

**STATE OF ALASKA**  
**ALASKA OIL AND GAS CONSERVATION COMMISSION**  
**333 West 7<sup>th</sup> Avenue, Suite 100**  
**Anchorage, Alaska 99501**

**Re: THE APPLICATION OF ) Enhanced Recovery Injection Order No. 4**  
**CONOCOPHILLIPS ALASKA, )**  
**INC. for an order authorizing a ) Colville River Unit**  
**pilot injection project designed to ) Qannik Accumulation**  
**test the potential for enhanced oil ) Well Colville River Unit CD2-404**  
**recovery in the Qannik )**  
**Accumulation, Colville River Unit, ) December 11, 2006**  
**North Slope, Alaska**

**IT APPEARING THAT:**

1. By letter and application dated October 20, 2006, ConocoPhillips Alaska, Inc. ("ConocoPhillips") as Operator of the Colville River Unit ("CRU") requests an order from the Alaska Oil and Gas Conservation Commission ("Commission") to authorize pilot water injection into well Colville River Unit CD2-404 ("CD2-404") to test the potential for enhanced oil recovery under 20 AAC 25.402.
2. Notice of a public hearing was published in the Anchorage Daily News on October 23, 2006.
3. No comments, protests or request for public hearing were received.
4. The Commission determined it had sufficient information as a basis for ruling, and the tentative public hearing was vacated.

**FINDINGS:**

1. Operator:

ConocoPhillips is operator of the Qannik Accumulation ("Qannik") in the CRU, North Slope, Alaska.

2. Project Location:

The surface location of well CD2-404 is 1,605' from the north line and 1,559' from the east line of Section 2, T11N, R4E of the Umiat Meridian. The bottomhole location is 956' from the south line and 928' from the west line of Section 26, T12N, and R4E of the Umiat Meridian. The surface and bottomhole locations are located onshore within the CRU.

3. 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. The Kuukpik Corporation is the only affected surface owner.

4. Description of Operation:

The Qannik is a potentially productive interval that has been penetrated by many wells targeting the deeper defined pools within the CRU. Well CD2-404 is the first well drilled to specifically target the Qannik. ConocoPhillips conducted flow tests on CD2-404 and now proposes to conduct injectivity tests using seawater to further evaluate the commercial potential of the Qannik. ConocoPhillips' proposed project involves injecting up to 30,000 barrels of seawater at various rates to determine fluid compatibility and fracture initiation pressure and then to flowback the injected water to evaluate sand control issues for future producing wells after water breakthrough.

5. Geologic Information:

- a. Injection will occur within CD2-404 into the Qannik, which is currently not part of a defined pool. The application describes the Qannik as the accumulation of hydrocarbons that is common to and correlates with the accumulation found in well Colville River Unit CD2-11 between the measured depths of 6,084' and 6,253' (4,013' to 4,099' true vertical depth subsea).
- b. The Late Cretaceous aged Qannik represents a Brookian topset play in which thin shallow marine sands (5 to 25 feet gross sand) are trapped stratigraphically and structurally.

6. Well Logs:

The initial formation logs obtained while drilling well CD2-404 are on file with the Commission.

7. Mechanical Integrity and Well Design of Injection Wells:

Well CD2-404 was permitted as an exploratory well in accordance with 20 AAC 25.005. ConocoPhillips anticipated possible use of the well as an injection well and designed it to meet those requirements. The drilling and cementing records from CD2-404 were reviewed and found satisfactory to prevent the wellbore from serving as a conduit for fluid migration out of the approved interval.

8. Injection Rates, Pressures, Fracture Propagation:

The injection rates are expected to average 1,500 to 3,200 barrels water per day ("BWPD"). The injection rate will be managed based on a step rate test used to determine fracture initiation pressure.

9. Type of Fluid / Source Water Analysis:

The fluid requested for injection is seawater provided from the Alpine Central Facility. Compatibility of the seawater and the Qannik is unknown and is a major factor for conducting the proposed test.

10. Freshwater Information:

Area Injection Order 18B concluded no underground sources of drinking water exist below the permafrost in the CRU area.

11. Expected Increase in Hydrocarbon Recovery:

There is no incremental hydrocarbon recovery associated with this proposed project. This project is intended to determine if a water flood will enhance recovery, and determine the critical design considerations for a full scale EOR project.

12. Mechanical Condition of Adjacent Wells:

Six Alpine Oil Pool development wells lie within the ¼ mile area of review (“AOR”) for CD2-404. Four of the wells are within ¼ mile of the 7-5/8” production-casing shoe with the remaining 2 wells within the AOR along the well’s trajectory. None of these wells is cemented across the Qannik. CPAI has not reported any problems with any of these wells.

**CONCLUSIONS:**

1. The application requirements of 20 AAC 25.402 have been met.
2. A review of the well records indicates that CD2-404 is constructed in a way that will prevent the migration of fluids outside the Qannik. Well integrity for CD2-404 must be demonstrated according to 20 AAC 25.412 (c).
3. Six wells penetrate the Qannik formation within ¼ mile of well CD2-404 targeting deeper productive formations. In each well, the production casing is uncemented across the Qannik. The volume of seawater to be injected represents a zone of influence within the Qannik that is insufficient to reach any of the 6 adjacent wells. Monitoring of the open annuli pressures in wells CD2-03, CD2-09, CD2-11; CD2-12, CD2-15, and CD2-23 will be used to ensure no fluids migrate out of zone via the uncemented annuli of these adjacent wells.
4. The suitability of seawater injection has not been established for the Qannik.
5. There are no potential sources of underground drinking water beneath the permafrost in the CRU area.
6. Sufficient information has been provided to authorize pilot water injection into the Qannik to evaluate the suitability of seawater injection as a possible enhanced recovery technique.
7. Injection pressure will be monitored to evaluate fracture initiation, propagation, and leak-off properties of the injectant.
8. Injected fluids will be confined within the appropriate receiving intervals by impermeable lithology, cement isolation of the wellbore and appropriate operating conditions.
9. Well surveillance will help demonstrate the performance of the pilot injection project or disclose possible abnormalities.

**NOW, THEREFORE, IT IS ORDERED THAT:**

The underground injection of water for the evaluation of enhanced oil recovery is authorized in CD2-404, subject to the following rules and the statewide requirements under 20 AAC Chapter 25 to the extent not superseded by these rules.

**Rule 1: Expiration Date**

This Order shall expire 12 months after its effective date.

**Rule 2: Authorized Injection Strata**

Injection into the Qannik accumulation is authorized. The Qannik accumulation is the accumulation of hydrocarbons that is common to and correlates with the accumulation found in well Colville River Unit CD2-11 between the measured depths of 6,084' and 6,253' (4,013' to 4,099' true vertical depth subsea).

**Rule 3: Fluid Injection Well**

Well CD2-404 is the only well authorized for fluid injection during this pilot project.

**Rule 4: Authorized Fluid for Enhanced Recovery**

No more than 30,000 barrels of seawater may be injected. Seawater received from the Alpine Central Facility is the only fluid authorized for injection during this pilot project.

**Rule 5: Authorized Injection Pressure for Enhanced Recovery**

- a. After determination of the fracture initiation pressure by means of a step rate test the normal injection pressures must be maintained below the parting pressure of the Qannik.
- b. Injection pressures must be maintained so that injected fluids do not fracture the confining zone or migrate out of the approved injection stratum.

**Rule 6: Demonstration of Tubing/Casing Annulus Mechanical Integrity**

The mechanical integrity of the injection well must be demonstrated before injection begins, and before returning the well to service following a workover affecting mechanical integrity. A Commission-witnessed mechanical integrity test must be performed after injection is commenced for the first time in the well, to be scheduled when injection conditions (temperature, pressure, rate, etc.) have stabilized. Mechanical integrity must be demonstrated by a tubing/casing annulus pressure test using a surface pressure of 2500 psi, that shows stabilizing pressure and does not change more than 10 percent during a 30-minute period. Results of mechanical integrity tests must be submitted to the Commission upon completion.

### **Rule 7: Pilot Project Surveillance**

Information gathered from the pilot, including daily wellhead injection pressures, tubing and casing annuli pressures in all wells within ¼ mile of CD2-404 injection interval that have uncemented penetrations through the Qannik, injection rates, volumes injected and produced back, and injection test results shall be monitored and provided monthly to the Commission until the pilot project is completed.

At the conclusion of this pilot EOR project, a report shall be sent to the Commission containing information regarding project parameters including but not limited to:

- a. Compatibility of seawater with Qannik formation fluids.
- b. Analysis of injection performance.
- c. Analysis of fluid containment surveys, step-rate tests or MIT's that would demonstrate confinement of injected fluids.
- d. Evaluation of fracture initiation, propagation, and leak-off properties determined from the pilot project.
- e. Evaluation of annular pressures in the following adjacent wells: CD2-03, CD2-09, CD2-11, CD2-12, CD2-15, and CD2-23
- f. Review of any specialized tests performed to gauge performance and results of the pilot project.

### **Rule 8: Notification of Improper Class II Injection**

Injection of fluids other than seawater is considered improper Class II injection. Upon discovery of such an event, the operator must immediately suspend injection, notify the Commission, and provide details of the operation. Additional notification requirements of any other State or Federal agency remain the operator's responsibility.

### **Rule 9: Well Integrity Failure and Confinement**

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 immediately notify the Commission and immediately shut in the well if continued operation would be unsafe or would threaten contamination of freshwater, or if so directed by the Commission.

### **Rule 10: Other Conditions**

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

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 is otherwise required, the Commission may administratively waive or amend 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 fluid movement outside of the authorized injection zone.

DONE at Anchorage, Alaska and dated December 11, 2006.



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

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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 23<sup>rd</sup> 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., 10<sup>th</sup> day after the application for rehearing was filed).