

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

Re: THE APPLICATION OF BP Exploration ) Docket Number: AIO-11-05  
(Alaska), Inc. for an order authorizing ) Area Injection Order No. 22E  
downhole commingling of injection within )  
the wellbore of Prudhoe Bay Unit S-09, in ) Prudhoe Bay Unit  
conformance with 20 AAC 25.215 (c). ) Aurora Oil Pool  
) North Slope Borough, Alaska  
)  
) August 22, 2011

**IT APPEARING THAT:**

1. By letter dated March 30, 2011, BP Exploration (Alaska), Inc. (BPXA), the Prudhoe Bay Unit (PBU) operator, applied to the Alaska Oil and Gas Conservation Commission (AOGCC) for authorization to commingle injection within well PBU S-09, in conformance with 20 AAC 25.215(c).
2. On April 17, 2011, pursuant to 20 AAC 25.540, the AOGCC published in the Alaska Journal of Commerce notice of opportunity for public hearing on May 26, 2011.
3. The AOGCC received no protest to the application, no public comment, and no request for hearing.
4. Based upon the information provided by BPXA, the AOGCC has sufficient information upon which to resolve the request.
5. The public hearing was vacated on May 6, 2011.

**FINDINGS:**

1. BPXA operates the PBU and the PBU S-09 well, which are located in the North Slope Borough, Alaska.
2. Well PBU S-09 penetrates hydrocarbon reserves within the Prudhoe Oil Pool (POP) and Aurora Oil Pool (AOP).
3. Well PBU S-09 is an active water alternating gas (WAG) injection well that penetrates the POP in an area where offset producers have low production rates due to high water cuts. The well PBU S-09 currently injects approximately 1,500 barrels of water per day (BWPD).
4. Well PBU S-09 penetrates the AOP in a compartmentalized area containing a single producer, well PBU S-118, which is currently shut in due to lack of reservoir support. The reserves in the portion of the AOP drained by well PBU S-118 do not justify the drilling of a new well to provide injection support.
5. It is projected that well PBU S-09 could inject approximately 1,000 BWPD in the AOP, bringing the total injection volume for the well to approximately 2,500 BWPD. Future

injection service for the well may include miscible injectant from the Prudhoe Bay Miscible Gas Project.

6. Injection logs can be used to determine the allocation of injection volumes between the two pools.
7. Pressure from the individual pools can be determined by means of tubing plugs and downhole pressure gauges.
8. Injection into either pool can be blocked as necessary.

**CONCLUSIONS:**

1. Allowing commingled injection in well PBU S-09 should increase ultimate recovery from this portion of the field by allowing the PBU S-118 to be returned to production with support from well PBU S-09, while continuing to provide support for POP oil production.
2. An injection logging plan can be designed to accurately allocate injection volumes between the two pools.
3. Provided the injection pressure and fluid type requirements of the Area Injection Orders that pertain to the AOP and POP are followed the pools will not be damaged due to incompatible fluids or injection pressures that allow for fracture propagation through the confining intervals.

**NOW THEREFORE IT IS ORDERED:**

In addition to statewide requirements under 20 AAC 25 (to the extent not superseded by these rules), the following rules govern Class II injection operations in the affected area described below and supersede and replace the rules adopted in Area Injection Order No. 22D dated January 30, 2008, as amended:

**AFFECTED AREA**

<u>Township Range, UM</u>	<u>Sections</u>
T11N-R12E	Sec 2: W1/2 Sec 3: All Sec 4: E 1/2, NW 1/4, E 1/2 SW 1/4 Sec 5: E 1/2 1/2 NE1/4 Sec 9: NE1/4, N1/2 SE1/4 Sec 10: NW1/4 SW1/4, W1/2 NW1/4
T12N-R12E	Sec 15: S1/2 SE1/4, SW1/4 Sec 16: NW1/4, S1/2 Sec 17: S1/2, NE1/4 Sec 18: SE1/4 Sec 19: N1/2 NE1/4 Sec 20: E1/2, N1/2 NW1/4 Sec 21: All Sec 22: All Sec 23: S1/2, S1/2 NW1/4, S1/2 NE1/4 Sec 25: S1/2, S1/2 NW1/4 Sec 26: All Sec 27: All Sec 28: All Sec 29: E1/2 NE1/4, SE1/4 Sec 32: E1/2 Sec 33: All Sec 34: All Sec 35: All Sec 36: All

**Rule 1. Authorized Injection Strata for Enhanced Recovery (Source: AIO 22)**

Injection is permitted into the accumulation of hydrocarbons that is common to, and correlates with, the interval between 6765'- 7765' measured depth ("MD") in the Mobil Oil Corporation Mobil-Phillips North Kuparuk State No. 26-12-12 well.

**Rule 2 Injection Pressures (Source: AIO 22B)**

The injection operations shall not allow fractures to propagate into the confining intervals. Surface wellhead injection pressures shall be limited to 2800 psi for water and 3800 psi for gas.

**Rule 3. Fluid Injection Wells (Source: AIO 22C)**

- a. The underground injection of fluids must be through a well permitted for drilling as a service well for injection in conformance with 20 AAC 25.005, or through a well approved for conversion to a service well for injection in conformance with 20 AAC 25.280.
- b. An application to drill or convert a well for injection must be accompanied by the information required by 20 AAC 25.402(c), and must include cementing records, cement quality log or formation integrity test records.

**Rule 4. Monitoring the Tubing-Casing Annulus Pressure Variations (Source: AIO 22D)**

The tubing by casing annulus pressure and injection rate of each injection well must be checked at least weekly to confirm continued mechanical integrity.

**Rule 5. Demonstration of Tubing-Casing Annulus Mechanical Integrity (Source: AIO 22D)**

The mechanical integrity of an injection well must be demonstrated before injection begins, and before returning a 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 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 AOGCC 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 AOGCC, mechanical integrity must be demonstrated by a tubing by casing annulus pressure test using a surface pressure of 1500 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 AOGCC inspection.

**Rule 6. Well Integrity Failure (Source: AIO 22D)**

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 AOGCC by the next business day and submit a plan of corrective action on a Form 10-403 for AOGCC 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 AOGCC. A monthly report of daily tubing and casing annuli pressures and injection rates must be provided to the AOGCC for all injection wells indicating well integrity failure or lack of injection zone isolation.

**Rule 7. Notification of Improper Class II Injection (Source: AIO 22C)**

The operator shall notify the AOGCC if it learns of any improper injection of fluids into a Class II well. Additionally, compliance with the notification requirements of any other State or Federal agency remains the operator's responsibility.

**Rule 8. Other conditions (Source: AIO 22D)**

- a. It is a condition of the authorization granted by this Order that the operator shall comply with all applicable AOGCC regulations.
- b. The AOGCC may immediately suspend, revoke, or modify this authorization if injected fluids fail to be confined within the designated injection strata.

**Rule 9. Administrative Action (Source: AIO 22B)**

Unless notice and public hearing are otherwise required, the AOGCC may administratively waive the requirements of any rule herein or administratively amend any rule 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.

**Rule 10. Authorized Fluids for Enhanced Recovery (Source: AIO 22B)**

The fluids authorized by this Order for injection and conditions of the authorization are as follows:

- a. produced water from the AOP or Prudhoe Bay Unit processing facilities;
- b. source water from the Prince Creek formation provided that the water is shown to be compatible with the AOP formation and administrative approval to inject is obtained from the AOGCC;
- c. enriched hydrocarbon gas processed within the Prudhoe Bay Unit processing facilities, with the following conditions:
  1. reservoir pressure must be maintained to ensure miscibility of the injectant, and
  2. expansion of injection outside of the North of Crest and West Blocks must be administratively approved prior to long-term injection;
- d. immiscible hydrocarbon gas from the AOP or Prudhoe Bay Unit processing facilities provided that AOGCC approval of the associated depletion strategy and surveillance plans is obtained prior to start of injection;
- e. tracer survey fluid to monitor reservoir performance; and

- f. non-hazardous filtered water collected from AOP well house cellars and well pads.

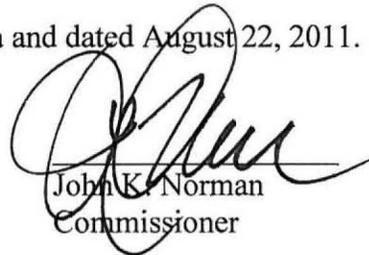
**Rule 11. Wells Authorized for Downhole Commingled Injection with the Prudhoe Oil Pool (Source: AIO 22C.002 and New This Order)**

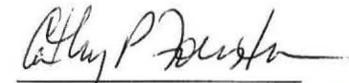
Injection into the AOP and POP within the same wellbore is authorized for wells PBU S-09 and S-31A, subject to the following conditions.

- a. An approved Application for Sundry Approval (Form 10-403) is required for each well prior to commencement of commingled injection.
- b. Within 60 days of commencement of commingled injection in a well, or switching from one injection fluid to the other, BPXA must conduct an injection survey to determine the proper allocation of injected fluids. Additional injection surveys shall be conducted on each well at least once per year thereafter as long as the well continues commingled injection.
- c. Annual and total cumulative volumes injected by pool and results of logs or surveys used for determining the allocation of injected fluids between pools must be supplied in the Annual Surveillance Report for the AOP.

**DONE at Anchorage, Alaska and dated August 22, 2011.**

  
Daniel T. Seamount, Jr.  
Chair

  
John K. Norman  
Commissioner

  
Cathy P. Foerster  
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 Commission grants for good cause shown, a person affected by it may file with the Commission 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 Commission 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 Commission 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 Commission mails, OR 30 days if the Commission 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 Commission 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 Commission, and it may be appealed to superior court. That appeal MUST be filed within 33 days after the date on which the Commission mails, OR 30 days if the Commission 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 Commission 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.