



July 16, 2019

Charles Ozaki
Broomfield City and County Manager
City and County of Broomfield
One DesCombes Drive
Broomfield, CO 80020

Re: Letter from CCOB, July 15, 2019

Mr. Ozaki,

Extraction Oil & Gas, Inc. (“Extraction”) is in receipt of the letter from the City and County of Broomfield (the “City” or “Broomfield”), dated July 15, 2019 (the “Letter”). Any capitalized terms utilized herein but not otherwise defined shall have the respective meanings set forth for such terms in that certain Amended and Restated Oil and Gas Operator Agreement, by and between Extraction and the City, dated October 24, 2017 (the “Operator Agreement”).

In the Letter, the City requests that Extraction provide the City information regarding Extraction’s determination that Tier 4 hydraulic fracturing pumps are not currently “commonly available” to it in its performance of operations pursuant to the Operator Agreement and that it do so by the close of business on July 17, 2019.

The written responses to the City Attorney’s questions that Extraction provided just before receiving this letter on July 15 (which have been re-attached to this Letter for reference) provide the basis for Extraction’s determination. In addition to the information contained herein, Extraction reiterates the information previously provided.

In the letter, the City asserts that “Broomfield’s information shows that Tier 4 fracturing pumps are available from at least 2 different manufacturers” and that, as such “we believe they are ‘commonly available’”. Availability of Tier 4 engines in hydraulic fracturing pumps made by certain manufacturers does not by itself mean that those engines are “commonly available” to Extraction to utilize for the operations for which they are contemplated to be utilized in the Operator Agreement.

Newly commissioned hydraulic fracturing pumps are being built utilizing Tier 4 engine technology. Consequently, hydraulic fracturing companies have begun integrating Tier 4 engine technology into their new fleets. However, the integration of the technology into the equipment available for Extraction to contract for in order to implement the operations contemplated by the Operator Agreement still remains quite limited. This is supported by the attached letter from the

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provider of the Liberty Quiet Fleet. As a reminder, the use of the Liberty Quiet Fleet or comparable technology is also a requirement of the Operator Agreement, as detailed in BMP No. 2.

The Operator Agreement does not state that if Tier 4 technology simply *exists*, Extraction must implement it. The requirement to use the technology is dependent on whether it is commonly available for Extraction's operations as contemplated by the Operator Agreement. And in fact, Tier 4 hydraulic fracturing pump engines are not commonly available.

Sincerely,

A handwritten signature in blue ink, appearing to read "E. Jacobsen", written over a horizontal line.

Eric Jacobsen

Senior Vice President of Operations



July 16, 2019

To Whom it May Concern:

Our customer, Extraction Oil & Gas, Inc (“Extraction”), has requested that Liberty Oilfield Services (“Liberty”) provide information as to whether or not Tier 4 hydraulic fracturing pump engines are commonly available to Extraction for its operations in the City and County of Broomfield (“Broomfield”).

Currently, Liberty is operating 7 fleets in the DJ Basin in Colorado. Of those 7 fleets, only one has fracturing pumps equipped with Tier 4 engines. The remainder of the fleets were constructed prior to 2018 and utilize Tier 2 engine technology. To our knowledge, no other hydraulic fracturing company has a fleet in the DJ Basin that utilizes Tier 4 engines on the fracturing pumps.

Newly commissioned frac fleets using Tier 4 engines will be deployed with time. Until further fleets are deployed, the availability to any operator in the DJ Basin is quite limited and, in the opinion of Liberty, not commonly available.

Regards,

Liberty Oilfield Services

1. Please explain why Extraction does not think Tier 4 engines are commonly available at this time.

ANSWER: The Operator Agreement requires Extraction to utilize Tier 2 and liquified natural gas dual fuel hydraulic fracturing pumps. Extraction will, at a minimum, be utilizing this type of engine in frac pumps at the Well Sites in Broomfield. For context, the Broomfield Oil & Gas Task Force deemed dual fuel engines to be an acceptable BMP as part of their recommendations to the Broomfield City Council.

As for Tier 4 engines in hydraulic fracturing pumps and the requirement to utilize them once they become commonly available, we utilize third-party contractors for our hydraulic fracturing equipment. We also are required to utilize quiet completions technologies. The leader in this technology in the DJ Basin is Liberty Oilfield Services and we have contracted with them to provide our completions equipment for the well sites in Broomfield. Currently, Liberty has a single fleet that does not utilize Tier 2 dual fuel engines in their frac pumps out of their 7 fleets operating in the DJ Basin. In fact, this is Liberty's only fleet that is utilizing all Tier 4 engines in its frac pumps within its nationwide fleet of 24 crews.

As was the case when the Operator Agreement was entered into, Tier 4 pumps are still not commonly available among frac fleet operators in the DJ Basin. Beginning January 1, 2018, any newly commissioned fleets are required to utilize Tier 4 pumps. As such, we expect Tier 4 pumps to become more common as operators replace their fleets or put new fleets into service. Extraction has no ability to control the speed at which industry transitions to the use of Tier 4 engines in hydraulic fracturing pumps.

With more time, we can get attempt to obtain more definitive data, but our representative from Liberty estimates that the use of Tier 4 engines in the pumps of onshore U.S. hydraulic fracturing operations still accounts for less than 10% of pumps in use. As such, while the DJ Basin is fortunate to have the one crew in Liberty's nationwide fleet that has fully transitioned to the use of Tier 4 engines in its hydraulic fracturing pumps, the use of such technology continues to be the exception rather than the rule.

2. Is Extraction using Tier 4 engines at another site in the DJ Basin?

ANSWER: Yes, Extraction is utilizing Liberty's single fleet with Tier 4 pumps at another well site. That fleet was not available for use at Interchange B at the time completions operations were scheduled to commence. Even though we expect that Tier 4 pump engines will still not be commonly available when completions operations commence at the Livingston pad, we will nevertheless attempt to contract Liberty's single fleet with Tier 4 engines on its pumps for completions operations at that site.

3. Does Liberty or Extraction have any safety concerns with using Tier 4 engines?

ANSWER: There are no safety concerns with using Tier 4 engines, it is a matter of fleet availability. Right now, Liberty only operates a single fleet that does not utilize Tier 2 engines for its hydraulic fracturing pumps and it is already being utilized at a different site.

4. What is the difference in emissions between a Tier 2 dual fuel engine and Tier 4 engines?

ANSWER: The use of Tier 2 dual fuel hydraulic fracturing pumps was contemplated by the Operator Agreement and information on the emissions from these pumps were utilized and accounted for in the studies contained in Section L (Facility Emissions Inventories & Air Quality Impact Studies) of the Comprehensive Development Plan approved by the City. Emissions data on the Tier 2 dual fuel pumps was detailed in those studies. Despite the fact that the Tier 4 engines being utilized by Liberty operate on diesel and are not dual fuel, any future implementation of Tier 4 engines in the hydraulic fracturing pumping equipment would be expected to result in a decrease to the emissions detailed in the Section L studies.