P.O.W.E.R Eneabba
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SUBMISSION TO: THE INDEPENDENT SCIENTIFIC PANEL INQUIRY

P.O.W.E.R Eneabba is a local committee of concerned citizens formed from a Public Meeting conducted in April 2012, when the community became aware this region was a target area for the unconventional gas industry. The Committee was directed to research the unconventional gas industry and report back on its findings. It presented these finding at a Public Meeting in October 2012. At this meeting the Committee was then instructed to do what it could to protect our community as it was obvious that the Government, The Department of Mines and Petroleum and the Industry were most keen to proceed with the unconventional gas development.

While initially researching this Industry it soon became apparent that truth and fact became casualties in the pursuit of vested interests.

P.O.W.E.R Eneabba is an anagram for Protect Our Water Environment and Rights. The initial phase of the team research was spent becoming acquainted with the process of fraccing and the various attributes and sequences of events necessary to bring an unconventional gas well into production.

We divided our committee of thirteen into three groups to research different areas of concern, which closely followed our name: Water; Environment; Rights (mainly property owner's rights). The following information is a summary of our finding and concerns.

Water

Our area is blessed with plentiful and very high quality potable ground water. Many people use this ground water unprocessed for drinking and domestic use as well as for livestock and agricultural spraying. This water is commonly regarded as good as, or better than "town or scheme" water and is meant to be regulated by the Department of Water. (Ref 1.0)

Worldwide there is a large amount of anecdotal and individually observed evidence of ground water contamination, however there are no recorded or "official reports" of ground water contamination. We believe that it is very hard to prove that there has been contamination when there is no pre-existing baseline data. Even when people know that they could once drink their ground water and now they cannot. This is not considered proof. Coincidentally in many of these cases, the exploration companies are generous enough to provide bottled water for the resident's domestic requirements. *(Ref 1.1)*

Interestingly enough, eyewitness and observation accounts are accepted in many courts of law. In the United States numerous outlets have declared that the countries Clean Water Legislation applies to all industries but not to the Unconventional Gas Industry. *(Ref 1.2)*

From our research we believe there is a lack of will by regulatory authorities to thoroughly and properly pursue contamination incidents, and we know that Governments are particularly keen to have these forms energy developed. The exploration companies are not bound by ethics or conscience, but only by law and regulation which history proves they do not always strictly adhere to in their quest for profit.

Well integrity is a major threat to ground water. We understand from our research that there has been a great deal of research done on well integrity and many reports produced regarding well failures. We believe that an average consensus for well failures is that 5% of wells fail initially this rises to 30% in 30years (?) and eventually all wells will fail. As we understand most well failures occur due to defects in the cementing process and over time the decaying of the steel casing. That is to say how well the cement is forced into place between the outside of the steel casing and the well wall. This distance we believe is approximately one inch or 25 mm. In a vertical well 3000 metres deep it is difficult to ensure that the casing is centrally located and that cement is evenly dispersed and compressed without any flaws. In fact as the reports state 5% do initially fail. Bear in mind that these reports were researched and written as we understand when vertical drilling and fraccing were standard practice. The next question is, what is the failure rate? When the Industry gets involved with the much more complex horizontal drilling and divided well drilling. Centralising the casing would be much more difficult and effectively cementing and sealing of a curved well is much more difficult. *(Ref 1.3,1.4,1.5,1.6)*

The bottom line is that no Government body or gas company is prepared to guarantee that wells will not fail or that the aquifers we drink from will not be contaminated. The assurances we receive are the use of “Worlds Best Practice”. This is “no guarantee” at all.

Other concerns with water include the disposal of fracking fluids and produced water which contain highly carcinogenic, toxic chemicals and pollutants, which can be spilt or escape at the well site or in transit and contaminate the surrounding landscape. These can include naturally occurring radio-active materials such as uranium, thorium, barium, bromine and various other naturally occurring toxic substances which are present in the shale or tight rock in which the gas is found. With these incidents it is not a case of whether it will happen but when it will happen and how complete the clean-up will be. Again this can lead to ground water and surface water contamination*. (Ref 1.7)*

The disposal of fracking fluids and produced water does present problems. One solution is to collect the offending material and transport it to a “Safe Disposal Site”. This begs the question what is safe disposal site? Is an out of the way place that is OK to pollute or is it a sealed site where the chemicals are contained forever. The other place is to dispose of the chemicals by pumping then down abandoned gas or oil wells, again this method does not

seem environmentally sound. As we know well integrity does not last forever and so there is the risk to ground water and "who knows" what other pollution. At the moment in writing this submission we have yet to see a detailed plan for the disposal of waste water and waste materials.

Environment

This region has been identified as having arguably the greatest diversity flora of any place on earth and locally for its display and diversity of wild flowers. It is the home of much fauna including some rare or endangered species. Notably the Carnaby Cockatoo and the Mallee Fowl.

This region is a one of the most reliable farming areas in the state. It receives an average of 500 mm of rainfall and if you chose to allow for "Climate Change", there is still considerable scope for agriculture. Crop yields in this West Midlands area have continued to increase with the application of minimal tillage and refined fertiliser packages coupled with timely applications of herbicides. This is in contrast to other parts of the state where the drying climate has exacerbated their already marginal rainfall and farming. The recent inclusion of sub-tropical grasses into the region is further advancing the livestock industry. The food producing parameters of this region are only limited by political and economic constrains.

Farming is a long term sustainable land use, gas fracking is short term, high risk and environmentally damaging industry. The expected life of an unconventional gas well is up to 15 years and often considerably less.

The Mediterranean West Coast Climate with cool wet winters and hot dry summers has appeal to many people as is evidenced by the continued growth of towns like Dongara and Jurien Bay, together with the many smaller communities along the coast.

This region needs stability and certainty not uncertainty and risk that the Unconventional Gas Industry will bring. Each of these towns rely on the reliable and plentiful aquifers for their water supplies. Water is definitely a "strategic resource" especially to these towns and this area.

The region has exposure with a smaller portion of the conventional gas and mining industry over the course of many years and has "happily co-existed." But we know that this industry is different.

It starts with toxic chemicals, it can unleash subterranean toxic chemicals and is shrouded with secrets and commercial sensitivity.

Damage to the environment includes leakage and escape of toxic chemicals, large usage of ground water during drilling and multiple fracking, physical damage to the environment during surveys, drilling and production, spreading of disease and weeds during vehicle and personnel movements through the environment and leakage of methane gas into the environment.

Let us expand on the damage, we have mentioned some of the concerns regards water, so let look at the disturbance and compaction of the land surface. Firstly the seismic surveys that have to be done, these are carried out on grid patterns that maybe at one to two kilometre spacing. These involve paths being prepared for the heavy thumping machines that produce the seismic shocks in lieu of explosives. These heavy vehicles which transverse paddocks at various angles create compaction lines that create hazards for machinery and lost production for many years. (Physical damage to a boom sprayer's wing could be in excess $10,000, damage to harvesting machinery could be much more) There is also damage when this is carried out in the natural bushland, with the clearing and soil compaction and the risk of spreading disease and weeds.

If we pause for a moment and we look at Barrow Island, with the aid of Google Earth we can see many of 740 wells that have been fracked, together with the many that have not been fracked and their associated tracks and roads on the 20000 hectares that make up Barrow Island. This is not a sight that we wish to see replicated over the Beekeepers Nature Reserve, other bushlands or indeed over any landscape involving agriculture. (We note that both Queensland and New South Wales have introduced legislation providing some protection for agricultural land.) We note that the Industry quotes that over 800 wells have been "fracked in WA", they fail to mention that approx. 740 are on Barrow Island and that only a very few actually involved high pressure hydraulic fracking. At the previous inquiry when AWE were directly questioned and they conceded that 5 or 6 wells may have been fracked around Dongara. We understand that since then there may have been as many as 3 wells fracked in the Eneabba area. We know that 2 of these were only partly successful.

If the seismic survey shows promise exploratory drilling is then carried out. This necessitates the forming of access roads, the preparation of a well pads big enough to accommodate drill rigs, associated works offices, space for drill rods etc. and then the compressor trucks (up to 20 sometimes more) and frack fluid trucks, monitoring equipment and fraccing equipment, along with produced water ponds and the clean water ponds and also the wash down & parking and turning areas, not forgetting the flare pits. It is no wonder that they need about four hectares of land for a single well site plus access roads and not two hectares as the industry suggests.

It can be easily envisaged there is a very considerable amount of vehicular traffic to transport all this equipment in and out, together with operations as they are carried out.

There is also the consideration of providing the millions of litres of water for the drilling and multiple fracking. In this area no doubt water would be provided by drilling water wells and using this high quality water. The next challenge is what to do with the produced water. Typically this up to 70% of frack fluid pumped down the well but this cannot be accurately predicted. Sometimes as in a case in the area North East of Badgingarra (Warro Gasfield) a well did encounter a deep aquifer, and in this case a "foul water" aquifer which continued to produce foul water. This creates additional challenges. These produced fluids often acquire additional additives and chemicals some of which are more toxic than those in the flack

fluids. Benzenes and radio-active substances have been detected. The millions of litres of produced fluids must be assessed and disposed of in "approved disposal sites". (The history of the Warro Gasfield is very interesting). *(Ref 1.8, 1.9)*

It follows that a number of exploration wells are necessary to prove an area before a full scale gas-field is proceeded with. This is when the full impact of unconventional gas becomes apparent, because to get the most gas out of given area, you must systematically frack as much of the ground as you possibly can. The method that has been used with vertical wells is drill wells in a grid pattern as close as 400 to 500 metre spacing. Because it seems that with vertical fracking, the effective frack is about 200 metres and as the frack radiates out like spokes on a wheel then the unfracked area becomes greater at larger spacing.

To illustrate the Department of Mines and Petroleum quote that there have been more than 740 wells fracked on Barrow Island. As we understand Barrow Island is an island that is approx. 25 km long by 10km wide with an area of about 202 sq. km. This equates to approx. 3.4 wells per sq km. or 100 hectares. Which equates to one fracked well to every 75 acres or 30 hectares. We are not sure how many other wells exist on Barrow Island. We are working on material we have accessed from the DMP. Hence it is referred to as invasive gas.

If you were to replicate this over a farming area or high value native vegetation it would cause a complete change to the character and landscape of that area. The invasion would render agriculture farming areas useless for cropping while creating complications with livestock enterprises. The presence of mining in the area will reduce surrounding land values. Experience elsewhere in Australia has shown that land owners have been refused bank finance due to uncertainty of the asset caused by the presence of wells on the property *(Ref 1.10, 1.11).*

Rights

P.O.W.E.R Eneabba have outlined above the developments in agriculture being made with crops and the progression to sub-tropical grasses being widely adopted in this region, together with its reliable rainfall all coming together to create a sustainable and progressive industry. The threat to the regions pristine and plentiful water is of vital importance, it is crucial to farming in this area and to town water supplies through this region.

Assurances of "Worlds Best Practice" are worth nothing to us unless they are guaranteed.

Again the threat of contamination from frack fluids and produced fluids on farm could if not thoroughly cleaned up can to lead livestock illness and death. Anecdotally this has happened in the United States, and in Queensland there is a "recorded" case near Kingaroy (Cougar Gas) *(Ref 1.12)* were several cattle died in an incident with Coal Seam Gas extraction. In any event contamination can and has lead to livestock being unproductive, unsalable and in the extreme case death.

The intrusion of unconventional gas exploration onto properties will be very invasive, the example of Barrow Island which is approx. 25km by 10 km about 200 sq kms or 20,000 ha. This equates to 4 average farms in this region, if the drilling program on Barrow Island was replicated on 4 average farms it would render the farms unworkable for agriculture, Regardless of other risk factors. Representatives from the industry and the DMP are very evasive when asked about well densities. They talk of horizontal wells and multiple wells drilled from a central pad, pushing pad spacing out significantly, but the truth is that they don't know and property owners will be asked to commit to unknown and changing parameters with very limited bargaining power.

The intrusion of building infrastructure and areas taken up by roads and pads, pipelines and processing infrastructure, together with the need to spread this across the landscape will mean that there will be considerable ongoing disruption to farming operations. It could be envisaged that heavy farm machinery may only be allowed to cross connecting pipelines at certain places and there can be restrictions placed on other movements and practices. Then there are nuisance factors from having other personnel on the property, especially people who are acting under different authority and control. It can be envisaged that livestock could stray and become mixed through negligence with gates or fences being damaged. With agriculture disruption can be seen with spraying programs which are very time and weather condition sensitive. There are a myriad of other conflicting and disruptive scenarios that can be envisaged.

We are concerned for capital value of our properties. It is well accepted that markets, be they share markets or property markets operate on perceptions and confidence. We believe that even the knowledge that this is a target area for unconventional gas will deter some buyers. It is very believable that when full on unconventional gas production is achieved that properties may become virtually unsalable. I have been to Roma in Queensland and spoken to a Real Estate Agent and he has stated that properties with Coal Seam Gas on are virtually unsalable and certainly if they sell they sell at a large discount, sometimes it is only the CSG companies themselves that will buy, other times they will not. The agent was Vince O'Brien from Elders Real Estate, when other real estate agents were asked they were apprehensive as they did not wish to be seen as anti or pro gas, but all believed gas was a disincentive to a sale.

In the event of an incident, once an access agreement or a production agreement has been signed, we can envisage that it could become very difficult to gain compensated or in the case of water contamination have it restored. We have noted that there are many cases in the US where gas companies provide property occupiers with bottled water for drinking. Whether one takes notice of anecdotal evidence or chooses to ignore it, we do not want to be in the position of having our assets devalued or destroyed and having to go through a long and convoluted court process with unpredictable outcomes. There are many examples of futile attempts to attain justice. In the case of oil and gas we have to look no further than the Western Australian Government itself with the Varanus Island incident. It is very

conceivable that small farming enterprise would have little chance procuring satisfaction and reinstitution should any serious incident occur.

Key Points

1) The State Government is very keen for the Unconventional Gas to be fully exploited. They call it a "strategic resource". We believe this is a loose interpretation of the word and that it is only another commercial export like iron ore or some other mineral. This evidenced by the Government allowing 85% to be exported.
2) APPEA. The Australian Petroleum Producers and Explorers Association are constantly lobbying the Government to enhance their position. People in country areas find it extremely hard to put their case and have significantly less resources to do it.
3) We believe that well failures are a significant risk. We are led to believe that up to 5% of all wells fail initially. Our concern is that nobody can or will guarantee our precious high quality and plentiful water. The Industry, The Government and the DMP's assurance of "World's Best Practice" is not a guarantee.
4) There will be significant disturbance to the natural environment. Whether it is in the Beekeepers Nature Reserve, other reserves or adjacent bushlands where there is such diversity of flora and rare and endanger species, of both flora and fauna.
5) We do not believe that an industry that is as invasive and far-reaching, as this should go ahead especially with the subsidisation of property owners. That is to say there should be proper compensation to cover all risk and potential losses including loss of capital value. We do not accept the DMP assertions that there will be no loss of capital value. Again nobody can envisage all risks that may arise or how significant they maybe.
6) We believe vested interests do their best to paint this industry in the best light. This industry has many serious downsides and these are down played by the Industry, the Government (the Water Corporation Included) and the DMP. We believe that many anecdotal reports have substance but are dismissed as lacking science, others are not recorded by official authorities, and others are dismissed because there is no baseline data to prove there has been change, when there has been obvious change.
7) We believe that is it absolutely inappropriate for the DMP to be a Promoter, the Regulator and Approver of any industry, let alone one as controversial as the Unconventional Gas.
8) Fracking that has been carried out in WA to this point, particularly on Barrow Island has been relatively low pressure fracking to assist in the recovery of conventional oil and gas. The fracking pressures have been around 1300 psi, this

compares to those used in the tight or shale gas recovery of in excess of 10,000 psi. These pressures require much better well integrity, and more machinery and equipment to produce these pressures.

9) We believe that if the Government, the Industry and the DMP want to build this Industry then they need to each build trust with the community and the stakeholders. To this stage each has failed to do this, by appearing to treat them with contempt and not recognising their ability to research and think through what they are being told or offered.

Conclusion:

We believe that the Unconventional Gas Industry is much more intrusive than the conventional gas industry and presents many more risks. The Industry is acutely aware of the risks, and are working to ameliorate these risks and are playing them down to the Government, the Regulators and the Public.

As time has moved on, more information has been revealed of incidents of contamination, failures and unacceptable practices. You do not have to look any further than the new regulations regards disclosure of chemicals in fracking fluids. If the Industry was the fine upstanding corporate citizen that they suggest they are, regulations like this would not need to be forced on them.

Again when negotiating with property owners, they should have been informing owners of their rights and suggesting that they obtain legal advice at the time they were presenting them with access agreements. Not presenting them with combined access and production agreements, offering insulting compensation and then suggesting that, should they choose not to accept it they could be taken to the Magistrates Court where they may well receive considerably even less. (In the case quoted here the compensation offered, amounted to about two weeks wages for a drilling worker, per year, for the exploration and production agreement) This is what was also happening in Queensland prior to 2010 when the Government embarked on an education program to inform property owners how to negotiate with gas exploration companies.

The companies are trying to present themselves as good corporate citizen and that they are a clean and green industry. But when it comes to the crunch none of the proponents are prepared to guarantee the safety or the outcomes of their industry. But hide behind the slogan of “World’s best practice”. Is there the assumption that “World’s best practice” should lessen their liability. Why should the community or any property owner have their property or their community diminished or put in jeopardy by a commercial enterprise without being fully or even generously compensated.

The Government itself seeks to gain advantage for this industry by calling it a “strategic industry” we reject this term and believe it is a commercial industry, the proof being the

willingness of the Government to export up to 85% of production and this figure could presumably be altered at the whim of the Government.

We believe water is a Strategic Resource.

We have reservations with the DMP who while they are regulator and enforcer of the Industry, they are also a promoter. We have not always been confident with the messages and the information we have received from the DMP. We believe that this has come from their enthusiasm to promote the Industry. This may or may not spring the enthusiasm of the relevant Minister.

We have no faith in the Companies involved the Unconventional Gas Industry. We believe their only motive is to produce profits and they have demonstrated themselves to lack ethics, have been evasive and less than truthful.

We believe the Industry has considerable Risk and we believe that “World’s Best Practice” is of no comfort when things go wrong and in spite of all precautions things do go wrong.

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References:

1.0	Safe Drinking Water Regulations for Eneabba – Department of Water - 2008	https://www.water.wa.gov.au/__data/assets/pdf_file/0017/5408/79232.PDF
1.1	Water Usage.	http://www.lockthegate.org.au/about_shale_and_tight_gas
1.2	USA Legislation to exempt oil and gas industries from safe water usage.	https://en.wikipedia.org/wiki/Exemptions_for_hydraulic_fracturing_under_United_States_federal_law
1.3	Gas leaks and methane.	https://www.theguardian.com/environment/2014/jun/20/fracking-wells-pennsylvania-leaking-methane
1.4	Well integrity.	htt C4
1.5	https://uk.news.yahoo.com/flawed-fracking-wells-taint-pennsylvanias-drinking-water-162146112.html	
1.6	Davies, R. J., Almond, S., Ward, R. S., Jackson, R. B., Adams, C., Worrall, F., Whitehead, M. A. (2014). Oil and gas wells and Their integrity: Implications for shale and unconventional resource exploitation. Marine and Petroleum Geology, 56, 239--- 254. doi: 10.1016/j.marpetgeo.2014.03.001	
1.7	Excerpts from Compendium of scientific, medical, and media findings demonstrating risks and harms of fracking 19 Jan 2018. Excerpts on water contamination.	http://www.psr.org/assets/pdfs/fracking-compendium-5-water-excerpt.pdf
1.8	EPA United Sates (2016): Hydraulic Fracturing for oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States. December 2016.	https://www.epa.gov/hfstudy
1.9	Fracking: The evidence.	https://docs.google.com/file/d/0B1cEvov1OlyHdzRBRjk4dElfbVE/edit?pli=1
1.10	Rabobank (2011) Submission to the Senate Inquiry into the management	http://www.aph.gov.au/DocumentStore.ashx?i

	of the Murray-Darling Basin – impact of mining coal seam gas.	d=5bfff958-7e81-41e7-94d3- c1f463ce8c26
1.11	Robertson, 2016, Commonwealth Bank: coal seam gas makes property 'unacceptable'.	https://www.theguardian.com/environment/2016/sep/30/commonwealth-bank-coal-seam-gasmakes- property-unacceptable-as-loan-security
1.12	Cougar Gas Toxicity in Water Found Guilty.	https://www.qt.com.au/news/kingaroy-win-over-cougar/1218957/