

## Summary

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21<sup>st</sup> June 2011

To: The Rural Affairs and Transport References Committee

Re: Inquiry into management of the Murray Darling Basin- Impact of mining coal seam gas on the management of the basin.

I am writing to voice my concerns with regards to the economic, social and environmental impacts of coal seam gas (referred to as CSM or CSG) in terms of:

The sustainability of water aquifers and future water licensing arrangements:

As stated by the Australian Government (Department of Sustainability, Environment, Water, Population and Communities), the Murray Darling Basin:

“is one of Australia's largest drainage divisions and covers approximately one million square kilometres or one-seventh of the continent. It incorporates Australia's three longest rivers (the Murray River, the Darling River and the Murrumbidgee River) and is one of our most diverse regions. It stretches from Queensland's channel country through NSW to the Australian Alps, Victoria's north-east and the Riverina, and on into South Australia's Riverland and the Coorong at the mouth of the Murray.

The Murray-Darling Basin is very important for its biodiversity. At the time of European settlement, about 28 per cent of Australia's mammal species, about 48 per cent of its birds and some 19 per cent of its reptiles were found there. The Basin contains more than 30,000 wetlands, including 16 internationally significant wetlands that provide habitat for migratory birds.

The Murray-Darling Basin is also very important for rural communities and Australia's economy. Three million Australians inside and outside the Murray-Darling Basin are directly dependent on its water. About 85 per cent of all irrigation in Australia takes place in the Murray-Darling Basin, which supports an agricultural industry worth more than \$9 billion per annum.”<sup>1</sup>

My first concern with regards to CSM/CSG mining is the serious risk it poses to fresh water aquifers by extraction, in particular a technology known as hydraulic fracturing (or fracking/fracking). According to the Australian Atlas of Mineral Resources, Mines and Processing Centres, “hydraulic fracturing of the coal seam is done by pumping large volumes of water and sand at high pressure down the well into the coal seam which causes it to fracture...the gas then moves through the sand-filled fractures to the well.”<sup>2</sup> This method releases methane gas from coal bed seams along with thousands of litres of water, thus lowering water tables as well as depleting and/or altering the behaviour and direction of underground water supplies. Apex Energy NL even states that the environmental issues associated with CSM/CSG mining activities and operations include “groundwater impacts including the impact on surrounding aquifers”.

1 <http://www.environment.gov.au/water/locations/murray-darling-basin/index.html>

2 [http://www.australianminesatlas.gov.au/education/fact\\_sheets/coal\\_seam\\_gas.jsp#extraction](http://www.australianminesatlas.gov.au/education/fact_sheets/coal_seam_gas.jsp#extraction)

My second concern relates to CSG bores and gas wells that pierce all geologic layers between the surface and bottom of the shaft, including the aquifers people rely on for drinking water and stock or irrigation supplies. Hydraulic fracturing which causes micro-seismic events or little earthquakes intended to open up pathways for fluids or gases to flow. If these fractures intercept fissures or faults, the fracking fluids and contaminated water (also referred to as “by-product water - large volumes of saline water created in CSG production”<sup>3</sup>) which also contains heavy metals including dissolved hydrocarbons, radioactive isotopes and cyanide or gas can move into other geologic layers including aquifers. In addition, if bore casings or cement seals fail, contamination can occur. Steel casings corrode rapidly in saline water while cement seals deteriorate over time and under pressure. With regards to fracking fluids, Dr Lloyd Smith has discovered that:

“Constituents of fracking fluids are often considered ‘trade secrets’ and not revealed. Even regulators are left in the dark...Risk assessments for specific CSG projects in Queensland lacked basic information on the chemicals. The ones we were able to identify concerned us because of their significant potential to cause damage to the environment and human health. Some were linked with cancer and birth defects, while others damaged the hormone system of living things and affected aquatic species at very low levels...Fracking chemicals are complex mixtures of different chemicals which increase their risks. They are being used in very large volumes and unknown concentrations for purposes they were never intended for”.<sup>4</sup>

My fourth concern relates to the use and disposal of CSG ‘by-product’ water, whereby “an average of 5-8 tonnes (5,000-8,000kg) of salt is expected to be produced for each megalitre (1 million litres) of coal seam water”<sup>5</sup>. Groundwater pressure traps gas in coal. Unleashed, it releases not only gas but huge volumes of water, often heavy in salt and other highly toxic contaminants as previously mentioned. Already, the Queensland Government has recognised “coal seam water as a major environmental problem. It found Queensland’s main gas sites were likely to produce 25 gigalitres of coal seam water a year for the next 25 years - enough to fill Sydney Harbour, and then some”.<sup>6</sup> In addition, the Queensland Government has declared that:

The salty nature and commonly poor quality of CSG water mean that it has the potential to cause environmental harm if released to land or waters through inappropriate management. As a result, there are significant ecological risks associated with its disposal and, without treatment...[which is expensive and energy intensive]...government believes that beneficial uses for CSG water are limited”.<sup>7</sup>

To highlight the environmental impact of CSG water, Atkinson explains:

“The Bohena No.2 drillsite in the northern Pilliga forest is an extreme case of sodic soil pollution as the direct result of careless exploration practices. Similar effects can also be seen at two other sites in the Bohena area. The Bohena gas prospect, sometimes known as the —Narrabri Gas Field, is near the junction of the Newell Highway and the Pilliga Forest Way, approximately 30 kilometres south west of Narrabri in the Pilliga East State Forest

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3 <http://www.apexenergy.com.au/csg/>

4 <http://ntn.org.au/2011/02/21/call-for-moratorium-as-report-finds-fracking-chemicals-have-never-been-tested-for-safety/>

5 [http://www.arrowenergy.com.au/icms\\_docs/73090\\_Water\\_and\\_salt\\_management\\_brochure.pdf](http://www.arrowenergy.com.au/icms_docs/73090_Water_and_salt_management_brochure.pdf)

6 <http://www.smh.com.au/business/miners-reap-ill-winds-20090529-bqa7.html>

7 <http://www.dlqp.qld.gov.au/resources/report/coal-seam-gas-water-discussion-paper.pdf>

The Bohena No.2 well (total depth 908 m) was completed in June 1998, and Bohena 2D, on the same one hectare site, was completed in September 1998. A barbed wire fence now encloses an area of about 80 metres by 90 metres containing the boreholes Bohena 2 and 2D, and the holding dam. This dam was built to contain the ground water pumped from underground, mainly from coal seams. It originally had a spillway in the northeastern corner to drain off excess soda-rich water in to the surrounding forest which is in the catchment of Bohena Creek, a tributary of the Namoi River. Testing of gas-bearing sandstones and coals intersected by these wells continued into 2000. Portions of the settling dam wall collapsed and a very saline/sodic fluid poured in to the forest at the southern edge of the site. This collapse probably followed a heavy storm in November 2000.. The debris from the dam wall break of late 2000 can be clearly seen south of the fence line. Pale coloured silt covers an area about 30m wide and 40m fanning out southwards from the repaired and enlarged dam wall.

The collapse of the retaining dam wall was a separate event from the extensive leakage from the dam (excavated in sandy soil) which resulted in the spread of sodic/saline liquid through the subsoil and shallow aquifers. At least as early as February 2001, trees adjacent to the site began to show signs of dieback, with dead and discoloured leaves. Slight depressions in the forest floor were filled with a black treacle-like liquid. Water in the retaining dam and the black sludge were sampled by the NSW Environmental Protection Agency in April 2001. Limited analyses showed the black sludge contained high levels of tannin. The sodium level in dam water samples was 3,700 mg/litre, or one third to one quarter that of sea water.

The repaired dam wall remained intact but the area of dying vegetation continued to expand at this site. In addition, trees began to die at two other sites (No.4 and No.3) up to a kilometre away where the saline water from No.2 site had been diverted to through a polythene pipe. By November 2001 the pollution front at No.2site could be traced eastwards over distance of 250m and a maximum width of 100 metres. South east of the drill site most trees appeared lifeless, although a small amount of re-sprouting was visible for a short time on some of the larger trees. A lobe of dead vegetation extends northeastwards across a track for 100metres".<sup>8</sup>

In summary, The National Water Commission emphasises potential risks to sustainable water management to include:

- Extracting large volumes of low-quality water will impact on connected surface and groundwater systems, some of which may already be fully or over allocated, including the Great Artesian Basin and Murray-Darling Basin.
- Impacts on other water users and the environment may occur due to the dramatic depressurisation of the coal seam, including:
  - changes in pressures of adjacent aquifers with consequential changes in water availability
  - reductions in surface water flows in connected systems
  - land subsidence over large areas, affecting surface water systems, ecosystems, irrigation and grazing lands.
- The production of large volumes of treated waste water, if released to surface water systems, could alter natural flow patterns and have significant impacts on water quality, and river and wetland health. There is an associated risk that, if the water is overly treated, 'clean water' pollution of naturally turbid systems may occur.
- The practice of hydraulic fracturing, or fracking, to increase gas output, has the potential to induce connection and cross-contamination between aquifers, with impacts on groundwater quality.
- The reinjection of treated waste water into other aquifers has the potential to change the beneficial use characteristics of those aquifers.<sup>9</sup>

8 <http://www.ccag.org.au/images/stories/pdfs/envirohazards.pdf>

9 <http://www.nwc.gov.au/www/html/2959-coal-seam#gas.asp?intSiteID=1>

### The property rights and values of landholders:

Issues of concern include potential impact of CSG mining for landholders, in particular the reduction of property values. The Basin Sustainability Alliance explains that “land agents report buyers are steering clear of properties with or are likely to have CSG development”.<sup>10</sup>

In addition, the incongruent nature of current legislative law regarding the increasing deprivation of landholders’ property rights needs to be acknowledged and addressed.

### The sustainability of prime agricultural land and Australia’s food task:

In the context of the information presented thus far, I feel that the sustainability of prime agricultural land, including production and compliance schemes (eg: Biosecurity, Organic Certification, Quality Assessment Schemes etc.) are at great risk. The Australian Government (Department of Sustainability, Environment, Water, Population and Communities) has already stated that “the long-term productivity and sustainability of the Murray-Darling Basin is under threat from over-allocated water resources, salinity and climate change”. In my view, CSG mining activities and operations will be nothing short of catastrophic to Australia’s future in agricultural food production, due to potential contamination of aquifers, above ground waterways and underground water depletion as a direct result of CSG mining practices.

### The social and economic benefits or otherwise for regional towns and the effective management of relationships between mining and other interests:

There are many stories, however Ulan and Wollar residents are the latest example of the negative social and economic impacts associated with CSG mining operations in regional and rural areas. As explained by Snyder, a Land and Environment Court hearing in Mudgee has heard from long-time Ulan resident Bob Campbell of the decline of the community as a result of the expansion of mining. Heritage houses and churches have been bulldozed, once successful locally owned small businesses are going into rapid decline and population within the communities is decreasing due to the health risks associated with CSG mining operations including noise, dust and sleep deprivation from noise levels.<sup>11</sup> Nason also raises concerns regarding a strong buyer resistance to rural properties that are affected by CSG activities and operations, unless being bought directly by CSG companies. Mining workers are also spending their earnings away from regional and rural areas in which they were working which means that money is not being put back into local communities.<sup>12</sup>

### Other related matters including health impacts:

As stated by Dr Mariann Lloyd-Smith and Dr Rye Senjen:

- Many of the chemicals and compounds that make up fracking fluids are either acutely toxic or have chronic toxicity to humans, animals and/or the environment. Companies argue that the full identity and composition of fracking fluids cannot be publicly disclosed as the

10 <http://www.basinsustainabilityalliance.org/cms-assets/documents/Fact%20Sheets/16378-776480.3landholderinformationfeb11.pdf>

11 <http://www.mudgeeguardian.com.au/news/local/news/general/ulan-wollar-residents-address-mine-case-hearing/2200311.aspx?storypage=1>

12 <http://qcl.farmonline.com.au/news/state/agribusiness-and-general/general/csg-ripples-felt-in-rural-property/2085883.aspx?storypage=0>

- information is a trade secret and involves commercial-in-confidence data
- A National Toxics Network (NTN) review has found that only 2 out of the 23 most commonly used fracking chemicals in Australia have been assessed by National Industrial Chemical Notification and Assessment Scheme (NICNAS). Neither of these 2 chemicals were specifically assessed for their use in hydraulic drilling and fracking
  - Environmental authorisations by Queensland regulators identified that in one CSG operation, approximately 18,500kg of additives were to be injected during the hydraulic fracturing process in each well, with only 60% recovered and up to “40% of the hydraulic fracturing fluid volume would remain in the formation, and this would correspond to 7,400kg of chemicals per injection well<sup>13</sup>

In addition, Transition the Grove highlights the common pattern of health impacts emerging in the USA that have been linked to similar mining practices, including:

- Adrenal-gland tumours
- Blood disorders
- Idiopathic haemorrhaging
- Kidney damage
- Cardiovascular effects
- Neurological effects<sup>14</sup>

In summary, the contamination to air, land/soil and water (above and below ground) due to unsustainable CSG mining activities and operations and their direct impact upon economic, social and environmental issues as outlined briefly in this paper cannot be denied or ignored. As a result, I request that a moratorium be placed upon all CSG mining practices in NSW until such time that appropriate and adequate studies can be done by independent peak bodies that can guarantee without question, the safety and security of Australia’s economic, social and environmental sustainable future.

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13 <http://ntn.org.au/wp-content/uploads/2011/04/NTN-Fracking-Briefing-Paper-April-2011.pdf>

14 <http://www.transitionthegrove.org.au/index.php/research-a-reports/367-csg-coal-seam-gas-mining-a-the-darling-downs>