Submission to Scientific Inquiry into Hydraulic Fracturing in the Northern Territory

prepared by

James Wright
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Submitted to:

Hydraulic Fracturing Inquiry
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My Introduction

Thank you for the opportunity to present my feedback on the NT Fracking Inquiry Background and Issues Paper. I have worked in the underground mining environment for 37 years in many mines in every state and territory throughout Australia and in varying other countries. My experiences and knowledge in underground mining has been developed from working as a;
Miner, hand held drilling and blasting.
Jumbo mining, drilling and blasting.
Drilling operator, deep high strength rock stabilizing support, general rockbolting and stabilizing of mine tunnels.
Mining Supervisor, supervising up to ten mining crews, drillers, stope drillers and ring firers, rockbolting crews, production ore handling (front end loader operators), road maintenance crew, servicer and support crews.
Mine Foreman, managing production and development planning and scheduling, managing crews on three shifts and coordinating operations with four supervisors.
Area Manager Technical Support, underground operator training of ground support installations and load testing of installed rockbolts in varying rock types.
National Manager Ground Support, coordinating, training operators in rock structure support, managing Technical Training Representatives from three offices in Australia, an office in New Guinea and an office in Fiji.
I have gained substantial knowledge in underground environments, including differing geology, rock structures, faults, shears, fissures, mineralized zones, aggressive ground water elements, ground movement, ground stress redistribution, voids, caves and rock support requirements to stabilize ground movement.

My involvement in the underground environment was from weathered rock in surface open pit mines down to around two kilometres in South Africa, the deepest mine operation in the world at that time.

I had to retire from the mining world due to a bout of cancer.
I now live near Batchelor in the Northern Territory.

Below I have aimed to share my experience and knowledge in relation to the risks raised in your Background and Issues Paper. I have also attached a PDF of a presentation and notes that I was not able to present to the inquiry in March due to health requirements at that time.

First, I would like to make some opening statements.

In the Northern Territory the far northern region has the two seasons, wet and dry. The wet will see ground water rise and flow north, east and west into the river systems around Darwin. The southern region will also see the water tables rise in the predominately sand stone and lime stone that form the Barkley Tablelands. This water flows mostly east forming the Gregory, Riversleigh and O'Shannassy rivers that flow from the NT and Queensland border through to the Gulf of Carpentaria and Australia's precious fishing industry.
Also feeding the Katherine River.
The Gregory River has an average flow of approximately 8 to 11cubic metres per second since 1967. This is beautiful fresh clear water

There is no such thing as stable geology. The deeper underground you go, the stronger the natural stresses gets, with faults, fissures, folded mineralized zones, sheer zones, ground movement, ground water flowing out through hard rock walls – I have seen it all during years spend underground. As a scientific panel, I believe you need to hear from hard rock geologists and geotechnical engineers on the realities of what happens, and the changes that occur as you go deeper underground. The stress transferred due to the creation of a void and structural changes to the natural rock formation.

All of the steel casing and cement supposedly used to stabilize a fracking well will not give a satisfactory guarantee of the integratory of a well in most cases, due to the far more powerful forces of deep underground geological features. The companies do not and cannot know where all the variables including medium to server fault zones are underground. They only know what comes out of their core sample and drill cuttings, or the layers that bounce back from their seismic surveys. It won't be known if they drill through faults, or near them, creating a pathway for contamination of waterways, fracking fluids, aggressive mineralized acids to migrate up the fault following a path from very deep high pressure to low pressure at the surface.

You cannot regulate away the realities of geology. To say that the gas companies can self-regulate to a strict rule in the remote and isolated areas of Australia would be a foolish expectation. The gas wells will begin to fail almost immediately they begin production. Other wells will fail progressively with all or most of the wells failing before the expected life of approximately thirty years. The likely scenario of these companies being in a position to seal and or cap the failed or completed wells is extremely unlikely. The completed wells will continue to discharge almost indefinitely. The integrity of the wells will continue to become unstable. Hundreds of shale gas wells will result in toxic gas being released to the surface. This is the reality. How much gas and what waterways it turns up in will not be known in advance, and will directly impact on the environment and people in and around the areas that are targeted by this industry.

Methane migration will occur. Other toxic and radioactive substance will escape from where they are released from deep pressurised environments into more shallow, lower pressure environments.

Fracking will use millions of litres of water per well and this fluid cannot be reused, is not being reused – they cannot recycle the fluids well enough. The facts on water use speak for themselves.

Aquatic ecosystems and biodiversity

Will be impacted as the chemicals, gases and other substances are released from underground and from surface spills and leaks.

Risk Theme: Regulatory framework

Failure to protect the environment

You cannot regulate away geology and other variables that will be impacted on. The best steel and cement, and the best drilling practices in the world will not stand up to the realities of the underground environment. I have seen high tensile steel sheared off and moved several centimetres due to deep underground rock movement. It is common. I have seen water flowing through what appeared to be solid rock – they are not impervious, everything is moving underground, and pumping thousands of litres of fluid at 10,000 to 15,000 psi into these drilled wells is going to add to the risks of movement and further create gas and pollutant migration pathways.

It is not possible to safely dispose of millions of litres of contaminated fluids in remote areas. Spills and leaching of fluids back into the ground will flow back into the waterways and river systems causing irreversible environmental damage.

My Conclusions

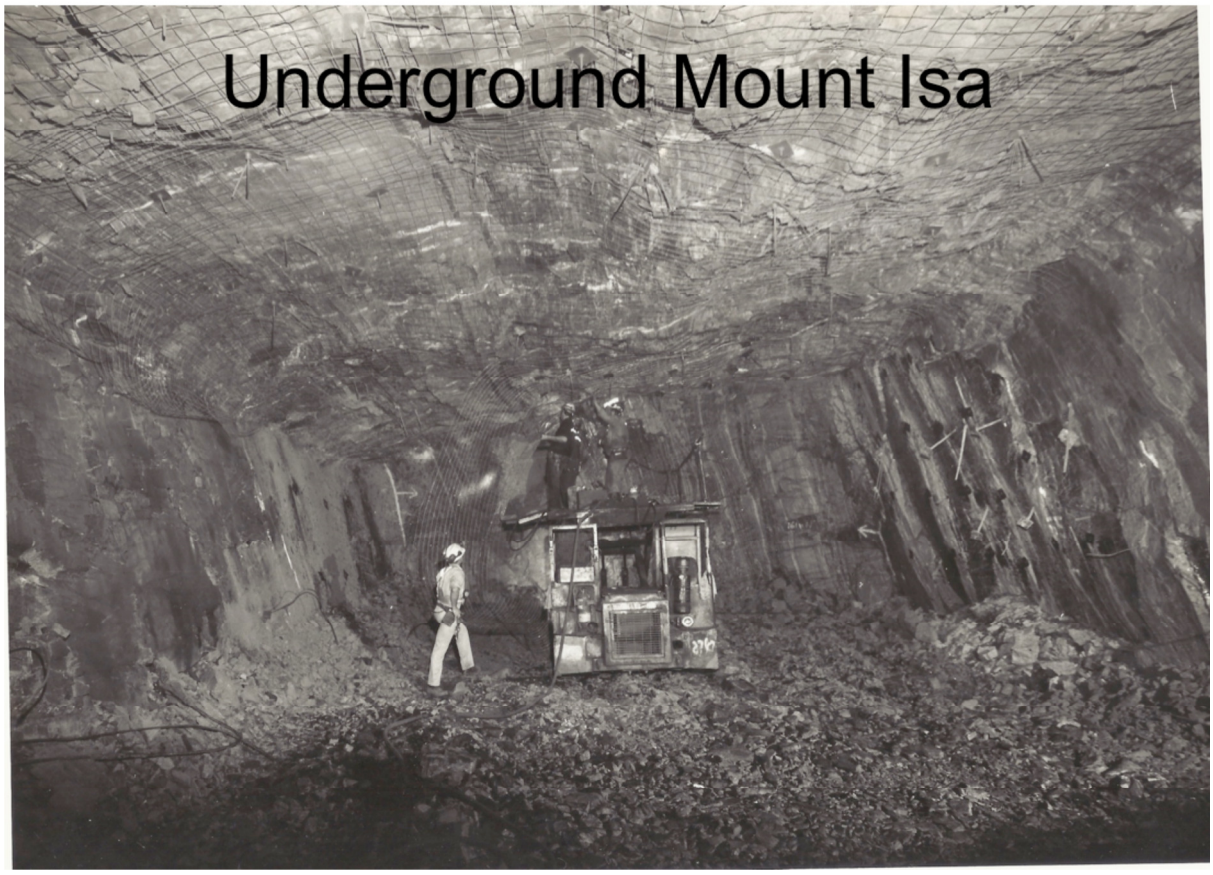
These are covered in the attached powerpoint presentation slides. I have also attached some papers written by geologists I have worked with in the field. They give more insights into the complexities of deep, hard rock environments.

In a sentence, it is not worth the risk!

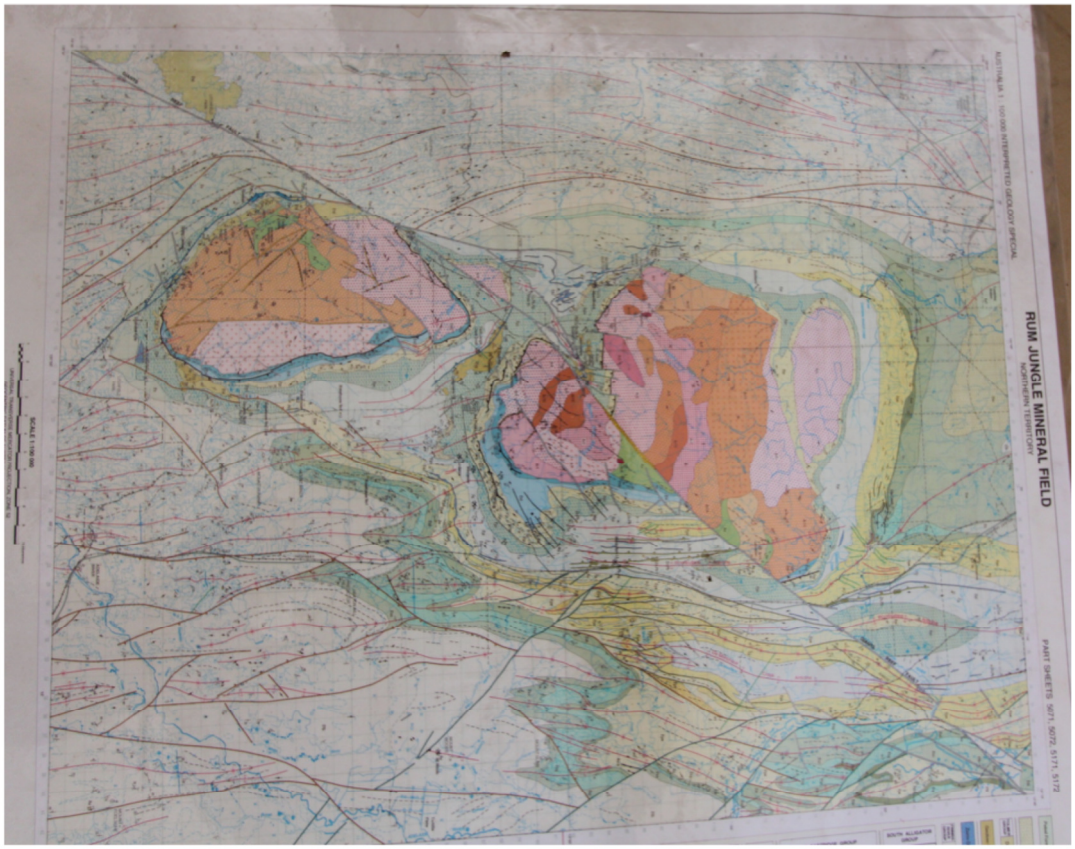
Risks of Horizontal Slickwater Fracking

James Wright

April 2017



Silver lead orebody underground at Mount Isa.
The walls along the orebody are black shale.
Note the rockbolts in the area to assist in stabilising the rock to allow extraction of the ore.
Bolts of varying lengths are required to stabilise the walls as well as the back (roof).
I have been working in the underground mining industry for 37 years.
I have been down there where these drill holes end up.
I know what it looks like down under the ground.
I know about ground stability and ground movement, I have seen it.



Map of Rum Jungle Mineral Field Northern Territory.
The fault passing through the orebody is an example of where there is a separation of the mineralised zone along the fault line.
Movement causing separation along a fault is the cause of earthquakes.
A recent example of this was when a seismic event in Indonesia was felt in Darwin.
If well bore holes pass through a fault it is possible for the rock on each side of the fault to move and shear off the bore hole.

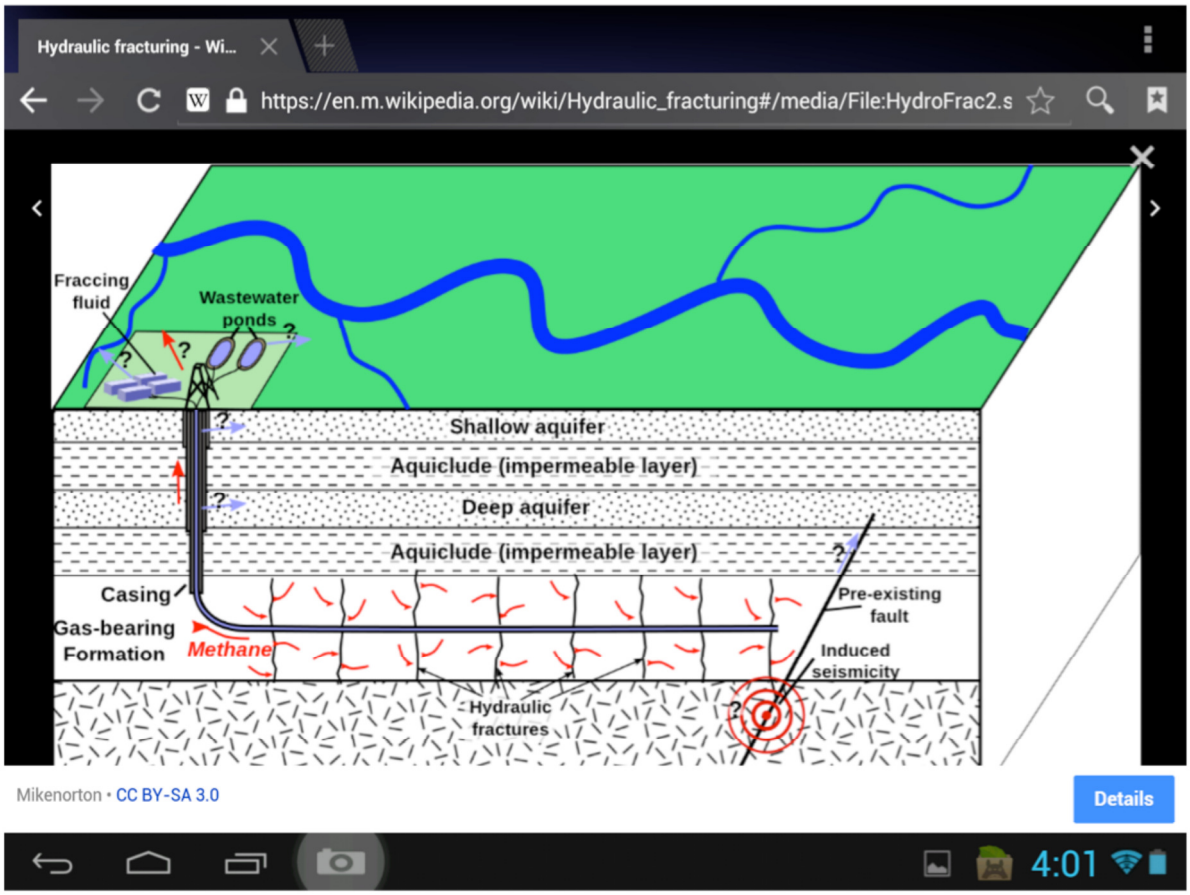
My Experiences with Ground Movement

- Mining heading, discharging water at 20 to 23 lts/m for seven years, I drilled and blasted this heading and all water disappeared.
- Shale hanging wall failed due to mechanical anchor radial forces on bedding plane, creating separation and rock burst.
- Drovers rock pool west of Mount Isa used to water stock and fresh water for the drovers. The pool was blasted and all water disappeared.
- Underground where a cut was made with a diamond blade across some bedding planes. In two weeks, the cut had separated by approximately 150mm with no other visible signs of movement.
- Glass slides were used to measure movement and displacement. A glass slide was glued on each end across a bedding plane, when the glass broke, the distance and direction of the movement could be measured.
- Rockbolts, solid 24mm high tensile steel bars were broken in shear due to ground movement.
- Highly acidic ground water in a copper mine completely dissolved a 2.4m long high tensile steel bar 24mm diameter in less than 12 hours,

Risks of Horizontal Slickwater Fracking

- Forces required to fracture the shale rock is up to 265 lts/second of fluid at 15,000 psi, can and will force water and chemicals into existing horizontal and vertical faults and shears. Up to 70% of fluid loss is apparent in some fracking operations.
- Gasses and chemicals have a path to escape to the surface along these faults and shears.
- The fractured shale creates a void that transfers natural stresses to concentrate at fault zones and along the edges and end of fractured area.
- The concentrated stresses create more seismic activity in the vicinity of the bore hole.
- The likelihood of a seismic event that can cut off the bore hole and allow the gas and chemicals to escape to the surface uncontrolled is extremely likely.
- The bore hole, high pressure water and chemicals and seismic activity can connect underground water tables with contaminated mineral zones.

A typical four wheel drive tyre is inflated to around 60psi.
History has shown that a ‘split rim” failure with this pressure has been fatal for the operator inflating the tyre.
In an incident in a tyre repair shop a failed “split rim” has projected debris out through the roof of the workshop building.
THIS IS LESS THAN 100psi.
Chemicals injected into the ground at 0.5% of the volume of water is equal to 1.325 kilograms per second.
0.5% doesn’t seem like much but, 79.5 kilograms per minute is a lot of chemicals.
Fracking a well can use from 11 to 15 million litres of water and 80 to 303 tons of chemicals

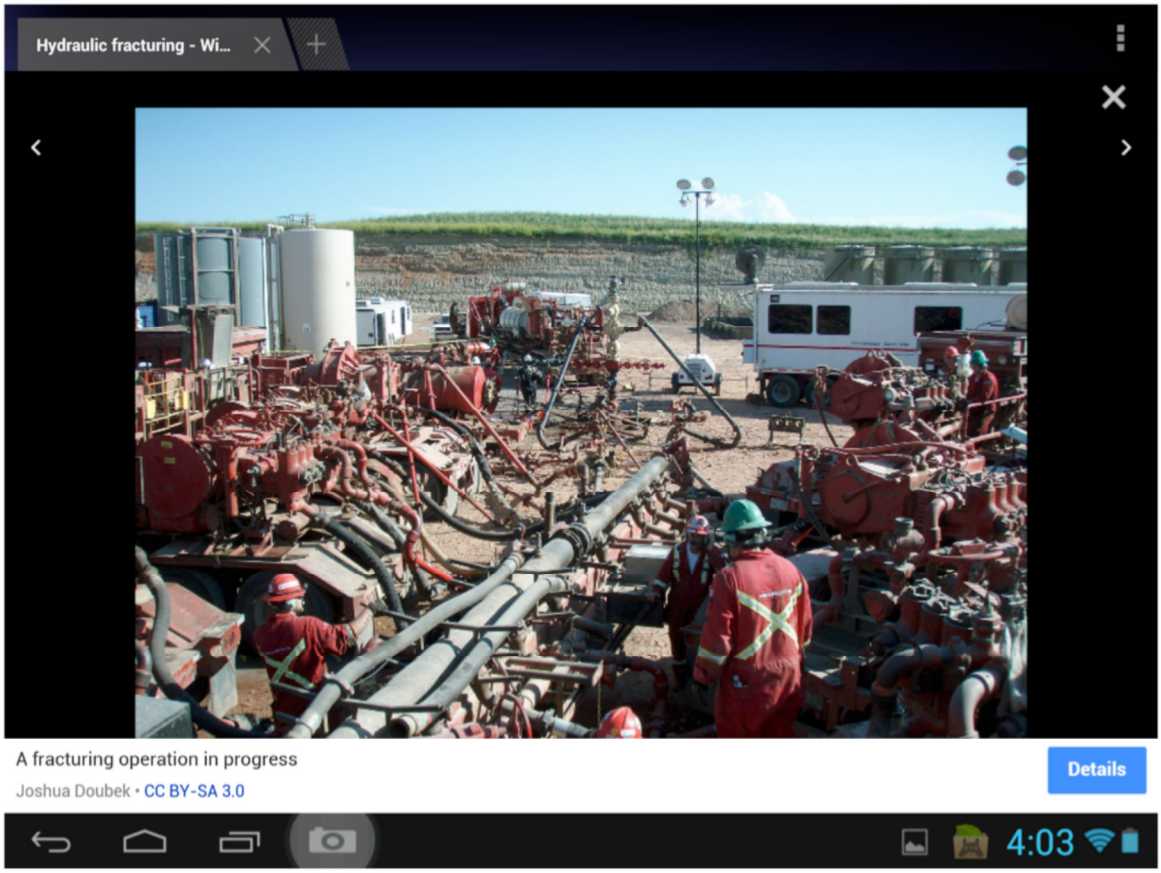


This picture is an example of how a fault can be in the effected area of fracking.
The concentrated pressure from the high pressure injection and the fracturing of the shale will allow a passage along the fault line for contaminated fracking fluid and any acids or contaminants from mineralized zones that may be intersected to join into the aquifer or to the surface.
Most faults are in waterways, creeks and or rivers, those that are between hill lines will wash down to these creeks and gullies.
If the contaminants don't surface directly in creeks or rivers, (like in central west Queensland) they will run into the waterways as the volumes increase.

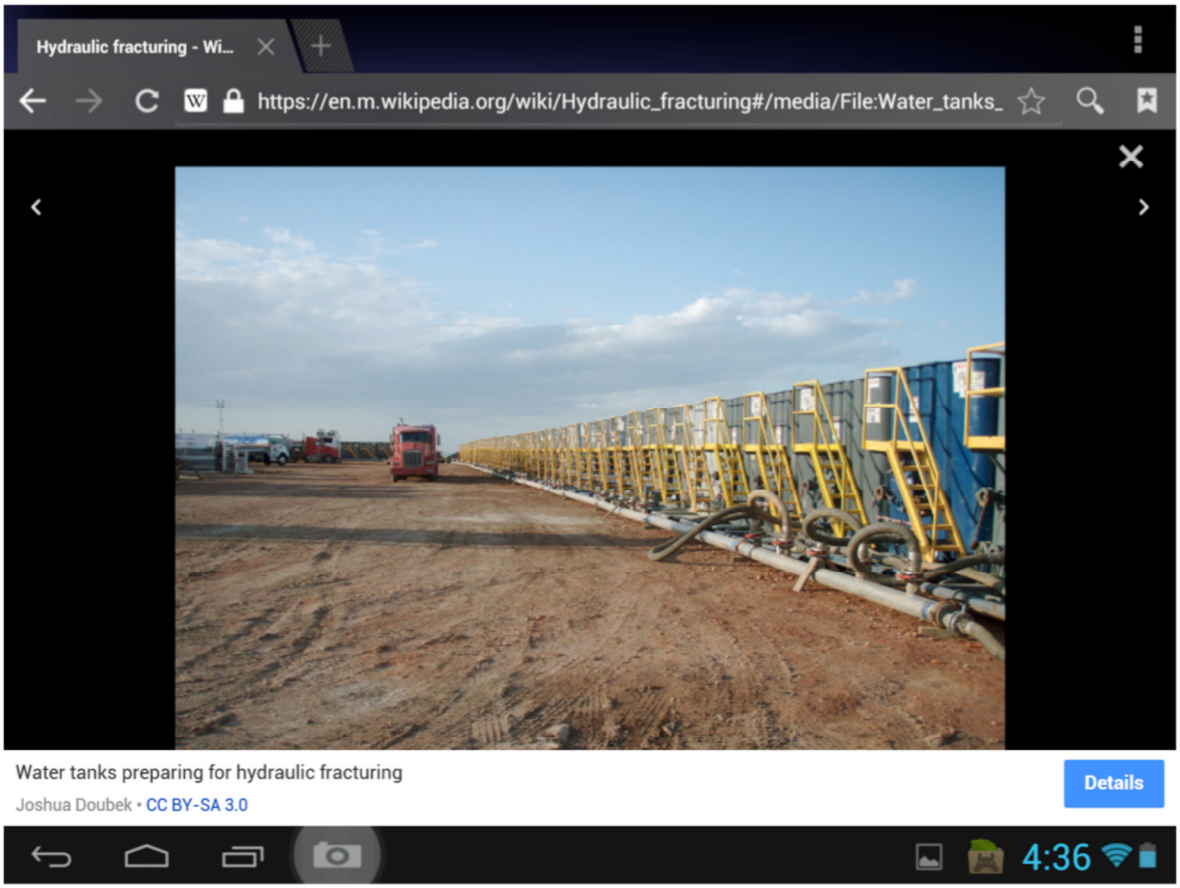
If only all underground rock structure was as a flat structure as drawn by the companies who say, "it is completely safe"

The reality is that there is very little flat, plain structure until they get to the shale bedding. From the surface down, there is a myriad of variables.

I have not seen a diagram that will show a large void or cave and how they will deal with that. The southern parts of the NT will be drilling through sand stone and lime stone that is known for irregular voids and caving.



How much control can one have with all of this high pressure activity in a sensitive environment?



Water to frack one well…..each well pad can have six wells.
How do you safely dispose of this much contaminated fluid?
Where is all the water going to come from to frack these wells?

My Conclusions

- Fracking in Australia is done to export gas products overseas.
- The companies who are behind the extraction do not care about us or our country, they see Australia only as a fuel source. What happens to us and our home doesn't matter.
- If allowed to continue, our climate, homes, people, food and water will all be compromised!
- WE DO NOT NEED FUEL!
- We have billions of kilowatts of energy from the sun every day that is not harnessed.

The thought of increased employment for the Northern Territory is unlikely or at best short lived. The gas boom in Queensland is slowing down and hundreds are being put off.
How many of the new jobs will be for new people?
Most of the jobs would be taken up by people from the industry who have been put off from else where.

IT IS SIMPLY NOT WORTH THE RISK!