Alice Springs – Arid Lands Environment

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Alexander Read: There are inherent problems and risks to this process because of the variables and uncertainties in the geological and hydrological characteristics of the region that vary from basin to basin. Each frack is an experiment and despite our best attempts to control these variables and our best attempts to control the engineering, we just cannot understand with certainty what is happening at that level and at those depths.

There are significant uncertainties in the methane seeps, the behaviour of faults, the way that gas migrates through these pathways and this is a complex challenge to communicate to stakeholders and to communicate through science.

The lateral continuity formations, methane fluxes and permeability, a lack of integrated geological and hydrological model to understand this adds to the complexities of understanding what is happening at that depth.

Well integrity is a systematic issue and I'm going to suggest that they have failed, they will fail and that they are failing. Bores with poor integrity have the potential to provide pathways for gases and liquids to migrate into and between aquifers causing contamination in ground water.

Petroleum safety authority in Norway has discovered a failure rate of 18% and 4.5% of Alberta bores have leaked. Bore integrity is still a significant knowledge gap in Australia and it will always be a risk despite our best attempts to improve technology and control these variables. The question then becomes what level of risk is this panel prepared to accept?

The Victorian parliamentary inquiry into CSG has noted that most documented cases of contamination of ground water with fugitive methane in the United States are attributed to either abandoned or poorly-sealed active wells and there is consensus within international literature that the major pathway by which cross-aquifer contamination of ground water due to unconventional gas occurs is through problems with gas and a water-bore integrity, particularly the case of cross-contamination with fugitive methane emissions.

A factor of this is sustained casing pressure. I have not been able to note the issue and variables with sustained casing pressure in the interim report and none of the companies have identified this as a variable in the process. Sustained casing pressure is a product of temperature, elasticity in the rock and depth and these are variables that need to be controlled throughout the process and that will each eventually lead to bore integrity issues because it is when pressure becomes too high that we have failures, blowouts and cross-contamination.

Thermoelastic deformations of product casing and surrounding rock change the annual volume observable. The hydraulic fracturing pressure and sustained casing pressure is involved to design a product casing in shale gas horizontal wells. This pressure is a product of the underlying geological strata and temperatures. Again, these are all variables that vary from region to region and would take considerable long-term studies at that depth to understand the dynamics of each fracked well.

Vengosh et al, 2014 studied the Marcellus shale. In some, the combined hydrocarbon ratios and helium geochemistry indicate that stray gas contamination occurs in a subset of wells less than one kilometre from drilling in Northeastern Pennsylvania. While it was noted that topography was a statistically significant factor, in these cases it could not explain the variations in methane and ethane concentrations with respect to distance from gas wells, so they've noted a correlation between the distance and methane-ethane.

The migration of natural gas to surface through production casing or well ……. is a common occurrence in the petroleum industry. 3% of all wells in Pennsylvania averages. There is no material that can withstand natural forces over geological time, and this is what we were talking about if we were to allow hydrological fracturing. It is only a matter of time.

The ability to trace is complicated by a lack of baseline studies on methane concentrations of which there are none in the NT. At the very least there has to be a comprehensive independent effort to develop these baseline water and methane studies as a benchmark from which to monitor behaviour of the industry.

Pennsylvania has been a state that has been largely fracked. The industry has been going for many years and there are thousands of wells. The Pennsylvania Department of Environment Protection published a water supply determination letter which catalogues violations and regulatory complaints from the years of 2009 to 2017. There are a total of 4000 regulatory violations in Pennsylvania over this period with 287 complaints leading to contamination.

In a lot of these cases the company has been compelled to provide potable water supply. The question then becomes have companies in the NT consider the cost of supplying water to rural and regional remote communities once their potable supply's not longer viable?

I would like to go through a couple of complaints that are on this. The first is dating from August 2013. After conducting monitor of well in Indiana County after an allegation of pollution, the EPA had admitted contamination had occurred because of exceedances in iron and manganese compared to pre-drill surveys. The law in that county ... presumes that there is responsibility of the oil and gas companies in the event of contamination so they were held responsible in law. The letter compelled the company to provide potable water supply.

Another incident from just June this year in Bradford, Pennsylvania, the Department of Environment established there was contamination of drinking water with manganese and methane. The reports stated it is the Department's recommendation that all water wells should be equipped with a working vent. This is to suggest that the water wells had to have a vent to vent off the methane so it would not pose a risk to life and property through combustion. They discovered levels of manganese and methane exceeding drinking water standards. They also said that, "Please note that it is not possible to completely eliminate the hazards of natural gas in your water supply by simply venting your well." There is also the issue of migratory emissions from water wells which hasn't been included in the risk matrix of the interim report. The analysis of these methane emissions included an isotopic analysis which concluded that it did come from methane sources associated with hydraulic fracturing.

In summary I am suggesting that this relationship between contamination and bore well integrity is one as an asymptote in that it is going to approach zero if circumstances are ideal and engineering is perfect but it would never reach zero. There is an inherent risk bores will fail and contamination will occur, has occurred.

Another significant uncertainty in this process is what we're going to do with the produced water and this has not been answered by the companies. An example of the toxicity of produced water is one company in America disposed of their water across the forest. Half of the forest died after Great experimental spraying with produced water. Within a few days of spraying, 100% of ground cover had died. This is a significant uncertainty that has not been identified and we still have no idea where this produced water will go.

Jimmy Cocking: I'm just going to just speak briefly about some of the economics and some of our concerns and perhaps if I can just ask a quick question just to clarify my comments but I was just wondering, is there going to be an opportunity once the economic study is done for public comment on that economic study?

Hon. Justice Rachel Pepper: The public will have the economic report, the final report at the same time as the panel so anybody will be free to submit whatever public comment they wish to in respect of that report.

Jimmy Cocking: Thank you for that clarification. That really does answer one of my questions because we were hoping that we would have the opportunity to be able to

critique it because as a lot of us do know is that economists and I think Rod Campbell has made the point on this around from the Australian Institute that economists, it depends on the model very much on what they're using to define the economic benefit and sometimes it does very much depend on who is paying for that. We hope that it will be very objective.

Hon. Justice Rachel Pepper: We are paying for it.

Jimmy Cocking: Excellent. It will be objective. One of our big concerns is that the economics of fracking being somewhat overblown like we've been sold the pipeline, the prospect of Northern gas pipeline which has begun construction. It was sold to us that it would be an opportunity for the state, for the Territory to be able to make up some of the difference of the GST. It's also a way of the power and water corporation being able to cover some of its losses but we've got some real concerns that electricity and water customers in the Northern Territory are covering the cost of transporting that gas and hence propping up the ... enabling infrastructure of the gas industry.

One of the other things too is that the economics of fossil fuel is declining. There are many reports now that both Renewable Energy and Storage provides a much cheaper cost curve in the long run for energy production and particularly since the prospect of fracking in the Northern Territory is the most expensive gas potentially in the world, about $7.50 per picojoule compared to the-

Hon. Justice Rachel Pepper: Gigajoule.

Jimmy Cocking: Sorry?

Hon. Justice Rachel Pepper: Gigajoule.

Jimmy Cocking: Gigajoule, sorry, compared to 20 cents a gigajoule from ….. I think that it's really important for the Territory economically to be looking at how we can be spending tax payer dollars on the development of a renewable energy industry and rather than the money being spent on hydraulic fracturing or the fossil fuel industry. While we very much welcome the inquiry and the money being spent to get down to the nitty gritty of the science of fracking but we do think that we just need to move through this, get the report done and make sure the government starts investing in renewable energy.

Alexander Read: Further on that point, I would like to acknowledge the work of the panel so far in comprehensively identifying all these heads of risk. It's a very balanced report and a difficult job. The panel has invited our comments on the risk matrix for methane emissions. My comment on this risk matrix is not necessarily a technical one, just limited to each category of risk but I would like to make a general comment on how we are assessing this risk.

This risk matrix has made assumptions about mitigation but I think that we need to go back to the initial question's risk of the obscene amount of

methane that is going to be produced through this. You heard yesterday about emissions that are potentially larger than the Carmichael mine in Queensland. This risk to the climate and risk of it exceeding our obligations onto international law have not been included in this risk matrix.

I would also like to draw attention to some volatile organic compounds and other aerosols that are produced in the hydraulic fracturing process. Ozone is a toxic gas and has been consistently correlated with hydraulic fracturing and shale resources across America. Ethane is also produced in this process and is a precursor to the production of ozone.

A paper from ….and ….. 2017 has noted a positive correlation with infant mortality in Pennsylvania. There has been a 33% increase in infant mortality with a 97% confidence. This is a positive correlation with fracking wells. There are also compounding health effects resulted to carbon disulphide.

The NT has a very young population with high birth rates in certain regions. The possibility of ozone production and infant mortality risks are only going to exacerbate preexisting issues with access to healthcare and disease in certain communities.

There is currently no monitoring of ozone in the NT or volatile organic compounds. This goes for conventional gas reserves in the Territory. This is a risk that is therefore highly unknown and uncertain but potentially connected to very serious consequences for childhood and human risk to death.

The panel has observed large discrepancies in the measurements of methane emissions and it has noted that this is a very uncertain variable in this process. It is difficult to bring certainty to these estimations because of the two methods of top-down or bottom-up approaches.

While it is appreciated that top-down does come with some reservations in terms of not being able to distinguish ambient sources from point sources. It is important to note that bottom-up approaches have been consistently shown to underestimate methane emissions. Top-down approaches have not been utilised in the NT but they're absolutely essential to collaborate readings of ambient methane and conclude the point sources.

Examples of top-down approaches include remote sensing, aerial surveys and satellite imaging. These need to be employed as well as bottom-up approaches to provide an accurate reading of migratory emissions from all processes of the hydraulic fracturing activities.

One uncertainty that cannot be accurately accounted for in terms of engineering standards are migratory emissions. Methane will be going to be seeping up through the ground through faults, seeps and any other part on the surface that is connected to a gas well. This is difficult to accurately measure by any standards because we're talking about over a large region

and remote sensing is the only way that is going to be able to capture these emissions.

Would also like to note that flaring is a method as commonly employed but note that on average this is only a 70% efficiency. A lot of fugitive methane is thus released in this process and if winds increase to 15 kilometres an hour then efficiency of this flaring reduces greatly, so this is another points source of fugitive emissions that has not been accounted for.

We are currently not employing strategies that have been utilised in the US and it is fundamental that we talk about employing satellite, aerial and remote sensing of baseline emissions and we have this data for many, many years to have an accurate understanding of the ambient methane concentrations in the NT.

The National Greenhouse Gas Inventory is the current basis from which we report our methane emissions but there are deficiencies in this reporting mechanism. A default emission of .058 tonnes of methane per kiloton informs as default in emission but this was only measured from well pads. Fugitive emissions from transport, processing, compressor stations, migratory missions to the ground were not included so this standard cannot be considered an appropriate default.

The methodology for recording methane emissions in Australia has been criticised by the United Nations as being inadequate and not up to best standards. There is yet to be a comprehensive, rigorous, independently verifiable audit of gas emissions. The CSIRO has noted there is not reliable measurements on Australian oil and production facilities.

The question then becomes to what end are we deciding on an acceptable level of fugitive emissions, assuming that we can have an accurate reading. Is it the panel's opinion that we need it below 2% because that is what would provide carbon savings or is that would provide climate change mitigation strategies or is that to reduce the threat to human health?

This claim that gas will mitigate from coal in terms of climate change mitigation is not certain and that there is no way to substantiate a claim of 2% as being able to provide substantial carbon savings.

There needs to be a greater emphasis on top-down approaches in this methane monitoring scheme. Aircraft could be used to provide averages of concentrations of methane upwind and downwind over production region and this can be multiplied by advection rate of the air over the basin. This could provide a total average of the basin.

We also need to develop baseline climatic studies for each region to understand advection currents so we can get a more accurate reading of methane concentrations. There needs to be a strategic process of monitoring to capture super emitters and ensure that any reading of methane from gas wells is representative of the entire industry. This should

be incorporated into the EIS process, environmental assessments of all projects.

There needs to be a framework to compel monitoring and capturable chemicals associated with unconventional gas production, including volatile organic compounds, ozone, carbon disulphide. The authority best placed to conduct this monitoring is the EPA. It is paramount that monitoring is independent and sampling is randomised. The choice of well inspection should not be up to the discretion of the companies. Mitigation is only possible once all point sources are identified and the localised ambient air concentrations are developed in tandem with an understanding of advection patterns.

Now I would like to talk to the hydrology and geohydrology of the Beetaloo Basin and the Lakewoods region. The panel has noted that extraction needs to be approached on a case by case basis with modelling of groundwater dynamics in each situation. Is it to the credit of the panel. They have noted that much better development into the understanding of this system in the Beetaloo Basin and the other systems in the Territory.

I have been talking to manager of the hydrological modelling in the Department of Environment and Natural Resources, Dale …..and I have on good advice that the modelling is not up to a sophisticated enough standard to understand surface and groundwater interactions and baseline understanding is not sufficient to understand any potential impacts from hydraulic fracturing. She is of the opinion that the Department of Mining has been provided with significantly greater resources to determine the extent of the gas resource, significantly greater resource that had been given to department to determine the nature and volume of the water resource.

This is a theme that generally needs to be acknowledged across the NT. A level of understanding of groundwater systems is rudimentary and insufficient to understand the complexity of this risk to groundwater systems. The characterisation of the Beetaloo is insufficient and inaccurate. There are near-permanent resources and water resides in these regions for over 12 months and in certain cases over several years. What is needed is an independent in-depth bi-regional assessment into the immense ecological water values of this region. This is a potential that has not yet been realised.

Dating of the water has indicated that there are young and old sources of water. This indicates that there is complexity in groundwater and surface water connectivity. There is a lag of a period of potentially decades. This means that we need to be monitoring over such a period so that we can determine any impact on surface water resources and how that flows down into the groundwater recharge points and discharge points.

In this dating system it was noted that the data wasn't stratified, it was integrated meaning that there is still more work to understand how this dating can connect with the aegis of groundwater and surface water connectivities.

There is a possibility that the Beetaloo is supporting groundwater-dependent ecosystems on the edges and there needs to be a lot more work to draw out the location and dynamics root depths of these ecosystems.

Flow in the system is intermittent but at fairly high frequencies. Ecosystems can survive off these sources for up to 20 years and after a dry period they will come back. There has not been sufficient rigour into the study of these regions by the department and this data is absolutely necessary to develop before we can understand what we are dealing with.

Dale Cobben was of the opinion that the department is deferring the consequences of any industrial development in this region to later generations before we can understand what they really mean to the ecosystems and aquatic resources.

There are also a whole host of springs around the Western edge of the Wiso Basin. Springs are incredibly sensitive ecological systems and vulnerable to discrepancies and fluctuations in rainfall and groundwater discharge. It is also important to note that climate change projections are showing that this area will become wetter with higher frequency rainfall events so flooding is likely to become more frequent. As surface water flows to this region as such it is so important they are capable of supporting a huge and diverse range of bird, fish and plant life. Jimmy's going to talk to the biology of the Lakewoods.

Jimmy Cocking: Thank you. We had some concern in reading the inquiry in that there was a lot of talk about the prospective development of the Beetaloo Basin and Lakewoods and Longridge Water Hole. There were a couple of mentions but beyond that it was downplayed as being an ephemeral wetland. I've only got a couple of copies here to pass to the inquiry but Lakewoods has got international significance. It's a wetland, it's describe as an ephemeral wetland but it's has water for 7 out of the last 10 years.

We've been speaking to some notable ecologists who have been working up there recently, whose details I'm happy to share with the inquiry to follow up. It's primarily fed by Newcastle Creek and, as we all know, Newcastle Creek is right in the middle of the Beetaloo Basin and Lakewoods is also recognised by Bird Life International as a key biodiversity area which is something that I think we need to consider.

It is under threat. There have been issues of weeds and Parkinsonia and other threats to the region but that is being managed. The water hole was fenced off in 1984 to exclude the stock and there's been a weed management programme there to reduce the impacts of the Parkinsonia in the area.

It supports hundreds of thousands of water birds. In a semi-arid moving into a tropical area, it is described as the largest tropical wetland in Australia. At times it can reach 850 square kilometres and it has reached over 1000 square kilometres of surface water. It is particularly vulnerable to surface

water flows coming down from Newcastle Creek and as the panel very rightly acknowledged that most of the threats of fracking do happen as a result of surface pollution rather than below the ground pollution.

We've got some real concerns that the wading birds as internationally-significant waders ... I forgot the names of them. Here the painted snout, the Australian bustard. Also we've got from one of the ecologists who has just recently been up there doing a review, and they found that subspecies of the yellow chat up there in numbers which they think is globally significant. There's culturally important birds up there and particularly in the arid zone it's, desert refuge, this water hole is globally important for migrating birds heading up into Asia every winter.

In talking to both of these ecologists they believe that it would qualify for RAM soliciting if it was put up. There's been no formal assessment. There was a flora survey done in 1992 and another review for the sites of conservation significance in 2007. There hasn't been any research done on here in 10 years and there's been water in there for 7 of the last 10 years so it's difficult and especially it's subject to the impacts of climate change as we see where the patterns change with the potential warming of the Indian Ocean and we see more of that rainfall coming through the Northwest. We could quite easily see Lakewoods's move from being an ephemeral to being perennial to long-term potentially being a permanent lake and I think that we need to consider those risks when we're looking at the Beetaloo Basin.

Migratory birds are particularly sensitive to pollution. They are water feeding birds so they will source their food from the lake floor and within the water, and that means that if there's toxins that are flowing down the river, that they will be subject to it.

There's a large large paleo lake basin there which demonstrates that it's been …… over time so Lakewoods has the potential quite large and potentially more biodiversity than what it currently does have.

We can pass on the details for these, we've spoken to both these ecologists. Their report is due as part of a biodiversity grant on September 1st and then we'll be happy to release their results publicly but in the meantime I can pass on their details for you to contact and rather than have me talk about it, talk to someone who's actually been there and flown over it and encountered these birds, so thank you for that and I'll just pass over to Alex to talk about indigenous rights and culture.

Alexander Read: There has been talk about fear-mongering in Aboriginal communities about environmentalists and people who are concerned about the impact of hydraulic fracturing. But the reality is that this is a very intimidating and scary prospect for aboriginal people in certain regions.

Economic and industrial development in Australia has historically been predicated on dispossession and dislocation of indigenous people and indigenous culture. While understanding that economic opportunity is

needed in certain regions, it is a form of economic blackmail to suggest that these communities have to decide between fracking or their ongoing situation on economic issues.

Lasting sustainable economic opportunity needs to be based on a solution that is connected to the ….. connection of lasting culture and their relationship to land. We need to understand that the impact of fracking is much greater than the immediate location around the world. There are broad social and political consequences of changing the dynamics of a region and introducing industrialised processes and infrastructure in these remote regions.

I will now speak towards the regulatory framework and gaps in the data that have been ignored in the interim report. I commend to the report on recognising that there are gaps in our data and there are gaps in the regulatory system that has lead to a lack of confidence and faith in the people of the NT in the regulatory system to adequately control this potential industry.

As it currently stands, there is no social licence for this industry and it may not even be possible but what is sure is that we would need a robust system that is able to adequately control each aspect of the process. An example of a reason behind this lack of social licence is the behaviour of certain gas companies in Australia. Origin has been implicated in allegations of covering up regulatory violations and a culture of non-compliance. As they have demonstrated, it is often easier to pay fines than to comply with these regulations to protect the environment.

The Northern Territory is currently undergoing its biggest reform of the environmental assessment and regulatory framework since such laws were introduced. These reforms are a systematic process of going over mining legislation, water legislation, environmental assessment legislation. It is anticipated that they will not be complete until 2020 as it is just in the discussion paper stage. Therefore regulatory system will not be able to accommodate expansion of the industry for many more years once we establish the models for environmental impact assessment and strategic impact assessment, for example.

These systems will not be able to operate effectively once we have many, many years of baseline data on the ambient concentrations of heavy metals, cesium, uranium, salts in groundwater.

The Victorian experience shows that the science was inconclusive but this regardless led to political momentum behind continuation of the moratorium. The moratorium must be continued until we have sufficient data and there is a regulatory system that demonstrates the ability to have confidence and hold companies accountable to their responsibilities to the environment and the people.

I would now like to go through a couple of examples where the report notes that the data is lacking and connect these to why we need to have a more robust regulatory system and in its current state it is not possible to accommodate those risks.

There is currently no framework or history of monitoring …. in populations in the NT. This is an absolutely essential process of all environmental impact assessment. It is not possible to assess the magnitude and frequency of risk of hydraulic fracturing without an environmental impact assessment framework. This process is still in its infancy.

Access to justice is an essential component of ecological sustainable development. In the NT it is acknowledged that merits review and judicial review are essential components of this process. Merits review do not currently exist in the NT and it will take many years before the regulations are capable of providing this right and understanding how this will work in tandem with environmental assessment.

There is insufficient capability or capacity to rehabilitate mine sites. APEA and the … did not comment on the long-term integrity of abandoned wells. There is already a significant and substantial issue with legacy mines in the NT. Red Bank Mine is leeching copper into the environment at a rate that is killing all ecosystems downstream. In some sense, copper mines are more simple than the hydraulic fracturing process because the surface footprint is much more obvious.

What I am suggesting is that there is already a regulatory problem with the treatment of legacy mines in the NT. Over 40% of mines that have been decommissioned in the last 20 years are legacy mine problems and they are discharging heavy metals into the environment. The department has not demonstrated a capacity to be able to deal with problems once wells have become abandoned and once they have become decommissioned.

There is also no certainty present about how much recycling of the water could be achieved in the NT from produced water. The question then becomes who will pay and who is responsible? If the situation does not currently exist to regulate mining in the NT. It is a valid question to ask if this regulatory culture is capable of being developed for hydraulic fracturing.

There are also considerable issues about the freedom of information, about rehabilitation bonds in the NT. The McArthur River Mine is currently fighting tooth and nail to prevent this information becoming public. This demonstrates that it is difficult to have this information in the public realm which also undermines any ability to develop public confidence in the environmental responsibilities of gas companies.

It is a struggle for this information to be released. In any regulatory framework it is absolutely essential that there is a presumption of causality between fracking and incidences of contamination. The burden of proof must rest with the company to establish that they are not responsible for

this contamination because a false negative is far more damaging than a false positive in this instance.

Strategic environmental assessment has been noted in the interim report but there is no framework and this does not currently exist. Strategic environmental assessment is contentious and is in development throughout the world so there is no way of understanding how this will be utilised and rolled out in the event of hydraulic fracturing.

There is a need for broad scale, bi-regional assessments in the NT but there will be no ability to do this once the regulatory system begins to be developed in 2020. There is also no offset policy in the NT that is capable of understanding the biological cost of hydraulic fracturing.

Acknowledging all of the above, the point is that this information and the certainty of the science is inconclusive. This is a textbook incident of where we need to operationalize the precautionary principle.

Jimmy Cocking: Just the clarify that point because I just saw you wincing a bit about some comments. Just to clarify, when we're talking about 2020 in terms of the environmental assessment and approvals framework coming into place, that is from personal communication through the engagement process that we've gone through with the policy unit or the Department of the Environment and Natural Resources where they gave a good advice that it would be at least 2020 by the time we actually had a reformed environmental assessment approval framework in place.

Hon. Justice Rachel Pepper: I understand that, thank you. Of course we're not bound by that process.

Jimmy Cocking: Of course. Just to put it on the record, that's all.

Alexander Read: Investigation in this panel is one of the most comprehensive in the world. It's going to provide insights into hydraulic fracturing in one of the most contentious environmental debates on the planet at the moment.

The tension in conflict in this debate however is not purely based on science. There are values and foundations for opinion that are not centred on the technical approaches to understanding methane concentrations or mercury concentrations in ground water.

The community of the NT is entitled to make decisions about what economy they would like to see and what direction the society should be taking. It is important to recognise that normally values and statements are informing this debate and while science is ultimately fundamental in alleviating some concerns, there is a role for the discussion of ethics and a philosophical inquiry into what values inform our risk matrix.

We need to include ethical elements so that we can properly adjudicate this debate on fracking. Our political values inform our positions, which means

that science will not be able to resolve the underlying tensions completely between the various positions on this issue.

The Victorian report was inconclusive yet it lead to policy implications. The value basis of disputes underlying environmental controversies need to be fully articulated and adjudicated through political means before they can then play an effective role in resolving environmental problems.

It needs to be acknowledged that regardless of the scientific findings, there is considerable community opposition to this and that there are implications for how the political consequences of having a population that is frustrated and concerned, and these are valid bases to be worried about.

This therefore has significant implications for the question of a social licence. Before assuming that a social licence is capable of being developed, we should be asking whether a social licence is deserving of this industry.

Jimmy Cocking: To conclude we've laid out the case that it's not necessarily one of the terms of reference for this inquiry was how may a social licence be acquired and we're are posing the question can a social licence be acquired in the Northern Territory. Could it be acquired? Because at this stage there is significant community concern on all sides of the political fence about this issue and while we very much welcome and applaud the inquiry for its depth of analysis, a good government will take the results of this inquiry and engage the community in the risks and the issues and then actually ask the attorney general to call for a plebiscite on this issue rather than making the decision themselves because we've got a lot of concerns and this is across the board in Australia that both sides of the political spectrum are encumbered by donations by the fossil fuel industry and so while we'll be looking forward to the outcomes of this inquiry but we'll be urging the government to take the findings from this inquiry to the people and put it to a plebiscite. Thank you.

Hon. Justice Rachel Pepper: Thank you very much. Just a few comments and a couple of questions before I pass it around to the rest of the panel. First, you quoted from well failure rates from Norway and Australia; what information or data did you have about well failure rates or leaky wells from, sorry, you quoted from Norway and Alberta I should say, what data did you have in respect of Australia?

Jimmy Cocking: I don't have anything on hand but I have papers that I could forward to the inquiry.

Hon. Justice Rachel Pepper: On Australia?

Jimmy Cocking: On Australian wells.

Hon. Justice Rachel Pepper: Good, because of course there are wells that are being fracked in the Mereenie and Palm Valley, or have been fracked and it'd be very useful to

find out what the leakage rates are and failure rates are of those wells, given their obvious proximity and no doubt, I'm assuming, and so an assumption on the geological similarities.

Jimmy Cocking: It would actually great for Central Petroleum to provide those figures. Have they been approached?

Hon. Justice Rachel Pepper: I'm asking you what data you have. You said you've quoted well failure rates from overseas but surely the more important data's what's happening in Australia.

Alexander Read: That would be great if that information was on the public record.

Hon. Justice Rachel Pepper: What about South Australia? Have you inquired South Australia? Done some research there?

Alexander Read: I can't comment on that, on Southern Australia failure rates. We only ….. three days a week.

Hon. Justice Rachel Pepper: Now, the comments you attributed to Dale Cobben is that person, is that individual speaking on behalf of the department or, I think it was herself, was that right? Herself?

Jimmy Cocking: This is a personal communication.

Hon. Justice Rachel Pepper: It's a personal communication? Right, okay. All right. In terms of social licence, how do you define social licence? What is it? What do you think it is?

Jimmy Cocking: Well, a licence in a strict sense is permission to engage in an activity. It's a legitimising process, a form of consent and a social licence is an analogy, society consenting to a process to occur, to saying, "We accept the consequences of this and we agree to be a give and take arrangement." Coming with mutual sense of obligations.

Hon. Justice Rachel Pepper: Is that your personal definition or is that based on sort of social science research?

Jimmy Cocking: I think the concept of a social licence, it doesn't have any strict definition and I don't think any one authority can speak to what that means. But that is how I understand social licence.

Hon. Justice Rachel Pepper: Now, you quoted a number of papers there in your presentation. If you could make those available in due course, that would be very helpful.

Jimmy Cocking: Absolutely.

Hon. Justice Rachel Pepper: Thank you. Yes, anybody else? Yes, Professor Hart.

Professor Barry Hart AM: Could I just follow that up because, Mr. Cocking, you've made a number of comments which are of vital importance to the panel. I just wanted to run through the key ones from our perspective, the water perspective and ensure that you'd be providing what evidence you have in your written submission. You made comments about the inadequate knowledge of the hydrogeology and that particular person had made some comments. I think you made also some comments about the age of the groundwater and I didn't quite understand precisely where you were talking at, some old, some young. Any evidence there would be really useful to us, the whole dating. You also noted the surface water flows intermittent Newcastle Creek and so forth, again, any info on that would be useful. There's very little as you no doubt noted and you guys are in the immediate vicinity or at least closer …

Jimmy Cocking: Only 700 kilometres away.

Professor Barry Hart AM: That's closer, yeah.

Jimmy Cocking: Halfway.

Professor Barry Hart AM: You talked about springs in the Wiso Basin. You talked about climate change where you said the rainfall would be higher. I'd like to see the evidence for that and you went through Lakewoods. Again, you noted a report coming out from those two ecologists. That would be very useful to us. But again, any of the evidence that backs up.

Jimmy Cocking: Yep.

Professor Barry Hart AM: Okay. Again, just putting on the record, we would be very interested in any evidence that you've got for those comments and statements.

Jimmy Cocking: I'll provide all that to your panel.

Professor Barry Hart AM: Okay, thank you very much.

Hon. Justice Rachel Pepper: Thank you. Yes, Doctor Anderson.

Professor Dr Alan Andersen: Yeah, thanks, I've got a few questions. First a comment on Lakewoods. The panel is aware of the conservation importance of Lakewoods. In fact, it's our understanding it's Australia's biggest fresh water lake and we're also aware that even though it lies outside the Beetaloo Basin, it is fed from surface water from Beetaloo so we are aware of that. I've got two questions and they're actually for Mister Read. The first one is that you talked about in terms of indigenous economic opportunity you talked about how aboriginal people need to choose between a fracking future or an alternative future and I'm just wondering if you could explain more how you see it's a competition, how being involved in fracking would preclude some other alternative economic futures.

Alexander Read: First I don't want to pretend that I can speak on behalf of aboriginal people but what I'm addressing is that the nature of this industry, considering the biological disturbance, fragmentation of habitat, influx of FIFO workers, this interferes with the nature of remote communities, interferes with the culture of connecting and caring for country. That is antithesis of gas and industrial development. I can't make those decisions about economic opportunity but expansion of this industry would compete with other opportunities and other solutions considering it's unsustainable and wells will eventually run out.

Jimmy Cocking: Can I just also add to that, it's been made very clear to the Northern Territory by the federal government in terms of GST distributions, in terms of which way they think that the territory should be heading in that direction and the Northern Territory does, per capita, have a lot more people that require access to government services than per capita anywhere else in the country and so as a result of that it does turn it into a dichotomy and a choice in that sense that the way the federal government has been putting that pressure on behalf of the gas companies, so that's another element to that either or scenario.

Professor Dr Alan Andersen: Thanks for that. And then my final question is the issue of social licence if it's something the panel has been grappling with. One of the problems is there's very few experiences elsewhere in Australia that we can sort of look at where the communities have experienced this development and really the only one that's sort of remotely comparable is the coals and gas experience in Southeast Queensland. I was just wondering what your assessments might be one where community social licence is at the moment after having experienced several years of development production of this coal seam gas experience in Southeast Queensland. Have you had any experience or thoughts on that?

Jimmy Cocking: I haven't travelled to those areas. We have a very small budget here at Arid Lands Environment Centre but just in conversation with people that we've had with people from Roma and other communities that are being subject to these issues and also this is largely due to conversations that we've had in the mall, when we've had Arid Lands Environment Centre store with visitors to town who come up to us when we've had the yellow triangles there and

wanting to tell us about the problems and the challenges that they face in their communities in Southwest Queensland as a result of the coal seam shale ……. I guess it's been happening in Queensland and people just say, "Stop it now. Don't let it get in because once you do then it all changes." Talking about the communities of Roma particularly and also Chinchilla now that are under subject of environmental investigation due to the underground coal classification there.

We're basing it very much on conversations that we've had with people and the conversations that we've had with visitors to ……..Springs here is to not let it in because once you do it's never the same again. That's what we're basing our concerns around social licence and based on other experiences around the country and seeing what also has happened in Northern New South Wales and in other areas where people have stood up as communities and voiced their concern about it and actually stood up in opposition to it.

We looked to that and we see that there obviously must be an issue with it even though we do have much more remote areas here. The people who are living remotely have, well, you can't deny that people and farmers and others have connection to land, the spiritual and cultural connection that indigenous people have to the land goes back to a time that we can't even imagine and I think that it's really important to consider that when we're looking at social licence for this industry to open up frack fields across the Northern Territory.

Hon. Justice Rachel Pepper: We're going to go down this way and then come back up this way. Doctor Jones.

Dr David Jones: Yes, I'd just like to follow up this issue of social licence and a plebiscite a little bit more because in a democracy one might say that if all the NT voted on this issue and the result was a resounding no or yes then that might be clear cut but I live in rural regional area and I know the dichotomy we face between the issues that we view as important and what Brisbane, a couple of thousand kilometres away, might view as important and I think one has to be very careful about not disenfranchising the people of the regions that are going to be most affected by, if you like, an urban bias. Do you have any comment on that particular issue?

Jimmy Cocking: I suppose it's also got to do with the nature of power as well. It's one thing to have a policy position when you go into an election, it's another one to want to get in there and are subject to the influences of particularly the fossil fuel industry in this case. As far as it goes, we anticipate that if it was put to a vote that there would be a simple majority of people who have got more concerns about this industry than don't have concerns. It's one of those things that bridges the political divide whether it's Country Liberal or Labour Party, where people on both sides of the fence there are concerned about it, was one of the reasons for people moving across from being rusted on Country Liberal Party to voting Labour in the recent election was because of the fracking position that the previous government had among other issues of course.

But I think that we really need to engage in forms of participatory democracy in this space because the community has been speaking loudly about this. People have got great concerns about it and it is really up to government to engage the public on issues of environmental and political importance. This is obviously one of them and while it's one thing to invest in having what will be an internationally significant report into hydraulic fracturing that the panel will be producing in November this year, it's another thing for the public to actually understand what is actually being put to government. We will be hoping that the government will take the opportunity to get the good sides and the research that has come out of this inquiry and put that out to people, to engage people in understanding the risks and then again rather than it being subject to a cabinet decision we would be hoping that they would put it out to the public because there's not another election until 2020 and a fair bit of damage can be done should cabinet or ministers be let loose on issues that they ... I could go on about this but yeah, at this we've got concern and we think that it should be put back to the people after this inquiry.

Dr David Jones: I guess a second question. The bridging time, that relates to the current review process of the environmental impact assessment process and so on. Are you seeing, from your point of view, good positives coming out of the changes that are being proposed? I ask this question in relation to the recommendations we might make as well, in terms of current regulatory deficiencies and maybe ways of remedying them.

Jimmy Cocking: The initial indication's positive. We're openly engaging in that process and we welcome the changes. The challenge with anything is the devil's always going to be in the detail and we have been making recommendations to the policy ……. the Department of Environment and Natural Resources to be engaging with national organisations. There's also the Australian panel of environmental experts in environmental law which have put together a framework for strengthening environmental legislation and that's something that we could probably also pass on a link to the panel as well if it will help in making some recommendations to assist that process. Current indications were positive and open. We're just keeping a good eye on it and being engaged actively to ensure that the public are aware of what's going on with that as well.

Dr David Jones: We'd certainly appreciate any specific feedback you can give us on what you see as a positive and/or negatives in that process.

Jimmy Cocking: Yes, thanks. And we will.

Hon. Justice Rachel Pepper: Yes, Doctor Smith.

Dr Ross Smith: As Doctor Andersen and Professor Hart have said, we're aware of the importance of Lakewoods and we appreciate that initial input you're providing there but we've particularly struggled to get any decent ecological information further up …….. within Newcastle Creek, Newcastle Waters and

it's almost …… to say whether you're aware of any further studies that have been done in that region and it's more than just that that's part of the Beetaloo.

We found that aquatic ecological studies in the Northern Territory are polarised to the arid zone which has a surprising amount of attention being tied to it in the top end and a relative …..of information……surface water and groundwater inconsistent in the middle so if you have any knowledge of ecological studies in particular, aquatic ecological studies in those regions or even groundwater or even fluvial aquifer depend on the ecosystems within those areas we'd appreciate it.

Jimmy Cocking: Mm-hmm (affirmative).

Hon. Justice Rachel Pepper: Professor Priestly.

Brian Priestly: Thank you. You quite correctly emphasised the importance of understanding airborne emissions from the industry to better inform the risk assessment of communities around there. You specifically mentioned ozone and carbon disulphide as not being considered very much in the report and you're right, I hadn't seen very many reports on those particular compounds, if you have specific references on the impacts or concentrations of ozone and carbon disulphide, it'd be very useful for you to pass those on. Thank you.

Jimmy Cocking: Again, the difficulty is though that ozone isn't really monitored in a great deal but I will do my best to provide those …….

Professor Brian Priestly: Thank you.

Hon. Justice Rachel Pepper: Yes, Doctor Beck.

Dr Vaughan Beck AM: During your presentation I think the words were to describe fugitive emissions were obscene risk and I think you were basing that perhaps on a article that may have been in the…..by Mister Tim ….I haven't read that article but I know that Mister …. did make a presentation to the public hearings in …. yesterday. All that I'll comment upon is that in the interim report we have detailed the mission's greenhouse gas emissions from shale gas operations and I will note that over time those emissions have substantially reduced based upon measurements in the United States particularly with the introduction of the new source performance standards that now require flaring or capture of emissions at the well head. That's one particular point.

You raised some issues around well are we intending to identify the emissions from forefield operations. In the report there were details there from forefield estimates from bottom-up and top-down measurements and so we are detailing those and in addition we note that we are wanting to undertake baseline measurements and in addition we proposing and

seeking input on the actual field measurements to monitor emissions not from individual pieces of equipment but from the gas field and we are looking to perhaps set some limits on those and we would welcome input from your organisation on those particular proposals. Thank you very much.

Jimmy Cocking: I noted that it was mentioned that Santos is already conducting baseline studies into methane emissions?

Dr Vaughan Beck AM: I don't know whether I would characterise it as already conducting. I think there are proposals to do that.

Alexander Read: Will the details of those proposals be available?

Dr Vaughan Beck AM: That would be an issue at the moment for Santos to release but the panel has of the mind to be recommending the need for baseline monitoring and not only baseline monitoring but as I just indicated the desire to undertake measurements in the field which would capture field emissions, not just emissions from particular pieces of equipment.

Alexander Read: Can I also just add to that that I think it's also critical that these baseline studies are done independently or at least done by government departments who are charged with the responsibility of looking after country and people.

Hon. Justice Rachel Pepper: Agreed but they must be independent.

Jimmy Cocking: Yep.

Hon. Justice Rachel Pepper: We're already slightly over time by thank you very much, Mister Cocking and Mister Read, for presenting today. I'm going to look forward to those extra references and material. Thank you.

Jimmy Cocking: Thank you so much for the opportunity and congratulations on such a well done inquiry so far.

Hon. Justice Rachel Pepper: Thank you.