KUPARUK RIVER UNIT

APPLICATION FOR THE
FORMATION OF THE WEST SAK
PARTICIPATING AREA

DECISION AND FINDINGS OF THE COMMISSIONER
ALASKA DEPARTMENT OF NATURAL RESOURCES

DECEMBER 18, 1997

KUPARUK RIVER UNIT

FORMATION OF THE WEST SAK
PARTICIPATING AREA

I. INTRODUCTION AND BACKGROUND

This matter concerns the formation of the West Sak Participating Area (WSPA) to be located within the current boundary of the Kuparuk River Unit (KRU) and what lands should be included in the proposed WSPA. ARCO Alaska, Inc. (ARCO) for itself and on behalf of BP Exploration (Alaska), Inc. (BPX) applied to form the WSPA within the existing boundaries of the KRU. ARCO and BPX ("the Applicants") are the only working interest owners in the proposed WSPA. The acreage proposed for inclusion in the WSPA overlies an oil reservoir known as the "West Sak Reservoir".

An oil and gas "unit" is a group of leases which cover all or part of one or more potential or known reservoirs and which are subject to a "unit agreement." The "unit agreement" is the instrument which is typically executed by those with an interest in the leases, including the royalty owner. The unit agreement specifies how unit operations will be conducted, and how costs and benefits will be allocated among the various leases. A second agreement called a "unit operating agreement" controls the relationship between the parties that share the costs of unit development. Unitization allows a potential or known reservoir to be more efficiently explored, developed, and produced.

A "participating area" (PA) is that part of the unit area which can produce oil or gas in "paying quantities." A PA may contain less, but not more, area than the unit. If the unit contains more than one reservoir, a separate PA must generally be established for each delineated reservoir. Separate PAs may be established to distinguish between the oil rim and the gas cap if a reservoir contains both oil and gas.

The boundaries of PAs can be revised as more wells are drilled and more data is obtained. The regulations governing unitization allow the expansion and contraction of a PA. Only parties who own interests within the PA will share in the costs of production and revenues from the sale of the oil or gas from the PA.

The Division approves the application to form the WSPA. The WSPA should be limited to the area proposed by the Applicants because only that area has been shown to be "reasonably known to be underlain by hydrocarbons and known or reasonably estimated...to be capable of producing or contributing to production of hydrocarbons in paying quantities." 11 AAC 83.351(a) (emphasis

added).[1] If additional data is later obtained and submitted, the boundaries of the WSPA may be revised. The effective date of the WSPA is December 1, 1997.

The Tract Allocation Schedule for the WSPA shown in Attachment 1 of this Decision and Findings is also approved effective December 1, 1997. The phased development approach proposed in the WSPA development plan allows PA development to adapt and expand as the understanding of the overall project improves. The tract allocation schedule "equitably allocates production and costs among the leases" during the initial development phase. 11 AAC 83.371(a).

II. APPLICATION FOR THE FORMATION OF THE WEST SAK PARTICIPATING AREA

ARCO submitted an application dated September 2, 1997 under 11 AAC 83.351 and Section 6.3 of the KRU Agreement. ARCO submitted supplemental materials to support its application on September 23, October 2, November 14, and November 20, 1997. The WSPA application included: a proposed plan of development and operations; a map and legal description of the leases proposed for the WSPA; geological data supporting the proposed WSPA; a proposed methodology for allocating production from the two producing reservoirs that will share the Kuparuk infrastructure and facilities; proposed methods for reporting the allocated production and gas reserve/gas debits from each PA sharing the Kuparuk facilities; a copy of the West Sak Special Provisions to the KRU Operating Agreement; and the initial tract allocation schedule for the WSPA. ARCO requested that the Division approve the WSPA effective December 1, 1997.

The acreage proposed for the WSPA is within the West Sak Reservoir (West Sak sands) and is believed to be commercially viable by the Applicants. The proposed area is capable of producing or contributing to the production of hydrocarbons in paying quantities and is included in the WSPA plan of development. The West Sak Reservoir is described on Attachments 4, 5 and 6 of ARCO's application. The leases proposed for inclusion in the WSPA are referenced in Attachments 2 and 3 of the application. The leases, which are already included within the Kuparuk Participating Area (KPA) of the KRU, reserve a 12.5% royalty share to the state. The state's royalty share is subject to Appendix I of the KRU Agreement, Settlement of Cleaning, Dehydration, and Transportation Charges Applicable to Royalty Oil Taken from the Kuparuk River Unit.

III. DISCUSSION OF THE PARTICIPATING AREA DECISION CRITERIA

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

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[1]It should be noted that the Applicants have not shown that all of the area included in the WSPA is reasonably known to be underlain by hydrocarbons. The Applicants have shown however, that all of the tracts in the proposed WSPA are reasonably known to be underlain by hydrocarbons. Nevertheless, for the reasons expressed in Section III C.5., the division is willing to accept the WSPA as proposed. Absent some of these circumstances, the division would likely approve only a smaller PA.

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). A PA application must be evaluated under these standards, and the standards in 11 AAC 83.303.

Under 11 AAC 83.303(a), a proposed PA will be approved if the commissioner finds that the PA is necessary or advisable to protect the public interest. To make such a finding, the commissioner must determine that the proposed PA will: (1) conserve natural resources; (2) prevent economic and physical waste; and (3) protect all parties of interest, including the state.

In evaluating these criteria, the commissioner will consider: (1) the environmental costs and benefits; (2) the geological and engineering characteristics of the potential hydrocarbon accumulation or reservoir proposed for inclusion in the PA; (3) prior exploration activities in the proposed PA; (4) the applicant's plans for exploration or development of the proposed PA; (5) the economic costs and benefits to the state; and (6) any other relevant factors (including mitigation measures) the commissioner determines necessary or advisable to protect the public interest. 11 AAC 83.303(b).

(A) Conservation of Natural Resources

The formation of oil and gas units and PAs within unit areas to develop hydrocarbon-bearing reservoirs conserves hydrocarbons. A single PA encompassing that portion of the West Sak reservoir capable of producing or contributing to the production of hydrocarbons in paying quantities will provide for more efficient, integrated development of the area. A comprehensive operating agreement and plan of development governing that production will help avoid duplicative development efforts on and beneath the surface.

Producing hydrocarbon liquids from a new PA through the existing KRU production and processing facilities reduces the incremental environmental impact of the additional production. Using the existing facilities, gravel pads, and infrastructure eliminates the need for new ones. West Sak fluids will be commingled with KPA fluids at existing KRU drillsites and produced into the existing Central Production Facility (CPF-1). The WSPA's utilization of the KRU infrastructure will maximize oil and gas recovery, while minimizing negative impacts on other resources within the area.

(B) Prevention of Economic and Physical Waste

Generally, forming a PA facilitates the equitable division of costs and allocation of hydrocarbon shares, and provides for a diligent development plan which maximizes hydrocarbon recovery from a reservoir. The formation of the PA and facility sharing opportunities may also allow development of economically marginal hydrocarbon accumulations. ARCO has represented that sharing the existing KRU facilities and infrastructure makes the West Sak Reservoir development possible.

Some of the KRU owners have negotiated agreements among themselves to share the existing production capacity of the KRU facilities and the KRU infrastructure. These facilities can be used to process the relatively small volume of recoverable hydrocarbons in the WSPA. Eliminating the need for construction of additional production facilities minimizes any additional surface impacts and costs. The state has agreed to allow commingled production through the existing facilities (at the drillsite and CPF prior to either the West Sak or Kuparuk production passing through a custody transfer meter) and has approved a well test-based production allocation methodology for current and future reservoirs sharing the KRU facilities. The methodology is designed to accurately and fairly allocate production. The adoption of that methodology is subject to periodic review and reconsideration to assure that the state's royalty and tax interests are protected.

Further, facility consolidation will save capital and promote better reservoir management through pressure maintenance and enhanced recovery procedures. In combination, these factors allow the West Sak Reservoir to be developed and produced to the benefit of all interested parties.

(C) Protection of All Parties

Forming separate PAs protects the economic interests of all working interest owners and the royalty owner. By combining interests and operating under the terms of a unit agreement and unit operating agreement, the owners may fairly allocate costs and revenues among themselves.

Because hydrocarbon recovery will be maximized and additional production-based revenue will be earned from WSPA production, the state's economic interest is promoted. Additional recovery of hydrocarbons, however, in and of itself may not always be determinative of the state's best interest. Production must occur under suitable terms and conditions to assure that the economic interests of both the working interest owners and the state, as the royalty owner, are protected.

All the leases proposed for the WSPA were issued on state of Alaska lease form DL-1. The interpretation of the royalty provisions in the form DL-1 lease were the subject of litigation, State of Alaska v. Amerada Hess Corporation, et al (C.A. No. 77-847. Superior Court for the State of Alaska, First Judicial District at Juneau). (ANS Royalty Litigation). When the KRU Agreement was signed in 1981, the state and the lessees disagreed whether and to what extent the cost of cleaning and dehydrating the oil could be deducted from the state's royalty share. The state and the lessees agreed to a formula for calculating and paying these field costs. This field cost allowance settlement is Appendix I to the KRU Agreement.

The area proposed for the WSPA is completely within the KPA and the KRU. The Applicants and the Department of Natural Resources, Division of Oil and Gas ("the Division") agree that the

provisions of Appendix I of the KRU Agreement apply to the royalty share of production from the WSPA. The state's economic interest in the allocation of production, royalty value and costs to process the state's royalty share of production from the WSPA is protected by Appendix I to the KRU Agreement, the ANS Settlement Agreements for the determination of royalty value for the WSPA and KPA production, and the production allocation methodology established to allocate the production between the reservoirs that share the KRU infrastructure.

In reviewing the above criteria, the following factors were considered:

(1) The Environmental Costs and Benefits

Sharing the existing KRU facilities eliminates duplication and reduces the surface area altered by the West Sak development. West Sak drilling will take place from existing KRU drillsites in the CPF-1 area of the unit. WSPA wells will be on 15 foot centers between existing KPA wells and on new rows opposite the KPA wells. West Sak fluids will be commingled with KPA fluids at the drillsite and produced into the existing CPF-1

The existing KRU road system will be used to support drilling, construction, and production operations. Taking advantage of existing road and pad gravel will almost eliminate new gravel placement. In most cases, the existing drillsite/pad footprint will not increase. Fluids produced from WSPA will utilize the existing KPA pipelines, except where current pipe systems are too small to handle both KPA and WSPA production.

The KRU owners propose to make maximum use of existing KRU infrastructure. No significant additional impacts to habitat or biological resources are anticipated because of the additional West Sak production.

(2) The Geological and Engineering Characteristics of the Reservoir

The West Sak Reservoir in the proposed WSPA is an informally named oil-bearing Late Cretaceous sandstone sequence of the Colville Group. It occurs at shallow depths, is highly faulted and has variable rock and fluid properties.

The West Sak sands are a series of marine delta front and shelf sandstones that were first named from their penetration in the KRU by the ARCO West Sak No. 1 Well between the depths of 3745-4000 feet. These sands are contained within the formally named Schrader Bluff Formation of the Colville Group and are Late Cretaceous in age. The West Sak sands are age and stratigraphically equivalent to the "O" sands that produce to the north in the Milne Point Unit (MPU). In the KRU area, the West Sak sands are subdivided into upper and lower members. The lower member is subdivided into A-1 through A-4 units and the upper member into B through D units. These smaller units are used for correlation purposes and to differentiate between various stacked reservoir sands. Oil in the West Sak interval was first encountered by the Chevron Kavearak Point Well in 1969 and first tested by the ARCO West Sak No. 1 in 1971. Since 1971, hundreds of KRU KPA wells have penetrated the West Sak. From 1984 to 1986, ARCO conducted a pilot production program in KRU Tract 61 in the southeastern part of the unit. BP currently produces the "O" and slightly shallower "N" sands in the MPU.

Within the proposed WSPA, the West Sak interval contains multiple stacked sandstone bodies within a stratigraphic interval that averages approximately 300 feet in thickness. Individual sandstone bodies range from a few feet to about 40 feet thick and are interbedded with non-reservoir siltstones and mudstones. Sandstones within the West Sak are both fine to very fine-grained litharenites and lithic wackes. Preserved primary macro-porosity within West Sak litharenites can be as high as 35 percent. Where sandstones not cemented by calcite, these sandstones typically have porosities of 25 percent or greater. Permeability within West Sak sands is highly variable but based upon ARCO's supplied data, can be as high as 1 darcy and as low as 15 millidarcies and still be considered net sandstone.

Within the proposed WSPA, the West Sak maintains a structural dip to the east-northeast. The top of the West Sak interval is approximately -2700 feet subsea in the southwest to approximately –3800 feet subsea in the east. The West Sak interval is highly faulted. There are two dominant fault systems, north-south trending and east-west trending. The overall up-dip limit of oil within the West Sak is located to the west of the proposed WSPA. The up-dip sealing mechanism for the overall accumulation is unknown but may a function of one or several of the following controls; permafrost, faults, very heavy oil/tar, and/or internal stratigraphic discontinuities. The West Sak interval contains multiple separate oil/water contacts, which vary over 1000 feet in depth. These oil/water contacts appear to be a function of both structural separation due to faulting and stratigraphic isolation of individual sandstone bodies.

The extent of the proposed WSPA underlain by hydrocarbons is difficult to map because of the varying oil/contacts, complex structure, apparent stratigraphic isolation of individual reservoir sands, and limited well data in some areas. Based on the available data, much of the WSPA is known to be underlain by hydrocarbons and all the tracts contain at least some oil in the West Sak interval. However, well data shows that parts of several tracts are known not to be underlain by hydrocarbons. While the precise extent of these wet areas is unknown, they are located in Tracts 34, 39 and 55 and in the northeast corner of Tract 38. It is estimated by division geologists that between 10 to 20 percent of the proposed WSPA is not underlain by hydrocarbons. In summary, the amount of total West Sak interval net pay within the proposed PA ranges from 0-120 feet. Within the area planned for the initial 50 well development (Tracts 38, and 56) the net pay thickness is generally greater than 80 feet.

Oil gravity within the West Sak is variable both vertically and horizontally. Within the KRU, API gravity of the West Sak varies between 10-22 degrees API. Based upon mapping provided by ARCO, the oil gravity in the West Sak B interval ranges from 14-20 degrees. Oil viscosity and reservoir temperature also vary throughout the West Sak interval. Temperature varies with depth from about 60 degrees F in the western area of the proposed WSPA to about 80 degrees F in the eastern area. Viscosity decreases from 300 cp in the west to 30 cp in the east. Oil gravity, viscosity, and temperature, net pay distribution and sandstone distribution are the major factors in determining well productivity and commerciality of the West Sak reservoir in the proposed WSPA.

As stated earlier in this discussion, West Sak data gathering has shown that West Sak reservoir quality and oil properties vary areally as well as vertically for the West Sak D, B, and A Sands within the proposed WSPA. The individual well tests and the West Sak Pilot project conducted from 1984-1986 helped determine expected well productivities and injectivities, and interwell behavior.

Production results from the West Sak Pilot and reservoir simulation results obtained with type well reservoir descriptions (West Sak reservoir descriptions based on core data and oil analyses from individual wells) were used to estimate well production rates. Paying quantities calculations were performed using these rates and varying costs for low, expected, and high side operating costs. All these data reasonably estimate that the tracts within the proposed WSPA are capable of producing or contributing to production of hydrocarbons in paying quantities.

In summary, areas in the middle of the WSPA are either not underlain by hydrocarbons or contain thin net pay because of a combination of stratigraphic discontinuities and major faults that break up the reservoir into isolated blocks with separate oil-water contacts. ARCO's Phase 1 development is an area of the WSPA where there is thick net pay (60-110 feet); the formation temperatures are warmer; and the West Sak oil is less viscous with a higher API gravity.

(3) Prior Exploration and Development Activities

The KRU Owners have collected West Sak Reservoir delineation data since the 1980's. They have log data from over 300 wells on most KPA Drillsites. The KRU Owners selectively logged and cored KPA development wells to evaluate the West Sak within the KRU. By 1989, there were approximately 21 delineation wells, and 13 production tests were conducted to evaluate the reservoir. From September 1984 through December 1986, a West Sak Pilot Implementation and Operation project was conducted south of Drillsite 1D to verify West Sak producing rates, evaluate stimulation/completion/artificial lift techniques, investigate drilling, completion and operating costs, and confirm West Sak development potential. A dedicated well, WS1-01 was drilled and completed by April 1989 and tested to evaluate the development potential of the West Sak Reservoir in the Drillsite 1D area. A small-scale waterflood project was scheduled to follow the WS1-01 well, but economic circumstances in late 1989 caused the waterflood project to be deferred. No further on-site delineation activities have occurred since 1989.

(4) The Applicant's Plan for Exploration or Development of the Participating Area

West Sak development plans call for a phased approach in which development proceeds as the understanding of the overall project improves. Phase 1 will consist of approximately 50 wells (31 producers and 19 injectors) at KRU Drillsites 1C and 1D. Drilling at Drillsite 1D will be divided into two periods commencing in the fourth quarter of 1997 and finishing by the second quarter of 1998. The first drilling period will include 9 producing wells and 5 injection wells, and the second period will include 10 producers and 5 injectors. First production from Drillsite 1D is expected in December 1997. Drilling at Drillsite 1C is scheduled to start in the third quarter of 1998. Twenty-one wells are planned at Drillsite 1C. The estimated recovery for the WSPA under the initial plan of development is 51 million barrels.

The Phase 1 plan covers only a fraction of the productive West Sak reservoir. Subsequent phases will include groups of wells or annual drilling plans implemented after Phase 1. After drilling at Drillsites 1D and 1C is complete, drilling is expected at a new drillsite to the south, perhaps at the West Sak Pilot Pad, or at a drillsite to the north, Drillsite 1R.

(5) The Economic Costs and Benefits to the State and Any Other Relevant Factors (including mitigation measures) the Commissioner Determines Necessary or Advisable to Protect the Public Interest

Representatives of ARCO and the division discussed the West Sak development before and after the submittal of the WSPA application. The division was concerned about: (1) the size of the proposed WSPA in relation to the proposed Phase 1 plan of development and initial tract allocation schedule; (2) areas of the proposed WSPA are not underlain by hydrocarbons; (3) facility sharing agreements; (4) how production would be allocated between the WSPA and the KPA; (5) gas disposition and reserve debit report for the commingled streams through KRU facilities; and (6) injection locations for West Sak produced gas and ownership of the West Sak reinjected gas.

In pre-application meetings with the division, ARCO proposed a West Sak participating area larger than the area embodied in their Phase 1 plan of development and larger than the area that was scheduled to be produced initially. Drillsites 1D and 1C represent only two of the eleven drilling blocks in ARCO's designated West Sak Core Area, the area proposed for the WSPA. The West Sak Core Area is the part of the West Sak accumulation that the working interest owners believed is capable of production in paying quantities. The owners are prepared to make the large capital investments in an ongoing development plan in that area. The working interest owners' Phase 1 plan calls for the establishment of a base development (Phase 1) before continued development. Phase 2+ calls for project expansion as the understanding of the overall project improves. The working interest owners proposed that the WSPA to be as large as the area they designated for possible, eventual development; the area for which they have contractual agreements in place.

Because some areas of the proposed WSPA are not underlain by hydrocarbons, the phased development approach to the West Sak, and ARCO's desire for flexibility in their drilling and development plans within the West Sak Core Area, the division was concerned that the drilling blocks beyond Drillsite 1D and 1C may not be developed in a timely manner, if they were developed at all. Further, by proposing such a large initial participating area, ARCO would have to assign a tract allocation factor (the formula that allocates hydrocarbon production to each tract in a participating area) to each tract in the proposed WSPA for which the reserves may never be produced or produced many years in the future.

To reconcile the two positions and the issue of the initial WSPA size, the division proposed, and ARCO accepted, a plan by which tract participation factors are assigned to tracts (or drilling blocks) or parts of tracts (drilling blocks) in the proposed WSPA as those tracts or parts of tracts are drilled and produced. Tracts or parts of tracts receiving allocated production must have active producing wells and/or active injection wells (See attachment 2 and 3 of the Application). Initially, production will only be allocated to the acreage associated with Drilling Block D (Tract 56), the first drilling block or tract to be developed. After wells have been completed in Drilling Block C (Tract 38), the allocation schedule will be revised to allow production allocation to that tract. The tract allocation schedule will continually be revised when development and production proceeds.

ARCO also agreed that the WSPA would automatically contract to those tracts or parts of tracts receiving allocated production; and to those tracts or parts of tracts with active production or injection wells 5 years from the effective date of the WSPA. The well spacing order will be the basis

for determining the area of a tract to be included in a tract allocation schedule. Development plans for the West Sak are for two of eleven drillsites, 1D and 1C, and extend only until the end of 1998. Further development plans depend on the results of Phase 1.

The division proposed this approach for several reasons. First, the lands in the proposed WSPA are now in the KRU KPA, and are, therefore, held by production from the KPA whether or not the lands are included in the WSPA. Second, the proposed lands are appropriate for inclusion in a PA, including the proposed lands now in the WSPA reduces the administrative burden to the state and the working interest owners of multiple participating area expansion applications in the future. Third, there is no economic harm associated with including the proposed lands within the WSPA now. All the tracts have the same royalty rates and the royalty financial issues associated with the leases are resolved. Finally, ARCO will be required to drill and produce all the lands in the tracts, all the lands in the drilling blocks, within 5 years to keep the lands in the WSPA.

This proposal permits the state and the KRU WSPA working interest owners to receive the economic benefits of the entire WSPA using a " phased-in production tract allocation schedule" approach prior to full production from the entire WSPA. The size of the proposed WSPA in relation to the plan of development and geology may not have been acceptable given any other set of circumstances. The "proof will be in the pudding" as ARCO either has to drill and produce all the WSPA lands within 5 years or the lands will automatically be eliminated from the WSPA.

ARCO has represented to the division that development of the West Sak is possible because the existing KRU facilities and infrastructure will be shared. West Sak production will be commingled with KPA production at the drillsite. The production will be commingled before either production stream passes through a custody transfer meter. ARCO proposes to allocate the KRU production between the WSPA and the KPA based on an individual well test allocation methodology similar to the methodology currently in place at the Lisburne Production Center (LPC) for the Greater Point McIntyre Area participating areas.

The KRU allocation procedures will vary from the methodology used at the LPC. First, West Sak will employ a new type of separation device to meter the West Sak production before it enters the KRU facilities; the Accuflow metering system. This multiphase meter system uses a separation approach in handling the oil/gas/water flow stream by first separating the gas from the liquid stream and then measuring the gas and the oil/water separately. This Accuflow system for measuring the individual well production rates will be the first use of multiphase metering on the North Slope.

The second variation proposed by ARCO for the West Sak is the use of a fixed production allocation factor (AF) of 1.0 for the West Sak production allocation and royalty and revenue accounting purposes. See Attachment 1 and Figure 2 of Attachment 1 of the Application . An AF of 1.0 means that the Accuflow meter data for the individual well test volumes will represent the volume of oil, gas and water allocated and reported for the WSPA.

Representatives of the division, the Department of Revenue (DOR), and the AOGCC met to discuss ARCO's proposals for production allocation and well testing. The division approved ARCO's WSPA production commingling, allocation and well testing procedures for volume and royalty accounting with the following terms and conditions: (1) the AF for the WSPA will be 1.0 for the first

year of WSPA production to evaluate the Accuflow multiphase meters, allocation methodology, well test frequency and quality of the individual well test data; (2) during the first year of production, the individual well test frequency will be a minimum of 2 well tests per month; (3) ARCO submit a monthly production allocation report per Attachment 7 of the Application; (4) an allocation and well test review meeting be held with the DNR, DOR, and AOGCC after 6 and 12 months of commingled production and (5) after 12 months of commingled production, the WSPA production allocation methodology will be evaluated to determine the continued use of the allocation procedures.

ARCO submitted an allocation of production and cost for the leases in the proposed WSPA in a letter dated October 2, 1997, as required by 11 AAC 83.371. The proposed allocation distributes working interest equity among the lease tracts on a surface acreage basis. Because all the leases within the WSPA were issued on the DL-1 lease form which reserves a 12.5% royalty to the state and the state is in sole royalty owner of the leases in the WSPA and West Sak Core Area, ARCO's tract allocation schedule is acceptable for allocating production and costs among the leases within the WSPA.

The WSPA will be the second participating area in the KRU and will share the KRU facilities with the KPA. The KRU Owners need procedures to properly allocate KPA, WSPA, 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 division proposed, and ARCO agreed, to use the gas reserve and gas debit reporting procedures already established for the facility sharing by the GPMA participating areas at the LPC (See Attachment 2, GPMA gas reserves and debit report). The gas reserves and gas debit report will be similar to the GPMA form except that the basis for apportioning the fuel gas used in development and production operations for each KRU participating area during a month shall be each participating area's fraction of the total hydrocarbon liquids produced through KRU facilities that month. The basis for apportioning the flare gas in any month shall be each participating area's fraction of the total produced gas determined from well tests that month.

To properly account for the various monthly dispositions among any participating area using the shared Kuparuk facilities, the division requires the monthly gas disposition and reserves debit report. The proposed fuel and flare gas allocation methodology is similar to the procedures established for the KRU in the Kuparuk Satellite Facility Sharing Ballot.

VI. FINDINGS AND DECISION

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

1. Under 11 AAC 83.351(a), a participating area may include only the land reasonably known to be underlain by hydrocarbons and known or reasonably estimated through use of geological, geophysical, or engineering data to be capable of producing or contributing to the production of hydrocarbons in paying quantities.

2. Under 11 AAC 83.303(c), the department will consider the factors specified in 11 AAC 83.303(a) and (b) when evaluating requests concerning participating areas.

3. The proposed participating area, the WSPA, meets the requirements of 11 AAC 83.303.

4. The available geological and engineering data submitted demonstrate that a paying quantities certification is appropriate for the tracts proposed for the WSPA, and that although not all of the acreage is underlain by hydrocarbons, all the tracts are underlain by hydrocarbons and, as shown by the Applicants' proposed development plans, known or reasonably estimated to be capable of production or contributing to production in sufficient quantities to justify the formation of the WSPA within the KRU.

5. The geological and engineering data support the inclusion of all of ARCO's proposed tracts within the WSPA at this time under the terms and conditions of Section III C.5. of this Decision and Findings. The WSPA is wholly contained within the boundaries of the current KRU. Under the terms of the applicable 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, the following lands are to be included in the WSPA:

T.11.N., R.10.E., U.M., Secs. 1 -36
(ADLs 25647, 25648, 25649, 25650, 25651, 25652, 25659, 25660, 25661);

T.12.N., R.10.E., U.M., Secs. 17-20, 27 - 34
(ADLs 25635, 25639 and 25640);

6. Formation of the WSPA equitably divides costs and allocates produced hydrocarbons, and sets forth a development plan designed to maximize physical and economic recovery from the West Sak Reservoir within the approved WSPA.

7.The production of WSPA hydrocarbon liquids may be commingled with KPA production in surface facilities prior to 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.

8.The proposed well test allocation methodology, as conditioned in Section III C.5., is acceptable for royalty allocation purposes and for allocating the commingled gas and hydrocarbon liquids production between the WSPA and the KPA as those streams are processed through the common KRU facilities.

ARCO, as KRU Operator, shall provide the division with the monthly production allocation reports and well test data for the West Sak wells producing through CPF-1 by the 20th of the following month. The Division reserves the right to request any information it deems pertinent to the review of those reports from ARCO. Moreover, this 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 which have been conducted.

9. 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, well test data.

10. During the first year in which commingled production from the WSPA 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. Subsequent reviews may be requested by either the Division or the operator. The allocation procedure may only be revised with the written consent of, or upon the written direction of, the Division.

11. Pursuant to 11 AAC83.351(a) and 11 AAC 83.371(a), the Division approves the tract allocation schedule for each lease within the WSPA, dated October 2, 1997. The tract allocation schedule shall be effective December 1, 1997.

12. Revisions to the October 2, 1997 tract allocation schedule may be permitted from time to time as more wells are drilled and brought into operation (begin production or injection) from the tracts or drilling blocks in the WSPA. Any revision to the October 2, 1997 tract allocation schedule shall be in accordance with the terms and conditions specified in Section III C.5. of this Decision and Findings.

13.To account for the gas produced from each participating area within the KRU, the gas volume disposition and gas reserves debited from or credited to each PA using the shared KRU facilities, ARCO shall submit a monthly gas disposition and reserves debit report using the form indicated in Attachment 2. The gas disposition report shall be submitted with the monthly production allocation reports.

14.The field cost allowance for the state's royalty share of oil produced from the approved WSPA is governed by Appendix I to the Kuparuk River Unit Agreement.

15.Diligent exploration and delineation of the West Sak Reservoir underlying the approved participating area is to be conducted by the Unit Operator under the KRU plans of development and operation approved by the state.

16.The plan of development for the WSPA meets the requirements of 11 AAC 83.303 and 11 AAC 83.343. The plan is approved for a period of two years from the effective date of this Decision and Finding. Annual updates to the plan of development which describe the status of projects undertaken 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.Approval of the WSPA within the KRU is effective December 1, 1997.

For these reasons and subject to the conditions and limitations noted, I hereby approve the West Sak Participating Area within the Kuparuk River Unit.

Kenneth A. Boyd
Division of Oil and Gas

18 DEC '97
Date

Attachments: WSPA Tracts and Tract Allocation Schedule
Example Gas Disposition and Reserve Debit Report

KRU.West SakPA.Appv.txt

ARCO Alaska, Inc.
West Sak Participating Area
Tract Allocation Schedule

Effective Date: Oct. 1, 1997

West Sak Drilling Block	Tract-ADL Number	Umiat Meridian	Sections	Royalty Burden	Tract Acreage	Tract Allocation Factor
1D	56-25650	T11N-R10E	Secs. 13, 14, 23, 24	12.50%	2560	1.0000

Totals	2560	1.0000

JOB: RTZ13LP# PROG: LRTB0901-01
AS OF: 10/31/1997

ARCO ALASKA INC.
VOLUMES ARE IN MCF AT 14.65 PSIA
PRODUCTION MONTH OCTOBER-1997
LISBURNE PRODUCTION CENTER
RESERVE DEBIT REPORT

RUN TIME: 09:17
RUN DATE: 11/12/1997

	AAI	BPX	EXXON	TOTAL
OWNERSHIP PERCENTAGES				
LISBURNE	.400000	.200000	.400000	1.000000
POINT MCINTYRE	.301000	.322000	.377000	1.000000
WEST BEACH	.500000		.500000	1.000000
NORTH PRUDHOE BAY	.500000		.500000	1.000000
NIAKUK		1.000000		1.000000
NIAKUK 27	.500000		.500000	1.000000
NIAKUK 28	.500000		.500000	1.000000
NIAKUK 29	.500000		.500000	1.000000
TOTAL HYDROCARBON LIQUIDS PRODUCED				
LISBURNE	101,943.20	50,971.60	101,943.20	254,858.00
POINT MCINTYRE	1,549,713.89	1,522,302.80	1,948,830.31	5,020,847.00
WEST BEACH				
NORTH PRUDHOE BAY				
NIAKUK		727,845.00		727,845.00
NIAKUK 27	59,985.50		59,985.50	119,971.00
NIAKUK 28	34,436.00		34,436.00	68,872.00
NIAKUK 29				
LPC SYSTEM SUMMARY TOTALS:				
TOTAL SOG GAS PRODUCED	3,089,356	3,531,374	3,581,145	10,201,875
LESS TOTAL FUEL GAS USED				
POWER GENERATION FUEL	48,639	55,597	56,381	160,617
LEASE FUEL	4,949	2,930	5,150	13,029
LPC FUEL	196,248	224,327	227,488	648,063
TOTAL	249,836	282,854	289,019	821,709
LESS POWER GENERATION SALES	0	0	0	0
LESS FLARE GAS				
EMERGENCY/OPERATIONAL <= 1 HR	88	101	103	292
PILOT PURGE	3,647	4,160	4,224	12,031
EMERGENCY > 1 HR	0	0	0	0
PLANNED <= 1 HR AND <= 5,000 MCF	0	0	0	0
CONTINUOUS ASSIST	717	818	825	2,360
PLANNED > 1 HR OR > 5,000 MCF (TAXABLE)	0	0	0	0
TOTAL AUTHORIZED	4,452	5,079	5,152	14,683
UNAUTH OR WASTE (SUBJECT TO TAX/PNLTY)	0	0	0	0
TOTAL FLARE GAS	4,452	5,079	5,152	14,683
LESS NGLS (MCF EQUIVALENT)	54,780	63,152	64,372	182,304
TOTAL SOG RESERVE GAS DEBITS	309,068	351,085	358,543	1,018,696
GAS INJECTED	2,780,288	3,180,289	3,222,602	9,183,179

NOTE: EACH PARTICIPATING AREA'S APPORTIONED SHARE OF FUEL GAS UTILIZED IN THE LPC AND FLARE GAS IN ANY MONTH IS BASED ON ITS APPORTIONED SHARE OF TOTAL PRODUCED GAS.

ARCO ALASKA INC.
VOLUMES ARE IN MCF AT 14.65 PSIA
PRODUCTION MONTH OCTOBER-1997
LISBURNE PRODUCTION CENTER
RESERVE DEBIT REPORT

	AAI	BPX	EXXON	TOTAL
LESS TOTAL FUEL GAS USED (CONTD)				
LEASE FUEL	0		0	0
LPC FUEL	1,475		1,475	2,950
NIAK28 TOTAL	1,841		1,840	3,681
NIAKUK 29				
POWER GENERATION FUEL	0		0	0
LEASE FUEL	0		0	0
LPC FUEL	0		0	0
NIAK29 TOTAL	0		0	0
LESS POWER GENERATION SALES				
LISBURNE	0	0	0	0
POINT MCINTYRE	0	0	0	0
WEST BEACH	0		0	0
NORTH PRUDHOE BAY	0		0	0
NIAKUK		0		0
NIAKUK 27	0		0	0
NIAKUK 28	0		0	0
NIAKUK 29	0		0	0
LESS FLARE GAS				
LISBURNE				
EMERGENCY/OPERATIONAL <= 1 HR	32	16	33	81
PILOT PURGE	1,262	631	1,262	3,155
EMERGENCY > 1 HR	0	0	0	0
PLANNED <= 1 HR AND <= 5,000 MCF	0	0	0	0
CONTINUOUS ASSIST	260	130	259	649
PLANNED > 1 HR OR > 5,000 MCF (TAXABLE)	0	0	0	0
LPA TOTAL AUTHORIZED	1,554	777	1,554	3,885
UNAUTH OR WASTE (SUBJECT TO TAX/PNLTY)	0	0	0	0
LPA TOTAL FLARE GAS	1,554	777	1,554	3,885
POINT MCINTYRE				
EMERGENCY/OPERATIONAL <= 1 HR	54	58	69	181
PILOT PURGE	2,297	2,457	2,876	7,630
EMERGENCY > 1 HR	0	0	0	0
PLANNED <= 1 HR AND <= 5,000 MCF	0	0	0	0
CONTINUOUS ASSIST	443	474	554	1,471
PLANNED > 1 HR OR > 5,000 MCF (TAXABLE)	0	0	0	0
PTMAC TOTAL AUTHORIZED	2,794	2,989	3,499	9,282
UNAUTH OR WASTE (SUBJECT TO TAX/PNLTY)	0	0	0	0
PTMAC TOTAL FLARE GAS	2,794	2,989	3,499	9,282
WEST BEACH				
EMERGENCY/OPERATIONAL <= 1 HR	0		0	0
PILOT PURGE	0		0	0
EMERGENCY > 1 HR	0		0	0
PLANNED <= 1 HR AND <= 5,000 MCF	0		0	0
CONTINUOUS ASSIST	0		0	0

ARCO ALASKA INC.
VOLUMES ARE IN MCF AT 14.65 PSIA
PRODUCTION MONTH OCTOBER-1997
LISBURNE PRODUCTION CENTER
RESERVE DEBIT REPORT

	AAI	BPX	EXXON	TOTAL
LESS FLARE GAS (CONTD)				
EMERGENCY/OPERATIONAL <= 1 HR	0		0	0
PILOT PURGE	0		0	0
EMERGENCY > 1 HR	0		0	0
PLANNED <= 1 HR AND <= 5,000 MCF	0		0	0
CONTINUOUS ASSIST	0		0	0
PLANNED > 1 HR OR > 5,000 MCF (TAXABLE)	0		0	0
NIAK29 TOTAL AUTHORIZED	0	0	0	0
UNAUTH OR WASTE (SUBJECT TO TAX/PNLTY)	0		0	0
NIAK29 TOTAL FLARE GAS	0		0	0
LESS NGLS (MCF EQUIVALENT)				
LISBURNE	15,448	7,724	15,448	38,620
POINT MCINTYRE	37,992	40,642	47,584	126,218
WEST BEACH	0		0	0
NORTH PRUDHOE BAY	0		0	0
NIAKUK		14,786		14,786
NIAKUK 27	885		885	1,770
NIAKUK 28	455		455	910
NIAKUK 29	0		0	0
TOTAL SOG RESERVE GAS DEBITS				
LISBURNE				
CURRENT MONTH	106,039	53,019	106,038	265,096
YTD	1,304,670	652,333	1,304,667	3,261,670
ITD	37,749,770	16,856,056	37,775,338	92,381,164
POINT MCINTYRE				
CURRENT MONTH	195,978	209,651	245,461	651,090
YTD	1,702,755	1,809,176	2,129,747	5,641,678
ITD	5,568,876	5,953,348	6,956,206	18,478,430
WEST BEACH				
CURRENT MONTH	0		0	0
YTD	129,839		129,820	259,659
ITD	338,490		338,366	676,856
NORTH PRUDHOE BAY				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	277,035		276,936	553,971
NIAKUK				
CURRENT MONTH		88,415		88,415
YTD		746,032		746,032
ITD		2,133,184		2,133,184
NIAKUK 27				
CURRENT MONTH	4,720		4,717	9,437
YTD	44,263		44,245	88,508

ARCO ALASKA INC.
VOLUMES ARE IN MCF AT 14.65 PSIA
PRODUCTION MONTH OCTOBER-1997
LISBURNE PRODUCTION CENTER
RESERVE DEBIT REPORT

	AAI	BPX	EXXON	TOTAL
GAS AVAILABLE FOR INJECTION (CONTD)				
CURRENT MONTH				0
YTD	27,166			27,166
ITD	27,166			27,166
NIAKUK 29				
CURRENT MONTH	0		0	0
YTD	26,818		26,822	53,640
ITD	26,818		26,822	53,640
TOTAL SOG RESERVES INJECTED INTO LPA RESERVOIR				
FROM LISBURNE				
CURRENT MONTH	964,849	482,425	964,851	2,412,125
YTD	12,289,376	6,144,690	12,289,378	30,723,444
ITD	392,068,014	195,976,262	392,042,456	980,086,732
FROM POINT MCINTYRE				
CURRENT MONTH	653,442	699,031	818,432	2,170,905
YTD	6,948,152	7,432,907	8,702,506	23,083,565
ITD	20,729,756	22,176,017	25,963,848	68,869,621
FROM WEST BEACH				
CURRENT MONTH	0		0	0
YTD	1,219,357		1,219,372	2,438,729
ITD	3,448,704		3,448,806	6,897,510
FROM NORTH PRUDHOE BAY				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	2,941,072		2,941,158	5,882,230
FROM NIAKUK				
CURRENT MONTH		823,879		823,879
YTD		7,029,741		7,029,741
ITD		22,225,980		22,225,980
FROM NIAKUK 27				
CURRENT MONTH	42,782		42,785	85,567
YTD	413,893		413,906	827,799
ITD	1,156,547		1,156,593	2,313,140
FROM NIAKUK 28				
CURRENT MONTH	20,888		20,891	41,779
YTD	114,224		114,233	228,457
ITD	234,249		234,264	468,513
FROM P1-09 TAIL				
CURRENT MONTH				0
YTD	27,166			27,166
ITD	27,166			27,166

ARCO ALASKA INC.
VOLUMES ARE IN MCF AT 14.65 PSIA
PRODUCTION MONTH OCTOBER-1997
LISBURNE PRODUCTION CENTER
RESERVE DEBIT REPORT

	AAI	BPX	EXXON	TOTAL
TOTAL SOG RESERVES INJECTED INTO PMPA RESERVOIR (CONTD)				
ITD	0		0	0
TOTAL SOG RESERVES INJECTED INTO WBPA RESERVOIR				
FROM LISBURNE				
CURRENT MONTH	0	0	0	0
YTD	0	0	0	0
ITD	0	0	0	0
FROM POINT MCINTYRE				
CURRENT MONTH	0	0	0	0
YTD	0	0	0	0
ITD	0	0	0	0
FROM WEST BEACH				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NORTH PRUDHOE BAY				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NIAKUK				
CURRENT MONTH		0		0
YTD		0		0
ITD		0		0
FROM NIAKUK 27				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NIAKUK 28				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM P1-09 TAIL				
CURRENT MONTH				0
YTD	0			0
ITD	0			0
FROM NIAKUK 29				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
TOTAL SOG RESERVES INJECTED INTO NPBPA RESERVOIR				

ARCO ALASKA INC.
VOLUMES ARE IN MCF AT 14.65 PSIA
PRODUCTION MONTH OCTOBER-1997
LISBURNE PRODUCTION CENTER
RESERVE DEBIT REPORT

	AAI	BPX	EXXON	TOTAL
TOTAL SOG RESERVES INJECTED INTO NPA RESERVOIR (CONTD)				
ITD	0	0	0	0
FROM POINT MCINTYRE				
CURRENT MONTH	0	0	0	0
YTD	0	0	0	0
ITD	0	0	0	0
FROM WEST BEACH				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NORTH PRUDHOE BAY				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NIAKUK				
CURRENT MONTH		0		0
YTD		0		0
ITD		0		0
FROM NIAKUK 27				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NIAKUK 28				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM P1-09 TAIL				
CURRENT MONTH				0
YTD	0			0
ITD	0			0
FROM NIAKUK 29				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
TOTAL SOG RESERVES INJECTED INTO NIAKUK 27 RESERVOIR				
FROM LISBURNE				
CURRENT MONTH	0	0	0	0
YTD	0	0	0	0
ITD	0	0	0	0
FROM POINT MCINTYRE				

ARCO ALASKA INC.
VOLUMES ARE IN MCF AT 14.65 PSIA
PRODUCTION MONTH OCTOBER-1997
LISBURNE PRODUCTION CENTER
RESERVE DEBIT REPORT

	AAI	BPX	EXXON	TOTAL
TOTAL SOG RESERVES INJECTED INTO NIAKUK 28 RESERVOIR (CONTD)				
FROM WEST BEACH				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NORTH PRUDHOE BAY				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NIAKUK				
CURRENT MONTH		0		0
YTD		0		0
ITD		0		0
FROM NIAKUK 27				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM NIAKUK 28				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
FROM P1-09 TAIL				
CURRENT MONTH				0
YTD	0			0
ITD	0			0
FROM NIAKUK 29				
CURRENT MONTH	0		0	0
YTD	0		0	0
ITD	0		0	0
TOTAL SOG RESERVES INJECTED INTO NIAKUK 29 RESERVOIR				
FROM LISBURNE				
CURRENT MONTH	0	0	0	0
YTD	0	0	0	0
ITD	0	0	0	0
FROM POINT MCINTYRE				
CURRENT MONTH	0	0	0	0
YTD	0	0	0	0
ITD	0	0	0	0
FROM WEST BEACH				
CURRENT MONTH	0		0	0
YTD	0		0	0

ARCO ALASKA INC.
LISBURNE PRODUCTION CENTER
COMINGLED GAS INJECTION SUMMARY RPT
PRODUCTION MONTH OCTOBER-1997

OPERATING ENTITY	GAS AVAILABLE FOR INJECTION	GAS INJECTED
LISBURNE	2,412,125	5,534,255
NIAK	823,879	0
NIAK28	41,779	0
NIAK29	0	0
NPBU	0	0
POINT MCINTYRE	5,819,829	3,648,924
WEST BEACH	0	0
WNIAK	85,567	0
TOTALS	9,183,179	9,183,179