

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

Re: THE APPLICATION OF BP Exploration) Docket Number: AIO-15-033
(Alaska) Inc. for amendments to Area) Area Injection Order No. 4G
Injection Order 4F to authorize the injection)
of carbon dioxide effluent from the proposed) Prudhoe Bay Field
Alaska LNG Project gas treatment plant for) Prudhoe Bay Unit
the purposes of enhanced oil recovery, and) Eastern Operating Area
the request from ConocoPhillips Alaska Inc.) Prudhoe Oil Pool
to authorize disposal of the carbon dioxide) Put River Oil Pool
effluent.) Lisburne Oil Pool
) Pt. McIntyre Oil Pool
) West Beach Oil Pool
) Stump Island Oil Pool
) North Slope Borough, Alaska
)
) October 15, 2015

IT APPEARING THAT:

1. By application received July 17, 2015, BP Exploration (Alaska) Inc. (BPXA) on behalf of itself and ExxonMobil Alaska Production Inc. (ExxonMobil) as working interest owners (WIOs) in the Prudhoe Bay Unit (PBU) requested that Area Injection Order (AIO) 4F be amended to allow the injection of carbon dioxide (CO₂) for enhanced recovery and pressure maintenance purposes from sources inside and outside the PBU.
2. Pursuant to 20 AAC 25.540, the Alaska Oil and Gas Conservation Commission (AOGCC) scheduled a public hearing for August 27, 2015. On July 20, 2015, the AOGCC published notice of that hearing on the State of Alaska's Online Public Notice website and on the AOGCC's website, electronically transmitted the notice to all persons on the AOGCC's email distribution list, and mailed printed copies of the Notice of Public Hearing to all persons on the AOGCC's mailing distribution list. On July 21, 2015, the notice was published in the ALASKA DISPATCH NEWS.
3. On July 23, 2015, the AOGCC published notice of that the location of the hearing had changed on the State of Alaska's Online Public Notice website and on the AOGCC's website, electronically transmitted the notice to all persons on the AOGCC's email distribution list, and mailed printed copies of the Notice of Public Hearing to all persons on the AOGCC's mailing distribution list. On July 24, 2015, the notice was published in the ALASKA DISPATCH NEWS.
4. By letter received August 19, 2015, ConocoPhillips Alaska, Inc. (CPAI) on behalf of itself and Chevron U.S.A. Inc. (Chevron) as PBU WIOs supported BPXA's request to allow the injection of CO₂ for enhanced recovery purposes, but also asked for authorization to dispose of the CO₂ in the event that CO₂ is not shown to provide any enhanced oil recovery benefit.

5. On August 25, 2015, the AOGCC received pre-filed written testimony from BPXA.
6. On August 27, 2015, the AOGCC received a letter from ExxonMobil supporting BPXA's application.
7. The hearing commenced at 9:00 AM on August 27, 2015, in the Alaska State Legislature Building, Legislative Information Office located at 716 West 4th Avenue, Anchorage, Alaska.
8. Testimony was received from representatives of BPXA, CPAI, and Mr. Tom Lakosh, a private citizen.
9. The record was held open until September 8, 2015 for responses to requests made by the AOGCC at the public hearing.
10. The AOGCC received written comments from Mr. Lakosh on August 27, 2015, requested additional information from CPAI on September 3, 2015, and requested additional information from BPXA on September 8, 2015.
11. By email sent September 4, 2015, the AOGCC requested CPAI provide further justification for its request to dispose of CO₂. CPAI responded that same day.

FINDINGS:

1. Operator and Owners: BPXA is the operator of the leases in the portion of the PBU within the Affected Area of this order. BPXA, ExxonMobil, CPAI, and Chevron are the WIOs, and the State of Alaska, Department of Natural Resources (DNR) is the landowner of the Affected Area, which is located within the North Slope Borough, along Alaska's northern coastline.
2. Affected Area: The Affected Area is defined in AIO 4F, and it remains unchanged for this amended order.
3. AOGCC Authority: The U.S. Environmental Protection Agency (EPA) has granted the AOGCC regulatory primacy limited to underground injection control (UIC) Class II wells.
4. Source of CO₂ Effluent: The proposed Alaska Liquefied Natural Gas Project (AK LNG) includes a North Slope gas treatment plant (GTP) to process produced gas from multiple fields to sales specifications prior to shipment to the proposed LNG plant in south-central Alaska. The GTP will remove significant amounts of impurities from the produced gas—primarily CO₂—prior to shipment for sales. The resulting effluent stream from the GTP is expected to contain more than 99% CO₂, and it will be sent back to the PBU for injection.
5. BPXA Request: BPXA requests that AIO 4F be amended to authorize the injection of the portion of the effluent stream that is sourced from fields outside of the PBU for enhanced oil recovery (EOR) purposes. AIO 4F currently authorizes injection of produced gas that originates within the PBU.
6. CPAI Request: CPAI supports BPXA's request for authorization to inject the GTP effluent stream for EOR purposes, but additionally requests authorization to dispose of the GTP effluent stream if it is determined there is no EOR benefit to injecting that effluent stream into any of the pools covered by this AIO. CPAI also requests AIO 4F be amended to permit administrative approval of future modifications.

7. EOR Potential of CO₂: BPXA states that under the right conditions, mixtures of CO₂ and the hydrocarbon miscible injectant already in use for EOR purposes within the PBU will be miscible with the crude oil and thus provide an EOR benefit. In the event that mixtures containing CO₂ are not miscible, injecting the CO₂-bearing effluent stream should improve oil recovery by maintaining reservoir pressure.
8. CO₂ Disposal: According to the EPA, CO₂ can be disposed of in Class II wells when those wells were previously used for a CO₂ EOR injection project. Disposal of CO₂ under other circumstances requires Class VI wells, which are administered by the EPA.
9. Administrative Relief: Rule 9 of AIO 4F provides for administratively amending the order if certain conditions are met, but is an older form of the rule than the AOGCC currently uses.

CONCLUSIONS:

1. Amendment of AIO 4F is necessary to authorize the injection of outside substances.
2. Injection of the effluent stream from the AK LNG GTP in the oil pools covered by this order should improve recovery and minimize waste.
3. CPAI's proposed disposal injection of CO₂-bearing effluent derived from the GTP requires use of UIC Class VI wells, which are under the jurisdiction of the EPA.
4. AIO 4F's administrative relief rule should be revised to be consistent with the AOGCC's current practices.

NOW, THEREFORE, IT IS ORDERED:

AIO 4, AIO 4A, AIO 4B, AIO 4C, AIO 4D, AIO 4E, and AIO 4F and all associated administrative approvals (except AIO 004E.012, AIO 004E.0014, AIO 004E.015 (as amended), AIO 004E.016, AIO 004E.017, AIO 004E.018, AIO 004E.020, AIO 004E.022, AIO 004E.023, AIO 004E.024, AIO 004E.025, AIO 004E.028, AIO 004E.029, AIO 004E.030, AIO 004E.032, AIO 004E.033, AIO 004E.035, AIO 004E.036, AIO 004E.037, AIO 004E 038, AIO 004E.039, AIO 004E.040, AIO 004E.041, AIO 004F.001, AIO 004F.002, AIO 004F.003, AIO 004F.004, and AIO 004F.005, which remain in effect) are hereby revoked and replaced by this order. All information related to AIO 4, AIO 4A, AIO 4B, AIO 4C, AIO 4D, AIO 4E and AIO 4F is hereby incorporated by reference into the record for this order. The following rules, in addition to the statewide requirements under 20 AAC 25 (to the extent not superseded by these rules), govern Class II injection operations in the affected area described below:

Affected Area: Umiat Meridian

Township	Range	Section
T13N	R14E	Section 26: S ½ Section 27: s ½, NW ¼ Protracted, All Tide and Submerged Lands Shoreward of the Line Fixed by Coordinates Found in Exhibit A of the Final decree, U.S. v. Alaska, No. 84 Original Section 28: Protracted, All Tide and Submerged Lands, Excluding State Oil and Gas Lease ADL 312809 Section 33: Protracted, All Tide and Submerged Lands, Excluding State Oil and Gas Lease ADL 312809 and ADL365548 Section 34: Protracted, All Tide and Submerged Lands, Excluding State Oil and Gas Lease ADL 365548 Section 35: Protracted, All Tide and Submerged Lands, Excluding State Oil and Gas Lease ADL365548
T12N	R14E	Sections 3, 4, 9, 10, 13, 14, 15, 16, Section 17: NE ¼, N ½ SE ¼, E ½ E ½ NW ¼, E ½ NE ¼ SW ¼, Section 21: N ½ NE ¼, Sections 22, 23, 24, 25, 26, 35, and 36.
T12N	R15E	Section 16: SW ¼ Section 17: S ½ Sections 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, and 36.
T12N	R16E	Sections 28, 29, 30, 31, 32, 33, and Section 34: W ½ NW ¼, SW ¼, and SW ¼ SE ¼
T11N	R14E	Sections 1, 2, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, and 36.
T11N	R15E	All
T11N	R16E	Section 2: SW ¼ NW ¼, SW ¼, S ½ SE ¼, Sections 3, 4, 5, 6, 7, 8, 9, 10, 11, Section 12: NW ¼, S ½ NE ¼, SE ¼, and SW ¼ Sections 13, 14, 15, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, and 33.
T10N	R14E	Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, and 36.
T10N	R15E	All
T10N	R16E	Sections 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 29, 30, and 31.

Those Lands in Block 605 lying northerly of the north boundary of Section 3, T12N, R14E, UM, AK (identical with line 4-5 on block 605) and lying easterly of the west boundary of sections 2 and 11, T12N, R14E, UM, AK (identical with line 5-6 on Block 605) and lying northerly of the south boundary of Section 11 and 12, T12N, R14E, UM, AK, and lying northerly of the south boundary of Section 7, T12N, R15E, UM, AK (identical with line 6-7 on block 605), within the offshore three-mile arc lines listed as State Area on the "Supplemental Official O.C.S. Block Diagram," approved 12/9/79, containing 1457.32 hectares.

Rule 1 Authorized Injection Strata and Fluids for Enhanced Recovery (Revised this order)

Within the affected area and the following strata:

The Prudhoe Oil Pool strata defined as (i) the accumulations of oil that are common to and that correlate with the accumulations found in the Atlantic Richfield - Humble Prudhoe Bay State No. 1 well between the measured depths of 8,110 feet and 8,680 feet, and (ii) the accumulation of oil that is common to and correlates with the interval from 9,638 to 9,719 measured feet on the Borehole Compensated Sonic Log, Run 2, dated September 28, 1975, in the Atlantic Richfield-Exxon NGI No. 1 well, and that is in hydraulic communication with the gas cap of the former accumulations in the Sag River Formation. The latter accumulation is found within the following area:

Umiat Meridian.

T11N R14E: Sections: 1, 2, 11(N/2 and SE/4), 12, 13, 14(E/2), 23(NE/4), 24, 25(N/2); T11N R15E: Sections: 6, 7, 8, 17, 18, 19, 20, 29(N/2), 30(N/2);

T12N R14E: Sections 35, 36

The Put River Oil Pool strata are defined as the sandstone reservoirs within the Southern, Central and Western lobes of the Put River Sandstone Member (PRS) of the Kalubik Formation that correlate with the interval 9,638 to 9,719 measured feet on the Borehole Compensated Sonic Log, Run 2--dated September 28, 1975--in the Atlantic Richfield-Exxon NGI No. 1 well, but excluding the PRS Northern Lobe reservoirs that are in pressure communication with the Prudhoe Oil Pool gas cap in the Sag River Formation. The Put River Oil Pool is found within the following area:

Umiat Meridian.

T11N R14E Sections: 3, 4, 9, 10, 11(SW/4), 14(W/2), 15, 16, 21, 22, 23(W/2 and SE/4), 25(S/2), 26, 27, 28, 33, 34, 35, 36; T11N R15E Sections: 29(S/2), 30(S/2), 31, 32;

T10N R14E Sections: 1, 2, 3, 11, 12, 13, 14;

T10N R15E Sections: 5, 6, 7, 8, 17, 18

The Lisburne Oil Pool strata correlate with and are common to the formations found in the ARCO Prudhoe Bay State No. 1 well between the measured depths of 8,790-10,440.

The Pt. McIntyre Oil Pool strata correlate with and are common to the formations found in the Pt. McIntyre No. 11 well between the measured depths of 9,908-10,665 feet.

The West Beach Oil Pool strata correlate with and are common to the formations found in the West Beach No. 4 well between the measured depths of 14,458-14,781 feet.

The Stump Island Oil Pool enhanced recovery plans will be evaluated on a well-by-well basis in conjunction with Pt. McIntyre Oil Pool development.

The following fluids may be injected for pressure maintenance and enhanced recovery purposes:

- (a) Produced water and gas from PBU processing facilities;

- (b) CO₂ and other GTP effluent gases from sources within or outside the Prudhoe Bay Unit;
- (c) Enriched hydrocarbon gas;
- (d) Non-hazardous water and water based fluids – (specifically seawater, source water, freshwater, domestic wastewater, equipment washwater, sump fluids, hydrotest fluids, firewater, and water with trace chemicals, and other water based fluids with a pH greater than 2 and less than 12.5 and flashpoint greater than 140 degrees F);
- (e) Fluids introduced to production facilities for the purpose of oil production, plant operations, plant/piping integrity or well maintenance that become entrained in the produced water stream after oil, gas, and water separation in the facility. Specifically:
 - i. Freeze protection fluids;
 - ii. Fluids in mixtures of oil sent for hydrocarbon recycle;
 - iii. Corrosion/scale inhibitor fluids;
 - iv. Anti-foams/emulsion breakers;
 - v. Glycols;
 - vi. Radioactive tracer survey fluids
- (f) Non-hazardous glycols and glycol mixtures;
- (g) Fluids that are used for their intended purpose within the oil production process. Specifically:
 - i. Scavengers;
 - ii. Biocides
- (h) Fluids to monitor or enhance reservoir performance. Specifically:
 - i. Tracer survey fluids;
 - ii. Well stimulation fluids;
 - iii. Reservoir profile modification fluids.

Rule 2 Authorized Injection Strata for Disposal (Source: AIO 4C)

Within the affected area, Class II waste fluids may be disposed by injection into strata defined as those which correlate with and are common to the strata found in the ARCO Sag River State No. 1 well between the measured depths of 3,607-6,750 feet.

Class II slurry injection from the Grind and Inject processes may be disposed into strata defined as those which correlate with and are common to the strata found in the ARCO Sag River State No. 1 well between the measured depths of 4,270-6,750 feet.

Rule 3 Fluid Injection Wells (Source: AIO 4C)

The injection of fluids must be conducted: 1) through a new well that has been permitted for drilling as a service well for injection in conformance with 20 AAC 25.005; 2) through an existing well that has been approved for conversion to a service well for injection in conformance with 20 AAC 25.280; or 3) through a well that existed as a service well for injection purposes on the date of this order.

Rule 4 Monitoring the Tubing-Casing Annulus Pressure Variations (Source: AIO4D)

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 AOGCC inspection.

Rule 5 Reporting the Tubing-Casing Annulus Pressure Variations (Revoked: AIO4D)

Rule 6 Demonstration of Tubing/Casing Annulus Mechanical Integrity (Source: AIO4E)

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. A 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/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 7 Well Integrity Failure (Source: AIO4E)

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 8 Plugging and Abandonment of Injection Wells (Source: AIO 4C)

An injection well located within the affected area must not be plugged or abandoned unless approved by the AOGCC.

Rule 9 Administrative Action (Revised this order)

Upon proper application, or its own motion, and unless notice and public hearing are otherwise required, the AOGCC may administratively waive the requirements of any rule stated herein or administratively amend this order 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 Surveillance (Source: AIO 4C and AIO 4C.001)

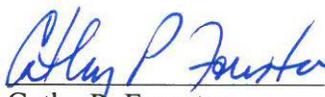
For slurry injection wells, a baseline temperature survey from surface to total depth, initial step rate test to pressures equal or exceeding maximum injection pressure and pressure falloff are required prior to sustained disposal injection. Regular fill depth tags are required at least once annually or as warranted following consultation with the AOGCC. Operating parameters including disposal rate, disposal pressure, annulus pressures and volume of slurry pumped must be monitored and reported according to the requirements of 20 AAC 25.432.

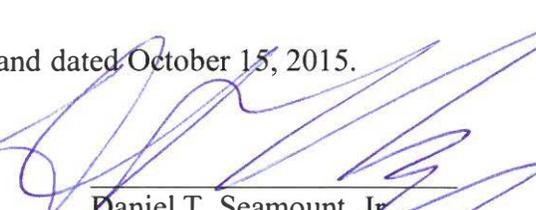
Also for slurry injection wells, an annual performance report will be required including rate and pressure performance, surveillance logging, fill depth, survey results, and volumetric analysis of the disposal storage volume, estimate of fracture growth, if any, and updates of operational plans. Reports shall cover the time period of October 1st through September 30th and submission must be on or before November 15th.

Rule 11 Notification (Revised this order)

The operator must notify the AOGCC if it learns of any improper Class II injection. Compliance with terms and conditions set forth herein does not relieve the operator of any additional notification requirements of any other State or Federal agency. Such notification remains the operators' sole responsibility.

DONE at Anchorage, Alaska and dated October 15, 2015.


Cathy P. Foerster
Chair, Commissioner


Daniel T. Seamount, Jr.
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.

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.