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

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| Re: THE PETITION OF Harold C. Heinze that the Alaska Oil and Gas Conservation Commission investigate, in accordance with AS 31.05, whether or not waste of propane is occurring at the Prudhoe Bay Field | ) | Docket Number: OTH-11-51<br>Other Order No. 075<br><br>Prudhoe Bay Unit<br>Prudhoe Bay Oil Pool<br>North Slope Borough, Alaska<br><br>August 17, 2012 |

**IT APPEARING THAT:**

1. On December 7, 2011, Petitioner requested the Alaska Oil and Gas Conservation Commission (AOGCC) investigate whether the operator's practice of reinjecting gas containing propane into the gas cap of the Prudhoe Bay Oil Pool (PBOP) instead of making the propane available for sale constitutes waste.
2. Although Petitioner concedes some propane is being beneficially used as a component of miscible injectant (MI) for the PBOP enhanced oil recovery (EOR) projects, he claims that recovery of injected gas in the future is not a certainty and that therefore the large amount being injected into the PBOP constitutes waste. Petitioner seeks to have the AOGCC order BP Exploration (Alaska) (BPXA) to remove some of the propane and offer it for sale.
3. On January 3, 2012, the AOGCC requested BPXA provide information about the gas streams and gas processing and handling facilities at the Prudhoe Bay Field (PBF).
4. On February 6, 2012, BPXA responded to the AOGCC's January 3rd request.
5. At the AOGCC's monthly meeting held April 4, 2012, the AOGCC decided to hold a formal hearing on the Petitioner's claims.
6. On April 11, 2012, a notice of public hearing was published on the State of Alaska Online Public Notice website and on the AOGCC website. This notice was published in the ALASKA JOURNAL OF COMMERCE on April 22, 2012. The hearing was scheduled for May 22, 2012.
7. BPXA requested the hearing be continued from May 22nd to June 19th, 2012, due to scheduling conflicts for several key technical personnel.
8. On May 22, 2012, the hearing was recessed to reconvene on June 19, 2012.
9. On June 19, 2012, the AOGCC heard testimony and received evidence regarding Petitioner's claims.
10. At the conclusion of the hearing, the record was held open until July 18, 2012, to allow for submission of additional evidence.
11. On July 5, 2012, the Southwest Alaska Municipal Conference submitted comments.
12. On July 18, 2012, BP Exploration (Alaska) Inc. submitted comments.

**FINDINGS:**

1. The PBF has substantial reserves of propane.
2. The PBF handles approximately 170 MMCFPD of propane at the Central Gas Facility (CGF).
3. Propane has an energy content of approximately 3.8 million British Thermal Units (BTU) per barrel while crude oil ~~is~~ has an energy content of approximately 5.8 million BTU per barrel. Therefore, on a barrel of oil equivalent (BOE) basis one barrel of propane is equivalent to 0.65 barrels of crude oil.
4. The produced gas that enters the CGF at PBF leaves in two streams, a gas liquids stream and a residue gas stream. The CGF, within operational and safety constraints, produces as much gas liquids as it is physically capable of doing. The gas liquids separation equipment cannot operate at a process temperature below -50° F. The system is operated as close to that temperature as seasonal, operational, and safety conditions will allow, resulting in an annual average processing temperature of -35° F and a peak operating temperature of -42° F. In winter colder ambient temperatures allow a colder processing temperature.
5. Any increase in the amount of gas liquids that could be extracted would require new separation equipment that could be operated at less than -50° F. The estimated cost of such equipment would be substantial. Installation of such equipment would require a six to eight month shutdown.
6. In normal operations the gas liquids stream is further processed into a natural gas liquids stream, which is either sold to the Trans Alaska Pipeline (TAPS) or the Kupuruk River Unit (KRU), and a stream of MI for EOR in the PBF. A small amount of the MI stream is occasionally taken to make high purity propane that is used as a coolant medium in the CGF gas processing systems. The majority of the propane in the gas liquids stream is used in the production of MI. The majority of the residue gas stream is reinjected into the PBOP gas cap to maintain reservoir pressure. Of the gas which is not reinjected, some is sold to the Northstar Unit to meet its fuel and EOR gas needs; the remainder is burned as fuel gas within the PBF.
7. The gas entering the CGF initially contained between 3.3% and 3.5% propane and now contains on average 2.45% propane.
8. The residue gas contains on average 1.65% propane.
9. Selling propane would reduce the amount of MI that could be produced and in turn would reduce the ultimate recovery from the PBOP.
10. The PBF processing systems have a capacity of compressing 600 MMCFPD of MI but currently only an average of 131 MMCFPD is being created.
11. If the separation system was changed to allow for increased gas liquids production the majority of these gas liquids would be used to generate MI.
12. Selling 1 barrel per day of propane would reduce the available MI volume by about 4 MCFPD. The actual cumulative effect, due to MI recapture and reinjection, of selling a barrel of propane is a net loss of 8 MCF of MI. The selling of 1 barrel of propane that could have been used to make MI will result in the lost recovery of about 0.7 barrels of oil. On an equivalent barrel basis this equates to 1.08 barrels of oil lost for every BOE of propane sold.
13. Additionally, approximately 85% of the MI that is injected will eventually be recaptured.
14. On a BOE equivalency basis a total of 1.93 BOE of fluids would be recovered (1.08 BOE of crude oil and 0.85 BOE of recaptured MI) for every BOE of propane injected.

15. Up to 20% of the approximately 1 billion barrels of residual oil in the initial gas cap, and an additional 8% of the 4 to 5 billion barrels of residual oil in the expanded gas cap, are expected to be vaporized and recovered by the residue gas injection. As a result, a total of approximately 500 million barrels of additional oil recovery can be attributed directly to residue gas injection.
16. Richer gas (i.e. gas with a higher concentration of ethane, propane, and butane) has a higher capacity to vaporize and therefore recover more of the residual oil.
17. Conservation Order 458 determined that selling residue gas to the Northstar Unit is projected to raise the ultimate recovery from that field from the 50% achievable by gas cycling alone to approximately 65% of the original oil in place.
18. Conservation Order 198A determined that each barrel of NGL sold from the PBF to the KRU will result in an estimated 1.3 barrels of additional recovery from the Kuparuk River Oil Pool.

**CONCLUSIONS:**

1. Selling one BOE of propane today would result in a net loss of .93 BOE of crude oil and recaptured MI in the future.
2. Utilizing the propane in the gas liquids stream that comes off the CGF to blend MI has clear and substantial benefits to ultimate recovery.
3. The sale of NGLs to the KRU and residue gas to the Northstar Unit provides clear and substantial improvements in ultimate recovery from these units while having a negligible effect on recovery in the PBF.
4. Propane is not being wasted.

**ACCORDINGLY:**

Because no waste has occurred, no action by the AOGCC is necessary at this time.

The AOGCC hereby closes the inquiry regarding whether propane is being wasted at the PBF.

**DONE** at Anchorage, Alaska and dated August 17, 2012.

Cathy P. Foerster
Chair, Commissioner

John K. Norman
Commissioner

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