

**CORRECTED**  
**ADMINISTRATIVE APPROVAL NO AIO14A.1**

Mr. Mark Weggeland  
GPMA Manager  
BP Exploration (Alaska) Inc.  
P. O. Box 196612  
Anchorage, AK 99519-6612

Dear Mr. Weggeland,

In accordance with 20 AAC 25.402, BP Exploration (Alaska) Inc. (“BPXA”), by letter dated September 8, 2005 has requested that the Alaska Oil and Gas Conservation Commission administratively amend AIO 14A to allow pilot water injection for enhanced recovery purposes into the Well NK-65A within the Ivishak Formation (“Raven” undefined oil pool) in the Prudhoe Bay Field. In addition, BPXA requested extension of a GOR waiver for producer NK-38A, also within the Raven accumulation.

Authority

20 AAC 25.402 provides authority to issue an order governing underground injection of fluids.

20 AAC 25.240(b)(1) allows the Commission to waive the gas-oil-ratio limitation of 20 AAC 25.240(a) if an enhanced recovery project operates in the pool from which the well is producing.

Rule 8 of AIO 14A gives the Commission flexibility to administratively waive or amend the order if 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.

### Background

Injection is proposed to support production from NK-38A. NK-38A produced under tract operations from March 2005 to July 2005. In April 2005 the Commission granted a waiver to the GOR requirements of 20 AAC 25.240. The waiver expired on July 31, 2005 and the well has been shut-in since that time. Continued production without pressure support will negatively affect ultimate recovery.

BPXA originally applied for injection into NK-65A on May 18, 2005. Notice for hearing was published May 27, 2005 for hearing July 7, 2005. Due to lack of quorum on that date, the hearing was to reconvene on July 13, 2005. There were no protests or requests for hearing from the public. However, the Commission requested additional information be supplied at the hearing. BPXA withdrew their application on July 11, 2005. The new application provides the additional information requested by the Commission

### Findings:

1. The surface location of NK-65A is within Section 36, T12N-R15E Umiat Meridian. The bottomhole location of NK-65A is within Section 30, T12N-R16E, Umiat Meridian. The Raven accumulation lies within Sections 23, 24, 25, and 36 of T12N-R15E and Sections 29, 30, 31, and 32 of T12N-R16E. The Raven reservoir strata are those that correlate with and are common to the formations found in BP Niakuk No. 65-A between the measured depths of 13,700 and 14,135 feet. The Raven accumulation lies entirely within the affected area of AIO 14A.
2. BP provided all designated operators and surface owners within one-quarter mile radius of NK65-A with a copy of the application for amendment of AIO 14A. Operators and Surface Owners within the areas are BPXA, Department of Natural Resources and heirs of Andrew Oenga.
3. The NK-65A water injection will be conducted from the PBU DS NK Pad, which was built for Niakuk Field development.
4. NK-38A produced a total of roughly 148 MSTB oil, 378 MMSCF gas, and 0.5 MSTB water from March to July, 2005. It has a production capacity of over 3000 STB/D, however it was choked back due to increasing GOR.
5. Initial reservoir pressure of the Raven is estimated at 4995 psi. As a result of production from NK-38A, the reservoir pressure has dropped to around 4300 psi.
6. Estimated total oil recovery is expected to increase from about 11% OOIP (primary production only) to approximately 30-35% OOIP with water injection from the NK-65A well.
7. BPXA plans to replace reservoir voidage resulting from production of NK-38A with water injection in NK-65A. This injector/producer pair will be operated to maintain a Voidage Replacement Ratio (VRR) of 1.0 within normal operating ranges.
8. Production surveillance activities for the Ivishak Raven Accumulation will include bottomhole pressure surveys, production logging and well testing in NK-

38A and injection logging.

9. There are no underground sources of drinking water within the proposed affected area.
10. The Kavik shale is 188' thick in the nearby NK-04 well and forms the lower confining zone, below the lower Ivishak. Over 200' of Kingak shale provides the upper confining interval.
11. It is anticipated that injection pressures greater than fracture pressure will be required, but the fracture pressure is significantly less than that of the confining shales. The estimated maximum and average injection pressures will be 2,500 psi and 1,500 psi, respectively.
12. There are no wells that penetrate the Ivishak injection zone within a quarter mile radius of well NK-65A.
13. Seawater from the Prudhoe Seawater Treatment Plant will be injected during the period of the pilot program. The same water has been injected within the Ivishak Formation of the Prudhoe Oil Pool without apparent compatibility problems.
14. The logs of NK-65A are on file with the Commission. Specific to this application, the bond logs of NK-65A have been reviewed, and sufficient cement exists above the Raven interval.
15. NK65-A was cased and cemented in accordance with 20 AAC 25.412.

Conclusions:

1. The application requirements of 20 AAC 25.402 have been met.
2. The proposed project will 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.
3. An order permitting the underground injection of water into the Raven will allow for production of NK-38A, will provide valuable information for ultimate waterflood planning, and will significantly improve overall recovery.
4. 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.
5. Injected fluids will be confined within the appropriate receiving intervals by impermeable lithology, cement isolation of the wellbore and appropriate operating conditions.
6. Reservoir and well surveillance, coupled with regularly scheduled mechanical integrity tests will demonstrate performance of the water injection project.
7. The proposed injection operations will not cause contamination of any underground sources of drinking water.

8. Proposed injection fluids are compatible with formation fluids.
9. Injection of water will significantly increase hydrocarbon ultimate recovery above primary production.

Rule:

The Commission approves BPXA's request for pilot water injection into the Raven accumulation within NK-65A subject to the applicable rules adopted in Area Injection Order No. 14A and subject to the conditions, limitations, and requirements set out in statewide requirements under 20 AAC 25 (to the extent not otherwise superseded by AIO 14A). The authorized injection strata are those that correlate with and are common to the formations found in BP Niakuk No. 65-A between the measured depths of 13,700 and 14,135 feet.

The operator shall monitor wells NK-65A and NK-38A daily to check for sustained pressure to ensure there is no pressure communication or leakage in any casing, tubing or packer, except if prevented by extreme weather conditions, emergency situations, or similar unavoidable circumstances. Monitoring results shall be made available for AOGCC inspection.

During the period of pilot water injection into NK-65A, the Commission waives the gas-oil ratio requirements of 20 AAC 25.240(a) so long as the monthly injection volume within NK-65A meets or exceeds the monthly reservoir voidage volume from NK-38A.

As provided in AS 31.05.080(a), within 20 days after written notice of this decision, or such further time as the Commission grants for good cause shown, a person affected by it may file with the Commission an application for rehearing. A request for rehearing is considered timely if it is received by 4:30 PM on the 23rd day following the date of this letter, or the next working day if the 23rd day falls on a holiday or weekend. A person may not appeal a Commission decision to Superior Court unless rehearing has been requested.

This approval expires on April 1, 2006.

**DONE** at Anchorage, Alaska and dated September 14, 2005. This approval corrects and replaces the original administrative approval dated September 12, 2005 that was erroneously numbered AIO14B.001.

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John K. Norman  
Chairman

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Daniel T. Seamount, Jr.  
Commissioner