Submission No 170

INQUIRY INTO COAL SEAM GAS

Name: Mrs Cathy Lock

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To Coal seam gas:
A current inquiry of the General Purpose Standing Committee No. 5.

As a scientist and citizen of this great nation, I am GRAVELY concerned about the environmental impacts of CSG mined by the technique known as Hydraulic Fracking. I am desperately concerned about water. Water is life. We can't live a week without it, our bodies are made up mostly of water. **WATER needs to be protected above all else. I am also desperately concerned about the welfare of all Australians as energy companies prepare to pillage, bully, trample and pollute our paradise.**

My Background
I have a BSC (honours) in Biochemistry and have worked in the environmental monitoring/analytical testing industry for 15 years in South Africa, UK and Australia. I have worked at Australian Laboratory Services (Smithfield), as Project Manager with the Sydney Catchment Authority (SCA) on the Pesticides Monitoring Program for 4 years, after that I managed 3 environmental testing/monitoring laboratories in Wollongong, Nowra and Newcastle for Ecowise Environmental (ACTEW), so I am **qualified as a professional** and as a resident of Bossley Park to raise these concerns.

HYDRAULIC FRACKING IN THE USA

When police are investigating a matter of crime, they go about interviewing witnesses, usually a case of 2 or 3 corroborates a story. Please read the attached document "The Case for the BAN on Gas Fracking". **The story is HORRIFYING.** (Page 3 of this report, Ten Studies and Investigations January 2010 to May 2011, documents a witness' account of the damages of fracking in the US).
http://documents.foodandwaterwatch.org/frackingReport.pdf

"Ten Studies and Investigations, January 2010 to May 2011 paraphrased from the Food and Water Watch report referred to above.

New York Times (Feb 2011) – an investigative report highlighting frackings' severe environmental risks. Radioactive drilling waste water, 1.3million gallons of waste water mostly sent to treatment plants unequipped to remove toxic material, and discharge of partially treated waste into streams.
My comment: CSG – CLEAN UP YOUR OWN WASTE, Don't "subcontract"and expect others to deal with your problem.

House Energy and Commerce Committee, (January 2011, April 2011)
Fracking fluids contain 750 chemicals, some hazardous to human health, including benzene and diesel. Yet in the USA ,diesel is the only chemical that requires a permit to inject into wells under the Safe drinking water act.
My Comment – National water regulations need updating to include all commercially and industrially available chemical compounds. Close the loopholes or else they will be exploited.

Riverkeeper (September 2010)
A report presenting hundreds of environmental fracking case studies, documenting well blow outs, groundwater contamination, air pollution, permit violations and improper waste management.
My Comment – Don't frack with my home.

Cornell University (September 2010)
Shale fracking could have a greater effect on climate than coal or oil over the life cycle since it releases methane, which traps 21 times more heat by weight than CO2. (EPA estimate).
My comment – tut tut, no study done on this CSIRO!

Environmental Working Group (January 2010)
Drilling fluid contains 93 times more benzene than diesel. The amount of benzene from a single fracked well could contaminate more than 100 billion gallons of water.
My Comment – Get the all CSG CEO's and all in favour of fracking to drink fracked or produced water all the time. Not just a swig in front of the cameras.

PennEnvironment Research and Policy Center (May 2011)
Study of 3000 gas wells in Pennsylvania's, found permitted wells within 2 miles of 320 day care centres, 67 schools and 9 hospitals.
My Comment – Don't let this happen in our cities and towns

Duke University (April 2011)
Methane concentrations in shallow water 17 times higher than those in non-active areas. The methane concentrations of drinking water closest to active gas wells were considered potential explosion hazards.

Question: Has any body put this into an Australian perspective? BUSHFIRES???

Endocrine Disruption Exchange (September 2010)
25% of fracking chemicals could cause cancer, 37% could disrupt the endocrine system, 40-50% could affect the nervous, immune or cardiovascular system; 75% could affect the skin, **eyes** and respiratory system, resulting in skin, eye or flu-like symptoms.

My Comment – This has already happened in Australia to a Chinchilla landowner.

On the 8TH August 2011, A landowner in Chinchilla QLD reported the following: "There is a mysterious odour wafting through the farms south of Chinchilla. Residents describe it as like "burning oil". It is most often reported in the air during the night and early in the morning. It is strong enough to wake some landholders from a deep sleep..... The land owner lives about 6km from the Linc Energy pilot plant and spends most of his time outdoors. But he is concerned. ***He said the fumes burn his eyes, with the pain remaining for two or three days, and he is also suffering respiratory problems.****"*
http://qcl.farmonline.com.au/news/state/agribusiness-and-general/political/linc-site-causes-big-stink/2251382.aspx?storypage=0

Question: What will be the effects of Hydraulic Fracking on Medicare? Has anybody in their "profit calculations of actuarial risk and the like" even bothered to think of this?

Associated Press (January 2011)
Found that the State could not account for 1.28 million barrels of waste water (1/5 of the annual total) due to faulty reporting. Water utilities struggle to remove THM's (Trihalomethanes), which cause cancer with chronic exposure. A lack of oversight has allowed wastewater from fracking to contaminate the Delaware River basin, which supplies 15million people.

My comment: Energy companies have already carved up Australia, as soon as they get the green light it will be all systems go, too late to put regulation in place. Eg. Queensland Gov doc (2 pages) on Salt and brine management in coal seam gas production.' Dated March 2011. Looks like it was thrown together in a hurry, judging date and length of document. Should be in place BEFORE commencement of CGS. (DERM 2011)
http://www.derm.qld.gov.au/factsheets/pdf/environment/en9.pdf

ProPublica (2011)
On going investigation into fracking since 2008 found court and government documentation on more than 1000 cases of water contamination.

My Comment – This is already happening in Australia. Arrow Energy found Benzene in monitoring bore @ 16 ppb near Dalby. Anna Bligh says this is very minute and insignificant, does she know that the USEPA maximum concentration for Benzene in drinking water is 5 ppb. Other comments from DERM were "Water is not used for drinking or crop irrigation". So what if we need to use the water in the future. It costs huge amounts of money and sophisticated technology to purify water, the more polluted it is the more treatments are needed, the more expensive it is. Most rural treatment plants are not equipped to treat water to potable standards. Trust a politician to try and put a spin on polluted water.....

http://www.smh.com.au/environment/csg-chemical-screening-is-working-bligh-20110829-1ji2g.html

CHEMICALS USED IN FRACKING/ POLLUTING A CRITICAL INFRASTRUCTURE

The thing that gets me most upset and **TRULY ANGRY** is the injection of fracking fluid into the ground. **I don't care what anybody says, or how many posters and advertising campaigns are fed to me – this is not acceptable.** It is a CRIME AGAINST HUMANITY. What is the difference between doing this and acts of Bioterrorism? **Polluting water, a critical infrastructure?** Injection of chemicals into the ground should not be allowed under ANY circumstance.

Please refer to the NTN brief attached in this letter **(NTN 2011)** to get an idea on chemicals used in Fracking. Pg 5-11. Ethylene Glycol is radiator fluid, used to make plastics, it can't be removed from water even by Reverse Osmosis, so all the money spent down at Botany won't even help. (See Reference 36 under Produced Water on Page 12 of NTN 2011 reference).

"Energy in Depth, an association of natural gas and oil producers in the USA, says on its own website that 0.5% of fracking fluid contains various acids, salts, petroleum distillates, sterilizers, **oxygen removers**, antifreeze, and ingredients usually found in glass cleaners, hair colouring, and antiperspirants. That's anywhere from 10,000 to 25,000 gallons of pure chemicals pumped into the **ground per well.** The EPA notes that there were 603 rigs drilling horizontal wells in June 2010, more than twice as many as were operating a year earlier. **(ANH Feb 2011).**

So then the CSG industry argues – but it's so far underground it won't affect the groundwaters and aquifers. The US EPA has proved this incorrect since saltwater breakout has occurred and in this instance caused contamination of boreholes. **(EWG 2011).** (Also see Dr Tony Ingraffea's comments on fracture lines, cement casings and leaks and spills in the U tube link below). http://www.youtube.com/watch?v=nPZqXGBlj10&feature=related

HYDRAULIC FRACKING WILL EXCABERATE EXISTING ENVIRONMENTAL THREATS TO AUSTRALIA

As an Australian and an environmental scientist I am aware of the most pressing environmental issues facing Australia:

1) Droughts - Lack of Water, think Sydney for the last 5-10 years.
2) Salinity – Increase of salt its effect on agriculture. Think Murray Darling Basin last 5-10 years.
3) Bushfires – Think Kingslake and Maryville Vic.
4) Floods – Think Queensland 2010.

This dirty little practice of Hydraulic Fracking exacerbates all these major concerns.

Hydraulic Fracking and Drought - Lack of Water

Hydraulic fracturing stimulation of a shale gas wells requires between 1-5 million gallons of water **(SEAB 2011)** - (that's 3.8-19 million litres of water **or 1.5-7.5 Olympic size swimming pools required per well**). So as you can see a large amount of water is used in CSG mining process itself, whether this is sourced from the local water authorities or from local ground water, the net result is a loss of usable water to the detriment of other industries, agriculture and communities in the area.

Question: In a fully developed gas field containing hundreds of wells that are fracked up to 18 times each in their life cycle, would this effect lower the groundwater table and render existing boreholes waterless? (Mining companies have plans for 40 000 wells in the Surat and Bowen basins in Queensland alone). Energy companies have carved up Australia with Dart Energy presiding over the Sydney Basin. If there are no restrictions in place, **Australia will become "GASLAND".**

Please note that only 40% of the fracking fluid pumped into the earth in a gas well, actually comes out again. 60 % of this deadly saline cocktail is lurking under our feet. A legacy for the future. Hydraulic Fracking will destroy Australia, not all at once but over time as toxins pool and begin to filter through groundwater networks and bio accumulate in our bodies through the food that we eat. I'm predicting the collapse of Medicare.

Hydraulic Fracking and Salinity – Increasing Salt Levels

"CSG water is a by-product of CSG production. CSG water typically contains significant concentrations of salt. The salinity of CSG water is variable and is usually measured by the concentration of Total Dissolved Solids (TDS). The TDS value og CSG varies from 200 **MORE than 10 000mg/L.** (TDS of drinking water around 500mg/L) **(DERM 2011)**

Please note that the Queensland Gas Company will produce **200 tonnes of salt per day**, a company spokesman said "Dumping it will be a last resort ". WHAT THE!! (See Reference 37 under Produced Water on Page 12 of NTN 2011 reference).

Now I admit that I am no expert in this field however, this is what Wiki encyclopedia online has to say about Salinity: "The consequences of salinity are

- detrimental effects on plant growth and yield
- damage to infrastructure (roads, bricks, **corrosion of pipes** and cables)
- reduction of water quality for users, sedimentation problems
- soil erosion ultimately, when crops are too strongly affected by the amounts of salts.

Salinity is an important land degradation problem. **Soil salinity can be reduced by leaching soluble salts out of soil with excess irrigation water**. Soil salinity control involves watertable control and flushing in combination with tile drainage or another form of subsurface drainage.[4][5] A comprehensive treatment of soil salinity is available from the FAO.[6]
High levels of soil salinity can be tolerated if salt-tolerant plants are grown. Sensitive crops lose their vigor already in slightly saline soils, most crops are negatively affected by (moderately) saline soils, and only salinity resistant crops thrive in severely saline soils. The University of Wyoming [7] and the Government of Alberta [8] report data on the salt tolerance of plants."

Conventional water and waste water treatment plants don't have the capacity or technology to treat the chemical nature or amount of waste generated by this industry. I question wether the industry is as clean as they would have us believe.

Question: In the mad rush for CSG and "CLEAN" energy, are we perhaps salting the earth?

Hydraulic Fracking and Bushfires – Methane Contamination

Despite the CSG industries claim that directional drilling and hydraulic fracking does not cause groundwater contamination, methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing has been reported in Pennsylvania **(Duke 2011).** In this study the peak methane level of **64 mg CH4/L** was detected in drinking water. This is a potential explosion hazard as the defined action level for hazard mitigation in this case is 10-28mg/L.

Australia is highly susceptible to bushfires, with the Victorian Kingslake and Marysville tragedy still fresh Feb 2009. Do we really need an added threat of flammable methane hanging around in drinking water and drilling wells at explosion level concentrations? I can remember coming home from work once scanning the horizon and watching 3 raging bushfires all around Sydney. I thought then that we were going to go up in smoke.....

Question: If there is a bushfire and Fracking goes ahead at the dizzying speed that is planned, what water will be to be used to put out fires? That is if we have any left after being sucked dry...

Hydraulic Fracking and Floods

Once CSG extraction commences, a large amount of 'produced' water/effluent is brought up from the coal seam. This produced water, as well as bringing up methane, brings up toxic, carcinogenic, **radioactive compounds** and heavy metals found naturally in the coal seam **(NTN 2011).** The current practice of treating produced water in evaporative ponds is recognised by the industry **(Glynn, 2009)** as very problematic, with permeation of salt and compounds into ground water or overflow into surrounding environments, streams and rivers etc. at the top of the list of concerns.

The recent flooding of these ponds in the Queensland floods demonstrates that these effects may not be limited to a local area. This has happened multiple times in Australia already, year after year in QLD. 2008, 2009, 2010 and 2011 tailings dams were breached and heavy metals were released into the Fitzroy catchment and other areas. **(Coal seam gas news). PLEASE LOOK at this website http://coalseamgasnews.org/?page_id=197 to view a CGS gas field and see an exaporation pond.** *(While you're on this site see* ***Dr Karl Kruszelnicki comment*** *"Burning CSG emits less carbon into the atmosphere, but in the process huge quantities of methane are released. "The methane is, say, 20 times worse than carbon dioxide as a greenhouse gas")*

An evaporation pond or hole in the ground lined with plastic, to prevent seepage into the environment is just not acceptable. All effluent pond wastage produced needs to be treated to ANZECC guidelines standards (which are not even enforceable) and tested for target pollutants BEFORE it is released into the environment. (For many pollutants, there are no ANZECC guideline values, just shows how far behind regulation is with industry. The government has been too caught up in the theoretical/conceptual world of ETS and Carbon Tax). Any liquid waste containing hazardous substances needs to be treated as Hazardous and disposed of by HAZMAT specialists. Transport of hazardous waste to restricted Hazardous waste sites needs to be carefully considered – distances, acesss routes and risk to agricultural land and waterways if there are accidents and spills.

Why should every other industry in Australia be subject to strict laws regarding treatment of waste when the CSG industry are allowed to accumulate waste in large ponds, untreated, evaporating and releasing deadly fumes into the atmosphere.

Question: When CSG leaves an area, who will clean up? They promise to do it BUT THEY DON'T.

THE ROLE OF THE ANALYTICAL LABORATORY / QUANTIFICATION OF POLLUTION

I have sold environmental analysis to industry/public for over 15 years, so please take some time to understand the position of environmental laboratories within this whole CSG nightmare.

Due to the gaseous or even liquid nature of the contaminants, concentrations of pollution dissipate/dissolve over time. This makes sampling and analysis of gas (or underground liquid) exceedingly difficult and **obtaining quantitative proof of contamination almost impossible for the general public.** Proof of contamination is usually qualitative and symptomatic and for this reason down played by the CSG industry indeed it seems that they use it to their advantage. Bare in mind that analytical laboratories have strict holding times (**time within which samples must be analysed** within) for VOC (Volatile Organic compounds, holding time 5 days) and SVOC (Semi Volatile organic compounds, 14 days) in order for results to be deemed viable or even to stand up in a court of law. Add this to the fact that labs require complicated Chain of Custodies (COC's) to be completed, makes the issue of pollution quantification even more complex. Samples also need to be collected in the correct sample bottles with the appropriate preservative.

Please note that you can't just send a sample to a lab and say – "Tell me what is in it", the lab needs to be directed in what pollutants to look for. Indeed if these pollutants are not disclosed due to "trade secrets", then you are wasting your time. Most of the pollutants discussed in CSG fall into the SVOC or VOC group of compounds, but even if a sample is sent in for this analysis, labs have different compounds that they report under the SVOC and VOC analyses. Indeed if the lab does not have the calibration standard for the required chemical pollutant then it will not be tested for or reported. If you know what the pollutant chemical is you have to ask for a targeted SVOC or a targeted VOC scan and check that the lab has the standard for instrument calibration. It would bet my house on the fact that none of the main stream commercial labs in Australia are in a position to report and quantify the 250 toxic chemicals listed in the NTN brief.

Most commercial labs in Australia have achieved NATA accreditation, but what about the person who takes the samples. In the environmental industry most sampling is undertaken by "Consultants" many of whom are students/newly qualified personnel with absolutely no clue what they are doing. A sample is only as good as the person who takes it. In the commercial industry, environmental reporting is left up to the "consultants" who often will send in numerous samples and then pick the best result to report to their client:....

Another most annoying issue regarding labs and the analysis of environmental samples is that there are almost no laws regarding pollutant concentrations in environmental samples (liquid, gas and soil). This is a nightmare when trying to use environmental analysis to stop pollution or fine polluters. I doubt that there are any "maximum concentration values" set by the Australian Government for all the chemicals used in fracking. There are probably no toxicological values either. SCARY.

Difficulties analysing brine and salt for contaminants, high sodium chloride levels mask pollutants – making analysis VERY difficult. So thinking of using CSG by products like salt in glass production and pools would be spreading the contamination. Salt by product would have to be cleared as contaminant free before trying to recyle.

Labs don't routinely test for radioactivity either, infact most labs will not accept samples on OH&S conditions if a sample is even suspected of being radioactive. Do samplers check for radioactivity before sampling??? Breach of OH&S – most definitely.

Other issues

Health

Please see Dr Theo Colborns comments on this U tube clip. "It is the ppt (parts per thousand) and ppb (Parts per billion) levels of these chemicals that undermines your health, especially if they get into the drinking water of pregnant women and into the drinking water of our children"
http://www.youtube.com/watch?v=nPZqXGBlj10&feature=related

Also see Dr Tony Ingraffea's comments on fracture lines, cement casings and leaks and spills.

SCA Exclusion Zones
Sydney Catchment Authority has strict exclusion zones in order to protect the catchment, bushwalkers and bikers are not allowed to enter these zones, and all spills of chemicals have to be reported by truck drivers if they occur on roads passing through the catchment. 15 coal seam gas (CSG) wells have been approved for development in the northern Illawarra. Further wells are being discussed and applied for in the region. These wells are in and around the Sydney Water Catchment, and pose a direct threat to our water supply. **(Stop CSG Illawara)**
"View Coal Seam Gas in NSW in a larger map"

Furthermore, I reject the findings of the Obama 90 day report Aug 2011 on the grounds of conflict of interest, a majority of writers on the panel have direct dealings with the industry.
Self regulation will never work.

Thankyou for taking the time to read this. I do truly understand the pressures facing the Energy Sector, but **PROTECTION OF WATER MUST TAKE PRIORITY.**

PLEASE IN YOUR CAPACITY THE AUSTRALIAN GOVERNMENT SEE BEYOND THE DOLLARS AND STAND UP FOR CLEAN WATER AS A HUMAN RIGHT.

We don't want hydraulic fracking in our cities, in our towns, in our water catchments, in our national parks or our state forests. In fact we don't want it in Australia.

BAN HYDRAULIC FRACKING IN AUSTRALIA
FIND ANOTHER LESS DAMAGING WAY!

Yours Sincerely

Cathy Lock
BSc Honours,
15 years experience in the environmental monitoring and analytical testing profession.

References

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