

Submission by Mr A J Pickard [REDACTED] NSW to "Independent review of the 'water trigger' legislation.

Sir

I thank you for the opportunity to have a say in your review of the 'water trigger' legislation.

Since 2606 have been observing, recording (through video and photographs, as well as diarising notes and reporting to the NSW authorities of any breaches of the exploration licence I have found) and reading all the information on the CSG exploration activity in the Pilliga Forest and surrounding areas, where I have live. There is a pilot gas field, [REDACTED] (non-operational at this time) next door to my property on the northern side, as well as an operational pilot, [REDACTED] three kilometres to the south. I feel that I have some experience in what the industry is doing and is capable of doing to the water of the region.

I run a small wool growing enterprise in area where Santos is exploring and have taken a particular interest in the groundwater of the region since Santos, at my request, sampled my bore water, which had changed from being palatable with no smell to being undrinkable and having a foul odour, in March of 2012 and then in April 2012 Santos informed me that the water was not fit for domestic use due to high levels of bacteria. As a result of the results of these tests and because Santos would not assist, I commissioned a hydrologist and an aquifer fauna specialist to carry out a series of water sampling, as well as bacterial sampling and the sampling of the aquifer water for water dependant fauna. These studies were carried out between May 2012 and October 2013. At least five aquifer water sampling tests were conducted during this time on five different bores over the area known as the Narrabri Gas Project Area, three of which were tested five times over that period. Water tests were also conducted on water where CSG produced water had been spilt, on unlined produced water storage ponds and on water from Bohena Creek. All of these waters contained bacteria and the results indicated that the bacterial levels were increasing, however the water chemistry only increased noticeably in its pH. One other bacterium noted and observed forming when the produced water entered clean water was blue green algae. I have a video tape of the commencement of the algal growth due to the aforementioned and thus consider that increase in colony forming units associated with bacterial levels is a good indication of altering water quality. Testing was carried out under strict conditions and by qualified personnel using the correct sample containers. The microbiology was done separately by a microbiological laboratory (Baseline) in Brisbane with ALS also carrying out microbiological testing on the sample for some common bacteria to cross check results between the two labs, however, it was noted that the ALS results were always lower than the microbiological laboratory results.

This submission is based on only one (1) gas company, Santos (currently the holder of the exploration licence for PEL 238) and their operation located in the Narrabri Region, where they are exploring gas extraction from multiple levels of the coal seams located under the Southern Recharge Area of the Great Artesian Basin.

As the 'water trigger' only came into effect in 2013 I will keep this submission to events after this date, although events prior to this date should not be ignored in this review, in particular, the great risk of accumulation effects caused by spills/discharges at sites such as Bohena 2, Bohena 4/4L and Bohena 7, as well as the Bohena Ponds located at Bohena 1 South, the Bibblewindi Gas and Water Treatment Facility, the discharge of untreated and inadequately treated produced water into Bohena Creek, the possible long term effects caused by fracking in the earlier times of exploration, including the Bohena series and the Bibblewindi 9 Spot Wells and infrastructure and finally the Bibblewindi Water and Gas Gathering Facility leakage/spill of 2011 and the many minor leakages/spills of produced water onto the ground and into the surface waters of the area, as well as any other unreported spills. All of these occurred prior to 2013 and some after 2013.

## **SUBMISSION**

There are areas where I feel the 'water trigger' legislation could be tightened up and improved, these are:

1--- Truth by the gas companies involved when applying for EPBC exemption.

2--- Proper baseline testing.--- Improving and expanding the provisions within the EPBC Act for the inclusion of Bacteria testing and reporting to be included in the requirements when applying for and maintaining the exemption under water trigger provisions of the EPBC Act.

3--- Provision for either a temporary halt or complete termination of some or all approved projects in an area should the ongoing water testing reveal that there is significant change to the water quality and quantity in that specific area. This action should not enable the Companies to claim any form of compensation for loss of any kind.

4--- Other Factors.

Some examples of the above follow.

## 1. Truth in Applications and Reporting.

This is very important to all and should not be ignored or treated as frivolous by any approving body. Some examples of this are:

In Santos' EPBC Application of 2014, it states on page 65 "that the extraction of the waters from the coal seams **WILL** affect the ground water of the Gunnedah Basin."

Extract from page 65 of the Santos EPBC Application dated October 2014.

*"Compared with the assessment conducted in accordance with the Significant Impact Guidelines for the Exploration and Appraisal Program, an assessment of the Project indicates that the duration and wider geographic extent of depressurisation of groundwater head within the coal seams and adjacent strata will cause a significant impact to the groundwater resources of the Gunnedah-Oxley Basin. However, due to the depth of the target coal seams, low hydraulic conductivity of the target strata and poor hydraulic continuity with overlying strata, the overlying groundwater features of greater sensitivity (Pilliga Sandstone, alluvium) are highly unlikely to experience significant impact."*

By using the word "will", which is a word used to make a committed statement of fact, it means that the water removed from the coal seams many kilometres from the Gunnedah-Oxley Basin area, **will** effect this region and thus should have initiated the 'water trigger' provisions of the EPBC Act.

Santos has tried to down play this statement by stating that they are required under the provisions of the EPBC Act to state the worst possible scenario that their operation will have on the water of the Gunnedah/Oxley Basin, but that still does **not** remove the intent of the written statement.

The stated effect on the Gunnedah Basin by the removal of the water can now be added to the possible effects of the water extraction by the proposed Shenhua Coal Mine, and other coal mines in the area, either approved or awaiting approval, located in the surrounding area within the Gunnedah Basin.

Records of water removal that lead to "Accumulation Impacts" should be maintained and used. If approved projects are found to cause this then all projects approved or otherwise should be terminated immediately and not recommenced until the problem is permanently fixed. Companies should be made aware of this when applying for EPBC exemptions and again before applying for a production licence.

A further example of untruthful reporting can be found in the 2015 Leewood Phase 2 REF where there are two charts showing the amount of accumulation of salts per hectare, per year caused by the drip irrigation of treated produced water. The charts, authored by Santos and the contractor *BeneTerra*, show the accumulation of salts to be 1859 kg/ha/year in the Santos document and 2320 kg/ha/year in the *BeneTerra* attached appendix to the REF. Santos tried to explain this difference in salts accumulation as an "inadvertent mistake."

A further example of untruthful reporting can be found in Santos' baseline water data for the stock and domestic bores located in the Narrabri Gas Project area. The bore in question is code numbered by Santos as [REDACTED] which is my bore and has had the resulting water sampling analytical data along with the sampling date altered from the original sample results. I am in possession of both sets of results along with all the results from the Santos bores.

## **2. BASLEINE TESTING**

Baseline testing should be done in order to obtain an accurate result and should consist of a specific number of tests. To call a one-off test "baseline" is absurd to say the least. A proper baseline is obtained after doing a series of tests on a prescribed number of bores, which are spaced so as to be completely representative of an area over a specific period of time.

Santos has only 6 or 7 shallow aquifer monitoring bores and 2 or 3 deep aquifer monitoring bores of their own to obtain aquifer information from over the 7000 ha area of the Narrabri Gas Project Area.

According to Santos' records, Santos has carried out water sampling only once at each of the over 40 stock and domestic bores in that same area, with the majority of these samplings being conducted in 2013/2014.

Most of the private bores sampled for the baseline results are outside of the Pilliga Forest, the main area of Santos current operations, while the Shallow Aquifer Monitoring Bores are evenly distributed between the Pilliga Forest and cultivated lands outside of the Pilliga Forest.

**This situation needs to be addressed and guidelines must be put in place with regards as to what constitutes a baseline test, and how many tests over what period of time are required to qualify for a baseline study result.**

Baseline testing should not be restricted to 'water chemistry' but should include bacteria. These bacteria should include Sulphate Reducing, Iron Reducing, Iron Precipitating, Naphthalene, Methanogenic, Hydrocarbon Utilizing Bacteria as well as Heterotrophic plate counts. There could also be other bacteria that can be used to give either an accurate baseline or indicate some form of contamination and a possible problem with water quality, which should not be ignored.

The bacteria as shown above are all held at stable, naturally existing levels by either the food source or natural enemies. Increase, reduce or remove any of these by the operations associated with gas development and bacterial levels will change. My aforementioned study has indicated this has happened. Sulphate Reducing Bacteria (SRB) is considered to be harmless to humans, although it does produce Hydrogen Sulphide, which in certain conditions and concentrations can be fatal to humans and animal life. When burnt or when combined with water forms an acid, thus resulting in die back of vegetation and a change of pH in any ground or surface waters. This is a good reason as to why the bacteria levels should be checked regularly, even after a baseline value is established.

Sulphate Reducing Bacteria is one of the main enemies of the oil and gas industry; not only will it attack the methane producing methanogens, but it will also feed on chemicals that exist in the cement and steel used to protect and prevent any cross contamination of an underground or surface water source.

SRBs consume sulphates in cement, steel, plastics and rubber, to name a few food sources. They also can obtain sustenance from organic material.

They are used to clean up sulphate material in mines and other locations, however in order to do all this their

natural numbers need to increase. SRB were controlled by the use of biocides, however over a period of time, they can and have developed a resistance to this form of control and only become “injured.” (*See the Oilfield Review Summer 2012 by Schlumberger also Oilfield Review April 1994 and Drilling Fluids and Health risk management by IPIECA-OGP Report Number 396*).

I know from the aforementioned study of the bore water at my property and other locations that the bacteria increase, along with the change in pH from alkaline to acid, is a good indication that something is not right with the aquifer waters.

I have seen the levels in SRB increase from 2400 CFU/100ml of water to 1.6 million CFU/100ml of water in the space of 18 months between 2012 and 2013.

The types of aquifers in a specific area need to be accurately represented when providing information to the EPBC.

There are many types of aquifers including, but not limited to, consolidated, alluvial, hard rock, unconsolidated and perched, some of which can be located in one area or within another of the aforementioned aquifer types. The Pilliga area, for example, has many aquifer types such as consolidated (Pilliga Sandstone), unconsolidated (old creek or river beds), alluvial sands and perched aquifers all of which are contained either separately or are in combination with the aforementioned.

Every one of these aquifer types has a different set of characteristics; these include flow rate, chemical properties, water dependant ecosystems such as Stygofauna, just to name a few.

Stygofauna is of particular interest as they are too large for many of the consolidated aquifers and they require space to move around and search for prey. They are also one of nature’s water cleaners, and as such their existence should also be tested for as part of a baseline study. (Information from my aforementioned study conducted by Dr Peter Serov).

**Above is another example of the type of testing that should be done in order to obtain a true and accurate baseline.**

**Baseline testing for an EPBC exemption is fine, but it should not end there. Testing of the ground and surface waters should be an on-going process and be reported back to the Federal Government on at least a trimonthly basis. 3 months is an adequate time to catch a problem that may be able to be fixed before the damage caused becomes irreversible.**

**All results of baseline testing must be made public within 30 days of receipt.**

### **3. STOP WORK AND COMPENSATION PROVISIONS**

**There should also be provisions for either a temporary halt or complete termination of some or all approved projects in an area should the ongoing water testing reveal that there is a significant change to the water quality and quantity in that specific area. This action should not enable the companies to claim any form of compensation for loss of any kind.**

This provision is simple and basic but needs to be made now, as at present there seems to be no provision for stop work and compensation due to changes to water quality and/or quantity.

### **4. OTHER FACTORS TO CONSIDER**

One other factor to be considered is that Federal, State and Territories should all get together and set hard and fast permanent guidelines as to what is considered to be the best method of treating the produced water and what is the best considered value of that treated produced water to be released into the local natural environment, that will not cause over time, any changes to either the existing quality or quantity of the water, or introduce new and potentially harmful bacteria.

To ensure that the aforementioned is achieved, the water returned to the environment should be of the same analytic and bacterial value, with no added biological control, as that already existing in the area and to that end the Federal Government, through the provisions within the EPBC Act, should implement ongoing and permanent reporting systems that the companies have to adhere to in order to hold the EPBC 'water trigger' exemption.

**To assist in the prevention of the spread of bacteria that potentially can affect water quality, all drill rigs and associated infrastructure, including any containers used to transport and store produced or other waters, should be thoroughly and chemically cleaned with a good quality bacteria biocide prior to any movement of the unit and that all the washings be disposed of in a secure and separate lined location. (SRB are anaerobic, however, can form a protective crust in moist and cool areas to protect themselves and thus be transported from one location to another. Santos' own water analysis of stock and domestic bores carried out as their "baseline" testing shows that SRB levels vary from 0 CFU to 2400 CFU so a thorough cleaning of the rig and associated infrastructure/equipment and secure disposal of the washings is required to prevent any changes to the water quality in areas where there are none to very little quantity of SRB (for reasons please see previous mentions of SRB).**

**The Federal Government should not just examine once and then if the particular project is approved, dissolve itself of any responsibility. Companies have been known to present information in such a way as to mislead in one form or another, as well as later requesting and in most cases being granted, changes to already approved conditions of water quality treatment and disposal.**

**Royalties and investment streams along with employment should not be considered ahead of water quality and quantity. To lose the water or make the water unusable to support agriculture in all its forms means you lose more than just royalties, investment/investment streams and employment. You must also remember that many towns/cities rely on clean water from aquifers for their existence.**

Mr A J Pickard

29<sup>th</sup> January 2016

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