

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

Re: THE APPLICATION OF CONOCOPHILLIPS) Docket ERIO-11-001
ALASKA, INC. for an order authorizing a pilot) Enhanced Recovery Injection Order
project injecting carbon dioxide gas and nitrogen gas) No. 5
to test the potential for recovery of methane from gas)
hydrates in the "Upper C Sands" of the) Prudhoe Bay Unit
Sagavanirktok Formation, Prudhoe Bay Unit, North) Ignik Sikumi No. 1
Slope, Alaska) Sagavanirktok Formation
) Upper C Sands
)
) January 18, 2012

IT APPEARING THAT:

1. By letter and application dated October 14, 2011, ConocoPhillips Alaska, Inc. (CPAI), as operator of the Prudhoe Bay Unit Ignik Sikumi No. 1 exploratory well (Ignik Sikumi 1), requests an order from the Alaska Oil and Gas Conservation Commission (AOGCC) to authorize a pilot project injecting carbon dioxide gas (CO₂) and nitrogen gas (N₂) into the "Upper C Sands" of the Sagavanirktok Formation (Upper C Sands) to test the potential of methane gas production from gas hydrates. The process for which CPAI seeks approval utilizes a technology not proved feasible under the conditions in which it is being tested. The purpose of the project is to test the potential for gas recovery from the Upper C Sands.
2. Notice of opportunity for a public hearing was published in the Anchorage Daily News on October 24, 2011. The public hearing was tentatively scheduled for November 29, 2011.
3. No comments, protests or requests for public hearing were received.
4. Based upon information submitted by CPAI and matters in AOGCC files, the Commission has sufficient information to rule on the request. The public hearing tentatively scheduled for November 29, 2011 was vacated on November 17, 2011.

FINDINGS:

1. Operator

CPAI is the operator of the Ignik Sikumi 1 exploratory well, Prudhoe Bay Unit, North Slope, Alaska.

2. Project Location

The surface location of the Ignik Sikumi 1 is 1858 feet from south section line (FSL), 2475 feet from west section line (FWL), Section 34, T12N, R11E, and a bottom hole location 1848 feet FSL, 2478 feet FWL, Section 34, T12N, R11E, Umiat Meridian. The surface and bottom hole locations are within the Prudhoe Bay Unit.

3. Notification of Operators and Surface Owners

CPAI provided operators and surface owners within ¼ mile of the proposed pilot project area with a copy of the application for injection. Affected operators and surface owners are BP Exploration (Alaska), Inc. and the State of Alaska Department of Natural Resources.

4. Description of Operation

The Upper C Sands are potential gas hydrates reservoirs that may produce methane from naturally occurring, gas hydrate-saturated sandstone by the process of CO₂ and N₂ exchange, a technology that has not yet been proved feasible under these conditions. CPAI proposes to inject approximately 20 tons of CO₂ mixed with N₂ in order to test the potential for methane gas recovery from hydrate-saturated portions of the Upper C Sands.

Injection will occur over a 10- to 14-day period followed by drawdown and production. Produced fluids will be flowed through above-ground well testing equipment where the produced gas will be heated, separated and measured. Metering will include gas chromatographs and low-flow gas meters.

5. Geologic Information

Injection will occur within the Upper C Sands between 2234' and 2273' MD (which is equivalent to -2150' to -2189' true vertical depth below sea level). The Upper C Sands consist of thick layers of very fine- to fine-grained, uncemented quartz sand interbedded with thinner layers of siltstone. Upper confinement for injected gases will be provided by overlying layers of siltstone and claystone and the bottom of the permafrost layer, which lies at about 1740' MD (equivalent to -1656' true vertical depth below sea level).

6. Well Logs

Initial formation logs obtained while drilling Ignik Sikumi 1 and formation logs for all offset wells within ¼ mile of the proposed pilot project area are on file with the AOGCC.

7. Mechanical Integrity and Design of Injection Well

Ignik Sikumi 1 was permitted as an exploratory well in accordance with regulation 20 AAC 25.005. The well was constructed according to regulations 20 AAC 25.030 and 20 AAC 25.412 with 10-¾" surface casing set at 1473' measured depth (MD) and cemented to surface. A tapered 7-5/8" x 4-½" production casing was set at 2592' MD and also cemented to surface. A 4-½" tubing string was set in the sealbore at 1986' MD, and the tubing and inner annulus were successfully pressure tested to 3000 psi. A cement evaluation log indicates that the 4-½" portion of the tapered production casing is properly cemented.

8. Injection Rates, Pressures, and Fracture Propagation

Fracture-stimulating the receiving formation is not planned, although it is possible that parting pressure may be exceeded when injection is initiated. Actual injection is intended at matrix rates, with an average surface pressure of about 800 psi and less than 1400 psi at the formation face. The well is equipped with real-time, down hole instrumentation to monitor operational parameters.

9. Type of Fluid

The fluid requested for injection is a mixed gas stream of CO₂ and N₂. Whether the mixed gas stream is absolutely compatible with the hydrate-bearing Upper C Sands is unknown and is to be investigated with the proposed project.

10. Freshwater Information

Per Aquifer Exemption Order No. 1, all aquifers are exempted for Class II activities for at least a ¼ mile radius around Ignik Sikumi 1. Injection of CO₂ or N₂ will not occur within or above fresh water zones.

11. Expected Increase in Hydrocarbon Recovery

Because this is a pilot project into a formation which has not yet produced, no incremental hydrocarbon recovery is associated with this proposed project. The project is intended to determine the viability of this type of injection to enhance recovery of methane gas.

12. Mechanical Condition of Adjacent Wells

Six Prudhoe Bay Field wells operated by BP Exploration (Alaska), Inc. lie within the ¼ mile area of review for Ignik Sikumi 1. The Upper C Sands occur within the surface casing section of the wells. AOGCC records demonstrate that the Upper C Sands have been properly cemented in these wells.

13. Regulatory Authority

Subparagraph (b) of regulation 20 AAC 25.450, Enhanced Recovery Operations, allows the AOGCC to authorize pilot projects using a technology not proved feasible under the conditions in which it is being tested, if the project will not result in an increased risk of fluid movement into freshwater sources.

CONCLUSIONS:

1. The application requirements for regulation 20 AAC 22.402, Enhanced Recovery Operations, have been met.
2. As described, this pilot project meets the requirements regulation 20 AAC 25.450, Underground Injection Control Variances.
3. As constructed, Ignik Sikumi 1 will prevent the migration of fluids outside of the Upper C Sands. However, well integrity of Ignik Sikumi 1 must be demonstrated according to regulation 20 AAC 25.412(c).
4. Upper C Sands have been properly cemented in all wells within ¼-mile of Ignik Sikumi 1.
5. All aquifers are exempted for Class II activities within the project area per AEO 1.
6. CPAI provided sufficient information to support an AOGCC decision authorizing CO₂ and N₂ injection into the Upper C Sands to evaluate in-situ gas-to-gas exchange as a potential method for producing methane from gas hydrates.

7. Injection pressure will be monitored to evaluate fracture initiation, propagation and leak-off properties of the injected fluids.
8. Injected fluids will be confined within the appropriate receiving interval 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:

The underground injection of CO₂ and N₂ for the evaluation of methane production from gas hydrates is authorized in the Ignik Sikumi 1 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 unless an extension is approved according to Rule 11.

RULE 2: Authorized injection Strata

Injection into the Sagavanirktok "Upper C Sands" is authorized. The Sagavanirktok "Upper C Sands" gas hydrates is the accumulation that is common to the interval from 2234 to 2273 feet MD (-2150 to -2189 feet SSTVD).

RULE 3: Fluid Injection Well

Well Ignik Sikumi 1 is the only well authorized for CO₂ / N₂ injection during this pilot project.

RULE 4: Authorized Injection Fluid for Enhanced Recovery

The pilot project involves injecting no more than 20 tons of mixed CO₂ / N₂ into the hydrate saturated Sagavanirktok "Upper C Sands" to validate laboratory experimental results supporting CO₂ / CH₄ (Methane) exchange. The injected CO₂ / N₂ mixture in a gas state will exchange with the methane and remain sequestered in the pre-existing hydrate lattice.

RULE 5: Authorized Injection Pressure for Enhanced Recovery

- a. After injection is initiated, normal injection pressures must be maintained below the parting pressure of the interval
- 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 return the well to service following a workover affecting mechanical integrity. An AOGCC-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 minimum surface pressure of 1500 psi that shows stabilizing pressure and does not change more than 10 per cent during a 30-minute period. Results of mechanical integrity tests must be submitted to the AOGCC upon completion.

RULE 7: Pilot Project Surveillance

Information gathered from the pilot project, including injection pressures, tubing and casing annuli pressures, injection rates, volumes injected and produced back, and produced fluid analyses shall be collected and provided to the AOGCC.

At the conclusion of this pilot ERIO project, a report shall be submitted to the AOGCC containing information regarding project parameters including but not limited to:

- a. Analysis of injection performance
- b. Analysis of any information (logs, pressure analyses, MITs, etc.) relating to confinement of injected fluids.
- c. Evaluation of fracture initiation or parting pressure, propagation, and leak-off properties of the pilot project.
- d. Review of any specialized tests performed to gauge the performance and results of the pilot project.

RULE 8: Notification of Improper Class II Injection

Sustained injection of fluids other than CO₂ / N₂ mixture is considered improper Class II injection. This does not include the completion fluid in the tubing, including diesel or methanol used for freeze protection and any fluids used to maintain well control. Upon discovery of an improper Class II injection, the operator must immediately suspend injection, notify the AOGCC, 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 AOGCC and immediately shut in the well unless otherwise authorized by the AOGCC to continue operating the well

RULE 10: Other Conditions

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

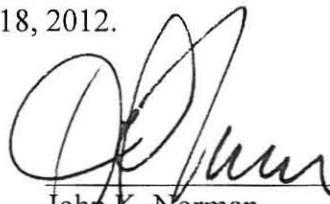
The AOGCC may suspend, revoke, or modify this authorization if injected fluids fail to be confined within the designated injection strata.

RULE 11: Administrative Actions

Unless notice and public hearing is otherwise required, the AOGCC 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 January 18, 2012.


Daniel T. Seamount, Jr.
Chair, Commissioner


John K. Norman
Commissioner



RECONSIDERATION AND APPEAL NOTICE

As provided in AS 31.05.080(a), within 20 days after written notice of the entry of this order or decision, or such further time as the AOGCC grants for good cause shown, a person affected by it may file with the AOGCC an application for reconsideration of the matter determined by it. If the notice was mailed, then the period of time shall be 23 days. An application for reconsideration must set out the respect in which the order or decision is believed to be erroneous.

The AOGCC shall grant or refuse the application for reconsideration in whole or in part within 10 days after it is filed. Failure to act on it within 10-days is a denial of reconsideration. If the AOGCC denies reconsideration, upon denial, this order or decision and the denial of reconsideration are FINAL and may be appealed to superior court. The appeal MUST be filed within 33 days after the date on which the AOGCC mails, OR 30 days if the AOGCC otherwise distributes, the order or decision denying reconsideration, UNLESS the denial is by inaction, in which case the appeal MUST be filed within 40 days after the date on which the application for reconsideration was filed.

If the AOGCC grants an application for reconsideration, this order or decision does not become final. Rather, the order or decision on reconsideration will be the FINAL order or decision of the AOGCC, and it may be appealed to superior court. That appeal MUST be filed within 33 days after the date on which the AOGCC mails, OR 30 days if the AOGCC otherwise distributes, the order or decision on reconsideration. As provided in AS 31.05.080(b), "[t]he questions reviewed on appeal are limited to the questions presented to the AOGCC by the application for reconsideration."

In computing a period of time above, the date of the event or default after which the designated period begins to run is not included in the period; the last day of the period is included, unless it falls on a weekend or state holiday, in which event the period runs until 5:00 p.m. on the next day that does not fall on a weekend or state holiday.