

STATE OF ALASKA
ALASKA OIL AND GAS CONSERVATION COMMISSION
333 West 7th Avenue, Suite 100
Anchorage, Alaska 99501

Re: THE APPLICATION OF) Area Injection Order No. 30
CONOCO-PHILLIPS ALASKA)
INC. for an order authorizing) Colville River Field
underground injection of fluids for) Colville River Unit
enhanced oil recovery in the Fiord) Fiord Oil Pool
Oil Pool, Colville River Field,)
Colville River Unit, North Slope,) July 25, 2006
Alaska)

IT APPEARING THAT:

1. By letter and application dated November 22, 2005, and received by the Alaska Oil and Gas Conservation Commission ("Commission") on November 25, 2005, ConocoPhillips Alaska, Inc. ("ConocoPhillips") in its capacity as Unit Operator of the Colville River Unit ("CRU") requested an order from the Commission authorizing the injection of fluids for enhanced oil recovery in the Fiord Oil Pool within the CRU.
2. Notice of a public hearing was published in the Anchorage Daily News on December 20, 2005.
3. The Commission requested additional information from ConocoPhillips on December 20, 2005. Supplemental information was received from ConocoPhillips on January 11, 12 and 13, 2006 and on July 18, 2006.
4. The Commission received no protests, comments or requests for public hearing.
5. The Commission vacated the public hearing on January 13, 2006.
6. On January 27, 2006, the Commission received a request from ConocoPhillips to contract Sections 13, 14, and 15 of T12N, R5E, Umiat Meridian ("UM") from the affected area of Area Injection Order 18B (October 7, 2004) in order to ensure that there is no overlap between the Alpine Oil Pool and the proposed Fiord Oil Pool.

FINDINGS:

1. Operator: ConocoPhillips is the operator of the property in the area proposed for development. ConocoPhillips uses the name Fiord in reference to the development project.
2. Project Area Pool and Formations Authorized for Enhanced Recovery: Enhanced recovery injection is proposed within the Fiord Oil Pool. This pool correlates to the Fiord No. 5 exploration well between the measured depths of 6,876' and 7,172'. It encompasses two reservoir sandstones that are in direct contact and in hydraulic

communication within the oil column: the deeper "Nechelik zone" lies within the Kingak formation and the shallower "Kuparuk zone" lies within the Kuparuk formation.

3. Proposed Injection Area: ConocoPhillips requested authorization to inject fluids for the purpose of enhanced recovery operations on lands in the CRU within T12N-R4E, T12N-R5E, T13N-R4E, and T13N-R5E, UM.
4. Operators/Surface Owners Notification: ConocoPhillips provided operators and surface owners within one-quarter mile of the proposed area with a copy of the application for injection. The only affected operator is ConocoPhillips, operator of the CRU. The State of Alaska, Department of Natural Resources and Kuukpik Corporation are the only affected surface owners.
5. Description of Operation: The Fiord Oil Pool will be developed from the new CRU drill site named CD3. Seventeen horizontal wells, nine producers and eight injectors, will be drilled to the Fiord Oil Pool. Water alternating with miscible gas injection ("MWAG") will be implemented as the enhanced recovery mechanism. Water injection is scheduled to begin in 2006 followed by miscible hydrocarbon gas ("MI") injection beginning in 2007. Production from this pool will be commingled with production from other pools within the CRU before separation and processing at the Alpine Central Facility. All production will be transported from the Alpine Central Facility to the Kuparuk River Unit using the existing pipeline.

Peak production rates from the Fiord Oil Pool are expected to range between about 14,000 and 41,000 barrels of oil per day. Peak waterflood injection rates are expected to reach between 23,000 and 59,000 barrels of water per day ("BWPD"). Miscible gas injection rates are expected to peak between 16 and 42 million standard cubic feet of gas per day ("MMSCFD").

6. In-Place and Recoverable Hydrocarbon Volumes: Based on exploratory drilling and seismic mapping the Fiord Oil Pool is estimated to contain 80 to 190 million stock tank barrels ("MMSTB") of original oil in place ("OOIP"). Computer simulation predicts recoverable reserves of between 32 and 113 MMSTB. More detailed information is presented in the table below.

<u>Estimates</u>	<u>Kuparuk Zone</u>	<u>Nechelik Zone</u>	<u>Fiord Oil Pool Totals</u>
OOIP, MMSTB	20 to 60	60 to 130	80 to 190
Primary Recovery, MMSTB	1 to 6	9 to 26	10 to 32
Waterflood Recovery, MMSTB	7 to 31	5 to 16	12 to 47
MWAG Recovery, MMSTB	3 to 11	7 to 23	10 to 34
Total Estimated Recovery, MMSTB	11 to 48	21 to 65	32 to 113

7. Geologic Information:
 - a. Stratigraphy and Structure: The Fiord Oil Pool encompasses two reservoir sandstone intervals that are in direct contact and in hydraulic communication

within the oil column. The deeper, Jurassic-aged reservoir interval, informally termed the Nechelik zone, lies within Kingak formation. The shallower reservoir interval, informally named the Kuparuk zone, lies within the Cretaceous-aged Kuparuk formation.

1. Nechelik Zone: The Nechelik zone consists of very fine-grained, bioturbated, quartz-rich sandstone deposited in environments ranging from marine-shelf (at the base of the zone) to middle shoreface (near the top). Detrital matrix constitutes 10 to 30 percent of the sediments at the base of the Nechelik, but decreases in abundance upward as sand content increases. The best-quality reservoir sandstone occurs near the top of the zone.
2. Kuparuk Zone: The Kuparuk zone consists of a thin, transgressive, fine- to medium-grained, quartz-rich shallow-marine sandstone containing varying amounts of glauconite and siderite cement. This sandstone was deposited directly atop the Lower Cretaceous Unconformity ("LCU"). It is typically less than 5' thick, but thickens locally on the downthrown sides of northwest-trending normal faults that occur in the development area that were active during deposition.

The Nechelik and Kuparuk zones are separated by a wedge of predominantly non-reservoir shale and sandstone that thickens to the south. The top of the non-reservoir wedge is the LCU, which dips to the north. The base of the wedge is the top of the Nechelik zone, which dips southeast within the proposed development area. In the northern part of the pool, the LCU intersects and cuts into the Nechelik zone, and the reservoir sandstone of the Kuparuk zone directly contacts reservoir sandstone of the Nechelik zone.

At Kuparuk level, the Fiord structure dips to the northwest within the development area. The main fault in the development area is termed the "Fiord" fault, and it is a northwest-trending, down-to-the-west, normal fault.

Along the southeastern edge of the affected area, within portions of Sections 13, 14, and 15 of T12N, R5E, UM, the wedge of sediments separating the Nechelik and Kuparuk zones contains a thin interval of Alpine sandstone. This sandstone is 5' thick in the Fiord No. 2 exploration well, where it was described as being fine-to medium-grained, calcareous, and glauconitic with spotty, medium to dark brown oil staining. In this area, which is situated more than 2 miles from the nearest Alpine development well, the Alpine sandstone appears to be of fair to poor reservoir quality.

- b. Confining Intervals: The Fiord Oil Pool is overlain by approximately 90' of Kuparuk D and Kalubik shales. The pool is underlain by 330' to 1,100' of interbedded mudstone, siltstone and very fine-grained sandstone assigned to the Kingak formation. The overlying and underlying confining intervals are laterally continuous throughout the proposed development area.

8. Well Logs: Logs of injection wells will be filed with the Commission according to the requirements of 20 AAC 25.
9. Mechanical Integrity and Well Design of Injection Wells: Cement-bond logs will be run to demonstrate isolation of injected fluids to the Fiord Oil Pool. To facilitate wireline access, packers in injection wells may be located more than 200' measured depth above the top of the injection zone; however, packers will not be located above the confining zone.
10. Type of Fluid / Source: Fluids requested for injection are:
- a. source water from the Beaufort Sea;
 - b. MI obtained from the Alpine Central Facility;
 - c. produced water from the Fiord Oil Pool;
 - d. produced water from other oil pools within the CRU; and
 - e. small amounts of Class II fluids, which will be blended with the source or produced water including: sump fluid, hydro-test fluid, rinsate from washing mud-hauling trucks, excess well-work fluids, melt water collected from well cellars and secondary containment, and treated camp waste water.
11. Water Composition, Water and MI Compatibility with Formation: Seawater will be the initial waterflood source water for the proposed Fiord Oil Pool. Later in the life of the field, waterflood source water is expected to change from seawater to some combination of seawater, produced water from the Fiord Oil Pool, produced water from other oil pools within the CRU, small volumes of non-hazardous fluids collected from sumps, hydrotests, well-work, rinsate from washing mud hauling trucks, and treated camp waste water. Core flood studies indicate compatibility of seawater with both the Nechelik and Kuparuk zones of the Fiord Oil Pool. The operator reports that, with proper treatment, produced water from other CRU pools and seawater are expected to be compatible with the Fiord Oil Pool.

Numerical simulation, laboratory experiments, and PVT modeling indicate that MI obtained from the Alpine Central Facility will be miscible with Fiord crude oil at initial reservoir conditions, and will significantly reduce residual oil saturations below that achievable by waterflooding. Simulated slim tube recovery results indicate a miscibility pressure of 2,935 psia based on expected MI composition.

12. Injection Rates and Pressures: Injection rates will be adjusted to manage voidage for both zones. Injection of MI and water will alternate in each injection well. Expected maximum and average injection rates are:

Zone	Maximum MI Rate (MMSCFD)	Average MI Rate (MMSCFD)	Maximum Water Rate (BWPD)	Average Water Rate (BWPD)
Nechelik	10	6.5	10,000	2,200
Kuparuk	10	6.3	10,000	1,900

Seawater injection pressures from the Alpine Central Facility pump discharge are expected to average approximately 2,500 psi. Wellhead pressures during water injection cycles are expected to be about 2,400 psi. The MI pressure available from the Alpine Central Facilities is expected to be about 4,000 psi, and wellhead pressures during MI injection cycles are expected to be 3,800 psi. Injection wells may be choked back to lower wellhead pressures to manage injection rate.

Variations in MI composition are expected to yield minimum miscibility pressure variations from 2,400 to 3,200 psi. To ensure optimal resource recovery, ConocoPhillips will maintain average reservoir pressure above the minimum miscibility pressure.

13. Fracture Information: Although injection pressure will exceed the parting pressure of both the Nechelik and Kuparuk zones, computer modeling indicates:
 - a. fractures created within the Nechelik and Kuparuk zones will be confined to the injection zones or will be arrested in the confining zones above and below the injection intervals, and
 - b. injected fluids will remain within the Fiord Oil Pool.
14. Absence of Underground Sources of Drinking Water: According to the findings and conclusions of Area Injection Orders 18, 18A, and 18B, there are no underground sources of drinking water beneath the permafrost in the CRU area. Shallow aquifer salinity calculations performed on well log data from the Fiord No. 1, 4, 5PB1 and Nigliq No. 1 exploration wells and wellbores confirm that there are no aquifers within the affected area that could serve as underground sources of drinking water.
15. Mechanical Condition of Adjacent Wells: The Fiord No. 1, 2, 4, 5, 5 PB1, Nigliq No. 1, 1A, and Nechelik No. 1 exploration wells all penetrate the proposed injection intervals within the project area. All of these wells have been plugged and abandoned, and have sufficient mechanical isolation to provide confinement of the proposed injection intervals.
16. Elimination of Overlap with Alpine Oil Pool: Area Injection Order 18B (October 7, 2004) for the Alpine Oil Pool includes Sections 13, 14, and 15 of T12N, R5E, UM. Examination of well logs from exploratory well Fiord No. 2 demonstrate that the Alpine sandstone is thin and of fair to poor reservoir quality within these sections.

CONCLUSIONS:

1. The application requirements of 20 AAC 25.402 have been met.
2. Injection of water and MI will significantly improve recovery.
3. There are no underground sources of drinking water beneath the permafrost in the proposed affected area, which is contained in the CRU.

4. Sections 13, 14, and 15 of T12N, R5E, UM should be removed from the affected area of Area Injection Order 18B (October 7, 2004) and included in the affected area of this area injection order.
5. Increasing the distance between the packer and top of the injection zone will not compromise well integrity, so long as the top of production casing cement is at least 300' measured depth above the packer.
6. The proposed injection operations will be conducted in permeable strata, which can reasonably be expected to accept injected fluids at pressures less than the fracture pressure of the confining strata.
7. Injected fluids will be confined within the appropriate receiving intervals by impermeable lithology, cement isolation of the wellbore and appropriate operating conditions.
8. Seawater waterflood source water is compatible with the Fiord Oil Pool. Compatibility has not been demonstrated for produced waters, mixtures of waters, non-hazardous liquids collected from sumps, hydrotests, well work, rinsate from washing mud-hauling trucks, and treated camp wastewater.
9. Reservoir pressure will be maintained to ensure gas miscibility.
10. Reservoir and well surveillance, coupled with regularly scheduled mechanical integrity tests will demonstrate appropriate performance of the enhanced oil recovery project or disclose possible abnormalities.
11. Sufficient information has been provided to authorize injection of water and miscible and gas into the Fiord Oil Pool for the purposes of pressure maintenance and enhanced oil recovery.

NOW, THEREFORE, IT IS ORDERED:

The underground injection of fluids for enhanced oil recovery is authorized in the Fiord Oil Pool within the affected area, subject to the following rules and the statewide requirements under 20 AAC 25 to the extent not superseded by these rules.

Affected Area:

Umiat Meridian

<u>Township, Range</u>	<u>Sections</u>
T12N, R4E	1, 2, 11, 12, 13, 14
T12N, R5E	1 - 18
T13N, R4E	25, 34, 35, 36
T13N, R5E	15 - 22, 26 - 36

Rule 1 Authorized Injection Strata for Enhanced Recovery

Authorized fluids may be injected for purposes of pressure maintenance and enhanced recovery within the Fiord development area into strata that are common to, and

correlate with, the interval between the measured depths of 6,876' and 7,172' measured depth in the Fiord No. 5 well.

Rule 2 Fluid Injection Wells

The underground injection of fluids must be through a well that has been permitted for drilling as a service well for injection or through a well approved for conversion to a service well for injection in conformance with 20 AAC 25.

Rule 3 Injection Well Completion

To facilitate wireline access, packers in injection wells may be located more than 200' measured depth above the top of the injection zone; however, packers must not be located above the confining zone. In cases where the distance is more than 200' above the injection zone, the production casing cement volume shall be sufficient to ensure cement placement a minimum of 300' measured depth above the planned packer depth.

Rule 4 Authorized Fluids for Enhanced Recovery

Fluids authorized for injection are:

- a. produced water from the Fiord Oil Pool;
- b. source water from a sea water treatment plant;
- c. miscible gas obtained from the Alpine Central Facility with the condition that the reservoir pressure must be maintained to ensure the miscibility of the injectant.

In addition, the following fluids may be authorized by future administrative approval for injection upon demonstration of compatibility with the Fiord reservoir:

- a. produced water from other CRU oil pools;
- b. tracer survey liquid to monitor reservoir performance;
- c. small amounts of other non-hazardous liquids: sump liquid, hydrotest liquid, rinsate from washing mud hauling trucks, excess well work liquids, and treated camp waste water.

In the event any mixture of approved fluids is injected, the following additional requirements apply:

- a. The operator shall continue to collect and analyze representative samples of the mixed fluid stream to demonstrate its non-hazardous characteristics and its continued suitability for EOR injection.
- b. Analysis results must be retained according to the provisions of 20 AAC 25.310.

Rule 5 Monitoring Tubing-Casing Annulus Pressure

The tubing and casing annuli pressures of each injection well must be monitored at least daily, except if prevented by extreme weather condition, emergency situations, or

similar unavoidable circumstances. Monitoring results shall be documented and made available for Commission inspection.

Rule 6 Demonstration of Tubing/Casing Annulus Mechanical Integrity

A Commission-witnessed mechanical integrity test must be performed after injection is commenced for the first time in a well, to be scheduled when injection conditions (temperature, pressure, rate, etc.) have stabilized. Subsequent tests must be performed at least once every four years thereafter, except at least once every two years in the case of a slurry injection well. The Commission must be notified at least 24 hours in advance to enable a representative to witness mechanical integrity tests. Unless an alternate means is approved by the Commission, mechanical integrity must be demonstrated by a tubing/casing annulus pressure test using a surface pressure of 1,500 psi or 0.25 psi/ft multiplied by the vertical depth of the packer, whichever is greater, that shows stabilizing pressure and does not change more than 10 percent during a 30-minute period. Results of mechanical integrity tests must be readily available for Commission inspection.

Rule 7 Well Integrity and Confinement

Injection operations must ensure that injected fluids do not fracture through adjacent confining intervals or migrate out of the approved injection zone.

Whenever any pressure communication, leakage or lack of injection zone isolation is indicated by injection rate, operating pressure observation, test, survey, log, or other evidence, the operator shall notify the Commission by the next business day and submit a plan of corrective action on a Form 10-403 for Commission approval. The operator shall immediately shut in the well if continued operation would be unsafe or would threaten contamination of freshwater, or if so directed by the Commission. A monthly report of daily tubing and casing annuli pressures and injection rates must be provided to the Commission for all injection wells indicating well integrity failure or lack of injection zone isolation.

Rule 8 Notification of Improper Class II Injection

Injection of fluids other than those listed in Rule 4 without prior authorization is considered improper Class II injection. Upon discovery of such an event, the operator must immediately notify the Commission, provide details of the operation, and propose actions to prevent recurrence. Additionally, notification requirements of any other State or Federal agency remain the operator's responsibility.

Rule 9 Plugging and Abandonment of Fluid Injection Wells

An injection well located within the affected area must not be plugged or abandoned unless approved by the Commission in accordance with 20 AAC 25.112.

Rule 10 Other conditions

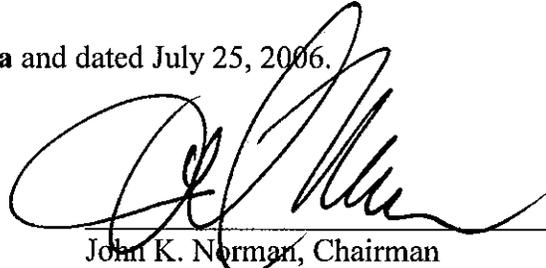
- a. It is a condition of this authorization that the operator complies with all applicable Commission regulations.

- b. The Commission may suspend, revoke, or modify this authorization if injected fluids fail to be confined within the designated injection strata.

Rule 11 Administrative Actions

Unless notice and public hearing are otherwise required, the Commission may administratively waive or amend the requirements of any rule stated above as long as the change does not promote waste or jeopardize correlative rights, is based on sound engineering and geoscience principles, and will not result in an increased risk of fluid movement into freshwater.

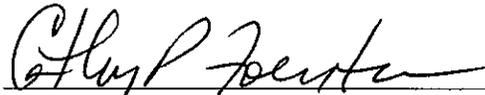
DONE at Anchorage, Alaska and dated July 25, 2006.



John K. Norman, Chairman
Alaska Oil and Gas Conservation Commission



Daniel T. Seamount, Jr., Commissioner
Alaska Oil and Gas Conservation Commission



Cathy P. Foerster, Commissioner
Alaska Oil and Gas Conservation Commission

AS 31.05.080 provides that within 20 days after receipt of written notice of the entry of an order, a person affected by it must file with the Commission an application for rehearing. A request for rehearing must be received by 4:30 PM on the 23rd day following the date of the order, or next working day if a holiday or weekend, to be timely filed. The Commission shall grant or refuse the application in whole or in part within 10 days. The Commission can refuse an application by not acting on it within the 10-day period. An affected person has 30 days from the date the Commission refuses the application or mails (or otherwise distributes) an order upon rehearing, both being the final order of the Commission, to appeal the decision to Superior Court. Where a request for rehearing is denied by non-action of the Commission, the 30-day period for appeal to Superior Court runs from the date on which the request is deemed denied (i.e., 10th day after the application for rehearing was filed).