Submission No 273

INQUIRY INTO COAL SEAM GAS

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Rivers SOS

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NSW Legislative Council's General Purpose Standing Committee No. 5:

Coal Seam Gas Inquiry

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Rivers SOS

Submission from Rivers SOS

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The Rivers SOS Alliance is an expanding network of 45 environmental and community groups around NSW, campaigning to protect river systems from mine damage. (Please see our web site for further details of our activities and history: riverssos.org.au).

Rivers SOS was formed in 2005, initially with 13 groups, all concerned with the impacts of coal mining, both open cut and longwall. However with the rapid expansion of CSG extraction, we are now equally concerned with CSG operations. We have been advised that the impacts of CSG extraction on water resources is even more destructive than longwall mining impacts.

In keeping with the aim of our alliance, this submission is confined to addressing the issue of impacts of CSG activities on aquifers and river systems. We believe that this issue is the most serious of all, involving the long term sustainability of NSW's water resources.

Nevertheless we would like to mention in passing the importance of recent reports which address related issues, such as the Cornell University study indicating that methane emissions from CSG operations may contribute more greenhouse gas than conventional coal mining; [1]also the Doctors for Environment Australia report which outlines health risks in great detail and from many angles[2].

[1] R. Howarth, R. Santoro, A. Ingraffea, *"Methane and the Greenhouse Gas Footprint..."* Cornell University, 12/4/11 (www.springerlink.com)
[2] Doctors for the Environment Australia, *Submission to Senate Inquiry into Coal Seam Gas,* June 2011

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1) Overseas Experience in CSG Mining

Fortunately we in Australia have the opportunity of learning from impacts of previous CSG mining on aquifers and rivers overseas.

In the USA thousands of complaints are now lodged with state and federal agencies by people impacted in various ways by CSG mining[3]. We would not want to see the same expensive upheavals here.

In the Appalachian town of Dimock, for example, the water supply was contaminated by leaky gas wells, causing high levels of iron and aluminium in their aquifer, as well as toxic ethylbenzene.[4] This resulted in illness in humans and animals. The EPA USA is researching impacts ahead of future federal legislation.

New York State has meanwhile imposed a one year moratorium on fracking (from 6 June 2011).

Officials in Pennsylvania have recently fined a gas company over $1 million for contaminating the water supply of 16 families.[5]

France banned fracking in May. South Africa has imposed a moratorium in Karoo: a large semi-desert region. A UK study (University of East Anglia) calls for a moratorium.

The new Coalition government of NSW imposed a 60 day moratorium on new coal or CSG exploration licences and is reforming aquifer interference regulations, hopefully taking CSG impacts into account.

We call on the NSW Government to extend this moratorium until the issue is adequately researched and regulated.

Much more research needs to be done before moratoriums and bans can be safely lifted and until such time there is enough alarming evidence concerning aspects of CSG operations for a halt to be called, alongside the growing number of agencies around the world.

2) Sustainability of Aquifers

Rivers are the life blood of every nation. Rivers depend on inflow from aquifers. Australia is the driest continent, with climate change already having an effect, an effect

[3] Debra Jopson & Ben Cubby, SMH, 25/9/10
[4] Ibid.
[5] Pro Publica, USA, 17/5/11

that will result in more severe droughts and higher temperatures. Therefore the protection of Australian river systems is of supreme importance.

Agriculture in NSW is highly dependent on bore water pumped from aquifers and river systems. Our greatest asset, the Great Artesian Basin (straddling the NSW/Qld border) is already sadly depleted and the rapid expansion of CSG wells will hasten the unsustainable rate of extraction here and in all other areas where rivers and ground water are exploited by CSG operations.

Possibly up to 80% of current water volumes being extracted from the Great Artesian Basin is solely for CSG operations.[6] We support the call for CSG extraction to be banned altogether in the GAB basin and in other major catchments and river systems.

The huge volumes of water used by CSG operations will increasingly compete with human and agricultural needs, and the rapid growth of protest activities by farmers and environmentalists in NSW and Queensland attest to this concern.

Even Ross Dunn, head of the industry body Australian Petroleum Production and Exploration Association, admitted that landholders have legitimate concerns about the industry's effects on groundwater.[7] At a CSG community meeting in Leichhardt he said that "drilling will, to varying degrees, impact on adjoining aquifers. The extent of impact and whether the impact can be managed is the question."[8]

But the question cannot be answered. The newly established Centre for Groundwater Research and Training reports: "Because existing data is limited or non-existent, management decisions are being made using hydrogeologic conceptual models that can be grossly misleading."[9]

If CSG is allowed to continue at some later stage (we would oppose this at present) the rate of extraction of ground water and river water must be carefully regulated and monitored to ensure sustainability of the state's water resources. This may mean a drastic reduction or a staggering of CSG operations but the necessity of protecting water resources must be paramount.

3) The extraction process

One major problem concerns the initial process of extraction: drilling and then cementing the wells.

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[6] Doctors for the Environment Australia, *op.cit.*, p8
[7] *ABC, AAP* 28/4/11
[8] *Leichhardt CSG Meeting,* August, 2011
[9] Doctors for the Environment Australia, *op.cit.*, p. 7

As wells are drilled, the drill will probably breach one or more aquifers before reaching the coal seam. The drill wells are then cased in a thin cement layer (cement plus water plus calcium carbonate). A lot can go wrong in the process of cementing a gas well. Faulty equipment, a botched mix, a failure to fill even a tiny crevice with cement, a minor – or major – earth tremor can all produce dire consequences (and of course added to this is the question of just how long cement casing will last before crumbling and collapsing).

The inevitable errors will cause saline water and toxic chemicals, oil and other wastes from the subject well to leak and to contaminate aquifers as at Dimock. And as at Tara in Queensland, where 5 wells were emitting flammable levels of methane gas. According to farmer Tim O'Connor, a gas well has blown out no less than four times on his land near Dalby, Qld.[10]

The BP oil rig disaster in the Gulf of Mexico of April 2010 was, according to a National Commission report, the result of a faulty cement job: "cementing failures are not uncommon even in the best of circumstances."

We submit that we must not gamble with this process near our major river systems. Are all wells being carefully monitored ? Is an adequate risk assessment in place ? Are there suitable emergency procedures and rehabilitation methods in place ? We believe that in the rush to develop this commodity the survival and the safety of water resources is under threat.

For instance, the recent gush of water from AGL's Rosalind Park well demonstrated that the company was unable to cap this powerful jet of contaminated water. Emergency procedures were either absent or totally inadequate.

AGL maintains that the foam observed on video in this accident was merely detergent, but we have not heard of any independent confirmation of this. We note that the "foam" was blown towards the open waters of the Upper Canal, only 200m away. The Upper Canal carries on average 20% of Sydney's water supply to the Prospect Reservoir. This vital flow of water is thus at risk of uncontrollable contamination .

Well may AGL apologise for this slip-up, but we maintain that a responsible government would make sure that all CSG operations must be kept at a safe distance from water supplies: dams, canals, reservoirs, catchments and river systems. AGL and other gas companies can only operate in such dangerous circumstances when approved by the NSW Government.

[10] *ABC News*, 24/5/11

We are appalled that CSG extraction might even be approved in the Warragamba catchment (the Warragamba Dam supplies 80% of Sydney's water) and in the Woronora Dam catchment (supplying Sutherland Shire and northern Illawarra).

As the Doctors for the Environment submission says: "The monitoring of potential contamination of water supplies in coal seam gas mining areas is inadequate ...Human health relies on having clean safe drinking water ... CSG operations should not be allowed to endanger these basic health needs of Australians."[11]

Furthermore, the NSW government should have no confidence in the ability of the gas companies to manage environmental damage and risks adequately. The companies are proving inadequate to cope with emergencies and even with "normal" operational procedures.

There have been numerous accidents and leaks. The Queensland government, for example, tested 58 wells around Tara and found that 26 of them leaked, some seriously.[12] Testing only took place after media attention and community protests, not because a rigorous and responsible testing procedure was in place, as it should be everywhere.

Mining magnate Clive Palmer, not known as an environmentalist, has reported that a leading Chinese company told him that the CSG extraction techniques used here were abandoned in China twenty years ago. Palmer concluded: "CSG technology currently used in Australia is lethal and will kill Australians, poison our water table and destroy the land."[13]

4) Unsustainable Water Usage in CSG Operations

Huge amounts of water are necessary in the CSG process, and this usage as it expands will compete with human and agricultural needs, as well as the need for rivers and creeks to be fed by groundwater sources into the future. The user – the CSG company – gets the benefit but the rest of the population and the environment bear the cost.

A related example is the use of 30,000,000 litres of water per day taken from the Great Artesian Basin by the Olympic Dam, at an absurdly low cost to the company.

And while the Great Artesian Basin management plan (GABSI) is trying to reduce outflow by 200,000 ML p.a. to manage it sustainably, Queensland Gas Company plans to drill around 6000 gas wells in the Surat and Bowen areas of the GAB. A J.P. Morgan Report, 2010, estimated that in the Surat and Bowen basins between 125 – 350 gigalitres p.a. will be extracted.

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[11] *DEA Submission,* pp 3, 10
[12] *Ibid., pp 23-24*
[13] Clive Palmer, *ABC News*, 28/8/10

CSG operations in the Powder River Basin in Wyoming have caused drops of up to 200m in near-surface aquifers.[14] Australian farmers are facing similar disasters in CSG regions.

The high water usage is unsustainable. Recharge processes in aquifers are slow and aquifers are already seriously depleted through use of agricultural bores and pumps, through coal mine usage and now through rapidly expanding CSG mining.

As groundwater is extracted pressures in adjoining aquifers, underlying or overlying the coal seam, may fall and flows to rivers and streams and bores will be choked off. This can only result in the further degradation of our river systems.

As drilling breaches more than one aquifer, water from one may contaminate water in another. Dr John Williams, formerly of CSIRO, from the Wentworth Group of Scientists and now head of the Natural Resources Commission, recommended in a 2002 catchment audit that mining plans "should be approved only if they can reasonably demonstrate that subsequent subsidence is unlikely to affect water courses or hanging swamps."[15] Now he is equally concerned over CSG extraction: "It's likely to be breaking some of the barriers between good and bad water and putting the good water at risk."[16]

5) **Dangerous Disposal of Waste Water produced in CSG process**

The coal seam water which spurts up from the wells, as the coal seams are depressurised, is unfit for human consumption or even for agriculture. It may contain radioactive substances as well as salt and other toxic chemicals. There is a huge problem with its disposal. Often water is kept in large dams on site, where there is the risk of overflow in heavy rains, or the risk of seepage into the groundwater if the disposal dams are not lined. And if lined, how long will the lining last ?

Waste water can be injected into underground storage pits, but this ensures seepage into adjacent groundwater unless adequately and permanently lined Even worse, the waste water is sometimes discharged into nearby surface water. Sometimes it is transported to treatment facilities of questionable effectiveness.

Some operations have been using the contaminated water to spray on to their access roads to suppress dust, but residents at Tara in Queensland complained of illnesses caused by this spray.[17]

And will the dams be adequately monitored for decades ? A Pennsylvanian Oil and Gas Association official has estimated that "the waste that flows back slowly and

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[14] *Coalbed Natural Gas Regional Groundwater Monitoring Project,* Powder River Basin, 1993 - 2006
[15] *Audit of Sydney Catchment,* November, 2002
[16] *Coal Seam Gas News,* 27/6/11
[17] *The Courier Mail,* 21/10/10

Given growing community outrage, some gas companies now promise that they will not frack. However fracking chemicals are not the only problem. The fracturing of rock by drilling also releases a number of toxins which leach into the water. Professor David Shearman, professor of medicine at the University of Adelaide, is concerned not only with fracking chemicals "but also with those arising in coal seams themselves which may be brought to the surface. This flow-back water can contain volatile organic compounds, high concentrations of ions such as calcium, iron, magnesium, sodium, strontium and also radioactive substances. Potential long-term hazards are cancers and deformities."[24]

7) Moratorium until Adequate Research is Completed

Every serious student of the CSG expansion calls for more research. We repeat the statement from the National Centre for Groundwater Research and Training: water planning "requires far more knowledge of sub-surface water systems than is currently available ... decisions are being made using hydrogeologic conceptual models that can be grossly misleading." Precise impacts of CSG mining are unclear and the National Water Commission has also emphasised the urgent need for further research.

.After a moratorium of at least two years, and independent and thorough research, we would want to see site-specific research carried out in each case before exploration licences are approved , and we would also want to see many more officials of local and national agencies employed to monitor all gas wells, and be empowered to impose hefty fines and demand serious rehabilitation efforts where breaches occur. Ability of the companies to respond to emergencies must also be monitored and regulated properly.

CSG should never be allowed in the GAB or in drinking water catchments.

Finally, we support the call for a review of all water legislation to better ensure protection of surface and groundwater. Current regulations and legislation in NSW is obviously not adequate to protect drinking water sources from depletion and contamination.

Thanking you for the opportunity to lay our concerns before your committee,

Caroline Graham, on behalf of Rivers SOS

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[23] *The Courier Mail,* op.cit.

[24] *Coal Seam Gas News,* 27/6/11. Professor Shearman was speaking on the submission by Doctors for the Environment Australia to the recent Senate Inquiry