these areas to access existing unit facilities and infrastructure prevents economic and physical waste.

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

The proposed expansion of the KRU and formation of the MWPA seeks to protect the economic interests of all working interest owners of the reservoirs in the expanded unit and MWPA, as well as the royalty owner. Combining interests and operating under the terms of the KRU Agreement, the KRU Operating Agreement, and the Greater Kuparuk Area Alignment Agreement provides each individual WIO an equitable allocation of costs and revenues commensurate with the value of their lease(s).

Because hydrocarbon recovery will be maximized and additional production-based revenue will be

derived from the MWPA production, the state's economic interest is promoted. Diligent development and exploration under a single, approved unit plan without the complications of competing leasehold interests are 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.

The four leases at issue in this Findings and Decision, ADLs 373111, 373112, 389058, and 389059, were issued on the new form lease contract. The lease form provides, in part, that the state's royalty share will be free and clear of all lease expenses, including, but not limited to expenses for separating, cleaning, dehydration, gathering, saltwater disposal, and preparing the oil, gas, or associated substances for transportation off the lease. Including the four leases in the KRU and forming the MWPA will not subject them to Appendix I of the KRU Agreement, which is the Settlement of Cleaning, Dehydration, and Transportation Charges Applicable To Royalty Oil Taken From The Kuparuk River Unit. This settled the issue of whether and to what extent the state's royalty share of DL-1 lease production is subject to the costs incurred by the lessees in cleaning, dehydrating, and transporting the Kuparuk oil. The State's royalty share of any production from the four leases will not be burdened with charges precluded by the lease agreements. Furthermore, operating under the terms and conditions of the leases and KRU Agreement, also provides for accurate reporting and record keeping, royalty settlement, in-kind taking, and emergency storage of oil, all of which will further the state's interest.

Finally, because no specific exploration or delineation activities were proposed for ADL 389059 and the southern half of ADL 389058, conditions were proposed and agreed to by the Meltwater Owners and the Division for including the expansion leases into the KRU and forming the MWPA. First, Phillips and the Division agreed that the lands within ADLs 389058 and 389059 that are not entitled, under 11 AAC 83.351, to be included in a participating area three (3) years after the effective date of this Findings and Decision would automatically contract from the KRU. Second, it was agreed that if only a portion of a lease were included in a PA within the three-year period, the rest of that lease would not be severed from the portion in a PA. However, the rest of the lease will no longer be part of the KRU. It 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.

These conditions ensure that the inclusion of the expansion lands in the unit and the formation of the MWPA promote the state's interest in the evaluation and development of those lands sooner rather than later.

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 KRU and the formation of the MWPA promote the conservation of all natural resources, promote the prevention of economic and physical waste, protect all parties of interest, and are necessary and advisable to protect the public interest. AS 38.05.180(p); 11 AAC 83.303.

2. The available well data and development plans justify the inclusion of the proposed lands

within the KRU. 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 to be included in the expanded KRU area:

T8N, R7E, U.M., Secs. 19-21, 28-33
(ADL 389058 (Tract 144))

T8N, R7E, U.M., Secs. 22-27, 34-36
(ADL 389059 (Tract 145))

3. The two expansion leases shall be included in the KRU for a period of three years and will not be subject to Appendix I of the KRU Agreement. The leases or portions of the leases, ADL 389058 and ADL 389059, not included in a participating area within three years of the effective date of this Findings and Decision will be automatically eliminated from the KRU. If conditions warrant the continuation of the leases within the KRU after the three years, Phillips may then apply to defer the automatic contraction of the lands from the KRU.

4. The unitized development and operation of the leases 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.

5. The KRU expansion 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.

6. The available geological and engineering data demonstrate that a paying quantities certification is appropriate for the lands proposed for the MWPA. The data also suggest 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 MWPA within the KRU.

7. The available geological and engineering data justify the inclusion of the proposed tracts within the MWPA. 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 to be included in the MWPA:

T8N, R7E, U.M., Sec. 5: SW/4; Sec. 6: SE/4; Sec. 7: E/2; Sec. 8: all; Sec. 9: S/2;
Secs. 16-18: all.
(ADL 373112 (Tract 142))

T8N, R7E, U.M., Secs. 19-21: all; Sec. 28: N/2; Sec 29: N/2; Sec. 30: N/2.
(ADL 389058 (Tract 144))

8. The formation of the MWPA adequately divides costs and allocates produced hydrocarbons, and sets forth a development plan designed to maximize physical and economic recovery from the Meltwater Reservoir within the approved MWPA.

9. Under 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 MWPA under the terms and conditions of Section III.A.4 of this Findings and Decision.

10. The production of MWPA hydrocarbon liquids may be commingled with other KRU 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 under the surface.

11. The proposed well test allocation methodology, as conditioned in Section III.A.4, is acceptable for royalty allocation purposes and for allocating the commingled gas and hydrocarbon liquids production among the participating areas within the KRU.

Phillips, as KRU Operator, shall provide the Division with the monthly production allocation reports and well test data for the MWPA wells by the 20th of the month following production. The Division reserves the right to request any information it deems pertinent to the review of those reports from Phillips. Moreover, the approval of the allocation methodology is conditioned upon the operator's agreement to promptly and fully reply to any such requests. The monthly allocation report shall include a summary of monthly allocation by well, and specific well test data for all tests that have been conducted.

12. The Division reserves the right to review the well test allocations to ensure compliance with the methodology prescribed in this Decision. This review may include, but is not limited to, inspection of facilities, equipment, and well test data.

13. During the first year in which commingled production from the MWPA is allocated, semi-annual reviews of the allocation methodology will be scheduled with the Division. Following its review, the Division, in its discretion, may require revision of the allocation procedure. Either the Division or the operator may request subsequent reviews. The allocation procedure may only be revised with the written consent of, or upon the written direction of, the Division.

14. To account for the gas produced from each PA within the KRU and the gas volume disposition and gas reserves debited from or credited to each PA using the shared KRU facilities, Phillips shall submit a monthly gas disposition and reserves debit report. The report shall be submitted with the monthly production allocation reports.

15. Diligent exploration and delineation of the Meltwater Reservoir underlying the approved PA is to be conducted by the Unit Operator under the MWPA plan of development and operation approved by the state. Before undertaking any specific surface 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 mitigation measures will minimize adverse environmental impacts.

16. The MWPA Plan of Development meets the requirements of 11 AAC 83.303 and 11 AAC 83.343. The plan is approved until September 30, 2002 to synchronize the MWPA Plan of Development with the one-year approval cycle for the Plans of Development for the Kuparuk, Tabasco, Tarn, and West Sak Participating Areas. A revised MWPA Plan of Development that describes the status of projects undertaken, drilling results, and the work completed, any changes or expected changes to the plan, and a further plan of development, must be submitted in accordance with 11 AAC 83.343.

17. The plan of exploration for ADL 373111 and ADL 373112, subject to the terms and conditions of the Sixth KRU Expansion Decision, meets the requirements of 11 AAC 83.303 and 11 AAC 83.341. In addition, the exploration activities for the two KRU expansion leases, ADL 389058 and ADL 389059, subject to the conditions of Section III.B.3, also meet the requirements of 11 AAC 83.303 and 11 AAC 83.341. Further plans of exploration that describe the status of projects undertaken and the work completed, and any changes or expected changes to the plan, must be submitted in accordance with 11 AAC 83.341.

18. Approval of the Seventh Expansion of the KRU, formation of the MWPA, and the MWPA tract allocation schedule are effective June 1, 2001.

A person adversely affected by this Decision may appeal this Decision, in accordance with 11 AAC 02, to Pat Pourchot, Commissioner, Department of Natural Resources, 550 W. 7th Avenue, Suite 1400, Anchorage, Alaska 99501-3561. Any appeal must be received at the above address, or by fax to 1-907-269-8918, within 30 calendar days after the date of "delivery" of this Decision, as defined in 11 AAC 02.040. A copy of 11 AAC 02 may be obtained from any regional information office of the Department of Natural Resources.

Appeal Code: OGO082901KRUSEVENTHEXP

Original signed by Mark D. Myers 8-29-01

Mark D. Myers, Director
Division of Oil and Gas

Date

Attachments: 1) Seventh KRU expansion area leases
2) MWPA leases and tract allocation schedule
3) Map of the proposed Seventh KRU expansion area and MWPA
4) Mitigation Measures for Sale 87, North Slope Areawide

KRU7exp_MWPA_Appv.doc

Attachment 1

Kuparuk Unit Expansion Area Tracts
(Seventh Expansion)

Revised 6/6/01

									Agreed Working Interests (Subject to Final ADN)				
Tr. No.	Lease No.	Exp. Date	Legal Description	Lease Acres	Lessor Royalty	Alaska Net Profit Share	Unit	Initial PA?		Phillips Alaska	BPX	UNOCAL	M
144	ADL389058	10/31/05	T08N, R07E, UM: Sec. 19: All; Sec. 20: All; Sec. 21: All; Sec. 28: All; Sec. 29: All; Sec. 30: All; Sec. 31: All; Sec. 32: All; Sec. 33: All.	5,607	12.50%	0.0%	Expansion	Partial	Leasehold	55.507047%	39.433753%	4.950600%	0.00
									Costs	56.085920%	39.845000%	3.960480%	0.00
145	ADL389059	10/31/05	T08N, R07E, UM: Sec. 22: All; Sec. 23: All; Sec. 24: All; Sec. 25: All; Sec. 26: All; Sec. 27: All; Sec. 34: All; Sec. 35: All; Sec. 36: All.	5,760	12.50%	0.0%	Expansion	No	Leasehold	55.507047%	39.433753%	4.950600%	0.00
									Costs	56.085920%	39.845000%	3.960480%	0.00

Total

11,367

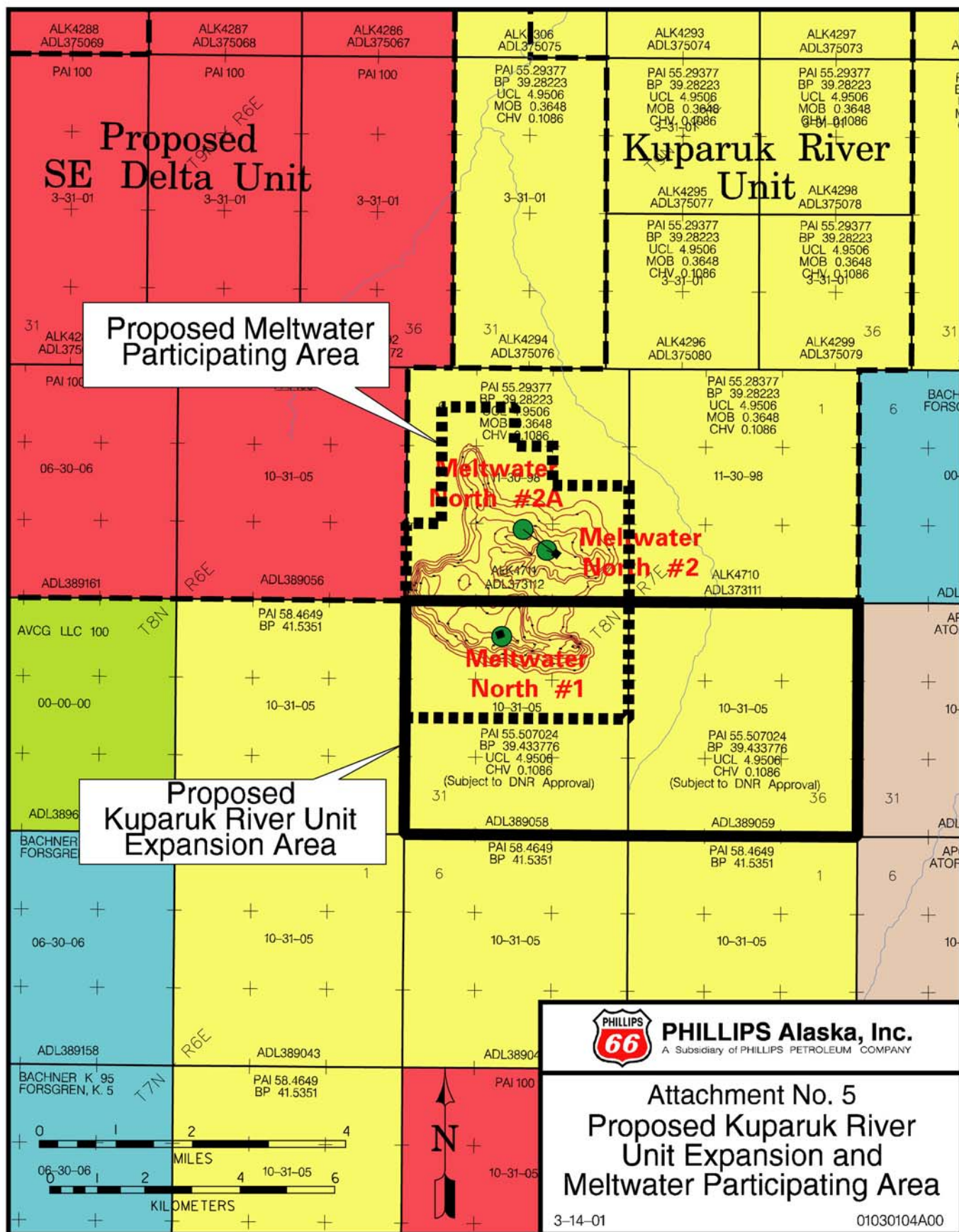
Attachment 2

Meltwater Participating Area Leases and Tract Participation Decimals

Revised 6/6/01									Agreed Working Interests (Subject to Final /				
Tr. No.	Lease No.	Exp. Date	Participating Area Legal Description	PA Acres	Lessor Royalty	Alaska Net Profit Share	Estimated Bermuda Net Sand (Acre-Ft)	Tract Participation*		Phillips Alaska	BPX	UNOCAL	
142	ADL373112	11/30/98	T08N, R07E, UM:Sec. 5: SW 1/4; Sec. 6: SE 1/4; Sec. 7: E 1/2; Sec. 8: All; Sec. 9: S 1/2; Sec. 16: All; Sec. 17: All; Sec. 18: All.	3,419	12.50%	0.0%	103866	59.3958%	Leasehold	55.293767%	39.282233%	4.950600%	
									Costs	55.872640%	39.693480%	3.960480%	
144	ADL389058	10/31/05	T08N, R07E, UM: Sec. 19: All; Sec. 20: All; Sec. 21: All; Sec. 28: N 1/2; Sec. 29: N 1/2; Sec. 30: N 1/2;	2,800	12.50%	0.0%	71005	40.6042%	Leasehold	55.507047%	39.433753%	4.950600%	
									Costs	56.085920%	39.845000%	3.960480%	
Total				6,219			174871						

Note 1- Tract Participation Decimals based upon estimated Net Sand derived from the Bermuda net pay map (Attachment 14)

Note 2 - Area in PA derived from information in lease documents on acreage in each governmental section.



Mitigation Measures for Sale 87, North Slope Areawide

AS 38.05.035(e) and the departmental delegation of authority provide the director, Division of Oil and Gas (DO&G), with the authority to impose conditions or limitations, in addition to those imposed by statute, to ensure that a resource disposal is in the state's best interests. Consequently, to mitigate the potential adverse social and environmental effects of specific selected lease related activities, DO&G has developed mitigation measures and will condition post-sale plans of operation, exploration, or development, and other permits based on these mitigation measures.

Under AS 38.05.035(e), DNR has authority to apply the following mitigation measures for Oil and Gas Lease Sale 87, North Slope Areawide, to all oil and gas activities performed to access the state's leased mineral interest, regardless of the ownership status of the land from which the lessee seeks access.

Lessees must obtain approval of a detailed plan of operations from the Director before conducting exploratory or development activities (11 AAC 83.158). An approved plan of operations is the authorization by which DO&G regulates exploration, development, and production activities.

A plan of operations must identify the specific measures, design criteria, and construction methods and standards to be employed to comply with the restrictions listed below. It must also address any potential geohazards that may exist at the site. Plans of operation must comply with coastal zone consistency review standards and procedures established under 6 AAC 50 and 80 including coastal district plans. Applications for required state or federal agency authorizations or permits must be submitted with the plan of operations. DO&G will require, as a condition of consistency approval, such modification or mitigation measures as may be necessary to ensure consistency with the ACMP standards.

These measures were developed after considering stipulations and terms imposed in other North Slope oil and gas lease sales; fish and wildlife resource and harvest data submitted by ADF&G; and environmental data relating to air and water quality, solid and liquid waste disposal, and oil spills submitted by ADEC. Measures were also developed or modified after considering comments submitted by the public, industry, federal and state agencies, and local government. Additional project-specific mitigation measures will be imposed if and when oil and gas lessees submit plans of exploration, operation, or development.

In addition to compliance with these mitigation measures, lessees must comply with all applicable local, state and federal codes, statutes and regulations, and any subsequent amendments. Federal, state and local government powers to regulate the oil and gas industry are discussed in the "Governmental Powers to Regulate Oil and Gas Exploration, Development, Production, and Transportation" in Chapter One of this finding. Additionally, some applicable federal and state statutes and regulations are presented in Appendix B.

Information to lessees relevant to Sale 87 is also presented in the "Lessee Advisories," section C of this Chapter. This section contains important information to lessees and operators regarding the Sale 87 area. It also includes precautions which may apply to post-lease sale activities, and reflect existing local, state, and federal law or policy at the time of the sale.

The following abbreviations are used in these mitigation measures: Alaska Coastal Management Program (ACMP), Alaska Department of Environmental Conservation (ADEC), Alaska Department of Fish and Game (ADF&G), Alaska Department of Natural Resources (ADNR), Division of Land (DL), Division of Governmental Coordination (DGC), Division of Mining and Water Management (DMWM), Director, Division of Oil and Gas (Director), Division of Parks and Outdoor Recreation (DPOR), National Pollutant Discharge Elimination System (NPDES), North Slope Borough (NSB), North Slope Borough Municipal Code (NSBMC), North Slope Borough Coastal Management Plan (NSBCMP), State Historic Preservation Officer (SHPO), Spill Prevention Control and Countermeasure (SPCC), and the U.S. Fish and Wildlife Service (USF&WS).

Except as indicated, the restrictions listed below do not apply to geophysical exploration on state lands; geophysical exploration activities are governed by 11 AAC 96. See lessee advisory four, Section C of this Chapter.

The following mitigation measures and advisories will be imposed on oil and gas activities in or on all Sale 87 leased lands and waterbodies as a condition of the approval of plans of operation:

1. General Measures

1. a. Explosives must not be detonated within, beneath, or in close proximity to fishbearing waters if the detonation of the explosive produces a pressure rise in the waterbody greater than 2.5 pounds per square inch (psi) unless the waterbody, including its substrate, is solidly frozen. Explosives must not produce a peak particle velocity greater than

0.5 inches per second (ips) in a spawning bed during the early stages of egg incubation. The minimum acceptable offset from fishbearing streams and lakes for various size buried charges is:

1 pound charge	37 feet
2 pound charge	52 feet
5 pound charge	82 feet
10 pound charge	116 feet
25 pound charge	184 feet)
100 pound charge	368 feet

Specific information on the location of fishbearing waterbodies may be obtained by contacting ADF&G.

- b. The lessee will consult with the NSB prior to proposing the use of explosives for seismic surveys. The director may approve the use of explosives for seismic surveys after consultation with the NSB.
2. Except for approved off-road travel, exploration activities must be supported only by ice roads, winter trails, existing road systems or air service. Wintertime off-road travel across tundra and wetlands may be approved in areas where snow and frost depth are sufficient to protect the ground surface. Summertime off-road travel across tundra and wetlands may be authorized subject to time periods and vehicle types approved by DL. Exceptions may be granted by the director, DL, and the Director, if an emergency condition exists or if it is determined, after consulting ADF&G, that travel can be accomplished without damaging vegetation or the ground surface.
3.
 - a. Removal of water from fishbearing rivers, streams, and natural lakes shall be subject to prior written approval by DMWM and ADF&G.
 - b. Removal of snow cover from fishbearing rivers, streams, and natural lakes shall be subject to prior written approval by ADF&G. Compaction of snow cover overlying fishbearing waterbodies will be prohibited except for approved crossings. If ice thickness is not sufficient to facilitate a crossing, ice and/or snow bridges may be required.
4. Water intake pipes used to remove water from fishbearing waterbodies must be surrounded by a screened enclosure to prevent fish entrainment and impingement. Screen mesh size shall not exceed 0.04 inches unless another size has been approved by ADF&G. The maximum water velocity at the surface of the screen enclosure may be no greater than 0.1 foot per second.

2. Facilities and Structures

5. Lessees must minimize the impact of industrial development on key wetlands. Key wetlands are those wetlands that are important to fish, waterfowl, and shorebirds because of their high value or scarcity in the region. Lessees must identify on a map or aerial photograph the largest surface area, including future expansion areas, within which a facility is to be sited or an activity is to occur. The map or photograph must accompany the plan of operations. DO&G will consult with ADF&G to identify the least sensitive areas within the area of interest. To minimize impacts, the lessee must avoid siting facilities in the identified sensitive habitat areas, unless no feasible and prudent alternative exists.
6. Exploration facilities, with the exception of artificial gravel islands, must be temporary and must be constructed of ice unless the Director determines that no feasible and prudent alternative exists. Re-use of abandoned gravel structures may be permitted on a case-by-case basis by the Director, after consultation with the director, DL, and ADF&G. Approval for use of abandoned structures will depend on the extent and method of restoration needed to return these structures to a usable condition.
7.
 - a. Pipelines must be located so as to facilitate the containment and cleanup of spilled hydrocarbons. Where feasible and prudent, onshore pipelines must be located on the upslope side of roadways and construction pads unless the director, DL, determines that an alternative site is environmentally acceptable. Wherever possible, onshore pipelines must utilize existing transportation corridors and be buried where soil and geophysical conditions permit.
 - b. All pipelines, including flow and gathering lines, must be designed and constructed to provide adequate protection from water currents, storm and ice scouring, subfreezing conditions, and other hazards as determined on a case-by-case basis.
8. Pipelines shall be designed and constructed to avoid significant alteration of caribou and other large ungulate movement and migration patterns. At a minimum, above ground pipelines shall be elevated five feet, as measured from the ground to the bottom of the pipe, except where the pipeline intersects a road, pad, or a ramp installed to facilitate wildlife passage. ADNR may, after consultation with ADF&G, require additional measures to mitigate impacts to wildlife movement and migration.

3. Gravel mining and use

9. Gravel mining sites required for exploration and development activities will be restricted to the minimum necessary to develop the field efficiently and with minimal environmental damage. Where feasible and prudent, gravel sites must be designed and constructed to function as water reservoirs for future use. Gravel mine sites required for exploration activities must not be located within an active floodplain of a watercourse unless the director, DL, after consultation with ADF&G, determines that there is no feasible and prudent alternative, or that a floodplain site would enhance fish and wildlife habitat after mining operations are completed and the site is closed. Mine site development and rehabilitation within floodplains must follow the procedures outlined in McLean, R. F. 1993, *North Slope Gravel Pit Performance Guidelines*, ADF&G Habitat and Restoration Division Technical Report 93-9.
10. (a) The state of Alaska discourages the use of continuous-fill causeways. Environmentally preferred alternatives for field development include use of buried pipelines, onshore directional drilling, or elevated structures. Approved causeways must be designed, sited, and constructed to prevent significant changes to nearshore oceanographic circulation patterns and water quality characteristics (e.g., salinity, temperature, suspended sediments) that result in exceedances of water quality criteria, and must maintain free passage of marine and anadromous fish.
- (b) Causeways and docks shall not be located in river mouths or deltas. Artificial gravel islands and bottom founded structures shall not be located in river mouths or active stream channels on river deltas, except as provided for in (c).
- (c) Each proposed structure will be reviewed on a case-by-case basis. Causeways, docks, artificial gravel islands and bottom founded structures may be permitted if the Director, in consultation with ADF&G, ADEC, and the NSB determines that a causeway or other structures are necessary for field development and that no feasible and prudent alternatives exist. A monitoring program may be required to address the objectives of water quality and free passage of fish, and mitigation shall be required where significant deviation from objectives occurs.

4. Prehistoric, Historic, and Archeological Sites

11. Prior to any ground disturbing activity resulting from exploration, development or production activities, the lessee must conduct an inventory of prehistoric, historic and archeological sites within the area affected by activity. The inventory must include consideration of literature provided by the NSB and local residents, documentation of oral history regarding historic and prehistoric uses of such sites, evidence of consultation with the Alaska Heritage Resources Survey and the National Register of Historic Places, and site surveys.

The inventory must also include a detailed analysis of the potential effects that might result from the activity. The inventory must be submitted to the Director for distribution to DPOR and the NSB for review and comment. In the event that an archeological, prehistoric or historical site or area may be adversely affected by an activity, the Director, after consulting DPOR, and the NSB, will direct the lessee as to what course of action will be necessary to avoid or minimize the adverse effect.

Discovery of prehistoric, historic, or archaeological objects: In the event any site, structure, or object of prehistoric, historic, or archaeological significance is discovered during leasehold operations, the lessee must immediately report such findings to the Director and the lessee must make every reasonable effort to preserve and protect such site, structure, or object from damage until the Director, after consulting the SHPO, has given directions as to its preservation.

5. Training

12. The lessee must include in any plan of exploration or plan of development a training program for all personnel, including contractors and subcontractors, involved in any activity. The program must be designed to inform each person working on the project of environmental, social, and cultural concerns which relate to the individual's job.

The program must employ effective methods to ensure that personnel understand and use techniques necessary to preserve geological, archeological and biological resources. In addition, the program must also be designed to help personnel increase their sensitivity and understanding of community values, customs, and lifestyles in areas where they will be operating. The program must include an explanation of the applicable laws protecting cultural and historic resources. The program shall address the importance of not disturbing archeological, cultural and historic resources and provide guidance on how to avoid disturbance.

6. Local Hire

13. To the extent they are available and qualified, the lessee is encouraged to employ local and Alaska residents and contractors for work performed on the leased area. Lessees shall submit, as part of the plan of operations, a proposal detailing the means by which the lessee will comply with the measure. The proposal must include a description of the operator's plans for partnering with local communities to recruit and hire local and Alaska residents and contractors. The

lessee is encouraged, in formulating this proposal, to coordinate with employment services offered by the state of Alaska and local communities and to recruit employees from local communities.

7. Subsistence Harvest Protection

14. a. Exploration, development or production operations shall be conducted in a manner that prevents unreasonable conflicts between lease related activities and subsistence activities. In enforcing this mitigation measure the division, during review of plans of operation, will work with other agencies and the public to assure that potential conflicts are identified and avoided to the fullest extent possible. Available options include alternative site selection, requiring directional drilling, seismic and threshold depth restrictions, subsea completion techniques, seasonal drilling restrictions, and the use of other technologies deemed appropriate by the Director.
 - b. Prior to submitting a plan of operations for both onshore and offshore activities which have the potential to disrupt subsistence activities, the lessee shall consult with the potentially affected subsistence communities and the North Slope Borough (NSB) (collectively "parties") to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures which could be implemented by the operator to prevent unreasonable conflicts. The parties shall also discuss the reasonably foreseeable effect on subsistence activities of any other operations in the area that they know will occur during the lessee's proposed operations. Through this consultation, the lessee shall make reasonable efforts to assure that exploration, development, and production activities are compatible with subsistence hunting and fishing activities and will not result in unreasonable interference with subsistence harvests.
 - c. A discussion of resolutions reached or not reached during the consultation process and plans for continued consultation shall be included in the plan of operations. The lessee shall identify who participated in the consultation and send copies of the plan to participating communities and the NSB when it is submitted to the division.
 - d. If the parties cannot agree, then any of them may request the Commissioner of DNR or his designee to assemble the parties. The commissioner may assemble the parties or take other measures to resolve conflicts among the parties.
 - e. The lessee shall notify the director of all concerns expressed by subsistence hunters during operations and of steps taken to address such concerns.
 - f. Lease-related use will be restricted when the Director determines it is necessary to prevent unreasonable conflicts with subsistence harvests.
15. No restriction of public access to, or use of, the lease area will be permitted as a consequence of oil and gas activities except in the immediate vicinity of drill sites, buildings and other related facilities. Areas of restricted access must be identified and a rationale justifying the area restriction must be included in the plan of operations.

8. Title 16 Streams

16. Under Title 16 of the Alaska statutes, the measures listed below will be imposed by ADF&G below the ordinary high water mark in designated anadromous streams and fishbearing streams for activities that could block fish passage. Exceptions to these requirements, including exceptions for the use of spill containment and recovery equipment, may be allowed on a case-by-case basis. Specific information on the location of anadromous waterbodies in and near the area may be obtained from ADF&G.
- a. Alteration of river banks, except for approved permanent crossings, will be prohibited.
- b. Except for approved stream crossings, equipment must not be operated within willow stands (*Salix* spp.).
- c. The operation of equipment, excluding boats, in open water areas of rivers and streams will be prohibited.
- d. Bridges are the preferred watercourse crossings in fish spawning and important rearing habitats. In areas where culverts are used, they must be designed, installed, and maintained to provide efficient passage of fish.

9. Waste Disposal

17. Solid Waste Disposal

- a. Garbage and domestic combustible refuse must be incinerated. Nonburnables must be disposed of at an approved upland site.

- b. The preferred method for disposal of muds and cuttings from oil and gas activities is by underground injection. Injection of non-hazardous oil field wastes generated during development is regulated by AOGCC through its Underground Injection Control (UIC) Program for oil and gas wells. Annular disposal of muds and cuttings associated with drilling an exploratory well is permitted by ADEC. Surface discharge of drilling muds and cuttings into lakes, streams, rivers, and high value wetlands is prohibited. Surface discharge of drilling muds and cuttings into reserve pits shall be allowed only when the Director, in consultation with ADEC, determines that alternative disposal methods are not feasible and prudent. If use of a reserve pit is proposed, the operator must demonstrate the advantages of a reserve pit over other disposal methods, and describe methods to be employed to reduce the disposed volume. Onpad temporary cuttings storage will be allowed as necessary to facilitate annular injection and/or backhaul operations.
- c. Proper disposal of garbage and putrescible waste is essential to minimize attraction to wildlife. The lessee must use the most appropriate and efficient method to achieve this goal. The primary method of garbage and putrescible waste disposal is prompt, on-site incineration in compliance with state of Alaska air quality regulations in 18 AAC 50. The secondary method of disposal is on-site frozen storage in animal-proof containers with backhaul to an approved waste disposal facility. The tertiary method of disposal is on-site non-frozen storage in animal proof containers with backhaul to an approved waste disposal facility. Daily backhauling of non-frozen waste only must be achieved unless safety considerations prevent this.

18. Wastewater disposal:

- a. Unless authorized by NPDES or state permit, disposal of wastewater into freshwater bodies, including Class III, IV, VI, and VIII wetlands, is prohibited.
- b. Surface discharge of reserve pit fluids will be prohibited unless authorized by ADEC permit and approved by DL.
- c. Disposal of produced waters in upland areas, including wetlands, will be by subsurface disposal techniques. ADEC may permit alternate disposal methods if the lessee demonstrates that subsurface disposal is not feasible or prudent.
- d. Discharge of produced waters into open or ice-covered marine waters of less than 10 meters (33 feet) in depth is prohibited. The commissioner, ADEC may approve discharges into waters greater than 10 meters in depth based on a case-by-case review of environmental factors and consistency with the conditions of a state certified development and production phase NPDES permit issued for the sale area.

10. Specific Measures

19. Birds: Permanent, staffed facilities must be sited to the extent feasible and prudent outside identified brant, white-fronted goose, snow goose, tundra swan, king eider, common eider, Steller's eider, spectacled eider, and yellow-billed loon nesting and brood rearing areas.

20. Bears:

- a. Exploration and production activities must not be conducted within one-half mile of occupied grizzly bear dens, unless alternative mitigative measures are approved by ADF&G. Known den sites shall be obtained from the Division of Wildlife Conservation, ADF&G, phone 459-7213, prior to commencement of any activities. Occupied dens encountered in the field must be reported to the above, and subsequently avoided by one-half mile.
- b. Operations must avoid known polar bear dens by one mile. Known den locations shall be obtained from the US Fish & Wildlife Service (907-786-3800) prior to starting operations. New dens encountered in the field must be reported to the above, and subsequently avoided by one mile. If a polar bear should den within an existing development, off-site activities shall be restricted to minimize disturbance.
- c. For projects in close proximity to areas frequented by bears, lessees will be encouraged to prepare and implement bear interaction plans to minimize conflicts between bears and humans. These plans could include measures to (a) minimize attraction of bears to the drillsites; (b) organize layout of buildings and work areas to minimize human/bear interactions; (c) warn personnel of bears near or on drillsites and the proper procedures to take; (d) if authorized, deter bears from the drillsite; (e) provide contingencies in the event bears do not leave the site or cannot be deterred by authorized personnel; (f) discuss proper storage and disposal of materials that may be toxic to bears; and (g) provide a systematic record of bears on the site and in the immediate area. The ADF&G has offered to assist lessees in developing educational programs and camp layout and management plans as lessees prepare their lease operations plans.

21. Waterbody Buffers:

- a. To the extent feasible and prudent, onshore facilities other docks, or road and pipeline crossings, will not be sited within 500 feet of fishbearing streams. Additionally, to the extent feasible and prudent, facilities will not be sited within one-half mile of the banks of the main channel of the Colville, Canning and Sagavanirktok, Kavik, Shaviovik, Kadleroshilik, Echooka, Ivishak, Kuparuk, Toolik, Anaktuvuk and Chandler Rivers. Facilities will not be sited within 500 feet of all other fishbearing waterbodies. Essential facility siting will be allowed in buffer areas in those instances where no other suitable sites are available. Facilities will not be sited within buffers unless the Director, after consulting ADF&G, determines that such facility restrictions are not feasible or prudent. Road and pipeline crossings must be aligned perpendicular or near perpendicular to watercourses.
- b. No facilities will be sited within one-half mile of identified Dolly Varden both overwintering/spawning areas on the Kavik, Canning and Shaviovik Rivers. Road and pipeline crossings will not be sited within these buffers unless the Director, after consulting ADF&G, determines that such facility restrictions are not feasible or prudent. Exception – ADF&G.

Lessee Advisories

1. Local Ordinance

Lessees are advised that the NSB Assembly has adopted a comprehensive plan and land management regulations under Title 29 of the Alaska Statutes (AS 29.40.020-040). The NSB regulations require borough approval for all proposed uses, development and master plans. The NSBCMP policies are included as part of the NSB zoning regulations (19.70.060) and all NSB permit approvals will require the proposal to be substantially consistent with these policies. The NSB likely will aggressively assert its land management powers to the fullest extent permissible under law to address any outstanding concerns regarding impacts to the area's fish and wildlife species and to habitat and subsistence activities.

Restricting access to and use of fish camps and other subsistence use areas defined in the NSB Traditional Land Use Inventory, may violate NSBCMP and NSBMC subsistence harvest protection and land use regulations. Lessees are advised to consult with the NSB Planning Department and local communities during planning of operations.

To comply with NSB Policy regarding the mining of beaches, barrier islands, or offshore shoals, in those circumstances where no feasible and prudent alternatives exist, substantial alteration of shoreline dynamics is prohibited.

2. Community Participation in Operations Planning

Lessees are encouraged to bring one or more residents of communities in the area of operations into their planning process. Local communities have a unique understanding of their environment and community activities. Involving local community residents in the earliest stages of the planning process for oil and gas activities can be beneficial to the industry and to the community. Community representation on management teams developing plans of operation, oil spill contingency plans, and other permit applications can help communities understand permitting obligations and help industry to understand community values and expectations for oil and gas operations being conducted in and around their area.

3. Wetlands Identification

The wetlands referred to in Mitigation Measures 5, and 19 are based on a classification system developed by Bergman et al (USF&WS Resource Publication 129, 1977 Waterbirds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska). Lessees are advised that the state may adopt or approve the use of an alternative wetlands classification system in the future, however, the protective nature of the wetlands mitigation measures developed for this and other oil and gas lease sales will remain consistent regardless of the wetlands classification ultimately selected.

4. Geophysical Activity

Except as indicated, the mitigation measures listed above do not apply to geophysical exploration on state lands; geophysical exploration activities are governed by 11 AAC 96. In conducting offshore geophysical surveys, neither the lessees or their agents will use explosives in open water areas.

Lessees may or may not propose operations which include seismic surveys in the Sale 87 lease area, and may not therefore have any control over those activities. However, if they are post-lease seismic surveys conducted by or contracted by the lessee, they may be considered lease-related activities. Consequently, restrictions on geophysical exploration permits, whether lease related or not, will depend on the size, scope, duration, and intensity of the project. They will also depend on the extent of effects on important species, specifically marine mammals.

Copies of the non-proprietary portions of all Geophysical Exploration permit applications will be made available to the NSB, AEWC, and potentially affected subsistence communities for comment.

5. Bird, Fish, and Marine Mammal Protection

- a. Lessees shall comply with the Recommended Protection Measures for Spectacled Eiders developed by the USF&WS to ensure adequate protection of spectacled eiders during the nesting and brood rearing periods. Lessees shall comply with the Recommended Protection Measures for Steller's eider once they are developed by the USFWS.
- b. Peregrine falcon nesting sites are known to occur in the Sale 87 area. Lessees are advised that disturbing a peregrine falcon nest violates federal law. Lessees are required to comply with the federal resource recovery plan for the arctic peregrine falcon.
- c. To minimize impacts on Dolly Varden (arctic char) overwintering areas, permanent, staffed facilities must be sited to the extent feasible and prudent outside identified Dolly Varden (arctic char) overwintering areas.
- d. Lessees are advised that they must comply with the provisions of the Marine Mammal Protection Act of 1972 as amended.

6. Aircraft Restrictions

In order to protect species that are sensitive to noise or movement, horizontal and vertical buffers will be required, consistent with aircraft, vehicle and vessel operations regulated by NSB Code § 19.70.050(I)(1) which codifies NSBCMP policy 2.4.4.(a). Lessees are encouraged to apply the following provisions governing aircraft operations in and near the sale area:

- a. From June 1 to August 31, aircraft overflights must avoid identified brant, white-fronted goose, tundra swan, king eider, common eider, and yellow-billed loon nesting and brood rearing habitat, and from August 15 to September 15, the fall staging areas for geese, tundra swans, and shorebirds, by an altitude of 1,500 feet, or a lateral distance of one mile.
- b. To the extent feasible and prudent, all aircraft should maintain an altitude of greater than 1,500 feet or a lateral distance of one mile, excluding takeoffs and landings, from caribou and muskoxen concentrations. A concentration means numbers of animals in excess of the general density of those animals found in the area.
- c. Human safety will take precedence over flight restrictions.

7. Oil Discharge Prevention and Contingency Plans (C-Plans)

Oil and hazardous substance pollution control: In addition to addressing the prevention, detection, and cleanup of releases of oil, contingency plans (C-Plans) for oil and gas extraction operations should include, but not be limited to;

- a. methods for detecting, responding to, and controlling blowouts;
- b. the location and identification of oil spill cleanup equipment;
- c. the location and availability of suitable alternative drilling equipment;
- d. a plan of operations to mobilize and drill a relief well;

- 8. a. To conform with ADEC requirements, impermeable lining and diking, or equivalent measures such as double-walled tanks, will be required for onshore oil storage facilities (with a total above ground storage capacity greater than 1,320 gallons, provided no single tank capacity exceeds 660 gal) and for sewage ponds. Additional site-specific measures may be required as determined by ADNOR, with the concurrence of ADEC, and will be addressed in the existing review of project permits or Oil Discharge Prevention and Contingency Plans (C-Plans).
- b. Buffer zones of not less than 500 feet will be required to separate onshore oil storage facilities (with a capacity greater than 660 gallons) and sewage ponds from freshwater supplies, streams, and lakes and key wetlands unless the Director after consultation with ADEC, determines that such a requirement is not feasible or prudent. Reserve pits, if used must be impermeable and otherwise fully contained through diking or other means. Exception – ADEC.

9. Sensitive Areas

Lessees are advised that certain areas are especially valuable for their concentrations of marine birds, marine mammals, fishes, or other biological resources; cultural resources; and for their importance to subsistence harvest activities. The following areas must be considered when developing plans of operation. Identified areas and time periods of special biological and cultural sensitivity include:

- a. the Canning River Delta, January-December;
- b. the Colville River Delta, January-December;
- c. the Sagavanirktok River delta, January-December.

10. Lessees are encouraged in planning and design activities to consider the recommendations for oil field design and operations contained in the final report to the Alaska Caribou Steering Committee: Cronin, M. et al, 1994. "Mitigation of the Effects of Oil Field Development and Transportation Corridors on Caribou." LGL Alaska Research Associates, Inc., July.

11. Access

No lease facilities or operations may be located so as to block access to, or along, navigable and public waters as defined by AS 38.05.965(13) and (17).

12. Hydrocarbon Emissions

- a. Because of the state's interest in encouraging clean air, lessees are encouraged to adopt conservation measures to reduce hydrocarbon emissions.
- b. The state recognizes that in the long run sources of energy other than oil and gas will be needed. Lessee participation in conducting research on alternative energy sources is appreciated.