

COLVILLE RIVER UNIT AGREEMENT

DECISION AND FINDINGS OF THE COMMISSIONER

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

March 19, 1998

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I. INTRODUCTION AND BACKGROUND

On November 26, 1997, Arco Alaska Inc. ("ARCO"), as Operator and on behalf of the six other working interest owners (WIOs), applied for approval of the proposed Colville River Unit Agreement ("Agreement"). The proposed Colville River Unit (CRU) is on the north slope of Alaska. The eastern boundary of the CRU is approximately 15 miles west of the Kuparuk River Unit. The western boundary extends into the National Petroleum Reserve – Alaska (NPR-A). The unit extends almost to the Beaufort Sea to the north, and extends south to within five miles of the village of Nuiqsut. This proposed unit will be the first unit formed in Alaska with a private party, rather than the state and/or federal government, as the lessor of a significant portion of the proposed unit area.

A copy of the Unit Operating Agreement was filed with the application as required by 11 AAC 83.306. That agreement describes how the WIOs will cooperatively explore for and produce the resources in the unit area. The working interest owners have equalized their equity interests in each of the individual leases in the unit. ARCO has a 56% interest, and Union Texas Alaska and Anadarko Petroleum Corporation each have a 22% interest in each of the leases in the unit. The Unit Operating Agreement is filed for information only, and is not subject to Department of Natural Resources (DNR) approval.

ARCO invited all proper parties to join the Agreement as required by 11 AAC 83.316. Proof that letters dated October 10, 1997 and November 26, 1997 inviting all parties, who have a record interest in land within the proposed unit area to join the Agreement, was filed with DNR. With one exception, all "proper parties", as that term is defined in 11 AAC 83.328, agreed in writing to join the unit. Kuukpik Corporation, the holder of an overriding royalty interest in some leases, declined to join the Agreement. Because all parties, who are WIOs in the leases, agreed to ratify the Agreement, ARCO has effective control of the unit area. Kuukpik Corporation has consented to oil and gas development on the lands in which it holds an interest.

DNR determined that the CRU application was complete on December 12, 1997. Notice of the application was published in the Anchorage Daily News on December 18, 1997, and in the Fairbanks Daily News Miner on December 22, 1997. Copies of the application and the public notice were also provided to interested parties under 11 AAC 83.311. DNR also provided public notice to the Alaska Departments of Environmental Conservation and Fish and Game, the North Slope Borough, the City of Nuiqsut, the Kuukpik Village Corporation, and the Alaska Oil and Gas Conservation Commission. The public notices invited interested parties and members of the public to submit comments by January 21, 1998. DNR did not receive any comments regarding the CRU application.

The Agreement requires the Unit Operator to file plans of exploration, development and operations describing the activities within the proposed unit area. The Unit Operator must consider how it can best develop the resource underlying the entire unit area, regardless of internal lease boundaries. The initial unit plan includes a plan of exploration (POE) and a plan of development (POD). The initial POE describes plans to explore for potential prospects other than the Alpine reservoir. The initial POE emphasizes further exploration, delineation and

development of the Fiord Prospect. The initial POD describes the long-range development activities (facilities and infrastructure, reservoir management and drilling plans) and the roads, pads and facilities locations for development of the Alpine reservoir.

The Agreement provides for separate approval of the unit plan of operations by the DNR Commissioner before any operations begin within the unit area on lands managed by the state. The unit plan of operations must contain: (1) statements and maps or drawings giving the sequence and schedule of operations; (2) the projected use requirements of the proposed operations; including the location and design of well sites, material sites, water supplies, waste sites, buildings, roads and utilities; (3) plans for rehabilitating the affected area; and (4) a description of procedures designed to minimize adverse effects on other natural resources and other uses of the area, including fish and wildlife habitat, historic and archeological sites, and public use. These plans are to be circulated to other state and local agencies for their review and comment before approval by the DNR Commissioner. The proposed plans must also be consistent with the Alaska Coastal Management Program.

ARCO, as Operator and on behalf of the working interest owners of the Kuukpik Unit, also requested the simultaneous contraction of the Kuukpik Unit to exclude certain leases that will be included in the CRU. By a Ballot Agreement Approving Contraction of the Kuukpik Unit Area, dated November 13, 1997, the WIOs of the Kuukpik Unit approved contraction of ADL 364470, ADL 364471, ADL 364472, ADL 372103, ADL 372104, and ADL 372105 from the Kuukpik Unit. ARCO requested that the proposed contraction of the six Kuukpik Unit leases be simultaneous with approval of the proposed CRU and addition of these leases to the CRU.

ARCO proposes to include thirty-seven individual oil and gas leases in the CRU. Sixteen are state leases, eighteen are held jointly by the state and Arctic Slope Regional Corporation (ASRC), and two are ASRC leases. The Agreement will conform and modify the leases. The proposed CRU covers approximately 80,440 acres. Exhibit "A" describes the working and royalty interests in all of the leases proposed for inclusion in the CRU. Exhibit "B" is a map of the proposed unit area. The history of these leases is complex. They are summarized below.

Seven of the leases involved in the proposed unit were issued in state Lease Sale No. 13, held on December 9, 1964. These leases, ADL 25538, ADL 25557, ADL 25558, ADL 25559, ADL 25529, ADL 25530, and ADL 25560, were issued on lease form DL-1 (Rev. Oct. 1963) which provides for a 12.5% royalty share for the state. Four of the leases, ADL 25538, ADL 25557, ADL 25558, and ADL 25559, were issued effective February 1, 1965, as conditional leases. Those four leases are still conditional because the U.S. Department of Interior, Bureau of Land Management has not yet issued a land patent to the state.

ADLs 25529, 25530 and 25560 were first issued in conditional status. The state selected these lands under the Alaska Statehood Act. BLM issued Tentative Approval to the state for the lands under ADL 25529, and then rescinded that approval when BLM recognized the existence of Nuiqsut as a village under the Alaska Native Claims Settlement Act (ANCSA). The village of Nuiqsut's claim to these lands superseded the state's claim to the lands under the Alaska Statehood Act. ASRC received an Interim Conveyance to the lands under ADL 25529 on April 22, 1986 after Kuukpik Corporation, selected the surface of these lands. The state jointly

owned these leases with ASRC under the terms of a settlement agreement between ASRC and the state. The state transferred these leases to ASRC for their management. The conditional status of the lease ended, and the primary term of ten years began when BLM issued an Interim Conveyance.

Similarly, BLM rescinded Tentative Approval to the state for the lands under ADL 25530 effective September 30, 1982, on a portion of the lands covered by the lease. Originally, ADL 25530 contained T.12N., R4E., Sections 24, 25, 26, 27, and 35, Umiat Meridian. ASRC received Interim Conveyance to two sections of lands within the lease on November 12, 1982. On June 6, 1983, the Division of Oil and Gas (division) segregated the lease. ADL 356001 was assigned to the portion of the lease that was conveyed to ASRC; T.12N., R4E., Sections 24 and 25, Umiat Meridian. BLM issued the Interim Conveyance on November 12, 1982, ending the conditional status of ADL 356001 and beginning the ten-year primary term.

BLM later rescinded Tentative Approval to the state for a portion of the lands remaining in ADL 25530. On April 22, 1986, ASRC received Interim Conveyance to those lands. On November 6, 1991, the division segregated the lease a second time. ADL 366204 was assigned to T.12N., R4E., Sections 26 and 35, Umiat Meridian, the portion of the lease that was conveyed to ASRC. The conditional status of ADL 356001 ended on April 22, 1986 and the ten-year primary term commenced.

The remaining lands in ADL 25530, T.12N., R4E., Section 27, Umiat Meridian, remained under tentative approval to the state. ADL 25560 was issued as a conditional lease effective February 1, 1965.

On December 6, 1991, BP Exploration (Alaska) Inc. appealed the division Director's decision ending the conditional status of leases in the Colville River Delta, including ADLs 25529 and 25530. In November 1992, the lessors and lessees settled their dispute over the removal of the conditional status of the leases. The State/ASRC/Chevron/BP Settlement Agreement provided that (1) the segregations of ADL 25530 are null and void; (2) ADL 25529 and 25530 will expire on November 11, 2000; and (3) ADL 25560 will expire on November 11, 2002.

Three of the leases in the proposed CRU were issued in state Lease Sale No. 43A, Colville River Delta/Prudhoe Bay Uplands, held on May 22, 1984: ADL 364470, ADL 364471, and ADL 364472. These leases were issued on lease form DO&G-11-84 (Net Profit Share) which provides for a 12.5% royalty share and a 30% net profits interest for the state. The leases became effective August 1, 1984 for a primary term of ten years. These three leases were included into the Kuukpik Unit on August 10, 1992 and are proposed for transfer to this unit with the consent of the Kuukpik Unit working interest owners.

Nine other leases proposed for the CRU, ADL 372095, ADL 372096, ADL 372097, ADL 372103, ADL 372104, ADL 372105, ADL 372106, ADL 372107, and ADL 372108, were issued in state Lease Sale No. 54, Kuparuk Uplands, held on January 26, 1988. These leases were issued on lease form DNR 10-4037 (Rev. 11/87) which reserves a 12.5 percent royalty share for the state. These leases became effective April 1, 1988 for a primary term of ten years. Three of

these leases; ADL 372103, ADL 372104, and ADL 372105, were included into the Kuukpik Unit on August 10, 1992.

ADL 380075, ADL 380077, ADL 380078, ADL 380079, ADL 380082, ADL 380095, and ADL 380096 were issued in state Lease Sale No. 75, held on December 8, 1992. These leases are jointly held with ASRC. The lease form DOG 9208AS reserves a 16.667 percent royalty share for the state and ASRC collectively. The leases became effective on February 1, 1993 for a primary term of ten years.

ADL 384209, ADL 384210, ADL 384211, and ADL 384214 were issued in state Lease Sale No. 75A, Colville River Exempt: Colville River Delta onshore, held on September 21, 1993. These leases are held jointly with ASRC. They were issued on lease form DOG 9208AS (Rev 5/93), reserving a 16.667 percent royalty share for the state and ASRC. The leases became effective November 1, 1993 for a primary term of ten years.

ADL 387207, ADL 387208, ADL 387209, ADL 387211, and ADL 387212 were issued in state Lease Sale No. 86A, Colville River Exempt: Colville River state onshore, State/ASRC onshore and offshore, held on October 1, 1996. These leases are held jointly with ASRC. ADL 387207, ADL 387208, ADL 387209 and ADL 387212 were issued on lease form DOG 9607(SSR)AS which reserves a sliding scale royalty share between 16.66667 and 33.33333 percent for the state and ASRC. ADL 387211 was issued on lease form DOG 9208 AS (Rev 5/96) which reserves a 16.66667 percent royalty share for the state and ASRC. All the leases became effective October 1, 1996 for a primary term of seven years.

All the leases proposed for inclusion into the CRU as a result of Lease Sales 75, 75A, and 86A are owned jointly by the state and ASRC. The joint ownership was established by the 1991 State-ASRC Settlement Agreement, approved by the legislature in Chapter 41 SLA 1992. The division offered the leases for sale and lease under the statutes and the state's regulations. The ownership interests of the state and ASRC vary from lease to lease. Those interests are described in the Settlement Agreement. The state and ASRC each independently administer their individual interests.

ASRC is the sole lessor of the last two leases proposed for inclusion into the CRU. ARCO and ASRC signed the Western Colville/NPR-A Agreement on September 1, 1995, granting ARCO these ASRC leases. The two leases, Tracts 22 (ALK-4742) and 23 (ALK-4743) of the proposed CRU, were effective September 1, 1995, between ASRC and ARCO, and grant to ARCO exclusive right to explore for oil, gas, and associated hydrocarbon substances for a primary term of ten years. The lease for Tract 22 (ALK-4742) reserves a 11.25 percent net royalty share for ASRC with an overriding royalty share of 1.25 percent to the Kuukpik Corporation. The lease for Tract 23 (ALK-4743) reserves a 15 percent net royalty share for ASRC with an overriding royalty share of 1.6667 percent to the Kuukpik Corporation. The leases are subject to section 1431(o) of the Alaska National Interest Lands Conservation Act (ANILCA) and the 1987 Agreement between ASRC and the Kuukpik Corporation.

The surface estate of the leases in Lease Sales 75 and 75A is owned by the Kuukpik Corporation. Under the terms of the 1987 1431(o) Consent Agreement, dated January 21, 1987, Kuukpik

Corporation must consent to any oil and gas exploration activities on these lands. The surface estate of the leases acquired within NPR-A, in Lease Sale 86A, and the ASRC only leases, is also owned by the Kuukpik Corporation. ASRC exercised its ANILCA 1431(o) option to acquire the subsurface under Kuukpik's NPR-A lands. Kuukpik granted its consent for these lands, the other leases jointly held by ASRC and the state over which Kuukpik Corporation has surface rights and the leases in which ASRC only has an interest, in agreements dated November 23, 1992 and August 27, 1997.

The 1987 Agreement between ASRC and Kuukpik Corporation that allowed ASRC to acquire these subsurface rights also granted Kuukpik Corporation the right to consent to any oil and gas exploration, development and production activities on that land. ASRC and Kuukpik Corporation disagreed about the interpretation of the consent provision in the 1987 Settlement Agreement. The dispute was settled on August 27, 1997, when ARCO and Kuukpik agreed to define the terms and conditions of ARCO's use of the surface of Kuukpik's NPR-A lands in exchange for Kuukpik's consent to development of the oil and gas resources on these lands. The ARCO/Kuukpik Surface Use Agreement was effective January 1, 1997. Under the August 27, 1997 Consent Agreement with ASRC, Kuukpik receives an overriding royalty from ASRC for consenting to oil and gas activities on the Kuukpik NPR-A lands.

II. DISCUSSION OF CONSIDERATIONS

State regulations require the commissioner to consider the following six factors in evaluating a unit application: (1) the environmental costs and benefits of unitized exploration or development; (2) the geological and engineering characteristics of the potential hydrocarbon accumulation or reservoir proposed for unitization; (3) prior exploration activities in the proposed unit area; (4) the applicant's plans for exploration or development of the unit area; (5) the economic costs and benefits to the state; and (6) any other relevant factors, including measures to mitigate impacts identified above, the commissioner determines necessary or advisable to protect the public interest. 11 AAC 83.303(b). How each of these factors applies to the proposed CRU is discussed below.

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

The proposed CRU area is habitat for a variety of fish, waterfowl and marine mammals. Area residents occasionally use these lands and waters for subsistence hunting and fishing. Oil and gas activity in the proposed unit area will impact some wildlife habitat, and may impact some subsistence activity. The extent of these impacts depends on a number of variables. DNR can control some of the variables to minimize the impacts. The environmental impact will depend on the effectiveness of mitigation measures; the availability of alternative habitat and subsistence areas; and the ability of the fish and marine mammals to adapt to some displacement and changes in their habitat.

Ongoing mitigation measures such as seasonal restrictions on specific activities in certain areas can reduce the impact on bird, fish, and mammal populations. Designating primary waterfowl

areas is one method of protecting the bird habitat. DNR can require consolidation of facilities to minimize surface disturbances. Regulating waste disposal is another way to limit environmental impacts. With these mitigating measures, the anticipated exploration and development related activity is not likely to significantly impact bird, fish, and mammal populations. In any case, the anticipated activity under the Agreement will impact habitat and subsistence activity less than if the lessees developed the leases individually. Unitized exploration, development and production minimize surface impact.

The leases proposed for unitization contain many stipulations designed to protect the environment, especially since portions of the proposed unitized lands are within the Colville River Delta. They address such issues as the protection of primary waterfowl areas, site restoration, construction of pipelines, seasonal restrictions on operations, and avoidance of seismic hazards. 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. ASRC's leases also include stipulations designed to protect the environment.

State unitization regulations require the commissioner to approve a Plan of Operations before the unit operator performs any field operations. 11 AAC 83.346. A proposed Plan of Operations must describe the operating procedures designed to prevent or minimize adverse effects on natural resources in the unit area and adjacent areas. The unit operator must guarantee full payment of all damage sustained to the surface estate before beginning operations. Finally, a Plan of Operations must include plans for rehabilitation of the unit area.

The unitization process itself has no environmental impact. Unitization does not entail any environmental costs in addition to those that may occur as a result of issuing the permits necessary to conduct lease-by-lease exploration or development of the leases. The commissioner's approval of a unit agreement is an administrative action, which, by itself, does not convey any authority to conduct any operations on the leases within the unit. 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 POE and/or POD 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. The ASRC leases include similar provisions to insure that environmental issues are adequately addressed during exploration and development.

ARCO has applied for permits and authorizations for the Alpine Development Project from the various federal, state, and local agencies. As of the date of this Decision and Findings, ARCO has received the permits and authorizations necessary for the construction the Alpine Development Project. These permits and authorizations include the approval of a plan of operations from the DNR, consistency determination with the Alaska Coastal Management Program from the State of Alaska-Division of Governmental Coordination and issuance of a permit from the Corps of Engineers.

B. Prior Exploration Activities in the Colville River Unit Area.

Data from the following wells within the proposed CRU is no longer confidential: Fiord No. 1, Fiord No. 2, Bergschrund No. 1, Alpine No. 1, Alpine No. 1A, Fiord No. 3, and Fiord No. 3A. The wells within the proposed CRU still in the 25-month confidentiality period include: Bergschrund No. 2, Alpine No. 1B, Alpine No. 3, Nanuk No. 1, Bergschrund No. 2A, and Neve No. 1. The confidential data from these wells is not discussed in this decision.

The first exploration for oil and gas in the Colville River Delta area was in the early and mid 1960s. Seismic data indicated that the area was underlain in part by a large structural element, informally named the Colville High. This structural high is part of the Barrow Arch, which forms a prominent, subsurface structural flexure trending for hundreds of miles sub-parallel to the arctic coast.

Sinclair, Unocal and Gulf drilled five early unsuccessful exploratory wells in the Colville River Delta area between 1965 and 1977. These wells, none of which are within the current proposed CRU, primarily targeted potential sandstone reservoirs of the Permo-Triassic Sadlerochit Group. A secondary target of some of the exploratory wells was the shallower Lower Cretaceous Kuparuk River Formation. In 1982 Sohio drilled Nechelik No. 1 to evaluate targets in the Sadlerochit Group and underlying Lisburne Group carbonates. This well was a dry hole, but did encounter hydrocarbon shows in a Jurassic sandstone interval (Nechelik sandstone) that was not tested. Nechelik No. 1 is located within the proposed CRU, less than two miles north of the Alpine accumulation.

A second round of exploratory drilling occurred in the mid 1980s when Texaco drilled Colville Delta No. 1 about six miles east of the northern part of the proposed CRU. This well, although targeted for the Permo-Triassic section, encountered and tested oil in a new Upper Jurassic sandstone reservoir, informally named the Nuiqsut sandstone. Texaco and Amerada Hess quickly drilled a sidetrack to the No. 1 and three additional delineation wells to evaluate this accumulation. None of these wells were drilled within the proposed CRU boundaries. They were all situated generally east and north of the unit.

In 1992-1993 ARCO and partners drilled five wells in the Colville River Delta area, Fiord No. 1, Kalubik No. 1, Till No. 1, Colville River No. 1, and Kuukpik No. 3. Only Fiord No. 1 is located within the proposed CRU. Fiord No. 1 and Kalubik No. 1 are noteworthy because they tested oil in the Kuparuk River sandstone at rates exceeding 1000 barrels of oil per day. Oil was also tested at lower rates from the Jurassic Nechelik sandstone in Fiord No. 1, and from the Nuiqsut sandstone in Kalubik No. 1. In 1994 Fiord No. 2 was drilled within the proposed CRU (south of Fiord No. 1) to help delineate the Kuparuk River Formation accumulation. Fiord No. 2 found only a thin veneer of Kuparuk River sandstone. However, it did encounter a thin Alpine Reservoir interval, which is contained within the proposed CRU.

ARCO and partners discovered the Alpine oil field in 1994 with the drilling of Bergschrund No. 1. The group announced the details of the discovery in October 1996. The well encountered an Upper Jurassic sandstone (Alpine sandstone) that flowed 2380 barrels of high quality 39.5° API

gravity oil per day. On October 24, 1997 the State certified Bergschrund No. 1 as the discovery well for the geologic structure containing the Alpine accumulation. This certification grants a reduction of royalty rate from 12.5% to the discovery royalty rate of 5% for all production allocated to ADL 25558 for the period from April 1, 1994 through March 31, 2004. In 1995 and 1996 ten additional wells were drilled within the proposed CRU to delineate the new discovery: Alpine No. 1, Alpine No. 1A, Alpine No. 1B, Fiord No. 3, Fiord No. 3A, Bergschrund No. 2, Bergschrund No. 2A, Alpine No. 3, Neve No. 1 and Nanuk No. 1. Temptation No. 1 and Temptation No. 1A were drilled just outside to the north of the proposed CRU in 1996. Production tests of Alpine No.1B, Neve No.1 and Bergschrund No.2A resulted in flow rates greater than 1000 barrels of oil per day of high quality crude oil from the Alpine interval. ARCO and partners have acquired both 2D and 3D seismic data over the areas of interest within and adjacent to the proposed CRU. The 3D Vibroseis survey conducted in the winter of 1996 covers approximately 170 square miles and is of good to excellent quality.

C. The Geological and Engineering Characteristics of the Reservoir, and the Plans for Exploration and Development of the Proposed Unit Area.

ARCO submitted technical reports, well data, well cross sections, various geologic maps, engineering data from formation tests and core analyses, reservoir fluid studies, and representative seismic lines to support their application to form the CRU. These data sets will help justify the Alpine Participating Area (APA) when that participating is proposed. The application to approve the CRU did not include an application to form the APA. However, the data reasonably describe the extent of a participating area if one were to be proposed.

During the course of the more than four-year unit agreement negotiations between the state, the WIOs, and ASRC, ARCO reviewed all of the pertinent data with the state and ASRC. The DNR also has a complete set of the 1996 3D seismic data, and most of the older 2D seismic data shot in the Colville River Delta area. These data are loaded on a seismic workstation for use in mapping and analysis. DNR maintains hardcopy and digital files of all the confidential and non-confidential wells in the area.

ARCO's data is adequate to evaluate the application. The following technical data displays were used to evaluate the proposed geometry of the unit and extent of a participating area for the Alpine Reservoir: Alpine sandstone and Fiord (Kuparuk sandstone) net pay maps, kh (millidarcy-foot) maps which display average permeability and thickness, maps of individual flow units (or layers) within the Alpine interval, recovery factor map (Alpine sandstone), correlated and annotated well cross-sections, well test summaries, summary listing of reservoir parameters by well, map of proposed drilling locations and well types, and example seismic interpretations from the western part of the proposed CRU.

The Alpine Reservoir is the primary oil-bearing objective that will be developed within a proposed APA. The Kuparuk River Formation oil accumulation discovered in Fiord No. 1 in the northeastern part of the proposed CRU (Fiord subarea) is a secondary objective that will be further explored and possibly developed later. The reservoir characteristics for the primary and

secondary objectives within the proposed CRU are briefly discussed below using just the information from the non-confidential wells.

The Alpine Reservoir is a very fine- to fine-grained, oil-bearing Upper Jurassic quartz arenite contained within the Upper Kingak Shale. It is interpreted as a shelf sandstone derived from a northerly source area. The Alpine Reservoir may represent one of the last pulses of significant Jurassic sandstone deposited before the onset of the Early Cretaceous rifting which formed the Canada Basin. Based on regional correlation, the interval thins and probably onlaps onto the south flank of the Colville High. It also may be truncated by the Lower Cretaceous Unconformity (LCU) on its northern extent. Occurrence and preservation of the sandstone body within the Upper Kingak Shale may be due to the availability of accommodation space that could have resulted from localized erosion related to eustatic and tectonically induced sea level changes. The trapping mechanism for the Alpine accumulation is very complicated, but appears to be predominantly stratigraphic in nature. It relies on east and west shale out, non-deposition and/or erosion of the reservoir quality sandstone, regional south dip of the Colville High and possible truncation by the LCU and/or shale out to the north.

In Bergschrund No. 1 the Alpine Reservoir was encountered at 6,876 feet (measured depth) or - 6,835 feet subsea. It contains about 52 feet of gross sandstone and 47 feet of net pay with an average porosity of 20% and permeability of 40 millidarcies. The interval is capable of sustained production rates in excess of 1,000 barrels of 39.5° API gravity oil per day. There is no evidence of an oil-water contact or of a gas cap in the well. Alpine No. 1 and Alpine No. 1A are located about 2.5 miles to the west of Bergschrund No. 1. Alpine No. 1 encountered about 40 feet of gross sandstone in the Alpine Reservoir and 30 feet of net pay. Alpine No. 1A encountered about 60 feet of gross sandstone, all of which is considered pay. To the east, the Fiord wells constrain the Alpine Reservoir accumulation. The Alpine sandstone is absent in Fiord No. 1 and thin in the other Fiord wells. The reservoir characteristics also degrade to the south and southeast due to higher glauconite and clay matrix content. Nechelik No. 1 is located about 3 miles north of Bergschrund No. 1 and contains no Alpine interval. The Alpine interval was removed by truncation by the Lower Cretaceous Unconformity (LCU) at that locality. This regional truncation surface may control and constrain parts of the northern extent of the Alpine Reservoir accumulation. Drilling has not occurred to date on the ASRC leases on the western side of the proposed CRU. Confidential seismic interpretations, however, have been used to map the Alpine interval thickness and to estimate the area potentially underlain by hydrocarbons in the western part of the Alpine Reservoir accumulation.

The Fiord prospect in the proposed CRU is an oil accumulation in the Early Cretaceous (Hauterivian) Kuparuk River Formation (C member equivalent) that was penetrated and tested by Fiord No. 1. Fiord No. 1 penetrated about 25 feet of net pay that was tested at 1,065 barrels of 33° API gravity oil per day. The net pay average porosity is about 24 % and permeability averages 160 millidarcies. The Fiord subarea contains a northwest trending fault system that appears to have been a control on sandstone deposition and preservation. Thickened sandstone intervals appear to be found on the downthrown side of individual normal faults. To the southeast, the accumulation is constrained by Fiord No. 2 where the interval is thin and net pay is negligible. The 3D seismic data has been used effectively to delineate the fault pattern and

potential exploratory drilling locations in the Fiord subarea. The initial POE requires the WIOs to complete an additional Fiord prospect exploratory well prior to May 31, 2000. This effort will help establish the size and potential commerciality of the accumulation(s).

ARCO has discussed other intervals of interest within the proposed CRU that are considered to have only modest potential. The most interesting of these objectives include known, oil-bearing, potential reservoirs in the Upper Jurassic Nechelik and Nuiqsut sandstones, as well as shallower turbidite sandstones of the Early Cretaceous (Albian) Torok Formation. Although interpreted as products of similar depositional systems (shelf sandstones) as the Alpine Reservoir, the older Nechelik and Nuiqsut sandstones appear to be slightly finer grained, more argillaceous and more poorly sorted. Therefore, reservoir characteristics of these two older intervals are substantially poorer than that of the Alpine Reservoir. The Nechelik and Nuiqsut sandstones have porosities generally in the 10 to 15 % range and permeabilities in the less than 1 to 10 millidarcy range based on penetrations in the Colville River Delta area. Although oil bearing, Torok Formation litharenites also have relatively low porosities and permeabilities where they have been encountered in the Colville River Delta area. The economic viability of Nechelik, Nuiqsut and Torok sandstone within the proposed CRU is unknown.

The State's regulations require that a unit include the minimum area required to include all or part of one or more oil or gas reservoirs, or potential hydrocarbon accumulations. 11 AAC 83.356(a). DNR technical staff evaluated all data previously specified to determine if the proposed unit area met that criterion. Much of this data is confidential and therefore cannot be discussed in this decision.

DNR's evaluation of the subsurface geology supports the configuration of the unit area as proposed. The unit operator has demonstrated that a legitimate geologic prospect, which may contain one or more commercially viable oil and gas accumulations, underlies the proposed unit area. DNR's review of the geologic information supports the inclusion of all the leases identified in the unit application within the proposed unit area.

The initial geometry of the initial APA will be the product of a mechanical methodology that involves drawing circles and tangents around proposed development wells, combined with a satisfactory mapping evaluation of the hydrocarbon-bearing Alpine Reservoir. The mapping evaluation used well and seismic data to estimate the area within the proposed unit to be underlain by hydrocarbons and capable of producing or contributing to production of hydrocarbons in paying quantities. Subsection 9.5.1 of the Agreement describes how a participating area for the Alpine Reservoir will be drawn using the "circle and tangent" method. The outer boundaries of the participating area are those lands encompassed within the outermost circles or ellipses and connecting tangents drawn around qualified, proposed injection or production wellbores. The radius of the circles and ellipses is one-half mile, and the area encompassed includes the entirety of each quarter-quarter section whether or not the entirety of that quarter-quarter section falls within the specified drawn configuration.

The Initial Unit POD includes a listing and schedule of proposed injection and production wells on each of the two Alpine development pads. Attachments show proposed bottomhole locations, proposed injection points (in injection wells) and proposed completion intervals (in production

wells), and the resulting draft initial APA for the Alpine Reservoir outline after applying the circle and tangent method. Eight proposed, qualified wells are used to draw the outermost boundaries of the draft initial APA. The eight wells used in drawing this configuration include A15, A17, A11 (from Drill Site A) and B5, B49, B58, B55, and B43 (from Drill Site B). The draft initial APA outline encompasses those lands that the Operator intends to drill and put into production. The geologic and seismic evidence indicates that the draft initial APA outline approximates the 10-foot Alpine Reservoir, net pay isopach contour. The boundary also approximates the estimated area contained within the 200 millidarcy-foot contour from the average kh maps. Uncertainty in mapping these “productive interval” cutoffs is greatest in the western and southern parts of the draft initial APA where well data is currently sparse or non-existent. The 3D seismic mapping and geologic modeling may be somewhat helpful in estimating potentially productive Alpine Reservoir in those areas, but future drilling will be needed to successfully define the economic limits of the reservoir. The Unit Agreement provides for expansions and contractions of a participating area based on the results of the development drilling program (Articles 9 and 12).

The state’s regulations require that a participating area may include only the land 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). Based on its evaluation of the data, which may be amended before the application for the formation of the APA, DNR concludes that the draft initial outline for an Alpine Reservoir participating area is appropriately drawn.

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

Approval of the Agreement will provide near-term economic benefits to the state by creating jobs associated with the construction of the Alpine facilities and operation of the Alpine field, and the assessment of the hydrocarbon potential of the other leases within the unit area. The state will also benefit from the unit plan of development, which proposes to maximize the physical recovery of hydrocarbons from the Alpine reservoir. Maximum hydrocarbon production, will enhance the state's long-term royalty and tax revenues. The WIOs have provided sufficient technical data to define the prospects under consideration, have committed their diverse lease interests to the proposed unit, and have agreed to a plan of exploration and a plan of development, which assures a timely sequence of drilling and development activities to evaluate and develop the proposed unit area.

The leases in the proposed CRU are written on a variety of forms, containing a variety of provisions. During the lengthy Agreement negotiations, the parties bargained for amendments to the terms and conditions of the various lease contracts to harmonize them. Consistent lease provisions allow the WIOs and the state to reduce the administrative burdens of operating and regulating this unit. Conforming the terms of the older leases to the unit agreement allows the state to avoid costly and time-consuming re-litigation of the problematic lease provisions in the older forms.

Under the proposed Unit Agreement, the state will benefit economically from a number of amendments to the individual leases. Specifically, the discovery royalty provision of the DL-1 lease form was eliminated for the seven DL-1 leases in the CRU for any wells not already certified as a discovery well on the effective date of the Agreement. The Alaska Legislature repealed the discovery royalty statute in 1969 and the DNR repealed the discovery royalty regulations in 1979. Although the original discovery royalty statute and regulations were repealed, there are still discovery royalty provisions in the leases issued on the DL-1 form.

Sections 11.6 and 11.8.3 of the Agreement harmonize the various lease provisions that describe the allowable deductions from the state's royalty share. The State's royalty share of production from the CRU will be free and clear of all field costs incurred on the North Slope of Alaska. Certain gas processing costs are specifically allowed.

The Agreement has provisions that resolve some of the challenging issues associated with operation of an oil and gas unit. The parties agreed to the methodology for establishing and revising participating areas. The parties have agreed to the basis for allocating production to the individual tracts included in the participating area. The Agreement also describes the royalty accounting procedures and sets the deemed rate of recovery of certain outside substances injected into reservoirs within the unit. The Agreement clarifies the dismantlement, restoration, and rehabilitation responsibilities of the WIOs when a unit terminates. The Agreement contains the dispute resolution procedures that the parties have agreed to use if any disputes arise during the operation of this unit.

There are also some potential costs associated with the proposed unit. The state agreed to allow the royalty payments for natural gas from the Fiord prospect to be delayed for ten years and for so long thereafter as approved if the Fiord gas is used for repressuring, recycling, storage, or enhanced recovery in another reservoir within the unit.

While the DNR jointly shares administrative responsibilities with the U.S. Department of the Interior, Bureau of Land Management (BLM) and the Minerals Management Service (MMS) for oil and gas units onshore and offshore Alaska, this is the first unit agreement with a private party, non-governmental entity. The BLM, MMS and the DNR have statutes and regulations that govern their administration of oil and gas units. ASRC's responsibilities are not similarly defined. The administrative costs of ASRC's involvement in the CRU management may be significant. This unit will serve as a test case for state-private party units. The Agreement includes many provisions drafted to facilitate ASRC's involvement in management of the unit. If this test case demonstrates that the administrative burdens of sharing some of the unit management responsibilities with a private party are too great, this form of unit will not be repeated.

Finally, there are some potential economic costs associated with the language of the Agreement. Any negotiated document includes compromises. The language of the Agreement is a compromise. It is in many cases cumbersome, archaic and arcane. There are potential dispute resolution costs associated with operating under a comprehensive agreement that is not drafted in clear language. Unclear language is susceptible to varying interpretations, which may cause disputes.

III. AMENDMENTS TO THE MODEL UNIT AGREEMENT FORM

The Agreement is the product of extensive negotiations among representatives from the ASRC, the WIOs, and the DNR. The proposed unit agreement is based on the State/Federal Model Unit Agreement Form. The parties proposed numerous modifications to the model form to address the unique circumstances of the proposed CRU. The most unique circumstance is the inclusion of both state and private lands. All of the proposed changes to the model unit agreement are acceptable to the state.

In Attachment 5 to the CRU application, the WIOs describe the differences between the proposed Agreement and the State/Federal model form. The following is a review and discussion of the more substantial modifications and exceptions to the state/federal model form.

Few changes were proposed to Articles 1 through 7 of the Agreement. Substantial modifications begin to appear with Article 8. Article 8 of the Agreement describes the procedures for obtaining DNR and ASRC approval of plans of exploration and development. It details the elements of the Initial Unit Plan and provides that the Agreement shall not be effective until the Initial Unit Plan has been approved by DNR and ASRC. The Initial Unit Plan was approved by ASRC on February 10, 1998. Article 8 also contains dispute resolution procedures that apply if ASRC and the state cannot agree to approve a later unit plan that affects lands owned by both royalty owners. The state agreed to allow ASRC to participate in the review of unit plans because ASRC insisted that participation was essential to protect their economic interests. The dispute resolution procedures are included to protect all parties against any unreasonable demands of any other party and to insure that development of the unit area is not delayed by litigation. DNR would not, however, agree to these procedures if the unit only comprised state lands.

Article 9 specifies what land must be in a state-only participating area (PA) an ASRC-only PA or PA with both state and ASRC lands. The requirements for state only PAs track the language of the state regulation governing formation and revisions of PAs. 11 AAC 83.351. The requirements for formation of a PA on ASRC lands or joint ASRC/state lands PAs are more complex. The shape of these PAs is determined by the "Circle and Tangent" method based on the use of specified production and injection wells. The Circle and Tangent method was acceptable to the state because this approach is a commonly used method for defining the shape of production units, PAs, and drainage areas in federal units. This method was acceptable to all the parties.

The state and ASRC added new provisions to Article 9, Sections 9.10 and 9.11. They outline the terms and conditions under which the unit operator has the right to use unitized substances for repressuring or recycling purposes. These modifications describe the procedures and options an individual royalty owner has for the use of a its royalty share of production anywhere within the unit. Finally, to obtain the WIO's agreement to other provisions of the Agreement, the state agreed to a delayed royalty payment for the natural gas produced from a Fiord prospect PA if that gas is used to enhance oil production in the Alpine PA. Enhanced recovery of Alpine PA oil would increase royalties and severance taxes due to the state.

Article 10 of the Agreement is the longest and most complex article. It details the procedures for allocating production from PAs that include state only lands and PAs that include any ASRC lands or any joint ASRC/State lands. Each party negotiated to protect its economic interests and to insure fairness in the production allocation process by detailing the procedures for allocating to the individual tracts in a PA. The Agreement sets forth the basis for the initial production allocation to an individual tract in a PA and the reallocation procedures if the PA is contracted or expanded. This section allows equity redeterminations based on available data at specific intervals in the unit's development history, subject to the approval of the state and ASRC. If the parties cannot agree on the redeterminations, there are dispute resolution procedures. The article also allows the parties to adjust and "true up" the payments due the royalty and overriding royalty owners after redeterminations, if necessary.

Article 10 includes two other sections that protect the economic interests of the state. The DL-1 form leases were amended to make the discovery royalty provisions inapplicable to any discovery not certified before the effective date of the unit. Also, the state clarified the exemption from royalty payment provisions of some leases.

ASRC added two new provisions to the Agreement. Section 10.1.10 sets forth tract allocation procedures for reservoirs within the CRU containing both crude oil (an oil rim) and a gas cap. Section 10.1.11 sets forth equity procedures applicable to ASRC and the Kuukpik Corporation on the two ASRC-only leases, Lease Number 22 and 23.

Changes to the model form in Article 11 are designed to unify the leases and protect the economic interests of the royalty owners. Section 11.6 is a new provision, added at DNR's request, that specifies that the royalty to be paid for unitized production shall be free and clear of all lease expense, unit expense, and PA expense on the North Slope of Alaska. It also defines these expenses. ASRC added a new provision to the Agreement, Section 11.11. That section describes how shifts in the NPR-A boundary caused by natural erosion and other natural events will affect the boundaries of unit leases.

DNR proposed that Sections 14.5, 14.6 and 14.7 be added to clarify how the unit area will be restored and rehabilitated after the unit is terminated. Few changes to the model form were made to Articles 15 through 18. The default provisions if Article 19 were clarified and revised to acknowledge ASRC's management role.

Article 20 describes the dispute resolution procedures available to the parties to the Agreement. It provides for different forms of dispute resolution depending on the nature of the dispute and the identity of the disputing parties. It was designed to create management stability during operations by allowing all disputes to be resolved without litigation. It was also designed to insure that unit operations were fairly managed. This article was included because of ASRC's role in management of this unit.

IV. DISCUSSION OF DECISION CRITERIA

The DNR Commissioner reviews unit applications under AS 38.05.180(p) and 11 AAC 83.303. He will approve a proposed unit agreement if he finds that it will conserve the natural resources

of an oil or gas reservoir and is necessary or advisable to protect the public interest. To approve a proposed unit agreement, the commissioner must find that the proposed unit will: 1) promote the conservation of all natural resources; 2) promote the prevention of economic and physical waste; and 3) provide for the protection of all parties of interest, including the state.

A. The Conservation of All Natural Resources.

DNR recognizes unitization of the leases overlaying a reservoir as a prudent conservation mechanism. Without unitization, the unregulated development of reservoirs can become a race for possession by competitive operators. The results can be: 1) unnecessarily dense drilling, especially along property lines; 2) rapid dissipation of reservoir pressure; and 3) irregular advance of displaced fluids, all of which contribute to the loss of ultimate recovery or economic waste. The concentration 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). Conservation orders and field rules issued by the AOGCC would mitigate some of these impacts without an agreement to unitize operations. However, unitization provides the most practical method for maximizing oil and gas recovery, while minimizing negative impacts on other resources.

The concern of lessees competing for the reservoir is less evident in the proposed Colville River Unit because ARCO, Union Texas Alaska and Anadarko Petroleum have already aligned their leasehold interests unit-wide. However, even with only one primary working interest owner group, formation of the unit will provide a comprehensive plan for exploring all the reservoirs within the proposed CRU. The initial unit POD/POE provides for an efficient, integrated approach to development of the Alpine reservoir and the Fiord prospect.

The Agreement will promote the conservation of both surface and subsurface resources through the unitized (rather than lease-by-lease) development. Unitization allows the unit operator to explore the area as if it were one lease. Without the Agreement the lessee would be required to obtain permits to drill wells on each individual lease in order to extend them all beyond their 10-year primary term. As part of the unit, all of the leases are extended provided the unit operator continues to explore and develop under an approved unit plan. The number of facilities required to develop the resource and the area of land that may be required to accommodate those facilities is reduced when the resources on several leases are developed as one. Facilities can be located to maximize recovery and to minimize environmental impacts, without regard for individual lease ownership.

B. The Prevention of Economic and Physical Waste.

Formation of the unit will prevent economic and physical waste because the unit operator must have an equitable cost sharing formula and a coordinated development plan. An equitable cost-sharing agreement promotes efficient development of common surface facilities and operating strategies. An equitable cost-sharing agreement and an acceptable unit operator allow the WIOs in the unit to rationally decide well spacing requirements and injection strategies, and construct

the appropriate 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 strategy.

Unitized operations greatly improve development of reservoirs with variable productivity across adjoining leases. An operator may not produce marginal economic reserves on a lease by lease basis, but can produce them through unitized operations. Facility consolidation and sharing saves capital, and promotes better reservoir management for all WIOs through pressure maintenance and secondary recovery procedures. These factors benefit all parties, including the state, by allowing the operator to develop and produce from less profitable areas of a reservoir.

The overall costs of exploring and developing the CRU leases would probably be higher on a lease-by-lease basis than it will be under the terms of unitization. Investments in drilling and facilities costs will be minimized as a consequence of eliminating the requirement for multiple sites within the unit area. Locations of individual wells and surface facilities will be selected to optimize recovery of the resources and to minimize costs with due regard for environmental considerations.

Reducing costs through unitized operations will expedite development of any reserves discovered and will promote greater ultimate recovery of any oil and gas in the unit area. This will accelerate and extend the state's income stream from severance taxes and royalties. The revenues to the lessee may be reinvested in new exploration and development in the state.

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

Unitization seeks to protect the economic interests of all WIOs and royalty owners of a common reservoir. Operating under a unit agreement and unit operating agreement assures each individual working interest owner an equitable allocation of costs and revenues commensurate with the value of their lease(s). The WIOs are also protected by the provisions of the Agreement and state law that provide for notice and an opportunity to be heard if they disagree with a unit management decision made by the state or ASRC.

ASRC's interests are protected by their level of involvement in the unit management process and the dispute resolution procedures. The Kuukpik Corporation's interests were protected during the process of negotiating for consent to subsurface development on their lands. They negotiated for specific limitations on surface use of the leases in which they have surface rights. Kuukpik also received overriding royalty interests in the leases which ASRC had an interest as compensation from the working interest owners and ASRC for consenting to oil and gas activities on their lands.

The proposed Agreement promotes the state's economic interests because production from the Alpine reservoir and further exploration of the other prospects within the unit area will likely occur earlier than without unitization. Diligent exploration and development under a single approved unit plan without the complications of competing operators is in the state's best interest. It promotes efficient evaluation of the state's resources, yet minimizes impacts to the

region's cultural, biological, and environmental resources. Earlier production from the Alpine reservoir will stimulate the state's economy from the production-based revenue, oil and gas related jobs, and service industry activity. The Agreement also provides for accurate reporting and record keeping, state concurrence with operating procedures, royalty settlement, in kind taking, and emergency storage of oil, all of which will further the state's interest. The modifications to the varying provisions of some of the leases that eliminate discovery royalties and field costs will economically benefit the state.

The Agreement is an unprecedented event for the state. It is the first time that a private, third party shares management responsibility for an oil and gas unit in the State of Alaska. A unit agreement such as this Agreement may not be signed again if the additional administrative burdens of sharing unit management responsibility with a third party are too great. The state and ASRC will both be able to protect their respective economic interests in the unit management process by the use of the dispute resolution procedures, if necessary.

V. FINDINGS AND DECISION

A. The Conservation of All Natural Resources.

1. The Agreement will conserve all natural resources, including hydrocarbons, gravel, sand, water, wetlands, and other valuable habitat.
2. The unitized development and operation of the leases in this proposed unit will reduce the amount of land and fish and wildlife habitat that would otherwise be disrupted by individual lease development. This reduction in environmental impacts and interference with subsistence activity is in the public interest.
3. If the exploration activities in the initial unit plan result in the discovery of a commercially producible reservoir, then there will be environmental impacts associated with the reservoir development. All unit development must proceed according to an approved plan of development. Before undertaking any specific operations, the unit operator must submit a Plan of Operations to the DNR and other appropriate state and local agencies for review and approval. All agencies must grant the required permits before drilling or development operations may commence. DNR may condition its approval of a unit Plan of Operations and other permits on performance of mitigating measures in addition to those in the leases if necessary or appropriate. Requiring strict adherence to the mitigating measures will minimize adverse environmental impacts.

B. The Prevention of Economic and Physical Waste.

1. ARCO submitted geological and engineering data to DNR in support of the unit application. DNR technical staff determined that the Colville River Unit area encompasses all or part of one commercially viable accumulation and one or more potential hydrocarbon accumulations.
2. The initial unit plan meets the requirements of 11 AAC 83.303, 11 AAC 83.341 and 11 AAC 83.343. The unit operator must conduct the proposed exploration and development activities in accordance with the schedule specified in the initial unit plan.
3. Arco must submit an annual update to the initial unit plan to DNR for approval. 11 AAC 83.341 and 11 AAC 83.343. The annual update must describe the status of projects undertaken and the work completed, and any proposed changes to the plan. Any changes to the unit plan must comply with Article 8 of the Agreement. Arco must submit a new exploration or development plan before the initial unit plan expires.
4. The initial unit plan provides for the rational exploration and development of potential hydrocarbon accumulations in the unit area. The initial unit plan is approved.
5. The Agreement will assure a fair and equitable return to the state from hydrocarbon production from the unit area.
6. The CRU will expedite exploration and development of the unit area. The unit provides greater economic benefits to the state than the economic costs to the state of extending the primary term of the state leases committed to the unit.

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

1. The Agreement, conditioned upon the performance of its initial unit plan of exploration and development, adequately and equitably protects the public interest, and is in the state's best interest.
2. The Agreement, with the modifications proposed by the parties and outlined in Article III of this Decision and Findings, meets the requirements of AS 38.05.180(p) and 11 AAC 83.303.

3. DNR complied with the public notice requirements of 11 AAC 83.311.
4. The Agreement 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 covered by this Agreement.
5. The Agreement provides for expansions and contractions of the unit area in the future, as warranted by data obtained by exploration. The Agreement thereby protects the public interest, the rights of the parties, and the correlative rights of adjacent landowners.
6. All proper parties have been invited to join the Agreement. 11 AAC 83.328.
7. The parties have sufficient interest in the unit to exercise control of unit operations. 11 AAC 83.316(c).

For the reasons discussed in this Decision and Finding, I hereby approve the Colville River Unit Agreement. Simultaneous with the approval of the Colville River Unit Agreement, I approve the contraction of the Kuukpik Unit and the inclusion of the contracted leases into the Colville River Unit. This Agreement will be effective at 12:01 a.m. after it has been signed by the Commissioner and the President of ASRC in the form submitted with the application.



John Shively, Commissioner
Alaska Department of Natural Resources

3/19/98

Date

3. DNR complied with the public notice requirements of 11 AAC 83.311.
4. The Agreement 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 covered by this Agreement.
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7. The parties have sufficient interest in the unit to exercise control of unit operations. 11 AAC 83.316(c).

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JS


 John Shively, Commissioner
 Alaska Department of Natural Resources

3/19/98
 Date