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29 April 2017

Hydraulic Fracturing Task Force

GPO Box 4396

Darwin, NT 0801

Australia

Re: Response to the Background and Issues Paper

Scientific Inquiry into Hydraulic Fracturing in the Northern Territory.

The Honorable Justice Rachel Pepper and Panel Members,

Blue Energy Limited is a Brisbane based ASX listed oil and gas exploration company and has exploration tenements in the following areas:

- Bowen Basin of Queensland (Coal Seam Gas and Shale)
- Surat Basin Queensland (Coal Seam Gas and conventional oil and gas)
- Maryborough Basin Queensland (coal Seam Gas, Shale Gas and Conventional gas)
- Cooper Basin Queensland (oil and gas)
- Georgina Basin Queensland (Shale oil and gas)
- Carpentaria Basin
- Greater MacArthur Basin Northern Territory (oil and gas)
- Galilee Basin Queensland (Coal Seam Gas)

Additional information on Blue Energy Limited including the credentials of its Board and Management can be obtained at www.Blueenergy.com.au

As a fundamental tenet, the supply of energy is a basic input to human life. The better access we have to energy, the longer we live, the better the standard of living we enjoy and the more amenities we can utilize. As the world's population continues to grow, the more energy will be required to maintain and improve living standards.

Energy is a primary input to food production, and with out energy, the global food yield is greatly diminished.

The list of risks presented in the background and issues paper cover almost every conceivable risk to every attribute of community and environment. It is not my

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intention to address each and every one of these, as I am sure there are those from my industry with far greater resources to apply to this than I can bring to bear. Furthermore, there are recent examples that give actual evidence of the impacts of the gas sector on communities. I would urge the panel members to look at the examples of Roma, Chinchilla, Miles and Dalby in Southern Queensland, where the Coal Seam Gas industry has developed. These areas by and large have a much higher population density that the NT and whilst they are demographically very different, these communities have all had concerns about impacts on water, land, air, public health Traditional owner impacts, social and economic impacts from the development of the gas industry. The gas sector in these regions has developed very rapidly with high levels of intense activity for a period of time in areas that are are used for intense cropping as well as cattle grazing.

I will intentionally keep my submission succinct as it is clear that this type of process (an inquiry into fracture stimulation) has been undertaken by many other jurisdictions both here in Australia and internationally, and therefore I do not wish to take up the Panel members' time (or my own) by repeating scientific and engineering factual data that these other investigative bodies have discovered, and which have all drawn upon the same baseline data sets available for the gas sector worldwide.

Having said this, the following high-level points are pertinent to ypur current deliberations:

1. The Hydraulic Fracture Stimulation (HFS) process was first developed in 1949 (last century).
2. HFS was designed to enhance oil and gas production rates (flow rates) from low permeability reservoirs (ie to achieve an economic flow rate of oil and gas where, if left to flow by itself a reservoir would not produce oil or gas at economic rates). That is to say – it is used to make oil and gas projects economic. It broad terms, Permeability is equivalent to NPV (net present value).
3. There are very few onshore oil and gas provinces in Australia today where gas can be economically produced without HFS
4. The HFS process is well documented (see www.onepetro.org for engineering details).
5. The HFS process is a standard technique used in oil and gas exploration and production worlwide.
6. The geological rock formations in the Northern Territory that are prospective for oil and gas discovery are all very old (445 – 1,800 million years old) and they are all of low permeability, and will all require some form of stimulation to promote enhanced (economic) oil and gas flow rates. With out HFS and horizontal drilling, there will be no future economic oil and gas production in the onshore of the Northern Territory.
7. In the United States (US) there are between 1.1 and 1.7 million oil and gas wells that have had HFS used. The panel should satisfy itself on the number of verified cases of aquifer contamination compared to the number and scale of HFS wells in that country to see if likelihood and impact criteria for this inquiry are reasonable.
8. HFS wells are responsible for 66% of US gas production as at May 2016

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9. US greenhouse emissions from the energy sector have declined to 1993 levels as domestic gas use has increased (due to the abundant supply of low price gas brought to market as a result of HFS and horizontal drilling and the resultant gas use for electricity generation which has displaced coal - (US EPA Inventory of US Greenhouse Gas Emissions and Sinks 1990-2014 (April 15 2016).
10. It is arguable but highly probable that the US shale gas industry has been responsible in part for bringing the US economy out of the GFC since 2008.
11. There are no widespread aquifer contamination issues from HFS processes given the documented and verified cases versus the number of HFS wells in existence.
12. There have been 5 Australian studies into either Coal Seam Gas and or HFS conducted by independent panels (including CSIRO, and the Australian Council of Learned Academics). Coal Seam Gas can also be viewed as "Unconventional Gas". These all concur that HFS "risks" if properly regulated can be managed.
13. Small scale seismic events that have been documented and sensationally attributed to HFS are mostly from water injection processes and not HFS activity. But by its very nature, HFS induces small fractures in rocks, but to extend this to creating a significant earthquake size events is an overreach. Any quarrying, mining or tunneling process using blasting could be equally accused of initiating small seismic events, but these would also all be too small to be of any significance.
14. There have been at least 12 European Studies into HFS including by the UK House of Commons and the UK Royal Society and Royal Academy of Engineering. Thee reports agree that with adequate regulation HFS poses little risk to the environment.
15. The US EPA conducted its own study into HFS and has identified certain conditions during the HFS process where there is increased risk of impacts. These are largely identified in the ancillary processes, such as water usage, surface handling of frac fluid, well integrity, injection directly into aquifers, or disposal of frac fluid. All these circumstances are identifiable and routinely managed by industry to minimise the risk of incident. These are base business activities that are managed.
16. Risk assessments are always conducted by Operators when conducting HFS activities. The likelihood of an incident is generally low (ie most risk scenarios are minimised) and any resultant environmental consequences (ie impact) to the environment are equally low, given the small volumes of "chemicals" used and the diluted nature of their application when compared to the amount of water used and the volumetric size of the aquifers, should there be any direct exposure to an aquifer. (which, by design does not occur) I would argue that if HFS is seen as a risk to the environment then back-flushing of backyard swimming pools into stormwater drains be banned, or indeed ensuring no car or truck ever drops any oil whatsoever on the roads (which will end up in stormwater drains and flushed into the environment.

The inordinate number of independent scientific studies into the HFS technique, all suggest that if properly regulated, there is no reason to ban HFS as un-safe.

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HFS was originally developed for use in "conventional" gas and oil wells. The Cooper Basin supplied Sydney and Adelaide with gas for decades from wells that used HFS. The NT's own former Power and Water Corporation and the township of Alice Springs have been supplied with gas from the Amadeus Basin fields (Mereenie and Palm Valley) for decades. A large number of the producing wells in the Amadeus providing this supply have used HFS. There should therefore be a plethora of available data within the files of the NT Regulator on the environmental effects, if any, of HFS in the Amadeus Basin.

There is essentially no technical difference between an HFS **process** for a "conventional" gas well compared with the HFS **process** used in Coal Seam Gas or Shale wells. Horizontal drilling techniques are also used for Shale, conventional and Coal Seam Gas wells. To allow HFS for "conventional" gas wells in the NT and outlaw HFS for Shale gas well drilling was a political outcome and has no scientific basis. The only difference is in the ultimate numbers of wells.

Over 60% of gas supplied to the Australian East Coast Gas Market comes from Coal Seam Gas (both domestic and Export LNG markets) some of which come from HFS wells.

From a social impact perspective, again I would urge the panel to look at the experiences in the Surat Basin of Queensland. Talk to the regional mayors, the land holders and the community leaders, who actually lived through the transition, rather than those who agitate against the industry from a position outside those communities and regions.

It should be remembered that banning the use of HFS will shut down the onshore gas exploration industry in the NT and will leave oil and gas in the ground and undeveloped in the Territory. To be clear, if explorers are prevented from using HFS in exploration or appraisal wells, there will be no ability to assess the econoimic viability of a successful exploration, and therefore the investment in exploration is completely unjustified if industry is prevented from using a technique which enables economic production from otherwise uneconomic rocks. Banning HFS will prevent further oil and gas investment in the onshore NT, together with jobs and skills development for all territorians. It will restrict Traditional Owner economic independence as there will be no more production royalties paid to the government or to Traditional Owners. As an example, the CLC has received hundreds of millions of dollars in royalty payments from oil and gas production from the Mereenie and Palm Valley oil and gas fields, which the CLC has disbursed to the traditional land owners. Shutting down the gas industry by banning HFS will deny other traditional landowners of the opportunity to obtain the same benefits that those royalties bring to the traditional landowners around those existing fields. It will also not break the cycle of the NT being a net recipient of GST from the richer states.

Restricting HFS activity to just the Beetaloo Basin will impugn exploration in the NT and is not rational. Why is the Beetaloo Basin special, other than it has shown early

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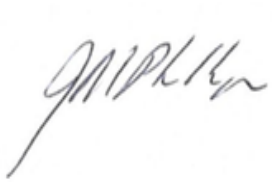
promise for shale gas prospectivity? Restricting exploration slows reduces the Does the Regulator restrict where gold or iron ore explorers may explore or even where petrol stations are opened (if you consider risks to air, water and public health and safety petrol stations should be banned)

Yours sincerely



John Phillips

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Reference Studies

- Fracfocus. *Hydraulic fracturing: The process*
- Society of Petroleum Engineers, *Hydraulic Fracturing 101*: George E. King, Apache Corporation – (2012) (PDF: 6.95 MB)
- GISERA (Gas Industry Social & Environmental Research Alliance) – Australia. *Shale gas in Australia* (2014) (PDF: 0.23 MB)
- International Monetary Fund (2011) – *World Economic Outlook Unconventional Gas* (PDF: 0.17 MB)
- Statistics (including Hydraulic Fracturing) in Australia – APPEA. (link)
- United States Environmental Protection Authority – *Hydraulic Fracturing* (link)
- CSIRO. What is Hydraulic Fracturing? (link) What is Hydraulic Fracturing Fact Sheet (PDF: 0.167 MB)
- Government of South Australia, *The Facts about natural gas and fracture stimulation in South Australia* (PDF 2.8 MB)

See also: **OnePetro** which offers numerous scientific references papers published on the rock mechanics, lab research, modelling, case histories, diagnostics, design, execution, and evaluation of hydraulic fracturing.

Australian reports

- Northern Territory Independent Inquiry into Hydraulic Fracturing (2014). (PDF: 7.57MB)
- Independent Review into Coal Seam Gas of the NSW Chief Scientist and Engineer (2014) (link to reports)
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European studies

- UK House of Commons Energy and Climate Change Committee, *Report of Inquiry into Shale Gas* (2011). (PDF: 1.5 MB)
- UK Royal Society and Royal Academy of Engineering, *Shale gas extraction in the UK: a review of hydraulic fracturing* (2012) (PDF: 7.9 MB)
- French Académie des Sciences (December, 2012). (PDF: 5.1 MB)
- French General Council of Industry, Energy and Technology (CGIET) and the General Council of the Environment and Sustainable Development (CGEDD) (2012) (PDF: 2.7 MB)
- Dutch Ministry of Economic Affairs (2013) (PDF: 0.62 MB – *not translated*)
- Scottish Government, Independent Expert panel, *Report on Unconventional Oil and Gas* (2013). (PDF: 2.0 MB)
- Germany, Ministry of the Environment, *Environmental Impacts of Fracking Related to Exploration and Exploitation of Unconventional Natural Gas Deposits* (2013) (PDF: 9.1 MB – translated)
- Acatech, German Academy of Science and Engineering, *Hydraulic Fracturing, A technology under discussion* (2015) (PDF: 1.33MB – not translated)
- Lithuanian Academy of Sciences, *Genesis of shale geological formations and hydrocarbon extraction: impact on environment and human health* (2014) (PDF: 3.7MB – translated)

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- European Union. EASAC Council, *Shale gas extraction: issues of particular relevance to the European Union*. (2014). (PDF: 0.67MB)
- Polish Geological Survey,*The development of shale gas in Poland and its prospects in the Czech Republic – analysis and recommendations (2014)*. (PDF: 2.68MB – not translated)