

**Submission  
No 183**

## **INQUIRY INTO COAL SEAM GAS**

**Name:** Dr Rockley G Boothroyd

**Date received:** 3/09/2011

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SUBMISSION FROM DR R.G. BOOTHROYD (RETIRED CHARTERED ENGINEER)

TO

General Purpose Standing Committee No 5 NSW Legislative Council

*This submission addresses several areas in the 'Terms of Reference' but it also goes beyond these where it is felt to be relevant.*

**SECTION A** contains my recent correspondence with the Queensland Government relating to CSG. Having reviewed the CSG 'produced' water treatment processes which are available to us, it appears that by far the best option is the algae treatment approach described below under **ABSTRACT**.

It would take me about 12 months to complete the writing and collation of this very long and complicated paper into a readable and publishable form. Also I estimate that a further 5 years of industry-based research is desirable to optimise the algae pyrolysis decontamination approach. The problem is that although there are several available viable routes towards successful water decontamination with algae, we need to find the best one. Produced water often varies from well to well. Different types of algae are advantageous in that they can be used in different climates and places. Also the algae of interest thrive in typical contaminants (such as sodium bicarbonate) in CSG produced water. However many types of algae can be quite difficult to handle and industrial plant designers need to look towards finding equipment which is universally applicable.

As NSW is less advanced than QLD in CSG development, a NSW moratorium could be helpful in enabling technology to catch up. In Queensland, with CSG investment already into billions of dollars, it seems to be impossible to extricate ourselves from the mess we have brought upon ourselves.

**SECTION B** outlines some further considerations. It seems that our CSG problems are just one symptom of a much more deep-rooted malaise which affects our entire society.

## **SECTION A**

**For the attention of the Hon Vicky Darling  
Minister of the Environment**

Dear Minister,  
I would appreciate your attention to the attached matters.

----- Original Message -----

**From:** Stretton Electorate Office  
**To:** rock boothroyd  
**Sent:** Tuesday, August 23, 2011 3:24 PM  
**Subject:** RE: Decontamination of CSG Produced Water

Good afternoon Dr Boothroyd

I have been advised that your email has been sent to the office of the Minister for Environment, The Hon Vicky Darling for a response.

You can contact that office at [environment@ministerial.qld.gov.au](mailto:environment@ministerial.qld.gov.au) for further information about your enquiry.

I hope this information is of help with your enquiry.

Regards  
Donna

***Donna Rohweder***

Electorate Officer for  
Stephen Robertson MP  
Member for Stretton  
PH: (07) 3344 2659  
FAX: (07) 3344 1258

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**From:** rock boothroyd [  
**Sent:** Monday, 22 August 2011 8:13 PM  
**To:** Stretton Electorate Office  
**Subject:** Re: Decontamination of CSG Produced Water

Dr Rockley Boothroyd

----- Original Message -----

**From:** Stretton Electorate Office  
**To:** rock boothroyd

**Sent:** Monday, August 22, 2011 9:20 AM  
**Subject:** RE: Decontamination of CSG Produced Water

Good morning

Thank you for contacting Stephen Robertson's electorate office concerning Coal Seam Gas. To ensure your concerns are dealt with appropriately can you please provide your full name, residential address and contact details.

Regards  
Donna

***Donna Rohweder***

Electorate Officer for  
Stephen Robertson MP  
Member for Stretton  
PH: (07) 3344 2659  
FAX: (07) 3344 1258

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**From:** rock boothroyd  
**Sent:** Saturday, 20 August 2011 3:59 PM  
**To:** Stretton Electorate Office  
**Cc:** John Dalton  
**Subject:** Decontamination of CSG Produced Water

**For the attention of the Hon Mr S. Robertson.**

Dear Minister,

I refer to my email dated 19<sup>th</sup> July. 2011 (sent to [energy@ministerial.qld.gov.au](mailto:energy@ministerial.qld.gov.au)) to which I have not received a reply (nor even an acknowledgment!).

I am one of the scientific consultants acting for Kingaroy Concerned Citizens Group (KCCG), now part of the Lock the Gate Alliance. KCCG has referred the Linc Energy emission matter to me and they expect me to report back. As the Cougar UCG project at Kingaroy is still not finalised, KCCG retains a legitimate interest in UCG. Also they have a legitimate interest in CSG, which explains my attachment to this email.

The attachment to this email relates to my research work in identifying those emergent technologies which are likely to be of commercial value 20 years or more in the future. I have published 5 peer-reviewed papers, (with a 6<sup>th</sup> presently under review) in the last 6 years in this general area. The seventh research project is described in the attached abstract. However, because decontamination of CSG produced water is an issue of such immediate importance, it seems to me this abstract should be brought to your attention.

Queensland Government guidelines hardly mention the use of algae to treat 'produced water' from CSG and the same criticism can be directed at industry-based reports (Parsons-Brinkerhoff, NRO0011)

Many well-resourced major companies have rushed into large industrial projects in Queensland without incorporating adequate contingency plans. It is hardly surprising, therefore, that there is so much public concern with these developments.

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## THE COAL SEAM GAS INDUSTRY IN QUEENSLAND, AUSTRALIA AND ITS LIKELY RELEVANCE TO THE COAL MINING INDUSTRY IN 2030

(This first draft (10<sup>th</sup> August, 2011) is for review purposes. Comment and criticism is invited. Please forward these to

### ABSTRACT

There are strong arguments for the development of an algae-based 'produced-water' decontamination technology for the CSG industry in Queensland and in other areas of Australia.

The main objective, and one which is technically feasible at an acceptable cost, is to use the 'produced water' as a saleable commodity, thus eliminating the huge present-day problems associated with waste-water disposal. Such a scheme would be to provide water to acceptable agricultural standards using 'race-course pond' algae generator/harvesters together with a much smaller photobioreactor system to provide smaller quantities of potable water to domestic standards. This system would replace the holding reservoirs used today which incur comparable overall costs. Existing CSG wastewater holding reservoirs can be retrofitted to function as 'race-course' ponds, although it is less expensive to design them as race-course ponds in the first place.

Such a water decontamination facility is seen as one which is easy to integrate with future petrochemical complexes, using coal resources. We might reasonably expect to see such petrochemical plant in outback Queensland in 20 years time. Such a petrochemical plant design is seen as incorporating Fischer-Tropsch liquid fuel manufactured from CSG. However water shift reaction to produce surplus hydrogen is anticipated for nearby associated industries such as fertiliser manufacture. Some likely other suggested by-products are also detailed in the paper which are perceived as marketable 20 years into the future. Some of these would derive from oxygenated organics from pyrolytic oil. This oil and its associated char would also be used to provide all the energy requirements for the algae water decontamination process. The solar-dried algae would be flash pyrolysed to destroy organic contaminants and the ash from the char would retain and lock in the

permanent toxic residues which can be made into non-leachable products such as building blocks. In this way the contaminants in the produced CSG water are used usefully and are no longer a waste product. Most of the carbon dioxide emissions and other waste products would be consumed by the algae to enhance its rate of growth. A portion of the algae could be used to produce other saleable products which might include hydride fuel capsules for lightweight urban transport. This level of detail depends on future uncertainties such as the competitive alternative of lithium supplies over which there are current doubts.

It is suggested that such a petrochemical complex need be served only by a railhead, because the products would be varied and all would be fully refined. Thus the expense of long pipelines would not be justified. Part of this reasoning is that backloading and ultimate disposal, of partially-processed waste products from coastal urban areas would be part of the purpose of the complex.

Comprehensive and detailed planning is needed in such a scheme because the prime intention is to use mined water to develop fully viable rural farming communities in outback Queensland. The processed water can be used to open up good agricultural land which needs irrigation for intensive agriculture. Inferior quality land would also be identified for other purposes such as 'molten-salt storage/ solar tower' base-load electricity generation connected to a HVDC grid.

Present day petrochemical industries normally have a low footprint of environmental-damage and this is also a reasonable expectation in future coal-feedstock plant. Also a clean and attractive environment is seen as necessary to provide a permanent and contented workforce for these future industries in inland areas., be they manufacturing or agricultural,

Consideration in the overall design is needed for the future conversion of the Fischer-Tropsch plant to use Syngas as an alternative feedstock as the available CSG supplies diminish. The Syngas would be generated by (above ground) entrained flow coal gasifiers. Entrained flow gasifiers also offer the facility to trap non combustible toxic compounds in the non-leachable molten slag which can also be used safely as a building material.

Effects on aquifers, such as water table lowering, with this algae-based technology would be no worse than that which is experienced with present day irrigation used in agriculture and CSG.

All these proposals are made in the context of a likely much enlarged and automated manufacturing economy in Queensland in both urban and rural areas. This is considered to be both likely and desirable to achieve a future Australian economy which is less dependent on international conditions. It would also contribute to reducing chronic unemployment problems now experienced in most other westernised nations.

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## **SECTION B**

### **Trying to Read between the lines concerning the Queensland CSG Industry**

Whichever of the two major political parties holds power, the Queensland Government is notorious for its cult of secrecy, despite the fact that a political decision is made sometimes "to feed the chooks" as one of our late Premiers often said. The Government of the day is usually reluctant to explain its failings and seek electoral support for increased taxation to remedy its mistakes.

Global corporations (often forced to move on to other locations because they have acquired a history of gross environmental damage in vulnerable countries such as Nigeria and Papua-New Guinea) are always on the look out to make easy money from other exploitable resource-rich nations. Queensland, with its resources and medieval mining laws, is likely to be an area of interest.

Clearly Queensland's Government and the resource-hungry global corporations share a common interest. How about offering royalties in exchange for some very advantageous contracts? There would be no need to consult the electorate. A few rural residents will get hurt, but who cares? They are a minority group and not important politically. It's just a matter of making plans in confidence, without seeking public opinion, and presenting a 'fait accompli' to the public from which there is no return.

If the above interpretation comes close to the truth, then clearly the CSG Industry is just one aspect of a much wider problem facing Australia today. I believe that the whole matter is so serious that it merits detailed scrutiny by a Royal Commission acting with very broad terms of reference, including CSG as just one component.

Moreover these concerns are not limited to State Governments but also include the Federal Administration and its political Opposition. For example, how can one explain the recent decision to spend nearly a billion dollars of taxpayers' money on two solar power stations at Chinchilla and Moree which are of seriously outdated design? Independent federal MP Tony Windsor and economist Ross Garnaut recently visited the vastly superior Gemasolar power station in Spain which generates 24 hours in the day without any assistance from fossil fuels.

In the light of such decisions the logical conclusion is that public petition for a Royal Commission needs to be made to the Queen through the Governor-General directly and the Commission's terms of reference need to be made by direct negotiation between public interest bodies and Her Majesty's representative.

### Is Democracy at Risk?

Recently, and symbolically, Greece, the very birthplace of democracy, was the first nation to experience serious social unrest. Similar disquiet has spread to Christendom itself in Italy, Spain and Portugal. Even that bastion of stability and organization, the United Kingdom, has now experienced rioting in its major cities. Will Australia follow suit because our governments are also losing touch with the people who elect them?

### Part of the Big Picture

The CSG problem before the NSW Legislature seems to be just one symptom of an underlying problem of weakness in our western-style elected governments. This can be illustrated by an examination of the history of changes in the British Civil Service in recent years which has shown a progressive deterioration in the quality of its administration. In particular the advice to British ministers from the highly-experienced administrative officer class seems to have disappeared. A similar situation exists in our own administrations, with reliance made on ad hoc

reports from external consultants whose findings appear to be not being checked and scrutinized adequately before ministerial consideration.

#### Who controls the controllers?

In our complicated and sophisticated world it seems ridiculous to expect a cabinet of ministers to formulate sensible policies without first class assistance from experts. Yet the advice from experts, such as that from specialised scientists, needs separate scrutiny, comparisons and digestion by well-experienced managers before presentation for ministerial consideration... The evidence is that such managerial advice is often inadequate.

It is not intended in this submission to pre-empt the findings of a Royal Commission, Hopefully a Royal Commission would find no evidence of impropriety but this may not eventuate. Hopefully a Royal Commission might conclude that all CSG contracts in Queensland are invalid. Common sense suggests that when an affected party to an agreement (the landowner) is not consulted or even notified in any way, then such an agreement should be seen as unlawful. However there is no assurance that common sense and the law will concur on this matter.

Nevertheless it is suggested in this submission that our governments, both state and federal, need an independent managerial body of the highest administrative ability. In order to achieve this level of advice, this managerial review body should have complete independence in offering advice. Advisers need to manage their responsibility to act in the public interest without the possibility of being exposed to pressure except from that within their own organisation.

#### A suggestion

- \* Let each State and the Federal Government have a college of 6 independent advisers. We might call them 'guardians' or mandarins.
- \* Each College of Guardians has the right to be privy to any form of government business except that which is directly related to national security.
- \* Each College manages its own affairs in the way it feels fit. In other words it acts as an independent analyst in government matters although it is excluded from the decision-making process.
- \* The primary responsibility of the College is to advise the government of the day but this responsibility is subservient to serving the national and public interest.
- \* Members of the Colleges are permanent employees of the Crown and are non-political and not affiliated to any other organization.
- \* Members of the Colleges are appointed by a Committee representing all public interests. Members of the Appointments Committee may be nominated by

conglomerations of special interest groups such as manufacturing, treasury and finance , rural affairs etc. Probably it would be desirable for members of the Appointments Committee to have strong powers of veto in appointing guardians..

- \* Once appointed, guardians have absolute tenure of office until normal retirement age

- \* A minimum age of 50 could be required for candidates seeking appointment as guardians. Candidates would require a proven record of integrity, wide experience and excellence in all aspects of administration.

- \* Candidates should have salary and pension rights similar to those of the judiciary

- \* Although it would be normal for much of their work to be confidential, a College would have the right and the responsibility to report directly to the public if it sees fit to do so. They would also have the right of absolute privilege in making public statements. With regard to controversial and questionable issues they should also respond independently to enquiries from the media relating to questions of major strategic importance.