Chief Scientist - CSG Review

paul saunders to: csg.review 26/04/2013 09:52 PM

History: This message has been replied to and forwarded.

I wrote to the Chief Scientist some weeks ago. The response from the Chief Scientist was that the article I created and enclosed would be referred to the review committee.. I attach the article in case it has not been passed on to the review committee. I also enclose the report from the Royal Society and Royal Academy of Engineering in the U.K who were tasked with a CSG review in the UK. I support CSG but not without worlds best practice as being the base position for all companies in the industry.

http://royalsociety.org/policy/projects/shale-gas-extraction/report/

Please consider my article and more particularly,

yours faithfully

Paul Saunders
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0424065369

2012-06-28-Shale-gas.pdf CSG CBM Moratorium Call 2.pdf

COAL SEAM GAS/COAL BED METHANE

A Call For A Moratorium

An article aimed initially at instigating a moratorium on CSG/CBM Development in NSW Australia. Australia already has a gas industry which has been successfully functioning for 60 years.

The CSG/CBM industry is significantly different. With CSG/CBM there is a risk of aquifer contamination, gas leaks producing greenhouse gases 20 times more polluting than CO2., no plan to use the waste salt, the possibility of leaching into aquifers, the poorly regulated industry.

"*We're playing catch up in trying to establish some rules and some policies to regulate the industry,*" Mr Gulaptis MP said on 13th Mar 2013 . "*We had nothing to work from*." This statement is from a Member of Government who overruled the Inquiry into CSG in NSW.

Any Country and State trying to fight for a moratorium is probably dealing with politicians who have the same lack of knowledge about an industry they have failed to regulate.

The article presents information from experts, scientists, Parliamentary Reports, Inquiries, Submissions, industry websites, news releases and a range of other sources.

I, Paul Saunders, left school and commenced study with the Institute of Chartered Accountants in Australia, and became involved in the Computer Software industry, in Managing Director, Sales Manager, CEO roles specialising in Project Management, Engineering Change Control, Records Management and Maintenance Management.

This document was started in the form of a letter to NSW politicians for the purpose of alerting them to issues from around the world relating to CSG.

I will leave the judgement of the industry, and the judgement of politicians in this article to you. If this document assists you in your efforts in your state or country to ensure your politicians create a safe and properly regulated industry, I will be pleased. Any feedback would be appreciated.

The main problems relate to possible contamination of aquifers, leakage of gas into the atmosphere, the lack of an effective plan for using the waste salt. The interests of politicians are purely economic, not environmental.

See acknowledgement of copyrights and ownership at the end of the document. The article should be used in conjunction with www.pimconnect.net which has the direct links to the websites referred to in the article.

With the interests of the planet at the heart of the document, and the need to create an environment where we are not trying to fix the unfixable, I have created this document.

Paul Saunders

An Unfolding Disaster - CSG in NSW, Australia
Coal Seam Gas, as it is known in Australia, Coal Bed Methane as it is known in the USA and other parts of the world, has become an industry around the world having commenced seriously approximately, 20 years ago.

The industry is risky in terms of aquifers and air pollution. This unfolding disaster applies in many other locations around the world, including NSW, Australia. The problem usually occurs in areas not heavily populated, affecting people without a loud voice, e.g rural, pastoral, small communities.

The UK Government's Chief Scientific Adviser, Sir John Beddington FRS, asked the Royal Society and the Royal Academy of Engineering to review the scientific and engineering evidence and consider whether the risks associated with hydraulic fracturing (often termed 'fracking') as a means to extract shale gas could be managed effectively in the UK.

The key findings of this review were:

- ***The health, safety and environmental risks can be managed effectively in the UK**. Operational best practices must be implemented and enforced through strong regulation.*
- ***Fracture propagation is an unlikely cause of contamination.** The risk of fractures propagating to reach overlying aquifers is very low provided that shale gas extraction takes place at depths of many hundreds of metres or several kilometres. Even if fractures reached overlying aquifers, the necessary pressure conditions for contaminants to flow are very unlikely to be met given the UK's shale gas hydrogeological environments.*
- ***Well integrity is the highest priority**. More likely causes of possible contamination include faulty wells. The UK's unique well examination scheme was set up so that independent, specialist experts could review the design of every offshore well. This scheme must be made fit for purpose for onshore activities.*
- ***Robust monitoring is vital**. Monitoring should be carried out before, during and after shale gas operations to detect methane and other contaminants in groundwater and potential leakages of methane and other gases into the atmosphere.*
- ***An Environmental Risk Assessment (ERA) should be mandatory**. Every shale gas operation should assess risks across the entire lifecycle of operations, from water use through to the disposal of wastes and the abandonment of wells.*
- ***Seismic risks are low.** Seismicity should be included in the ERA. Seismicity induced by hydraulic fracturing is likely to be of smaller magnitude than the UK's largest natural seismic events and those induced by coal mining.*
- ***Water requirements can be managed sustainably**. Water use is already regulated by the Environment Agency. Integrated operational practices, such as recycling and reusing wastewaters where possible, would help to minimise water requirements further. Options for disposing of wastes should be planned from the outset. Should any onshore disposal wells be necessary in the UK, their construction, regulation and siting would need further consideration.*
- ***Regulation must be fit for purpose**. Attention must be paid to the way in which risks scale up should a future shale gas industry develop nationwide. Regulatory co-ordination and capacity*

must be maintained.

- ***Policymaking would benefit from further research**. The carbon footprint of shale gas extraction needs further research. Further benefit would also be derived from research into the public acceptability of shale gas extraction and use in the context of the UK's energy, climate and economic policies.*

1http://royalsociety.org/policy/projects/shale-gas-extraction/report/

Fracking can be undertaken safely if best practice and effective regulation are enforced

Hydraulic fracturing (often termed "fracking") can be managed effectively in the UK as long as operational best practices are implemented and robustly enforced through regulation. That is the conclusion of a review by the Royal Society and the Royal Academy of Engineering released today (Friday 29th June).

Professor Robert Mair FREng FRS, Chair of the review's working group said: "There has been much speculation around the safety of shale gas extraction following examples of poor practice in the US. We found that well integrity is of key importance but the most common areas of concern, such as the causation of earthquakes with any significant impact or fractures reaching and contaminating drinking water, were very low risk.

This is not to say hydraulic fracturing is completely risk-free. Strong regulation and robust monitoring systems must be put in place and best practice strictly enforced if the Government is to give the go-ahead to further exploration. Professor Mair added:
"As we made clear at the start, this review is not an exhaustive analysis of all the issues associated with shale gas and we have highlighted a number of issues that we believe merit further consideration, including the climate risks associated with the extraction and subsequent use of shale gas and the public acceptability of hydraulic fracturing."

2http://royalsociety.org/policy/projects/shale-gas-extraction/report/

The Report highlights the fact that fracking is not risk-free. Seismic activity and contaminated aquifers are a risk.

Citizen complaints

Very little action occurs when citizens in CSG areas complain about gas coming from their tap water, or their dams or properties. The first thing CSG companies do after a report of a leak or problem is test the leak, and say the problem is unlikely to be caused by CSG drilling.

One way to prove the source of the leak is to have a central reporting facility for all **gas leaks** (a database) in cities, towns and other areas, to be registered in the database and any follow up action to be undertaken to be reported by the gas companies.

The UK report describes the need for a baseline to be established relating to the water aquifers at each well site. Molecular analysis can determine the source of any leak as being drilling related, or the natural occurrence of gas.

The database should include the result of any action taken, with advice from the people reporting the incident as to whether or not they are satisfied with the outcome, including the fact that the Gas Company providing fresh water, tanks, and any payouts offered by the gas companies. Over time we can see the likelihood of the areas where gas leaks occur and are reported, as being within a CSG exploration area, primarily, or not.

In a country (Australia) short on water we are playing with water tables? It doesn't make sense.

Australia is a vast country with limited water storage. With water shortages as a result of droughts which can extend for many years at a time, our Governments are playing with subterranean aquifers, allowing Gas Companies to risk available clean water. The Botany Basin once provided Sydneys' Water supply. Today this aquifer has been contaminated by industry.

The current state of the CSG industry in NSW with regard to regulations, and more importantly the oversight by the regulators themselves is grossly inadequate. We permit their failure to adequately police many businesses fully, let alone police an industry playing with the aquifers. This does not only apply to the NSW Government. It applies around the world. It particularly applies in the U.S where aquifers are pumped dry affecting farming communities.

Communities, as a whole, have very little reason to believe politicians have control or a proper understanding of the Coal Seam Gas Industry.

A quote from a response to a letter from me, sent to all NSW politicians, and including Scot MacDonald a NSW MLC, "*There Is no evidence to make a claim that we are endangering our water resources. I arrived at this conclusion after reading a considerable amount of evidence in the CSG Inquiry that I was a member of* .

This same politician, by his admission stated he was unaware of *"I am not aware of any evidence to substantiate your claim that CSG is unsafe." "I have insufficient knowledge of the Gas industry overseas to make additional commentary."*. This is a politician who was a member of the Inquiry investigating coal seam gas and admits he doesn't know what is happening around the world with Coal Seam Gas. Didn't he enquire at all.

The NSW Government Knows Better Than Industry Scientists and Experts

- *THE NSW government should cease issuing production licences for coal seam gas production until a "comprehensive framework" for regulating the industry is developed, a parliamentary inquiry is set to recommend.*

  The inquiry's report, due to be released today, is also understood to recommend a moratorium on the controversial extraction method of fracking be continued until the national regulator finishes testing the chemicals involved.

3http://www.smh.com.au/environment/inquiry-calls-for-freeze-on-coal-seam-gas-production-20120430-1xv5x.html#ixzz2LPymB4t4

- *This Inquiry received nearly 1,000 submissions and took evidence from approximately 130 witnesses. The practices of coal seam gas companies are variable at best, and on the whole have been less than acceptable. This was the case not only with regard to negotiating land access, but also with regard to community consultation.*

4http://www.parliament.nsw.gov.au/Prod/parlment/committee.nsf/0/318a94f2301a0b2fca2579f1001419e5/$FILE/Report%2035%20-%20Coal%20seam%20gas.pdf

- *On 8 November 2012, the New South Wales Government dismissed key recommendations made by the Parliamentary Inquiry into Coal Seam Gas, saying its policies are "more effective"*

5http://stop-csg-illawarra.org/2012/nsw-govt-ignores-csg-inquiry/

The Governments Answer to the Inquiry

- *a comprehensive suite of reforms to better regulate exploration activities, including mandatory community consultation.*

- *The creation of a Land and Water Commissioner to provide guidance to landowners in relation to land access arrangements and oversight exploration licence processes,*

- *Strategic Regional Land Use Plans for the Upper Hunter and New England North West, mapping over 2 million hectares of Strategic Agricultural Land which will be subject to a heightened assessment of agricultural and water impacts if affected by project proposals.*

- *A state-wide Aquifer Interference Policy to ensure the assessment of impacts on aquifers against objective and rigorous technical criteria,*
- *the requirement for an Agricultural Impact Statement at both the exploration and development application stages, and*

- *two new Codes of Practice for the CSG industry in relation to well integrity and hydraulic fracturing.*

6http://www.parliament.nsw.gov.au/prod/parlment/committee.nsf/0/318a94f2301a0b2fca2579f1001419e5/$FILE/121108%20CSG%20Govt%20response.pdf

Comment about the Government Response

- Mandatory community consulting does not mean that you respond to community issues by standing over people, as the government has now done with the Inquiry.

- Does the Land and Water Commissioner point out to landholders how they can avoid CSG drilling on their property, or only telling them how to respond to the CSG companies insisting on drilling on their land. The CSG Companies can already drill horizontally several kms under their property and still reclaim the methane gas. Are the landowners advised that fractures in the land (gas leaks, and gas in their water) which may or may not be caused by fracturing under their properties may have been caused by fracturing or are they told that it is not possible for gas leaks to occur as a result of CSG drilling under their property?

- What constitutes *heightened assessment of agricultural and water impacts?*

- Who establishes *the objective and rigorous technical criteria?*

- Why weren't the *Codes of Practice* established before the CSG Industry began?

Politicians have inadequate knowledge about Coal Seam Gas and its potential to damage the environment, the atmosphere, the air we breathe and the water we drink. I think the community have very little faith or reason to believe that Government agencies, Federal and State, can police the CSG industry, properly. The industry is too new and the regulators don't have enough knowledge about the science. I find it difficult to believe Government members know more about CSG than eminent persons & scientists in their Report from the Inquiry to the Parliament. The Inquiry into CSG was established by the Government in the first place.

We seem to spend large sums of money on Inquiries which in effect are dismissed. The cost of fixing the things broken under regulation supervision is mammoth. Let's hope this doesn't apply to our

aquifers and the air we breathe.

There are a few examples mentioned here about Government regulation/s, and inspection/s and decisions made, that are not working or didn't work. They are not all about the environment.

Australia's New South Wales state bans coal seam gas extraction near residential areas

- *The Australian state of New South Wales plans to introduce a 2 km (1.2 mile) exclusion zone for coal seam gas developments around residential areas, in a move which has drawn criticism from the local exploration and production industry.*

  "The NSW government has listened to community concerns about CSG -- these new measures build on what are already the toughest controls in the country," state Premier Barry O'Farrell said in a statement Tuesday. "We have declared country towns and suburbs across NSW 'no-go zones' for CSG activities in NSW, and established the Environment Protection Authority as the cop on the beat to enforce environmental and health regulations."

7http://www.platts.com/RSSFeedDetailedNews/RSSFeed/NaturalGas/8159965

- What happens with expanding towns and vineyards, like Campbelltown, Menai and Melbourne airport. At Campbelltown and its surrounds have now expanded to Liverpool and Camden. The Nuclear reactor at Menai, which was once a long way from towns and residential accommodation, has a large population nearby. Melbourne Airport in Victoria was built a long way from any significant population, now has thousands of homes nearby. The question must be raised, if towns expand to within the 2km exclusion zones, are wells shut down?

- If Coal Seam Gas is not a problem, why create the 2km buffer zone? What about the people outside the buffer zone. They are entitled to the same gas free zone as those inside the zone. Sounds like a way for Government to reduce the number of people attending CSG protests.

Good News for seekers of a CSG moratorium in the NSW Northern Rivers region

- *A COAL seam gas (CSG) company is suspending its Northern Rivers* (NSW) *operations, blaming uncertainty created by the NSW government's regulation of CSG activity. It has recently faced heated opposition from anti-CSG activists and other community groups.*

  But Metgasco managing director Peter Henderson blamed policies announced previously by the NSW government for uncertainty and delays.

  On February 19, the state government announced a two-kilometre "buffer zone" around residential areas to prevent new CSG activity, as well as exclusion zones around horse breeders and wine producers.

8http://www.news.com.au/breaking-news/national/coal-seam-company-shuts-northern-nsw-wells/story-e6frfku9-1226596416614#ixzz2NULBDyYZ

- There was no reference to any problems relating to CSG and the environment. This was not a Government initiative, nor is a state-wide moratorium. It is a Gas Company suspending operations which can be re-commenced at any time.

Failure of Regulators In The Past
ICI - Chemical Company (now Orica)

- **What is the Botany Sand Beds aquifer?**
  The Botany Sand Beds aquifer is a large volume of underground water present in the sandy ground surrounding Botany Bay. The aquifer is highly vulnerable to contamination due to the permeability of the sands and the generally shallow water table. Any contamination from land use activity that escapes or is spilled onto the ground is likely to accumulate in the earth and leach into the groundwater.

9http://www.water.nsw.gov.au/Water-management/Water-quality/Groundwater/Botany-Sand-Beds-aquifer/Botany-Sands-Aquifer/default.aspx

- **Botany Groundwater Cleanup Project**
  The groundwater beneath Botany Industrial Park (BIP) and nearby areas has been contaminated with chemical compounds commonly known as chlorinated hydrocarbons (CHCs). This contamination is the result of manufacturing activities including those previously undertaken by Orica's predecessor, ICI Australia. These activities no longer occur.

10http://www.oricabotanytransformation.com/index.asp?page=2&project=27

- **EPA notice**
  In August 2003, NSW EPA issued a Notice of Clean Up Action (NCUA), which required Orica to develop a groundwater cleanup plan for a site where Orica and its predecessor (ICI Australia) had manufactured chlorinated hydrocarbons (CHCs) from 1945 to 2000.

  Depth of the aquifer is in the range 20m to 40m. Depth to groundwater is low within the contaminated plumes, ranging from 1m to approximately 10m below ground surface, and generally around 4m to 6m below ground surface

11http://www.qedenv.com/files/water_engineering_apr08.pdf

- **Why is it necessary for the EPA to issue such a notice? – such a good corporate citizen?**
  How did ICI pollute the Botany basin, if the core legislation and policing/monitoring were adequate. It is now a major environmental disaster that won't be fixed in yours or my lifetime.

  The catchment extends from Prospect Reservoir in the north-west, and intersects with approx 25 local government areas including Fairfield, Liverpool, Campbelltown, Bankstown, Canterbury, Marrickville and Sutherland.

- *A range of industries operated in the Botany area such as tanneries, metal platers, service stations and depots, landfills, dry cleaners and wool scourers. As a result, chemicals such as chlorinated hydrocarbons and other solvents, petroleum hydrocarbons (such as petrol and diesel), and some heavy metals such as chromium, nickel, lead and arsenic, may have contaminated the aquifer.*

12http://www.water.nsw.gov.au/Water-management/Water-quality/Groundwater/Botany-Sand-Beds-aquifer/Botany-Sands-Aquifer/default.aspx#how

13http://www.environment.gov.au/water/policy-programs/nwqms/wqip/nsw/botany-bay.html

Botany Sands Aquifer

- *Industry has been polluting the Botany Sands Aquifer of Sydney, Australia, for a century. More recent contamination with chlorinated hydrocarbons (**CHC**) led to action by the government of New South Wales, and the **Orica** corporation since about 2006. A new discovery made in 2011 may help significantly. Traveling under 150 metres per year, it may take a century for all the currently contaminated water to escape or be treated.*

  The New South Wales government has issued guidance regarding domestic water use in the affected region. The basic message is, "Do not use the water for anything".

14http://suite101.com/article/the-slowly-evolving-botany-sands-aquifer-ecological-disaster-a382776

Ministers Safe Hands

"The Minister for Planning and Environment, Mr Landa, denied yesterday that ICI's proposed Botany petro-chemical plant would add significantly to air pollution"
- what about the polluting of the Botany Basin aquifers.

"A NSW State pollution control commission report showed that the proposed extensions would add 6 parts per hundred million of ozone to the air. ... ozone is a gas harmful to the respiratory system. The World Health Organisation had set a desirable limit of city air at 6 parts per hundred million while Sydney was recording ozone levels of 20 parts per hundred million."
(Herald mar 6 1979)

Government Regulation Can't Even Look After Our Swimming Areas – are people kept from the water?

Faecal coliform and enterococci compliances varied at sites in Botany Bay during summer 2007-2008

Five of the nine swimming sites complied at least 87% of the time with both faecal coliform and enterococci guidelines.

15http://www.environment.nsw.gov.au/beach/ar0708/botanybay.htm
People are still able to swim in these polluted pool areas**.**

Proof Of The Pudding about government oversight – The Condomine River - Queensland
Condamine River - (extract from the Condamine River Gas Seep Investigation (2012))

- ***Role of Government***
  Complex issues such as the gas seeps in the Condamine River *often require a multi-agency response by government. To this end, the LNGEU is coordinating government's two-phase investigation, which principally involves both DNRM and DEHP.*

  The two-phase investigation comprises an immediate ***focus on ensuring public safety, assessing environmental harm and the extent of gas seeps;*** *and a long-term investigation involving a technical program that will allow government experts to verify the information it receives from Origin.*

  Concurrently, ***Origin*** *has adopted a three-phase long-term investigative approach that comprises:*
  - *Phase 1 - issue background, safety and extent of gas seep*
  - *Phase 2 - technical studies to enhance understanding of the gas seeps*
  - *Phase 3 - ongoing monitoring program and additional investigation.*

16http://www.industry.qld.gov.au/lng/documents/condamine-river-seep-invest-report-full_.pdf

- **After the Event Activity**
  The Condamine report refers to a period after the gas seeps have occurred. What about protecting citizens in the planning stages before the the leaks occur. This report has also admitted that seeps have occurred.

  Why is it necessary for the Governments' two phase investigation mentioned in the Report? Government should be protecting us up front and monitoring as well, not investigating after the event. The government failed to protect the community before the event.

  The government either failed to put the correct protections in place when allocating the licences, or the gas companies have failed to comply. Either way there are gas leaks in CSG areas. Of course it may not be as a result of CSG activity. If the leaks are a result of CSG activity, then Gas Companies should be held accountable and prosecuted for clean air and water violations, and severely fined. In the Condamine case Origin obviously feel implicated by adopting a three-phase investigative approach.

- **Queensland reveals Condamine water quality report**.
  there is no safety risk in the immediate area from the gas seeps
  no evidence of environmental harm.
  more vigorous than previously observed
  However, these results do not provide definitive evidence of the source or cause of the Condamine River gas seeps.

  The Queensland Government has confirmed the toxicity of coal seam gas water to aquatic organisms is assessed against environmental standards after it is released into rivers and not prior to discharge.

This approach appears to stand at odds with the approach taken by the Queensland co-ordinator-general in his approach to contaminant guidelines when he approved the Australia Pacific Liquid Natural Gas (APLNG) project.

In June 2010, the Queensland Government granted an environmental approval allowing APLNG to discharge the equivalent of eight Olympic swimming pools of treated coal seam gas water per day into the Condamine River south of Chinchilla.

- **Methology on Condamine – way after commencement of Coal Seam Gas drilling**.
  On the commencement of government's Phase 1 investigation, the main focus of government was to ensure public safety and assess for environmental harm. Environmental Officers from the DEHP undertook assessment for environmental harm, while officers from the DNRM focussed on gas safety.

- **What chemicals are in the water being released?**
  The table shows 13 chemicals that Origin Energy/ConocoPhillips have been approved to release into the Condamine River, and the maximum detected concentration in the treated CSG water being released.

Contaminants	Maximum detected concentration in water discharged into the Condamine River (ug/L)	Toxic to aquatic organisms when Undiluted
Aluminium	20	Yes
Barium	3.2	
Boron	1200.0	Yes
Bromine	48	Yes
Cadmium	0.6	Yes
Chloroform (Trichloromethane)	6.8	
Chromium (as (Cr(VI))	1	Yes
Copper	1	Yes
Iodine	25	Yes
Lead	0.2	Yes
N-Nitrosodimethylamine (NDMA)	0.008	Yes
Nickel	0.8	Yes
Zinc	4	Yes

They include boron, silver, chlorine, copper, cadmium cyanide and zinc. At the concentrations present in the water being released, many of the chemicals would be toxic to aquatic organisms.

However, environmental water quality standards apply to water in the overall environment after the release, rather than specifically to the water that is being released.

17**http://www.abc.net.au/news/specials/coal-seam-gas-by-the-numbers/waste/**

Events, Here and Overseas, to Remember where industrial enterprises were able to continue without proper government oversight :

- **Union Carbide - Bhopal, India** - started with poor maintenance as a result of a reduced maintenance budget and some maintenance was long overdue – acknowledged by Union Carbide – no cleanup has been conducted – the area today is a wasteland, although people live nearby. 500,000 people were affected, thousands died,

- **BP – Gulf of Mexico** had no effective emergency plan, although they had been exempted by the U.S EPA. How can a company with a poor safety record and a poor environmental record be exempted from providing an emergency. plan. Business sense dictates that in such an industry an emergency plan would have been developed for their own safe operation, and for insurance purposes.

- **Union Carbide** developed a town called **Uravan**. *Ore from mines of the surrounding area, rich in uranium and vanadium deposits went to the processing plant at Uravan. The mildly radioactive tailings (byproducts of the extraction) were deposited in huge piles above the canyon next to the plant. For the last 15 years, $70 million has been spent in a reclamation project. Tailings above the mill have been stabilized and covered and process wastes from the evaporative ponds have been removed. A groundwater cleanup program is also underway.*

  This became an EPA Superfund project (In the U.S Superfund is the federal government's program to clean up the nation's uncontrolled hazardous waste sites) . *Since Uravan waste is left in place, five-year reviews will be required to ensure that the remedy remains protective of human health and the environment.*

18**http://www.uravan.com/**

- *The former* **Carlton & United Brewery site** *(5.8-hectare) on the western edge of the Sydney CBD. The redevelopment concept plan was approved in February 2007 to provide office space, apartments and a 5,400 square metre community park. Certain parts of the site were affected by petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAHs). Remediation work is required for the redevelopment (NSW DoP, 2008b)*

19**http://www.prres.net/papers/Chan_Revisiting_The_Valuation_Of_Contaminated_Land.pdf**

- **Union Carbide Australia Rhodes (soil polluted)**,
  Union Carbide now a subsidiary of Dow Chemical Company which made Agent Orange, used as a defoliant during the Vietnam War at its Rhodes plant, and Allied Feeds, a grain and stock feeds company which sat on a site which had been substantially reclaimed from the Parramatta River by Union Carbide who used the reclamation area as a dumping ground for its contaminated industrial waste, contaminating land and sediments with dioxin. The remediation of the former Union Carbide site, the former Allied Feeds site and a strip of heavily dioxin contaminated sediments in Homebush Bay have been the subject of extensive analysis, investigations and community activism,

20**http://www.suburbguide.com.au/post/rhodes?l=sydney-inner-west**

- **Contamination of Cockle Creek – Pasminco** lead smelter
  The EPA (as it was then known, now the Office of Environment and Heritage (OEH)) issued a Remediation Order to PCCS on 1 July 2003. The Remediation Order declared the site, in part, as a 'remediation site' and in doing so determined the site represented a Significant Risk of Harm ('SRoH'), as defined in the Contaminated Land Management Act 1997.

  The two main areas of concern for the OEH consist of the migration of air borne dust containing lead and the migration of lead, zinc, cadmium and manganese from the site via the surface water and groundwater.

21**http://www.pasminco.com.au/index.php/pasminco-cockle-creek/history**

- **Botany Ground Water Plume** - *Orica Petrochemicals (formerly ICI) Bruce Gotting, Orica's environment manager for the site said the plume was moving about 120 metres a year, but*

conservation groups insist its leading edge - which is contained in an aquifer that once supplied Sydney with drinking water - has already entered Penrhyn estuary, in the north-east corner of the bay.

22**http://www.smh.com.au/news/National/Toxic-plumes-spread-to-citys-edge/2005/03/30/1111862468318.html**

- **The M5 East Tunnel M5 – RTA**
  The process of community consultation around the M5 East tunnel project has been acknowledged as "disastrous" by two Parliamentary Inquiries and an International Workshop on tunnel ventilation. It has certainly provided valuable lessons for government authorities, project proponents and community groups, and, as a result of political and community pressure have there been some welcome changes in consultation practices for more recent tunnel projects such as the Cross City and Lane Cove projects.

23**http://www.iap2.org.au/sitebuilder/resources/knowledge/files/500/paper07.pdf**

Regulation Review Committee - Parliament of New South Wales
Report on the Protection of the Environment Operations (Clean Air) Regulation 2002

This Regulation makes provision with respect to the following:
(a) domestic solid fuel heaters,
(b) the control of burning,
(c) emissions from motor vehicles and motor vehicle fuels,
(d) emissions from activities and plant,
(e) the control of volatile organic liquids,
(f) limits on the sulphur content of liquid fuel,
(g) the offences under this Regulation that may be dealt with by way of a penalty notice,
(h) savings and formal matters.

24**http://www.legislation.nsw.gov.au/sessionalview/sessional/subordleg/2010-428.pdf**

There is no reference to Coal Seam Gas leaks. There's a reference to everything else positive to industry, but no Coal Seam Gas relating to leaking methane gas.

Coal Seam Gas (CSG)/ Coal Bed Methane (CBM) around the world
Canada

Currently, British Columbia requires approximately 640 acres for each conventional natural gas well. This equals a subsurface drainage area roughly the size of 50 football fields for each well. However, U.S. experience indicates that CBM wells may need to be closer together than conventional gas wells.

- **Quebec - suspended**
  The practice has been temporarily suspended, in Quebec, pending an environmental review.

  The rejection of CBM development was broadly based. And soundly based on its record in North America. In 2003, the Union of BC Municipalities called for the provincial government to freeze all CBM activity and resolve the issues with consultation, cumulative impacts and produced water. The government ignored the resolution. And hired more people to "consult" with communities.

25**http://www.watershedsentinel.ca/content/bad-gas-coalbed-methane-bc**

- **Sacred Headwaters, B.C Canada**
  Regional Opposition
  The proposed development resulted in unanimous opposition in the area: nine First Nations governments, five municipal governments, and two regional districts representing communities in and downstream of the proposed project.

  All MLA's and the MP in the region are on record numerous times in opposition of coal bed methane development in the Sacred Headwaters.

  The proposed development resulted in dozens of rallies, public meetings, blockades and court cases all in opposition to the development of CBM in the headwaters of the Skeena, Nass and Stikine Rivers.

- **Moratorium First**
  In 2004, Shell Canada (now Royal Dutch Shell) was awarded a 400,000 hectare tenure to develop coal bed methane (CBM) in the Sacred Headwaters in northwest British Columbia.

  Due to massive opposition throughout the region and within the Province of BC, the BC Government made a great decision and imposed a 4 year moratorium stalling the development in its tracks. That moratorium expires this December!!

26http://skeenawatershed.com/projects/detail/sacred_headwaters_campaign/

- **and Shell Quits Sacred Waters**
  ....to celebrate the British Columbia government's announcement this past December that Shell would be withdrawing its plans to develop coal bed methane, a natural gas, in the Sacred Headwaters region of northwest British Columbia.

27http://forestethics.org/news/shell-withdraw-development-plans-british-columbia%E2%80%99s-sacred-headwaters-local-communities-and

USA

- **Wells in the USA**
  According to EPA's screener survey, a total of about 56,000 CBM wells, organized into approximately 750 projects, produced gas and/or water in 2008. Of these projects, a minority (approximately 180 projects) discharged some produced water

28http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/upload/cbm_report_2011.pdf

- *By the year 2004, however, CBM accounted for more than 8% of natural gas production in the U.S.*

29http://www.energyjustice.net/naturalgas/cbm - at what cost to U.S citizens and society.

Typical spacing for U.S. CBM wells is one per 320, 160, or 80 acres. Closer spacing allows the wells to work together to reduce the area pressure, ensures optimum production and increases ultimate gas recovery.

The compressors must undergo frequent testing to ensure they meet strict air-quality standards. In many cases, electrical compressors may be used, further reducing emissions.

30http://www.em.gov.bc.ca/Mining/Geoscience/Coal/CoalBC/CBM/Pages/CBMBrochure.aspx

- **Water Disposal**
  A new CBM well can produce large volumes of water during its early stage of production. The volume decreases over time. Water disposal is an issue as it is often very saline and cannot be dumped into surface water supplies or be used for irrigation. Often the water is re-injected into subsurface rock formations, but this has led to concerns about contamination of the water table.

  In hot countries such as Australia, the water is put into evaporation ponds. In cold countries, the water is allowed to freeze and the salts are collected allowing surface disposal of the clean water.

- **Land Access**
  CBM projects cover large areas of land. In some cases this land is already used for other uses e.g. agriculture. CBM producers need access to drill hundreds of wells and this can cause conflict with land owners. There have been several cases of land owners seeking injunctions to prevent access resulting in projects being delayed or even cancelled. ***Horizontal drilling can be used to mitigate against land access issues.***

31http://www.fortune-oil.com/upload/Fox-Davies%20Capital%20CBM%20Sector%20Overview.pdf

- **Wyoming Water Discharge**
  Wyoming is one of a few states that allow the discharge of produced water from oil fields into surface waters for beneficial use by livestock and wildlife. Oil field discharges of produced water create wetlands that provide habitat for aquatic migratory birds and other wildlife.

  Wetlands surveyed in Wyoming from 1996 to 1999 showed that inefficient oil-water separation contributed to the discharge of oil into some wetlands receiving produced water. Over 62% of the sites surveyed had inadequate measures to exclude wildlife, particularly migratory birds, from entering skim pits used to separate oil from produced water. The risk of oil discharges into wetlands can be reduced significantly by proper maintenance of equipment used to separate oil from produced water; immediate removal of oil from production skim pits or tanks to prevent overflow into the receiving wetlands; installation of secondary or tertiary containment ponds or tanks to capture any oil accidentally discharged from the primary or secondary pits or tanks; or construction of wetland-based treatment systems for removing metals, radionuclides, and hydrocarbons from the produced water prior to discharge into natural wetlands. Wildlife mortality in skim pits can be prevented using closed containment systems, eliminating pits or keeping oil off open pits or ponds, or using effective and proven wildlife exclusionary devices.

32http://eg.geoscienceworld.org/content/12/2/65.abstract

- **California - And It Can't Happen To Us?**
  Yet another spill occurred on January 5, 2008, this one at the Zaca-Davis tank battery in the Zaca Oil Field, along Zaca Station Road. Approximately 8,400 US gallons (32 m^3) of oil and produced water overflowed the containment area – escaping the large secondary containment through an open 12-inch (300 mm) drainage pipe – and contaminated about one mile (1.6 km) of Zaca Creek.

  It was not long before Greka came to the attention of regulators in Santa Barbara County, where the majority of its operations are concentrated. Between 1999 and 2008, the Santa Barbara County Fire Department responded to over 400 waste leaks and spills at Greka.

Fines, legal action, and EPA investigations have all resulted from the numerous releases at Greka facilities

33**http://en.wikipedia.org/wiki/Greka_Energy**

California - Inadequate Draft Regulations Prompt Call for Fracking Moratorium
(San Francisco, CA) Calling DOGGR's 'discussion draft' regulations, released Tuesday, woefully inadequate, Clean Water Action announced today that it has called upon the agency to issue a moratorium on any new hydraulic fracturing operations pending revision and adoption of protective regulations, and an independent investigation into the potential impacts of fracking in California.

34**http://www.cleanwateraction.org/press/inadequate-draft-regulations-prompt-call-fracking-moratorium**

- **Vermont - banned**
  In May 2012, The state of Vermont outlawed hydraulic fracturing - the first U.S. state to ban the practice

- **Several U.S States Calling For Moratorium**
  New York Moratorium
  New York says no to fracking for now. The state will wait to review the practice before making a decision next spring.

  The New York State Assembly is saying no for now on allowing hydraulic fracking within the state's boundaries.

  Not One Well Until the Science and Facts on the Health Impacts of Fracking are Known

35**http://chej.org/2013/02/governor-cuomo-delays-fracking-decision/**

- **Ohio and Facts About Fracking (scientific)**
  Fears that fracking companies are operating in a Wild West environment with <u>little regulation</u> have prompted political action. In June, the group Don't Frack Ohio led thousands of protesters on a march to the statehouse, where they declared their commitment to halting hydraulic fracturing in the state. Legislation banning the process has been considered but is now on hold in California. New York — which sits atop a giant natural gas reserve — has a statewide fracking moratorium; pending policies would allow the process only where local officials support it.

36**http://www.sciencenews.org/view/feature/id/343202/description/The_Facts_Behind_the_Frack**

Ohio Moratorium - Ohio Senate Bill 213-Fracking moratorium
Establishes a moratorium on horizontal stimulation of oil and gas wells until the United States Environmental Protection Agency publishes a report containing the results of a study of the relationship of hydraulic fracturing to drinking water resources and the Chief of the Division of Oil and Gas Resources Management issues a report analyzing how Ohio's rules address issues raised in the USEPA report.

37**http://chej.org/nofracking/ohio/**

- **West Virginia, Michigan, Pennsylvania – all calling for moratorium**

Libya Overflow Pits -no alternative solution

- *Since the 1960's, produced water generated through the separation of crude oil within the producing fields, has been discharged into a series of **unlined**, disposal pits. BMT Cordah was contracted to determine the environmental risk posed by historical disposal activity and to design remediation measures, as appropriate.*

  The historical use of unlined pits for the disposal of produced water and as temporary storage for crude, has the potential to result in soil and groundwater contamination in the form of Heavy Metals, Hydrocarbons, Naturally Occurring Radioactive Material (NORM) and residues from process chemicals.

  One optimum solution considered included a 'boxing-in' approach where material is enclosed within an above ground structure to ensure that contaminated sand could not in the future, be mobilised through wind erosion, into the atmosphere.

38http://www.bmtcordah.com/?/1430/959/1820

- *RNAS was founded in 1998 as a bio-remediation consulting company. Our experience led us to practical solutions for successful enhanced bio-remediation. To avoid potential conflicts of interest with our consultant clients, RNAS now focuses exclusively on providing high quality bio-remediation products*

  An insoluble colloidal buffer, is also now available to address low pH at bio-remediation sites or sites where pH is the primary contaminant. -

39http://www.environmental-expert.com/companies/remediation-and-natural-attenuation-services-inc-22931#sthash.IkqPbbRp.dpuf

- What creates the need for bio-remediation – a primary contaminant. If Coal Seam Gas is not a problem, why the need for bio-remediation, and an industry supporting it?

South Africa

A temporary moratorium on hydraulic fracturing for shale gas in South Africa's Karoo region was imposed despite the interest of several energy companies

The following four aquifers are in or adjacent to the Cape Town municipal area:

- *Cape Flats Aquifer*
- *Atlantis Aquifer*
- *Langebaan Aquifer*
- *Table Mountain Group (TMG) Aquifer*

The physical nature of each aquifer varies widely, therefore the risk posed by contamination (pollution), any sea-level rise (which will include saline intrusion) and climate change may vary for each aquifer. The Cape Flats and Atlantis aquifers are the most critical because they are located within the City's metropolitan area – the other two aquifers are adjacent to the City and also need to be protected as far as possible

40http://www.capetown.gov.za/en/DRM/Pages/SalineIntrusionofAquifers.aspx

Ukraine

The Ukrainian government has announced that it will proceed with an international tender for rights to explore for unconventional gas in two vast concession areas containing conventional

gas, shale gas as well as coal bed methane, crude oil and condensate

41**http://www.naturalgaseurope.com/ukraine-to-tender-shale-gas-fields-5085**

Bulgaria - banned

After a nationwide protest in January 2012, the government decided to ban the hydraulic fracturing technology

No Fracking movements in Canada, U.K, Denmark

The practice has been temporarily suspended, in Quebec, pending an environmental review. The Canadian Centre for Policy Alternatives has also expressed concern.

Protest groups have emerged since April 2012, with the major nationwide group being Frack Off (UK)

A critical view is reflected in national media, and national campaigns against shale gas have started (Denmark)

42**http://en.wikipedia.org/wiki/Hydraulic_fracturing_by_country**

New Zealand Moratorium Undecided

The Parliamentary Commissioner for the Environment (PCE) has held back from calling for a moratorium on fracking, but is worried about the way the process is regulated and monitored.

"There have been calls for a moratorium to be placed on fracking in New Zealand, but I do not think this is justified at present," commissioner Dr Jan Wright said in an interim report published today.

43**http://www.stuff.co.nz/national/politics/8003883/Worry-over-fracking-but-no-moratorium**

France

Hydraulic fracturing was banned in France in 2011 after public pressure

44**http://en.wikipedia.org/wiki/Hydraulic_fracturing_by_country**

Spain

- *Spain, a country that's yet to produce its first shale gas, probably has enough resources of the fuel to satisfy domestic demand for at least 39 years, according to the nation's Council of Mining Engineers.*

45**http://www.naturalgaseurope.com/spain-shale-gas-reserves**

- *The Government of Cantabria has approved a draft law prohibiting the use of hydraulic fracturing in the Autonomous Community located in Northern Spain. There are currently five research permits granted for the research and extraction of unconventional gas.*

46**http://www.naturalgaseurope.com/spain-cantabrian-government-looks-to-ban-fracking**

Wales

Anti-Fracking campaigners from Wales joined protesters from across Britain yesterday to deliver a letter to Downing Street calling on Prime Minister David Cameron to impose an immediate ban.

Six people representing Lancashire, Sussex, Falkirk, Belfast, the Ribble Estuary and the Vale of Glamorgan handed in the letter calling for shale gas and coal bed methane exploration and

development in the UK to cease.

47**http://www.walesonline.co.uk/showbiz-and-lifestyle/music-in-wales/2012/12/02/anti-fracking-protest-letter-taken-to-downing-street-91466-32345382/**

Ireland

The Protest group "No Fracking Ireland" has been set up by locals of counties Leitrim, Roscommon and Sligo and petitions against hydraulic fracturing are still ongoing.

Events in Galway, Leitrim, Cork and Belfast coincided with up to 100 events across the US, Europe and Australia, including a "Poetry Against Fracking" event in Vitoria, Spain, and protests at the British Liberal Democrat party conference in Brighton.

48**http://en.wikipedia.org/wiki/Hydraulic_fracturing_by_country**

India

India's coal bed methane output is poised to increase to more than 99.9 million cubic feet per day by next year, from the current level of 15 MMcfd — marking the nation's entry to the global list of prominent CBM producers.

49**http://www.upstreamonline.com/hardcopy/article1317064.ece**

In India, which is in the process of promulgating a new shale gas regulatory framework, community activism has long been a major operational risk concern for business

50**http://www.controlrisks.com/Oversized%20assets/shale_gas_whitepaper.pdf**

How is it that so many countries and States have a moratorium on CSG, are in the process of initiating a moratorium on CSG, or have a total ban on CSG? What do NSW (and Australian) politicians know that all these countries and States don't know? Or maybe what do all these countries know about banning or initiating a moratorium that our Governments don't know?

Governments Are Slow To Act, and Business Doesn't Want to See.

- Governments are slow or fail to act when a problem is first raised. Big business appear to be exempt from the laws about pollution that apply to everyone else until the problem becomes big. Big Business is allowed to push forward, and initially deny the problem exists. Whilst businesses are required by environmental laws to comply with the environmental laws in force, nothing actually occurs about any breach until it is reported or results in a more significant event. This may lead to investigating the event. If the violation is subsequently proven, the businesses are prepared to face the consequences, which may include a nominal penalty and/or a Cleanup Order. Again, after the damage is done.

Submission to NSW Legislative Council Inquiry Into Health Impacts Of Air Pollution In The Sydney Basin by School of Safety Science, University of NSW - Associate Professor Chris Winder Associate Professor in Applied Toxicology (16/08/2006)

Very Important Extract from the Submission

Further, in many of these cases, common factors emerge, that contribute significantly to the magnitude of environmental impacts, including; lack of information, misinformation, overconfidence in part of the benefits of the original proposal, narrowly focused risk assessments, poor or inappropriate design, inadequate consideration of suitable controls, inadequate consideration of systems for failure or loss, reluctance in admitting error, and overbearing arrogance. Of all the factors in identifying safety, health or environmental

problems, the ability of organisations to resist change is impressive and in some cases, odious. Indeed, there is a tried and tested hierarchy of approach by industry for dealing with new threats to its business: ***denial, misinformation, bluster, threat, and slow, grudging acquiescence only if public or political pressure is strong enough to force change****.*

51www.parliament.nsw.gov.au/Prod/parlment/committee.nsf/0/4cf8647b8d36a96bca2571cd0023c57f/$FILE/sub%2035.pdf - please search manually

An Analysis Of Coal Seam Gas Production And Natural **Resource Management In Australia**
A report prepared for **The Australian Council of Environmental Deans and Directors** – an Extract

- ***Fugitive leaks of methane in CSG production and its place in climate-change mitigation policy.***
  Methane leakage from unconventional gas installations can potentially contribute markedly to greenhouse gas concentrations in the atmosphere. It is therefore critical that policy discussions consider the role of unconventional gas in climate-change mitigation.

  We conclude that clarification of the science and engineering involved in determining how unconventional gas production sits within climate change policy is of increasing importance.

52http://www.wentworthgroup.org/uploads/An%20analysis%20of%20CSG%20production%20and%20NRM%20in%20Australia%20Oct%202012%20FULL.pdf

- *The Wentworth Group of Concerned Scientists is an independent group of Australian scientists concerned with advancing solutions to secure the long term health of Australia's land, water and biodiversity.*

Up until this stage I have not mentioned our major export partner for CSG, China.

China – planning on becoming self sufficient

- ***China is currently the fourth biggest gas consuming country in the world,*** *China is abundant with unconventional gas resources.*
- *CBM reserves, no deeper than 2,000 meters underground in five major accumulated gas belts & forty coal basins, up to 36.8 TCM, including recoverable CBM reserves 11 TCM.*
- *CBM(coalmine gas) target by 2015*
- *CBM(coalmine gas) production: 30 BCM, to built the two CBM industrial bases (Qinshui Basin, the eastern margin of Ordos Basin)*
- *subsidies to CBM development*
- *subsidies to CBM utilization in power generation*

China's Environmental Concerns in Shale Gas Development

- *Pressure on the demand for water resources.*
- *Underground water protection*
- *Water recycle and utilization*
- *Waste treatment and waste disposal*
- *Pressure on land acquisition and land lease fees*
- *Restrictions on mining in forests and hills/alteration and destruction of eco-systems*

53http://www.iea.org/media/weowebsite/workshops/goldenrules/Xiaoli_LIU.pdf

- There is no mention of China importing gas for the long term. They are looking at CSG

development with the establishment of effective environmental regulations in place before the event. They are also subsidising CBM development and subsidising CBM for power generation. The Price for methane gas will fall further.

- Japans demand has increased since Fukashima. But they will be able to obtain gas at a lower cost when China produces its' own gas, that is subsidised.

World's Top LNG exporter.

- *Patchy drilling results, rising costs and a worldwide glut of gas threaten to jeopardise what could amount to more than $60 billion of additional investment in liquefied natural gas plants,* (in Australia)

- *Australia is on course to overtake Qatar as the world's top LNG exporter by 2017, whether or not future expansion of the coal seam projects goes ahead. The east coast projects are part of a wider $170 billion LNG boom, with more plants being built in the west and north and supplied with conventional gas.*

54http://www.climatespectator.com.au/commentary/australias-csg-plans-begin-falter

- I hope we are not destroying our own country building the infrastructure for exporting gas for a few short years.. China is expecting to produce it's own CSG starting in 2015. It has developed some wells since 2011.We (in Australia) are digging up our farms, and near our towns, causing a blot on the landscape, not for self-sufficiency, but for export. We are destroying our aquifers, and polluting our air for export dollars.

- If the industry was safe with no possibility of aquifer damage; no drainage of aquifers because of the need for vast volumes of water to produce the methane gas; if there was no risk of methane escaping into the atmosphere or into peoples taps; and if there was a solution to the vast quantities of salt from produced water, then CSG production may be fine.

- If the producers had more integrity and were honest about their industry, and if we could rely on our governments overseeing the process under more strict and suitable regulations, then perhaps the industry may proceed. If the Gas companies could operate without the need for disturbing, and putting at risk, our aquifers, then proceed with CSG drilling. Until then we need a moratorium.

- This problem applies to all countries involved with CSG drilling. Aquifers are at risk, albeit a small risk. Once the risk has been realised and the aquifers are contaminated, it is too late to shut the gate. Look at the ICI information provided earlier in this document about the Botany Basin Aquifer. Many hundreds of millions of dollars are being expended just around Sydney to remedy the damage already done. The Botany Basin aquifer can't be fixed in a lifetime.

- The fact that many States and Countries overseas have initiated a moratorium, or have banned CSG or are in the process of initiating a moratorium must send warning signs to politicians and governments around the world, on environmental grounds alone.

- With China developing its own CSG industry under stronger environmental controls than our own, and China being our biggest export market for CSG, why are we developing the market for an evaporating client.

- One other fact not yet considered. How much of the $170 billion will be retained in Australia after dividends and other payments are made overseas. How much will CSG benefit the Government coffers.

- More importantly how much will it cost, and who pays, to fix any damage caused by CSG mining if things go wrong. How are the aquifers repaired if something goes wrong. Who pays for plants to desalinate water in the event of contaminated aquifers. For cities there is vast water storage in the form of dams. However, in most states of Australia these dam levels have been dangerously low at times during long term droughts.

- The dams supply water to cities and towns. What about the Australians not in cities and towns; those on farms and properties. What about the fresh water drawn from aquifers for farming; feeding livestock, watering crops and trees. With contaminated aquifers, this water will not be available for those purposes.

Enough Gas

- Australia has a viable industry providing sufficient gas for Eastern Australia already..

- Queensland is already supplying 90% (**appea)** of the gas for Queensland and is developing an export market. Queensland gas could be transferred to NSW.

- BHP made an announcement recently that means NSW does not need to destroy the State in order to provide gas for NSW.

- **BHP announcement**
  BHP Billiton Chief Executive Petroleum, J Michael Yeager, said: "The Longford Gas Conditioning Plant is a necessary extension of Bass Strait infrastructure to enable valuable hydrocarbon liquids production and domestic gas supply for years to come."

55http://www.bhpbilliton.com/home/investors/news/Pages/Articles/Longford-Gas-Conditioning-Plant-Project-Approval.aspx

- Citizens have reason to doubt politicians to act in the best interest of the electorate and the citizens. When Governments disregard the findings of an Inquiry which recommended a CSG moratorium, they are unlikely to comprehend other evidence provided to them.

- CSG is a major issue here and around the world. Our politicians have stopped listening making hasty decisions to ensure the industry proceeds unchecked.

Important Videos to See

- **Four Corners**
  Includes an interview with Stephen Robertson, Minister for Natural Resources, Mines and Energy and Minister for Trade Minister for Health (2005–2009) minister for trying to fix Queensland health payroll system.

56http://www.abc.net.au/4corners/special_eds/20110221/gas/default.htm

- **60 Minutes video** including the interview with Stephen Robertson, Minister for Natural Resources, Mines and Energy and Minister for Trade.

57http://www.youtube.com/watch?v=PELxZ3K2o0c

- **SBS - Gasland**

58**http://www.sbs.com.au/documentary/program/751**

- **Tara, Qld**

59**http://www.youtube.com/watch?v=t4gGERobicw**

The Australian Petroleum Production & Exploration Association Ltd (APPEA) website

- *CSG developments only go ahead after extensive community consultation, particularly with property owners and local councils.*
  (What about the citizens say) Government and politicians allow disasters to continue until the problem is huge, e.g ICI, Union Carbide, Superfund EPA USA, M5 Tunnel, Pasminco, Wittenoom, and the list goes on. Countries around the world probably have similar experiences.

- *A CSG well has about the same lifespan and surface footprint as an individual mid-sized (5 megawatt) wind turbine but it delivers roughly five times the energy. The energy produced over the well's expected 20-year lifetime is as much as 85,000 tonnes of coal will deliver.*
  That's okay if we were only supplying Australia alone. It's not the footprint we are worried about.

  But with the NSW Government Hell bent on permitting and encouraging Gas Companies to develop the Industry in NSW, primarily for export dollars, and without the Gas Companies being able to guarantee leak-free protection within the lease they are drilling, where aquifers are involved, there should be no CSG mining. Low risk is too much risk with regard to aquifers.

- *The distance between CSG production wells varies from project to project, but they are typically 500 metres to 2km apart and connected by underground gas and water pipelines, which are generally built along fence lines and existing tracks in consultation with the landholder.*
  If you look at the Tara video, the pipelines do not appear to be underground, nor along a fence line. There are vast pipe lines on the ground. Looking from the air, Tara looks like a new subdivision with the streets being prepared – like a street map. In the USA the CSG industry started with less wells in an area and then began drilling more wells closer together to increase output.

  A response from Scot MacDonald relating to Tara, he said *I haven't seen Tara lately, but I've seen nearby Gas fields and the piping infrastructure is mostly underground. Please remember, Tara is a relatively recent failed blockie subdivision. It has in poor agricultural soil, low productivity, second rate living services. I would treat with some wariness descriptions about it being a wasteland.*

  This comment from a politician involved in the Governments CSG Inquiry implies there is justification to lay waste to peoples properties.

- *Some wells will require hydraulic fracturing* .
  I haven't seen or heard of too many alternatives to hydraulic fracturing, either in Australia or overseas. One company said only 6% of wells use hydraulic fracturing. All the illustrations from gas companies show fracking, not an alternative extraction method..

  According to the Royal Society and Royal Academy of Engineers in the Uk *there is a lack of*

data on the mechanical and flow properties of shales, such as permeability and gas migration potential. The majority of data has been collected during hydraulic fracturing operations (King 2010). Relatively little research has been undertaken on how hydraulic fracturing could affect the rate at which contaminants migrate vertically from shale formations (Myers 2012). Characterising shale to better understand its behaviour before, during and after hydraulic fracturing remains difficult.

- *CSG already meets 90 per cent of Queensland's gas use and Queensland is now exporting CSG to other states via pipelines.*

60**http://www.appea.com.au/coal-seam-gas.html**

- ***The proposed Queensland** Hunter Gas Pipeline is the Last link in the east coast gas pipeline network- North Queensland to Victoria. Queensland Gas can be piped to NSW if the project goes ahead.*

61**http://www.engineersaustralia.org.au/sites/default/files/shado/Divisions/Sydney%20Division/Southern%20Highlands%20and%20Tablelands%20Regional%20Group/INFRASTRUCTURE/CSG-Opportunities%26Concerns-Lindsay-28Jul11.pdf**

- Have a look at the AAP photo on page 18 of the above PDF file. It shows an aerial photo of The Kenya gas field near the Tara rural residential estate in South Central Queensland. There is not much underground as shown in this photo.

- The proposed pipeline project would avoid the need for NSW to create its own CSG industry. In any case gas can be piped from Victoria

- *The CSG industry will have little impact on the Great Artesian Basin as a whole or the aquifers relied on by agriculture, according to an independent study conducted by the University of Southern Queensland*.

62**http://www.appea.com.au/csg/key-issues/water-management.html**

Why not have No impact, not little impact – what if they are wrong? Maybe their starting ` data is incorrect. The CSG Companies estimation of water usage is far different from Government estimates of water usage.

- **Beach Energy has gas for Sydney, and then some**
  Oil and gas explorer Beach Energy has signalled central Australia's Cooper Basin could eventually generate enough shale gas to supply Sydney as well as export.

63**http://www.afr.com/p/business/companies/beach_energy_has_gas_for_sydney_Ja1xl7Vu6sqSZSHu0oHT4K**

Following Other countries into a CSG disaster.

- NSW, nor the rest of Australia, has to go along with CSG just because other countries are wrecking their air and water. You don't put your hand in boiling water because others do. We have followed others on many pursuits including Vietnam, Iraq, Afghanistan, - down paths that we later regret.

- The price on the International markets for gas has fallen. The problems with CSG in other markets (Canada, USA, Ireland, Indonesia and probably Iran) should be a warning sign and a

reason for a moratorium with CSG drilling.

- Methane leaking from the ground irrespective of whether it is as a result of CSG drilling or not, is not measured, but it is having an effect on greenhouse gases. The effect of methane leaks is 20 times worse than CO2. Using methane may be less polluting than other gases and coal burning, but not when it is leaking.

Measurement of Methane Emissions from ruminant livestock

- *Currently tropospheric methane concentrations are about 1750 parts per billion in comparison to levels of approximately 800 parts per billion prior to the human population explosion that has accompanied the industrial revolution.*

- *The global methane cycle have placed source strengths to 500 +/- Tg/yr. About 100+/- 20 of this is fossil methane primarily from coal mining and natural gas leakage. Half is emitted by wetlands (natural and agricultural) and 20% by ruminant animals. The remaining percent is released from a combination of sources including landfill, oceans (4% - see below) insects and biomass burning.*

64**http://pubs.acs.org/doi/pdf/10.1021/es00051a025**

Ocean Methane

- *Methane from the aerobic oceans accounts for up to 4% of global methane production*

65**http://www.rsc.org/chemistryworld/2012/08/ocean-methane-paradox-solved**

Disposal of Waste

- Why do governments permit CSG drilling and not insist on a plan for the use of salt waste prior to issuing a licence. In the case of the USA, the U.S was in a hurry to reduce reliance on imported fuel, in a market where oil prices were increasing – no real justification to wreak havoc on the land, the aquifers and peoples lives.

- Most other industries must have a waste disposal plan before beginning operations. In Australia it appears we haven't yet learned lessons from Wittenoom, the ICI plants with their chemical leaching into the Parramatta River and the Botany Basin. Nor have we learned from Union Carbide at Rhodes, the M5 tunnel in Sydney, and the waste from spent uranium. There are many other problem areas.

- **Why wasn't there a plan to deal with the waste before drilling for CSG.**
  The coal seam gas industry hasn't yet come up with a solution to its waste salt problem.
  Until they do, the waste salt will be stored in brine ponds and salt pits on the gas fields.

66**http://www.abc.net.au/news/specials/coal-seam-gas-by-the-numbers/waste/**

- *In the USA, wastewaters have historically been stored onsite in open pits, such as excavated and lined containment ponds (API 2009). The possible leakage of liners has led to calls to avoid the use of pits in favour of closed loop steel tanks and piping systems (Groat and Grimshaw 2012). Open storage ponds are not permitted in the UK. Wastewaters are instead stored in closed metal tanks before being treated.*

67**http://www.raeng.org.uk/.**

- **Santos re waste**
  Santos has considered dumping its salt at sea or transporting it to a waste facility but found "this option requires 200 tankers operating 24 hours a day, each travelling a distance of 500 kilometres". These options were ruled out on environmental and economic grounds.

  All the coal seam gas companies say they are pursuing options to sell their waste salt but if that fails salt pits will be constructed on land owned by the companies. Santos has two brine injection wells; QGC has one under trial.

  The Queensland Government has asked the industry to come up with a salt plan by 2013

68**http://www.abc.net.au/news/specials/coal-seam-gas-by-the-numbers/waste/**

- It is amazing that we accept what the industry determine is the least of 2 evils, transporting the waste to the ocean, or salt pits (which can leach into the subsoil and aquifers). Imagine the freight cost alone based on the industry numbers. Why is it that the Queensland Government is asking the industry to come up with a salt plan by 2013, now. The horse has bolted, government.

SANTOS website

- *As a fuel, natural gas is a natural choice for Australia. Supplies are abundant, it's affordable, and when used to generate electricity carbon emissions are less than half those of coal-fired power. In Australia, approximately 20% of natural gas currently being used comes from CSG, while in Queensland this is much higher: approximately 70%.*

- *CSG is simply methane natural gas extracted at low pressure from coal. Conventional natural gas is extracted from sandstone, generally at greater depths and higher pressure.*

- *Queensland has Australia's largest reserves of CSG in the Bowen and Surat Basins; enough to adequately supply growing domestic demand and LNG export opportunities and ensure the long-term supply of competitively priced gas in Australia.*

- **Commitment to minimise impact**
  If the exploration phase indicates sufficient gas may be available, pilot testing will be carried out. This would typically comprise drilling a pattern of up to five production-sized wells, spaced at up to 1 kilometre apart. Water is pumped from the coal seams and both the water and gas are extracted and tested.

69**http://www.santos.com/**

- Let's **try no impact**, certainly no risky impact. Queensland has enough gas for Eastern Australia. If there is no further drilling – which costs money to establish – Santos and other CSG companies would still be profitable.

Metgasco website

- *Metgasco applies advanced drilling and production techniques to extract coal seam gas. We produce gas from certain seams by drilling a vertical well to between 300 to 700 metres from the surface. The well is then cased to prevent any water from **upper aquifers** leaking into the well. We then drill horizontally along the coal seam to a distance of up to 1,000 metres. The well is then lined with perforated steel casing. **Water and gas** are then pumped from the well and separated at the well head. This process of taking water out of the coal seams lowers the*

pressure in the well and allows gas to flow to the wellhead.

- *The water that is pumped from the ground as part of the coal seam gas mining process is very salty and contains a range of naturally present chemicals. It may also include heavy metals and radionuclides.*

- *To figure out how much waste salt the coal seam gas industry will produce, two factors have to be taken into account:*
  how much water is being extracted; and
  how salty that water is.

70**http://www.metgasco.com.au/**

Earthquakes

- *Scientists studying the fault beneath the Spanish city of Lorca say that groundwater removal may be implicated in a deadly 2011 earthquake there. The study highlights how human activity such as drainage or borehole drilling can have far-reaching seismic effects.*

71**http://www.bbc.co.uk/news/science-environment-20025807**

- **Induced seismicity or natural seismicity: assess the seismicity at Trinidad Colarado**
  One aspect of this study is to explore the possibility that the earthquakes might be induced by water injection associated with coal-bed methane production. Conceivably, very accurate hypocenter locations alone might have provided a basis for accepting or rejecting this hypothesis, but this is not the case with the hypocenters obtained in the present study. For instance, if the hypocenters were concentrated at mid-crustal depths of 10-15 km (6-9 mi) or at substantial lateral distance from any well, this would constitute strong evidence against induced seismicity. Conversely, clusters of hypocenters at shallow depths directly beneath more than one of the wells would by themselves be strong evidence in favor of induced seismicity (Healy and others, 1968). However, although our hypocenter locations are accurate (see Appendix: Data analysis), their locations by themselves do not argue strongly for or against the induced seismicity hypothesis.

72**http://pubs.usgs.gov/of/2002/ofr-02-0073/ofr-02-0073.html#_Toc2571758**

Earths Water

- *97% is salt water and 3% is fresh water, but of that 3%, only 0.003% is available for human consumption.*

- ***Artificial Recharge*** *One example of artificial recharge is the use of "reclaimed municipal waste water" through infiltration basins or direct injection. Some other examples of artificial recharge are water traps, cutwaters, drainage wells, septic tanks and effluent disposal wells, and sinkhole injection of excess surface flows.*

73**http://academic.evergreen.edu/g/grossmaz/NIERMM/**

- Why is there a need for an artificial recharge when the water is perfectly good now. Water finds its way through soils, clays, rocks, naturally.

- **U.S Geological Survey.** *Groundwater withdrawals for crop irrigation have increased to over 16 million acre-feet per year in the High Plains Aquifer, according to a recent U.S. Geological Survey study.*

The USGS study shows that recharge, or the amount of water entering the aquifer, is less than the amount of groundwater being withdrawn, causing groundwater losses in this already diminished natural resource. The new USGS findings address concerns about the long-term sustainability of the aquifer.

The High Plains aquifer underlies about 175,000 square miles in parts of eight states – Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming – and is a major source of groundwater irrigation in the region. The High Plains region supplies approximately one-fourth of the nation's agricultural production.

74**http://www.usgs.gov/newsroom/article.asp?ID=3093**

Overpumping Around The World

- *Scores of countries are overpumping aquifers as they struggle to satisfy their growing water needs, including each of the big three grain producers—China, India, and the United States. These three, along with a number of other countries where water tables are falling, are home to more than half the world's people.*

- *There are two types of aquifers: replenishable and nonreplenishable (or fossil) aquifers. Most of the aquifers in India and the shallow aquifer under the North China Plain are replenishable. When these are depleted, the maximum rate of pumping is automatically reduced to the rate of recharge.*

75**http://www.eoearth.org/article/Aquifer_depletion**

QLD CSG Water Usage

- *Queensland's coal seam gas (CSG) industry has grown rapidly over the past 15 years — the annual number of wells drilled increasing from 10 in the early 1990s to almost 600 in 2010–11.*

- *The National Water Commission says the CSG industry as a whole will extract more than **300 gigalitres of water each year.** - over half of sydney harbour*

76**http://www.abc.net.au/news/specials/coal-seam-gas-by-the-numbers/waste/**

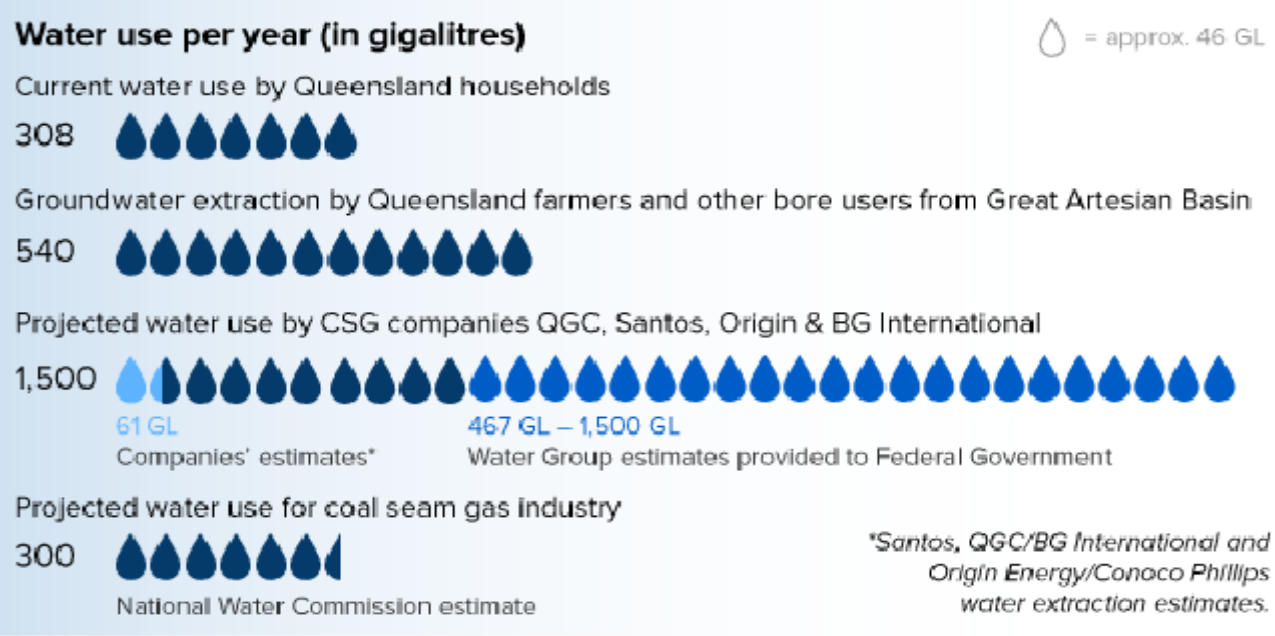
- *In Queensland, water production has, to date, averaged about 20,000 litres per well per day.*

77**www.csiro.au/**

An Olympic Swimming pool holds approximately 2,500,000 litres of water. A well uses approximately 3 Olympic pools of water per year.

- *The fracking of one CSG well can require as much as 5 million litres of water, although often only 2-3 million litres of water is used. In this process, a high-pressure mix of water, sand and chemicals is injected into the reservoir to release gas.*

78**https://theconversation.edu.au/national-water-commission-calls-for-a-closer-look-at-fracking-3498**



- *The Volume of water in Sydney Harbour is 560 GL – called a SydHarb unit! (This is not an actual unit of measure but is used informally)*
- *21 million tons salt – will fill 10 Melbourne cricket grounds to the brim. (The Queensland Government estimate of 203gl of water usage per year) (Melbourne Cricket Ground holds 100,000 people)*
- *31 million tons salt - will fill 15 Melbourne cricket grounds to the brim – (National Water Commission estimate of 300gl of water usage per year.)*

Waste Water Salt

- *The ABC has found that estimates of how much water the CSG industry will produce vary wildly.*
- *The National Water Commission says the CSG industry as a whole will extract more than 300 gigalitres of water each year.*
- *If you couple that number with information from gas company QGC about how salty the water it extracts is, you find that the industry will be producing 31 million tonnes of waste salt over the next 30 years.*
- *If you apply water-use estimates from the coal seam gas industry, it suggests 21 million tonnes of waste salt will be produced.*

***Waste salt** is referred to by the industry and government as 'salt', 'saline effluent' and 'brine'.*

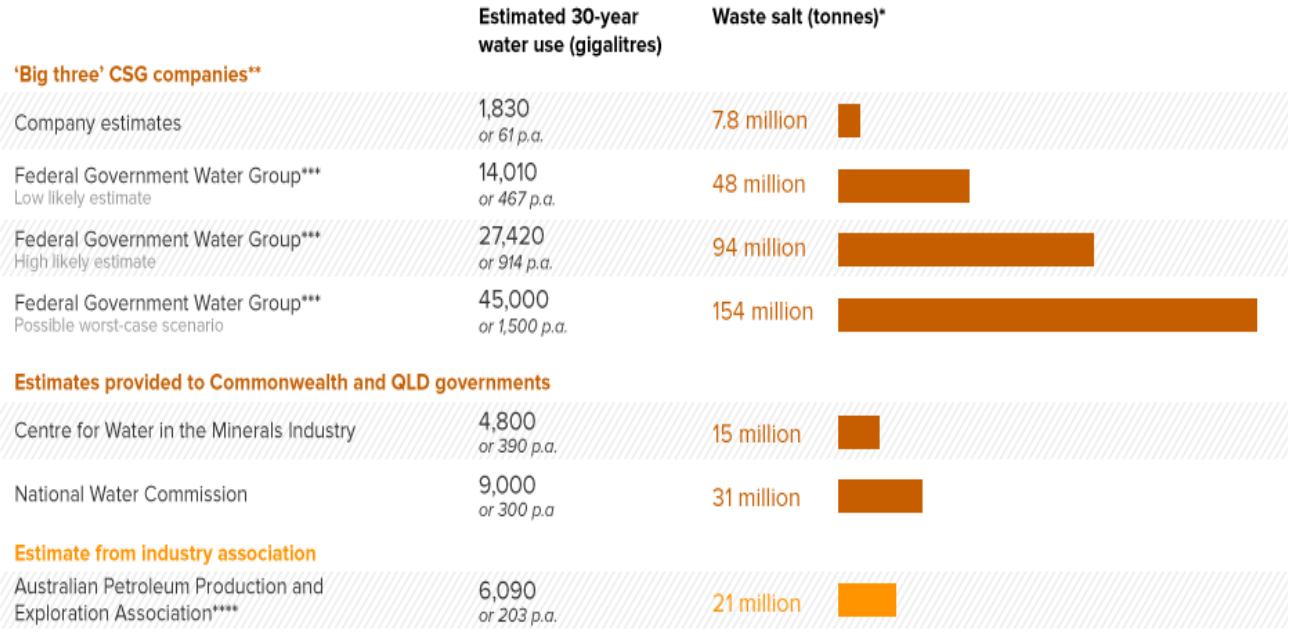
- *It is made of sodium chloride (NaCl) and other salts, including sodium carbonate or soda ash (NA_2CO_3) and sodium bicarbonate ($NaHCO_3$).*
- *These can be converted into the salts used in many chemical and industrial applications. You*

can also make table salt.

- The differences in salt estimates illustrate how much uncertainty there is about just how much will be produced.

Glaring Variations In Water Usage Estimates (30 year usage)

- The estimates of the Big Three CSG Companies in Australia are wildly different to the Federal Government Water Group estimates provided by Commonwealth and the estimates of the Queensland Government, other estimates including the Natural Water Commission and from the Industry Association.
- Hasn't anyone stopped to ask why the estimates are so different, and in the case of the Gas Companies estimates, why their estimates are so low? Warning bells should be ringing about the rest of the information provided by the Gas Companies.



79http://www.abc.net.au/news/specials/coal-seam-gas-by-the-numbers/waste/

Paying For Water Usage?

- The farmers in the Murrumbidgee Irrigation Area, the farmers along the Murray and the Darling Rivers, the households in cities and towns of NSW have to pay for their water. Why don't CSG Companies pay for their water usage?
- *COAL seam gas (CSG) companies will pay for the Queensland Water Commission (QWC) to manage the state's groundwater supplies with a levy to be introduced in 2012.*

80http://www.couriermail.com.au/news/queensland/coal-seam-gas-companies-to-pay-queensland-water-commission-to-manage-groundwater-supplies-with-a-levy/story-e6freoof-1226138231885#sthash.C0qxXO19.dpuf

- The answer from Scot MacDonald (referred to earlier) to the question as to why CSG Companies don't have to pay for the water they use when everyone else does, is **"***The water extraction you refer to is currently not budgeted for in the State's water plans because it is*

deeper and in addition to known groundwater reserves "

- In Queensland a levy is charged for managing groundwater levels. This is not the same as paying for the water used.

The Next 30 Years – after the first 30 years

- What about the following 30 years. The waste, presuming the industry does not expand from **300 gigalitres of water each year, will provide a further 15 Melbourne Cricket Grounds of salt** to find a use for. Salt we can't use and don't have a market for and have to store.

Salt Leaches Into The Groundwater & Contaminates The Soil.

- *One lone condition has been imposed which requires the company to 'make good' on any negative impact on landholders' bores, such as salt leaching from the coal seam gas water into the groundwater table. But once the groundwater is contaminated it's too late – too late for the farmers and too late for the Great Artesian Basin and the Murray Darling Basin.*

81http://greens.org.au/content/greens-warn-environmental-disaster-if-coal-seam-gas-approval-proceeds

The Americans Answer to Fresh Potable Water

- **Potential for Beneficial Use of Oil and Gas Produced Water -** David B. Burnett
  Technology advancements and the increasing need for fresh water resources have created the potential for desalination of oil field brine to be a cost-effective fresh water resource for the citizens of Texas

82http://www.circleofblue.org/waternews/wp-content/uploads/2010/09/beneficialuses-produced-water.pdf

Avoiding EPA Permits - ApexEnergy

- *The produced water can be treated on site, including desalination, for less cost than hauling it away. One key that makes desalination affordable is that the contaminants removed from the brine can be injected back into the oil and gas producing formation without having to have an EPA Class I hazardous injection permit.*

- *Pure methane is colourless, odourless and tasteless but small amounts of impurities make CSG detectable by smell*

83http://www.apexenergy.com.au/about-cmg-csg/

- It is unbelievable that an Energy Company sees the injection of brine back into the well as a means of avoiding an application for an EPA Class 1 Hazardous injection permit.

- The regulations can't be right if, by injecting the brine into the well they don't need an environmental permit.

No monitoring of groundwater

- *I know some of the coal seam gas projects I have reviewed do not even monitor groundwater and that is as much a fault of the regulator for not requiring it.*

84http://www.sbs.com.au/insight/episode/transcript/429/Coal-Seam-Gas

Transportation of Methane.

- *This is achieved in pressurized pipelines that are prone to leakage and therefore risk soil contamination, potentially impacting both flora and fauna (HBGAG, 2008) and public safety. These pipelines also risks expulsion of greenhouse gasses, suffocation and possible explosions. Some sites are even located close to endangered species, risking their future (GHD, 2008).*

- *Social; pipelining methane gas requires the trenching of privately owned land, upturning soils and introducing metals into the soils that may corrode, leaching metals into the soil and contaminating the land (Baker and Pickle, n.d.).*

85**http://www.ccag.org.au/images/stories/pdfs/aust_csm_report.pdf**

National Toxics Network Calls For A Moratorium on Hydraulic Fracturing Chemicals

- *The National Toxics Network (NTN) calls on federal and state governments to implement a moratorium on the use of drilling and fracturing chemicals ('fracking chemicals') used in coal seam gas and shale gas extraction, until these chemicals have been fully assessed for their health and environmental hazards by the Australian industrial chemicals regulator, the National Industrial Chemical Notification and Assessment Scheme (NICNAS).*

  NTN's review of chemicals used by the industry has found that only 2 out of the 23 most commonly used fracking chemicals in Australia have been assessed by NICNAS. Neither of these 2 chemicals has been specifically assessed for their use in drilling and hydraulic fracking fluids.

86**http://frackingfreeireland.org/wp-content/uploads/2011/08/NTN-CSG-Report-Sep-2011.pdf**

- *NTN works towards the full implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs)2001 and other global chemical conventions.*

In Montana,USA – finally some straight answers

- **Can CBM product water be treated to make it more usable?**
  The only ways to lower the salt concentration in saline and/or sodic water are through dilution with non-saline water, reverse osmosis, or salt precipitation with an evaporation process that leaves salt behind and traps evaporated water. Reverse osmosis is expensive, and evaporation and salt precipitation treatment is neither economical nor feasible with large quantities of saline CBM water. Dilution of CBM product water is only possible if there is a large source of non-saline water with which to dilute the saline water.

- **How can holding ponds hold all that water being produced from CBM development?**
  CBM product water holding ponds (also called infiltration ponds, evaporation ponds, or zero discharge ponds) are designed to hold CBM water and avoid any discharge onto the ground surface. Typical holding ponds are not lined and therefore discharge water to the subsurface. Some MT Bureau of Mines and Geology shallow monitoring wells show rising water levels in response to pond leakage in an area where CBM product water is being stored. This phenomenon was similarly reported by the Bureau of Land Management scientists monitoring relatively shallow aquifers near holding ponds in the upper Powder River Basin. In addition, seepage flow from impoundments is likely to reach stream channels via subsurface flow.

87**http://waterquality.montana.edu/docs/methane/cbmfaq.shtml#how_can_holding_ponds_hold**

Salt Solutions
Salt Tolerant Vegetation

- *In the absence of a strict cleanup criteria, planting of salt tolerant vegetation is an effective alternative where treatment is not feasible or economic.*

88http://www.projectnavigator.com/downloads/session_1_soil-sediment_landress.pdf

Desalination Plant

- *Concentration of sodium salt is the major water quality issue that plagues the coal seam gas industry, and apart from very expensive desalination plants there have been few solutions to this problem up until now.*

89http://theconversation.edu.au/volcanic-rock-brings-purer-water-4106

Funds (possible) For Research for Waste Salt

- With so many countries becoming involved with CSG, it may be possible to create an industry from everyone's waste salt. By funding Research into Salt solutions, we can be the smart country selling the solutions and the technology to countries with a CSG industry. First of all it solves one of the CSG industries major problems – what to do with the waste salt. It is also a more environmental solution overcoming the leaching of salt into the soil and aquifers.

- We can save our own countrys' problem of CSG Waste Salt, and countries where the CSG industry is permitted. An example of a solution is to develop the Geopolymer brick LTGS so that it holds the salt (without leaching). The brick can be used in domestic construction or the bricks can be provided to African and South American countries and poorer countries, free, as part of an aid program to provide housing. We are not exporting the problem to poorer countries. We are providing housing. The bricks would be leaching proof, and scientifically proven. In developed countries, the bricks may be purchased at a nominal fee.

See 90http://www.geopolymer.org/fichiers_pdf/ltgs.pdf - for information

Maintenance of CSG Equipment

- All CSG Companies should be required to have Maintenance plans, web based showing maintenance schedules and any overdue maintenance, and plans to rectify the position.

- Disasters around the world have often occurred due to poor maintenance regimes. Bhopal, BP, ICI, Union Carbide, Pasminco, but a few.

- The reason for exposing the maintenance plans to the web is to provide a view to the public of the maintenance, or it's shortcomings, in an industry that is generally less than honest and honorable relating to environmental issues and regulation inadequate. We are playing in an area where gas leaks cause air pollution far worse than CO2. We are playing in an area where aquifer contamination is a real possibility.

- *The compressors must undergo frequent testing to ensure they meet strict air-quality standards. In many cases, electrical compressors may be used, further reducing emissions.*

91http://www.em.gov.bc.ca/Mining/Geoscience/Coal/CoalBC/CBM/Pages/CBMBrochure.aspx

- The compressors are an example of equipment requiring frequent testing.

- *The risk of oil discharges into wetlands can be reduced significantly by proper maintenance of*

equipment used to separate oil from produced water;

92**http://eg.geoscienceworld.org/content/12/2/65.abstract**

What's the hurry with CSG fracking?

- *There are serious concerns, nationally and locally, about CSG production, including increases to our greenhouse gas footprint (relative to renewable energy sources), leaking wells contaminating freshwater aquifers, and the impact of thousands of wells and kilometres of pipeline that could adversely affect large tracts of land.*

- *Just what is the deal with coal seam gas? Is it safe and is it all it's cracked up to be?*

93**https://www.connectedwaters.unsw.edu.au/resources/articles/fracking.html**

- *The hurry with CSG, is we are moving to a global trade in Gas. This State will be impact by resource variability, insecure long-term contracts and inflated pricing unless it can develop local and adequate supplies. Frankly there is not one minute to waste.*

Quote from Scot MacDonald, MLC

- This means don't worry about the possible dangers, only worry about the export dollars, at any cost.

U.S Greenhouse Gases and CBM

- *Natural gas and oil production is the second-biggest source of U.S. greenhouse gases the government said, emboldening environmentalists who say tighter measures are needed to curb the emissions from hydraulic fracturing*

94**http://www.bloomberg.com/news/2013-02-05/greenhouse-gas-emissions-fall-in-u-s-power-plants-on-coal-cuts.html**

- **Greenhouse Gases – USA – EPA**
  An illustrated display (U.S) is provided relating to various greenhouse gases.

95**http://ghgdata.epa.gov/ghgp/main.do**

Chernobyl Disaster Similarities -

- There are underlying similarities between Chernobyl background and the CSG industry. Before testing of the nuclear plant at Chernobyl, there was no planning for the effects of the test. There was no consultation between the engineers and the nuclear scientists.

- In the CSG industry, there has been no baseline studies on the environment (air and water) conducted; there are no plans for using the waste salt; there is no discussion or research into the chemicals going into the ground and aquifers and the long term effects; there is no effective planning on water usage.

- **It's a case of do the damage first and then investigate and mitigate. It may be too late after we destroy the aquifers and leak methane gas into the atmosphere.**

Conclusion
Whilst the Government might earn part of a $170 billion gas windfall primarily through Exports, it should not be at the cost of our aquifers, nor the air we breathe. We in NSW have access to abundant gas supplies from Victoria and Queensland and possibly South Australia and therefore could initiate a moratorium in NSW until such time as the industry improves its standards, and improves the data provided which is at odds with all other Agencies information. The moratorium should exist for as long as it takes to create effective regulations that are monitored. With so many countries and States around the world either banning or initiating moratoriums on the CSG Industry. what is the hurry to get into trouble.

There should be a moratorium on CSG until web-enabled databases (accessible to the public) are created recording gas leaks and tap water contamination, with the follow-up actions undertaken by the relative gas company, or Government regulator inspections, and report responses on the database, together with the response from the person/s reporting the problem.

The moratorium should continue until an effective Maintenance Plan is created with actions reflected against the schedule. The Maintenance Plan and reporting to be available for viewing on the internet. Overdue maintenance will be highlighted and an expected response from the companies as to when overdue Maintenance will be completed. Too many disasters occur, worldwide, because maintenance budgets are reduced and required maintenance is not conducted.

At the moment we are sitting on an environmental disaster waiting to occur if our regulations, our regulators and the gas companies are not up to the mark. Our aquifers can be polluted. Our drinking water can be contaminated. Our air (and Greenhouse gases) can be impacted. With such a vast difference between Government agencies estimates and the gas companies estimates about water use and waste salt, there must be a reconciling of this information first. What if the agencies are correct? There is a monumental difference in water usage estimates and hence waste salt.

And finally, before any moratorium is lifted, a Plan for using the waste salt, because the salt can leach into the subsoil and aquifers. We do not need another ICI type contamination of the Botany Basin Aquifer to occur. Why not look at developing an Export Industry by Funding research of how to deal with waste salt. Any solution discovered will be required by all countries involved in CSG around the world. It will produce export dollars, with funds staying in the country, and it will solve a major global problem.

With such little faith in our politicians to effectively regulate, and the regulators to monitor regulation compliance, and because companies take short cuts to reduce costs such as avoid maintenance requirements, it is vital the moratorium be initiated forthwith. The fact that the Government dismisses the results of an Inquiry so readily, the Government shows little reason that the past problems won't be repeated. Better to be safe without CSG than being sorry after the horse has bolted. We don't want to be building de-salinators just to have a drink of fresh water and to have clean water for a shower.

The shear cost of fixing problems created, a la ICI, Union Carbide, BP, here and overseas, can be mammoth. They are not shown as a contingency on any balance sheet. They cost a lot of resources with investigations, Inquiries, discussion in parliament, discussion and protest in the community.

One final comment relates to the falling Export value of our gas and our largest gas export partner, China, who is embarking on its own CSG industry. We are developing all this infrastructure with the possibility that it might not, in the long term, be required. We will have devastated our own landscapes

and possibly severely damaged our own industries, our farming, our produce from our food bowls, our vineyards. China plans on subsidising its own CSG industry, which will force Australia to reduce its export price on CSG.

I call upon our Governments to play it safe. At the moment it is far too risky a business. Imagine if our country was held up as an example of how not to create a CSG industry, as the U.S currently is. This applies to other Countries and States as well.

The majority of the contents of this document were sent in a 27 page letter to all 135 NSW State politicians. I received 30 responses of which 26 were auto-reply acknowledgments. Four supported the position of a moratorium. One tried to sell me the idea of a no problems CSG Industry. A couple forwarded the letter to someone else. Some of the auto-responders said they would provide a response in due course. It shows the lack of political interest in the CSG subject.

This document has used vast resources in the form of information from Reports, Inquiries, Submissions. These are highlighted in the document by italics. The text not shown in Italics (not including titles) is my own. The web-links are shown below each of the texts which are only extracts. The full text of the item can be located by linking to the website link illustrated. To make it easier to look at the full-text, a website www.pimconnect.net provides links direct to these websites, by clicking on the number of the link. The copyright of the text in italics belongs to the respective author/s referred to in the web link illustrated.

My name is Paul Saunders. I am a concerned citizen of the world.

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