

Submission to Ministerial subcommittee on coal seam gas. from Keerrong Gas Squad.

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4. United Nations Economic and Social Council = Rights to Water
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6. Coal Seam Shale <http://www.linktv.org/video6258>
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9. National Water Commission. – Coal Seam Gas and Water challenge, position statement.
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‘...nor abridge right to use water. 100. The commonwealth shall not by any law or regulation of trade or commerce abridge the right of State or the residents therein to the reasonable use of the waters of rivers for conservation or irrigation’

Keerrong Gas Squad Submission.

We are representatives from Keerrong Valley in the Northern Rivers Region of NSW and we wish to bring the following matter to your attention:

A large and ever growing body of public, technical and scientific opinion worldwide is positing an ever growing volume of information in the public domain that makes the clear statement that the practice of hydraulic fracturing (fracking) as implemented by the Coal Seam Gas Industry (CSG) is the blueprint for the destruction of sweet water. Scientists estimate that at any given time only 3% of the water on our planet is fresh water. In Australia the vast bulk of our sweet water is stored in an integrated underground aquifer system; geological rock strata that hold water in a dynamic equilibrium under pressure that has been created over aeons. This is Australia's greatest yet now most vulnerable resource. It is necessary to stress that in 1978 the Atomic Energy Commission demonstrated that this water varies from 100,000 years old in the Maitland aquifer to over 500,000 years old on the western edge of the Great Artesian Basin. Understood through the prism of the cyclical nature of recharge on such a time scale this water is infinitely precious and certainly not in any immediate sense renewable when it is interrupted at deeper levels than what is colloquially referred to as the water table. This has been the primary support system to all of our life systems since time immemorial.

Over the last three years state governments across our country have sold hundreds of billions of dollars worth of gas to Japan and China nationwide, this in every state and territory of the nation. Of course this can only happen after approval has been given by the National government acting as agent for the Crown in all matters that pertain to sub-surface rights. In our Northern Rivers Region we have been invaded by three gas companies, Metgasco, Red sky and Arrow Energy. This brings us contemporary to the national and (indeed) the global situation. We wish to impress upon all people that the Northern Rivers region is the most abundant and species diverse area of Australia, yet, even as the second wettest area of the continent our water supplies are spring fed once the surface water has run off after the rain. (ref.2) We have to contend with three levels of government on all of these issues to address this potent danger; (ref.3) we find ourselves speaking to elected representatives who don't know what an aquifer is, state government representatives who have accepted the companies self-interested assurances and Federal members who have fallen prey to the high powered lobbying process of mining companies. Our basic human rights to clean air and clean water as stated in the United Nations Charter have been usurped by the legislative system and their dealings with the companies. (ref.4)

In NSW the companies are regulated by the On Shore Petroleum Act of 2004, which places no premium or price on the water that the companies displace whilst fracking. This legislation is in need of immediate redress. Basically we have NO rights to our sub-surface resources; to repeat, our basic rights as stated in the United Nations charter to clean air and water have been usurped by our legal system and their dealings with the mining companies.

To further illustrate this we bring your attention to the following: On February the 23rd the Gillard Government gave the go ahead for a further 7 billion dollar deal on Coal Seam Shale despite the fact that the N.S.W Farmers Federation, the Queensland Farmers Federation and the National Feedlot Association and many others were demanding a moratorium on Coal Seam Gas Mining. 4 corners (ref.5) on the ABC the night before had given a graphic presentation of the excesses and negligence of the state

government and mining authorities happening in the Darling Downs in Queensland where the industry is still in its infancy. Coal Seam Shale operations are emerging as the most dangerous process of all coal seam projects. It has been revealed that toxic radon and perhaps uranium has leached into the New York State drinking supply through this system. (ref.6. see link <http://www.linktv.org/video6258>) Eighty percent of all gas production in Australia is dependent on fracking. (ref.7). Hydraulic fracturing is the process of blasting open aquifers under great pressure, often with a toxic brew of chemicals (ref.7)

Here it is appropriate to bring your attention to the statements made by the National Water Commission which was finally established in 2005 (refs.8 and 9). The Commission makes the connections continent wide between aquifer and surface water flows abundantly clear. Their position statement on CSG also make it clear that the Federal government needs to fully consider the consequences of the potential for the destruction of the aquifer and surface water system posed by the CSG. When national bodies of this calibre are simply ignored by all three levels of government with emphasis on the Federal government acting as the agent for the Crown and being whom the national Water Commission advises in the first instance we have to question; who controls the agenda and for what purposes? The political indifference to this nation-wide atrocity that is unfolding is staggering. The dislocation between elected officials and advisory bodies appear to be inbuilt and purposeful, deliberate and criminal. There are no certainties that the government infrastructure despite repeated assurances are able to guarantee or even attempt the most basic oversight. Simply stated the bureaucracy is neither capable or willing as events in Queensland give testimony to. (ref.5)

We would like to ask the Government; in their recent plan for the Murray Darling Basin, has there been sufficient consideration of the connections between underground and surface water. Ground water provides base river flows all across the country and also naturally provides submarine flows to coastal estuaries. In the local region, the Richmond River that was in the recent past one of the greatest natural fish hatcheries on the East Coast has been severely mauled by the application of agricultural sprays; proposed fracking along the river spells the death-neil for this river estuary that we are currently trying to restore in a state government funded project. The economic loss is beyond analysis and this is a clear example of government organizations involvement with CSG companies making a mockery of our communal endeavours to restore the environment and the industries that depend on them. The short term return from gas for the local community and national economy is minute compared to the value of the natural hatchery. In NSW additions to the water Act from 2010 finally admit to the importance of an aquifer system (ref. 10) and as the northern area of the Great Dividing Range is a major recharge area for both the Great Artesian Basin and springs that feed into the Murray darling Basin we can assure that the plan is incomplete if not seriously flawed.

In our region and generally across our country if a farmer wants to put a bore into the superficial layers of the water table they need a license and receive a quota based on rates of recharge. How can it be that mining companies can to all affect mine water; disturb and destroy megalitres, gigalitres of our precious underground system, effectively destroying water for future generations of all biological life that depend on them. In our legislative system water is considered as a by-product of the mining industry and water has no price or premium placed on it. Generations to come are not considered in legislation or real practice of the mining industry at any level. Coal Seam Gas Mining is the greatest

threat our nation has ever faced. The assurances of politicians and companies are not worth the paper they are written on. What insurance company would after a policy on water given the current state of play? Even sound business principles have been waived.

We maintain that the process of fracking aquifers open underground is the core of our concern; We also consider the situation of the toxics applied through the process of CSG mining to be of great importance and include the findings of the National Toxic Network that demonstrate the farce behind the assurances of government and companies alike.(ref. 7).

We recommend the following:

- That national and state and local legislation reflect the connectivity of our fragile water supply?
- Ultimately a national water authority must override ALL other considerations based on adequate definitions of water, surface, aquifer and recharge areas. These continental water flows supersede any man made boundaries. The Murray Darling is a component albeit a major one of our larger integrated continental water system. Our legislation needs to reflect this connectivity if we are to survive the ravages being inflicted by the mining industry.
- Short term sell-offs to China and Japan do not give authority to destroy our water and the food supplies the production which depend on it. To extrapolate the economics over longer periods would show that mining profits are unsustainable and short term, in truth through their manner of distribution almost negligible given the cost to long term productivity of other industries
- We suggest that we need in our constitution (ref. 11) a definition of water supplies and sources and a definition of safe practice. Surely the need for this would receive a resounding yes if a referendum were held. The three tier system makes a mockery of water management without a National Water Commission given teeth through legislation. It must be more than an advisory body. We quote from the constitution. 'The commonwealth shall not, by any law or regulation of trade or commerce abridge the right of any State or the residents therein to the reasonable use of the waters and rivers for conservation or irrigation. 'If as all hydrologists, geologists and farmers know the aquifer system provides the base flow to surface water, this definition must be extended to include underground water. We suggest that even with this definition the damages as already done to water systems provide a basis to challenge Coal Seam Gas or Roxby Downs or any of the major mining endeavours across the nation as criminal as are those who authorize them. Part 3a of the Land and Environment Act gets around all this through the need for infrastructure. We suggest the guarantee for long term water health supersedes all other considerations. And legislation must fall in line with this basic human right.
- A ban on Coal seam Gas Mining. And deeper consideration of all aspects of the mining industry.

Table 1. Trigger levels for operational changes under drought scenarios (from Rous Regional Water Supply Strategy, 2009)

When Rocky Creek Dam reaches	Supply Status	Source Status	Restriction Level
100%	Normal Operation	Rocky Creek Dam only	Ongoing
95%		Start Wilson's River Source and Emigrant Creek Dam	water saving measures
60%	Dry Period Operation	Start Woodburn Bores, Convery's Lane Bore	1
50%			2
40%			3
30%	Emergency Operation	Start Ballina Council's Plateau Bores	4
20%		Start Wilson's River Emergency Extraction	5
15%			6
10%			7

Rous Water regularly assesses the secure yield of its entire water supply to ensure that the system remains capable of meeting regional demand for water and to plan for future conditions, i.e. possible impacts associated with climate change.

Rous Water's most current calculation for secure yield incorporating current operating strategies provides a secure yield of approximately 14,900 ML per annum. This figure well exceeds recent annual demand (Figure 1). Recent modelling by the NSW Office of Water suggest that yields will be reduced due to the effects of climate change, resulting in a nine percent decrease in secure yield by 2030.

The forecast decreases in secure yield demonstrate the need to better forecast likely future water demand as part of the Future Water Strategy. Rous Water is currently undertaking analysis of water consumption through out the region to better estimate the effects of regional growth on total water demand. This includes consideration of a range of factors including:

- projected future growth;
- the effectiveness of demand management strategies to encourage efficient use of water;
- rainwater tank incentives;
- BASIX requirements for new residential development, and
- the use of dual reticulated recycled wastewater supplies.

This analysis will be completed by June 2011 so that it can be used to assist in determining the steps necessary to ensure a secure water supply.



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Agenda item 3

SUBSTANTIVE ISSUES ARISING IN THE IMPLEMENTATION OF THE
INTERNATIONAL COVENANT ON ECONOMIC, SOCIAL AND CULTURAL
RIGHTS

General Comment No. 15 (2002)

**The right to water (arts. 11 and 12 of the International Covenant
on Economic, Social and Cultural Rights)**

I. INTRODUCTION

1. Water is a limited natural resource and a public good fundamental for life and health. The human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realization of other human rights. The Committee has been confronted continually with the widespread denial of the right to water in developing as well as developed countries. Over one billion persons lack access to a basic water supply, while several billion do not have access to adequate sanitation, which is the primary cause of water contamination and diseases linked to water.¹ The

¹ In 2000, the World Health Organization estimated that 1.1 billion persons did not have access to an improved water supply (80 per cent of them rural dwellers) able to provide at least 20 litres of safe water per person a day; 2.4 billion persons were estimated to be without sanitation. (See WHO, *The Global Water Supply and Sanitation Assessment 2000*, Geneva, 2000, p.1.) Further, 2.3 billion persons each year suffer from diseases linked to water: see United Nations, Commission on Sustainable Development, *Comprehensive Assessment of the Freshwater Resources of the World*, New York, 1997, p. 39.

14, paragraph 2, of the Convention on the Elimination of All Forms of Discrimination Against Women stipulates that States parties shall ensure to women the right to “enjoy adequate living conditions, particularly in relation to [...] water supply”. Article 24, paragraph 2, of the Convention on the Rights of the Child requires States parties to combat disease and malnutrition “through the provision of adequate nutritious foods and clean drinking-water”.

5. The right to water has been consistently addressed by the Committee during its consideration of States parties’ reports, in accordance with its revised general guidelines regarding the form and content of reports to be submitted by States parties under articles 16 and 17 of the International Covenant on Economic, Social and Cultural Rights, and its general comments.

6. Water is required for a range of different purposes, besides personal and domestic uses, to realize many of the Covenant rights. For instance, water is necessary to produce food (right to adequate food) and ensure environmental hygiene (right to health). Water is essential for securing livelihoods (right to gain a living by work) and enjoying certain cultural practices (right to take part in cultural life). Nevertheless, priority in the allocation of water must be given to the right to water for personal and domestic uses. Priority should also be given to the water resources required to prevent starvation and disease, as well as water required to meet the core obligations of each of the Covenant rights.⁶

Water and Covenant rights

7. The Committee notes the importance of ensuring sustainable access to water resources for agriculture to realize the right to adequate food (see General Comment

Plata Action Plan of the United Nations Water Conference; see para. 18.47 of Agenda 21, *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992* (A/CONF.151/26/Rev.1 (Vol. I and Vol. I/Corr.1, Vol. II, Vol. III and Vol. III/Corr.1) (United Nations publication, Sales No. E.93.I.8), vol. I: *Resolutions adopted by the Conference*, resolution 1, annex II; Principle No. 3, The Dublin Statement on Water and Sustainable Development, International Conference on Water and the Environment (A/CONF.151/PC/112); Principle No. 2, Programme of Action, *Report of the United Nations International Conference on Population and Development, Cairo, 5-13 September 1994* (United Nations publication, Sales No. E.95.XIII.18), chap. I, resolution 1, annex; paras. 5 and 19, Recommendation (2001) 14 of the Committee of Ministers to Member States on the European Charter on Water Resources; resolution 2002/6 of the United Nations Sub-Commission on the Promotion and Protection of Human Rights on the promotion of the realization of the right to drinking water. See also the report on the relationship between the enjoyment of economic, social and cultural rights and the promotion of the realization of the right to drinking water supply and sanitation (E/CN.4/Sub.2/2002/10) submitted by the Special Rapporteur of the Sub-Commission on the right to drinking water supply and sanitation, Mr. El Hadji Guissé.

⁶ See also World Summit on Sustainable Development, Plan of Implementation 2002, paragraph 25 (c).

11. The elements of the right to water must be *adequate* for human dignity, life and health, in accordance with articles 11, paragraph 1, and 12. The adequacy of water should not be interpreted narrowly, by mere reference to volumetric quantities and technologies. Water should be treated as a social and cultural good, and not primarily as an economic good. The manner of the realization of the right to water must also be sustainable, ensuring that the right can be realized for present and future generations.¹¹

12. While the adequacy of water required for the right to water may vary according to different conditions, the following factors apply in all circumstances:

(a) *Availability.* The water supply for each person must be sufficient and continuous for personal and domestic uses.¹² These uses ordinarily include drinking, personal sanitation, washing of clothes, food preparation, personal and household hygiene.¹³ The quantity of water available for each person should correspond to World Health Organization (WHO) guidelines.¹⁴ Some individuals and groups may also require additional water due to health, climate, and work conditions;

(b) *Quality.* The water required for each personal or domestic use must be safe, therefore free from micro-organisms, chemical substances and radiological hazards that constitute a threat to a person's health.¹⁵ Furthermore, water should be of an acceptable colour, odour and taste for each personal or domestic use.

¹¹ For a definition of sustainability, see the *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 1992*, Declaration on Environment and Development, principles 1, 8, 9, 10, 12 and 15; and Agenda 21, in particular principles 5.3, 7.27, 7.28, 7.35, 7.39, 7.41, 18.3, 18.8, 18.35, 18.40, 18.48, 18.50, 18.59 and 18.68.

¹² "Continuous" means that the regularity of the water supply is sufficient for personal and domestic uses.

¹³ In this context, "drinking" means water for consumption through beverages and foodstuffs. "Personal sanitation" means disposal of human excreta. Water is necessary for personal sanitation where water-based means are adopted. "Food preparation" includes food hygiene and preparation of food stuffs, whether water is incorporated into, or comes into contact with, food. "Personal and household hygiene" means personal cleanliness and hygiene of the household environment.

¹⁴ See J. Bartram and G. Howard, "Domestic water quantity, service level and health: what should be the goal for water and health sectors", WHO, 2002. See also P.H. Gleick, (1996) "Basic water requirements for human activities: meeting basic needs", *Water International*, 21, pp. 83-92.

¹⁵ The Committee refers States parties to WHO, *Guidelines for drinking-water quality*, 2nd edition, vols. 1-3 (Geneva, 1993) that are "intended to be used as a basis for the development of national standards that, if properly implemented, will ensure the safety of drinking water supplies through the elimination of, or reduction to a

constraints, the vulnerable members of society must be protected by the adoption of relatively low-cost targeted programmes.

14. States parties should take steps to remove de facto discrimination on prohibited grounds, where individuals and groups are deprived of the means or entitlements necessary for achieving the right to water. States parties should ensure that the allocation of water resources, and investments in water, facilitate access to water for all members of society. Inappropriate resource allocation can lead to discrimination that may not be overt. For example, investments should not disproportionately favour expensive water supply services and facilities that are often accessible only to a small, privileged fraction of the population, rather than investing in services and facilities that benefit a far larger part of the population.

15. With respect to the right to water, States parties have a special obligation to provide those who do not have sufficient means with the necessary water and water facilities and to prevent any discrimination on internationally prohibited grounds in the provision of water and water services.

16. Whereas the right to water applies to everyone, States parties should give special attention to those individuals and groups who have traditionally faced difficulties in exercising this right, including women, children, minority groups, indigenous peoples, refugees, asylum seekers, internally displaced persons, migrant workers, prisoners and detainees. In particular, States parties should take steps to ensure that:

(a) Women are not excluded from decision-making processes concerning water resources and entitlements. The disproportionate burden women bear in the collection of water should be alleviated;

(b) Children are not prevented from enjoying their human rights due to the lack of adequate water in educational institutions and households or through the burden of collecting water. Provision of adequate water to educational institutions currently without adequate drinking water should be addressed as a matter of urgency;

(c) Rural and deprived urban areas have access to properly maintained water facilities. Access to traditional water sources in rural areas should be protected from unlawful encroachment and pollution. Deprived urban areas, including informal human settlements, and homeless persons, should have access to properly maintained water facilities. No household should be denied the right to water on the grounds of their housing or land status;

(d) Indigenous peoples' access to water resources on their ancestral lands is protected from encroachment and unlawful pollution. States should provide resources for indigenous peoples to design, deliver and control their access to water;

(e) Nomadic and traveller communities have access to adequate water at traditional and designated halting sites;

(f) Refugees, asylum-seekers, internally displaced persons and returnees have access to adequate water whether they stay in camps or in urban and rural areas.

Specific legal obligations

20. The right to water, like any human right, imposes three types of obligations on States parties: obligations to *respect*, obligations to *protect* and obligations to *fulfil*.

(a) Obligations to respect

21. The obligation to *respect* requires that States parties refrain from interfering directly or indirectly with the enjoyment of the right to water. The obligation includes, inter alia, refraining from engaging in any practice or activity that denies or limits equal access to adequate water; arbitrarily interfering with customary or traditional arrangements for water allocation; unlawfully diminishing or polluting water, for example through waste from State-owned facilities or through use and testing of weapons; and limiting access to, or destroying, water services and infrastructure as a punitive measure, for example, during armed conflicts in violation of international humanitarian law.

22. The Committee notes that during armed conflicts, emergency situations and natural disasters, the right to water embraces those obligations by which States parties are bound under international humanitarian law.²⁰ This includes protection of objects indispensable for survival of the civilian population, including drinking water installations and supplies and irrigation works, protection of the natural environment against widespread, long-term and severe damage and ensuring that civilians, internees and prisoners have access to adequate water.²¹

(b) Obligations to protect

23. The obligation to *protect* requires State parties to prevent third parties from interfering in any way with the enjoyment of the right to water. Third parties include individuals, groups, corporations and other entities as well as agents acting under their authority. The obligation includes, inter alia, adopting the necessary and effective legislative and other measures to restrain, for example, third parties from denying equal access to adequate water; and polluting and inequitably extracting from water resources, including natural sources, wells and other water distribution systems.

24. Where water services (such as piped water networks, water tankers, access to rivers and wells) are operated or controlled by third parties, States parties must prevent them from compromising equal, affordable, and physical access to sufficient, safe and acceptable water. To prevent such abuses an effective regulatory system must be established, in conformity with the Covenant and this General Comment, which

²⁰ For the interrelationship of human rights law and humanitarian law, the Committee notes the conclusions of the International Court of Justice in *Legality of the Threat or Use of Nuclear Weapons (Request by the General Assembly)*, ICJ Reports (1996) p. 226, para. 25.

²¹ See arts. 54 and 56, Additional Protocol I to the Geneva Conventions (1977), art. 54, Additional Protocol II (1977), arts. 20 and 46 of the third Geneva Convention of 12 August 1949, and common article 3 of the Geneva Conventions of 12 August 1949.

increasing the efficient use of water by end-users; (g) reducing water wastage in its distribution; (h) response mechanisms for emergency situations; (i) and establishing competent institutions and appropriate institutional arrangements to carry out the strategies and programmes.

29. Ensuring that everyone has access to adequate sanitation is not only fundamental for human dignity and privacy, but is one of the principal mechanisms for protecting the quality of drinking water supplies and resources.²⁴ In accordance with the rights to health and adequate housing (see General Comments No. 4 (1991) and 14 (2000)) States parties have an obligation to progressively extend safe sanitation services, particularly to rural and deprived urban areas, taking into account the needs of women and children.

International obligations

30. Article 2, paragraph 1, and articles 11, paragraph 1, and 23 of the Covenant require that States parties recognize the essential role of international cooperation and assistance and take joint and separate action to achieve the full realization of the right to water.

31. To comply with their international obligations in relation to the right to water, States parties have to respect the enjoyment of the right in other countries. International cooperation requires States parties to refrain from actions that interfere, directly or indirectly, with the enjoyment of the right to water in other countries. Any activities undertaken within the State party's jurisdiction should not deprive another country of the ability to realize the right to water for persons in its jurisdiction.²⁵

32. States parties should refrain at all times from imposing embargoes or similar measures, that prevent the supply of water, as well as goods and services essential for securing the right to water.²⁶ Water should never be used as an instrument of political

²⁴ Article 14, para. 2, of the Convention on the Elimination of All Forms of Discrimination Against Women stipulates States parties shall ensure to women the right to "adequate living conditions, particularly in relation to [...] sanitation". Article 24, para. 2, of the Convention on the Rights of the Child requires States parties to "To ensure that all segments of society [...] have access to education and are supported in the use of basic knowledge of [...] the advantages of [...] hygiene and environmental sanitation."

²⁵ The Committee notes that the United Nations Convention on the Law of Non-Navigational Uses of Watercourses requires that social and human needs be taken into account in determining the equitable utilization of watercourses, that States parties take measures to prevent significant harm being caused, and, in the event of conflict, special regard must be given to the requirements of vital human needs: see arts. 5, 7 and 10 of the Convention.

²⁶ In General Comment No. 8 (1997), the Committee noted the disruptive effect of sanctions upon sanitation supplies and clean drinking water, and that sanctions regimes should provide for repairs to infrastructure essential to provide clean water.

(c) To ensure physical access to water facilities or services that provide sufficient, safe and regular water; that have a sufficient number of water outlets to avoid prohibitive waiting times; and that are at a reasonable distance from the household;

(d) To ensure personal security is not threatened when having to physically access to water;

(e) To ensure equitable distribution of all available water facilities and services;

(f) To adopt and implement a national water strategy and plan of action addressing the whole population; the strategy and plan of action should be devised, and periodically reviewed, on the basis of a participatory and transparent process; it should include methods, such as right to water indicators and benchmarks, by which progress can be closely monitored; the process by which the strategy and plan of action are devised, as well as their content, shall give particular attention to all disadvantaged or marginalized groups;

(g) To monitor the extent of the realization, or the non-realization, of the right to water;

(h) To adopt relatively low-cost targeted water programmes to protect vulnerable and marginalized groups;

(i) To take measures to prevent, treat and control diseases linked to water, in particular ensuring access to adequate sanitation;

38. For the avoidance of any doubt, the Committee wishes to emphasize that it is particularly incumbent on States parties, and other actors in a position to assist, to provide international assistance and cooperation, especially economic and technical which enables developing countries to fulfil their core obligations indicated in paragraph 37 above.

IV. VIOLATIONS

39. When the normative content of the right to water (see Part II) is applied to the obligations of States parties (Part III), a process is set in motion, which facilitates identification of violations of the right to water. The following paragraphs provide illustrations of violations of the right to water.

40. To demonstrate compliance with their general and specific obligations, States parties must establish that they have taken the necessary and feasible steps towards the realization of the right to water. In accordance with international law, a failure to act in good faith to take such steps amounts to a violation of the right. It should be stressed that a State party cannot justify its non-compliance with the core obligations set out in paragraph 37 above, which are non-derogable.

54. Having identified appropriate right to water indicators, States parties are invited to set appropriate national benchmarks in relation to each indicator.²⁹ During the periodic reporting procedure, the Committee will engage in a process of “scoping” with the State party. Scoping involves the joint consideration by the State party and the Committee of the indicators and national benchmarks which will then provide the targets to be achieved during the next reporting period. In the following five years, the State party will use these national benchmarks to help monitor its implementation of the right to water. Thereafter, in the subsequent reporting process, the State party and the Committee will consider whether or not the benchmarks have been achieved, and the reasons for any difficulties that may have been encountered (see General Comment No.14 (2000), para. 58). Further, when setting benchmarks and preparing their reports, States parties should utilize the extensive information and advisory services of specialized agencies with regard to data collection and disaggregation.

Remedies and accountability

55. Any persons or groups who have been denied their right to water should have access to effective judicial or other appropriate remedies at both national and international levels (see General Comment No. 9 (1998), para. 4, and Principle 10 of the Rio Declaration on Environment and Development).³⁰ The Committee notes that the right has been constitutionally entrenched by a number of States and has been subject to litigation before national courts. All victims of violations of the right to water should be entitled to adequate reparation, including restitution, compensation, satisfaction or guarantees of non-repetition. National ombudsmen, human rights commissions, and similar institutions should be permitted to address violations of the right.

56. Before any action that interferes with an individual’s right to water is carried out by the State party, or by any other third party, the relevant authorities must ensure that such actions are performed in a manner warranted by law, compatible with the Covenant, and that comprises: (a) opportunity for genuine consultation with those affected; (b) timely and full disclosure of information on the proposed measures; (c) reasonable notice of proposed actions; (d) legal recourse and remedies for those affected; and (e) legal assistance for obtaining legal remedies (see also General

²⁹ See E. Riedel, “New bearings to the State reporting procedure: practical ways to operationalize economic, social and cultural rights – The example of the right to health”, in S. von Schorlemer (ed.), *Praxishandbuch UNO*, 2002, pp. 345-358. The Committee notes, for example, the commitment in the 2002 World Summit on Sustainable Development Plan of Implementation to halve, by the year 2015, the proportion of people who are unable to reach or to afford safe drinking water (as outlined in the Millennium Declaration) and the proportion of people who do not have access to basic sanitation.

³⁰ Principle 10 of the Rio Declaration on Environment and Development (*Report of the United Nations Conference on Environment and Development*, see footnote 5 above), states with respect to environmental issues that “effective access to judicial and administrative proceedings, including remedy and redress, shall be provided”.

BRIEFING PAPER

Hydraulic Fracturing in Coal Seam Gas Mining: The Risks to Our Health, Communities, Environment and Climate

Prepared by: Dr Mariann Lloyd-Smith and Dr Rye Senjen
February 2011

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 hydraulic drilling and fracturing chemicals ('fracking chemicals') used in the hydraulic drilling and fracturing of coal gas seams and gas shale extraction, until the fracking chemicals have been fully assessed for their health and environmental hazards by the industrial chemicals regulator, the National Industrial Chemical Notification and Assessment Scheme (NICNAS).

NTN's assessment 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 have been specifically assessed for their use in hydraulic drilling and fracking.

NTN demands that a comprehensive hazard assessment is carried out for all fracking chemicals used in Australia, including their risks to human health, ecotoxicology and environmental fate assessments (air emissions; releases to groundwater and watercourses), as well as a full costing of the long term public burden of the cleanup and remediation of contaminated areas and the impact on the increased landfill capacity needed to deal with the waste products created by these mining methods.

What is Hydraulic Fracturing?

Hydraulic fracturing or 'fracking' is the practice of using high-pressure pumps to inject a mixture of sand, water and chemicals into bore wells in order to fracture rocks and to open cracks ('cleats') present in the coal seams thereby releasing natural gas in the process. A well can be repeatedly 'fracked'.

The social and environmental impact of fracking is an emerging issue of concern around the world, including Australia. It has received widespread community attention in the USA, particularly since the release of the documentary film *Gasland*¹ and, it is also emerging as an important issue in Europe.

The social and environmental impacts of fracking cut across many issues including: climate change; sustainable/renewable energy; hazardous waste disposal; air, soil and water pollution; and, land and water use.

¹ See www.gaslandthemovie.com and www.gasland.com.au

Coal Seam Gas Exploration and Extraction in Australia

With the realities of climate change/chaos upon us, the scramble for sustainable energy sources is rapidly expanding. One potential source of energy in the Australian context is the extraction of gas from coal seam gas (CSG), shale gas, basin-centered gas and tight gas.

Until recently these types of gas were too expensive to extract and too difficult to produce, but technological 'innovations' such as 'fracking' have made this gas accessible and commercially viable.

Some commentators have compared this 'unconventional' gas extraction to a new gold rush and a way to ensure our energy future. It's estimated that up to 80% of all natural gas wells in the next 10 years will use fracking.²

CSG largely consists of methane and is bonded to the surface of coal particles. In comparison, natural gas is found in the space between grains of sandstone or similar types of rock.³ CSG typically contains very small amounts of other hydrocarbons (propane, butane).

While the interest in CSG stems from its high content of methane, it can also contain carbon dioxide (CO₂), and the amount of CO₂ can vary dramatically. For instance, the Illawarra Coal Measures in NSW may even contain predominantly carbon dioxide.⁴ This raises critical questions about CSG and its validity as a 'clean' source of energy for the future.

Australia's coal basin deposits, particularly in Queensland and NSW, contain large resources of CSG. Explorations are also occurring in the Perth and Tasmanian basins. It is estimated that these deposits will be larger than the combined conventional gas deposits of Bass Strait, the Cooper Basin and the North West Shelf.⁵

There are already a number of coal seam gas projects in Australia, chiefly in the Surat-Bowen basin in Queensland, but also in NSW. To give an indication of the scale of the proposed operations up to 20,000 - 40,000 wells could be drilled in the Surat and Bowen Basins in the next 20 years alone.^{6,7}

By October 2010 there were a reported 72 mining projects at an advanced stage, an increase of 21% since May 2010. Not all of these are CSG deposits, but they do include the development of BG Group's \$15 Billion Queensland Curtis Island LNG

² Hydraulic Fracturing for Natural Gas Development, Investor Environmental Health Network 2011 IEHN <http://iehn.org/overview.naturalgashydraulicfracturing.php>

³ Clark, A. (Dec 2010). Millionaires: not in our backyard. Australian Financial Review (AFR). Available at: http://www.afr.com/p/national/millionaires_not_in_our_backyard_E3sB01Jq0IRg0cYNsu4zvl

⁴ Coal bed methane- factsheet, Australian Mining Atlas. Available at http://www.australianminesatlas.gov.au/education/fact_sheets/coal_bed_methane.jsp

⁵ Ibid.

⁶ Queensland Government announces gas enforcement team. ABC Rural 23/11/2010. Available at <http://www.abc.net.au/rural/news/content/201011/s3074371.htm>

⁷ Growing concern over coal gas seam plant. ABC Tropical 23/11/2010. Available at: <http://www.abc.net.au/news/stories/2010/11/23/3073726.htm?site=tropic>

facility, which draws on CSG deposits.⁸ The plant will take coal seam gas from the Surat Basin and pipe it to Gladstone to be super-cooled to create Liquefied Natural Gas (LNG).⁹

Another project in Gladstone was approved in November 2010. The Australia Pacific LNG project is a joint venture between Origin and ConocoPhillips and is also proposing a coal seam gas (CSG) to liquefied natural gas (LNG) plant. It will involve the construction of a 450km gas transmission pipeline from the coal seam gas fields to an LNG plant in Gladstone, which will have a processing capacity of up to 18 million tonnes per annum.¹⁰

The financial, political and environmental stakes are high. In November 2010 the federal Minister for Sustainability, Environment, Water, Population and Communities approved \$35 billion worth of coal gas seam projects in Queensland alone, despite his own Department voicing concerns about the potential environmental implications of the projects to the Murray-Darling basin.^{11,12} *For a list of companies actively exploring and/or extracting CSG in Australia see Appendix 1.*

Shale Gas

Shale gas is another unconventional gas and is the type of gas that has fuelled the natural gas boom in the USA in the past decade. Interest in this type of gas has spread worldwide with exploration and drilling occurring in Asia, Europe and also Australia.

Shale gas is also produced by fracking. Shale is a fine-grained, sedimentary rock, which is essentially a mix of flakes of clay minerals and tiny bits of other minerals, especially quartz and calcite. The environmental issues associated with shale gas production are similar to CSG fracking.

Beach Petroleum has commenced exploratory drilling for shale gas in the Cooper Basin, South Australia.¹³

Is CSG a Sustainable Source of Energy?

The real environmental and social costs of CSG extraction have not been adequately assessed. According to a recent Cornell University assessment, "Natural gas obtained by the controversial technique of hydraulic fracturing may contribute significantly to greenhouse gas emissions and so should not be considered as a cleaner alternative to coal or oil."¹⁴

⁸ Clark, A. (Dec 2010). Millionaires: not in our backyard. AFR Available at:
http://www.afr.com/p/national/millionaires_not_in_our_backyard_E3sB01Jq0IRg0cYNsu4zvI

⁹ BG Group and Coal Seam Gas. Available at:
http://www.bg-group.com/OurBusiness/OurBusiness/Pages/BGGroup_and_CoalSeamGas.aspx

¹⁰ Media Release, Australian Pacific LNG project. Available at:
http://www.originenergy.com.au/files/APLNG_EIS_20101109.pdf

¹¹ <http://www.smh.com.au/environment/energy-smart/windsor-plans-new-coal-seam-gas-rules-to-protect-water-20101205-18lej.html>

¹² Clark, A. (Dec 2010). Millionaires: not in our backyard. AFR Available at:
http://www.afr.com/p/national/millionaires_not_in_our_backyard_E3sB01Jq0IRg0cYNsu4zvI

¹³ See www.beachenergy.com.au

¹⁴ Robert Howarth (2010) Preliminary Assessment of the Greenhouse Gas Emissions from Natural Gas obtained by Hydraulic Fracturing, http://www.damascuscitizens.org/GHGemissions_Cornell.pdf

Despite that fact that fracking chemicals have not been adequately assessed for their health and environmental impacts, there is concern that fracking chemicals may have significant negative impacts on the environment and surrounding communities.

For instance, toxic spills can occur and the air, soil and water can also be polluted with fracking chemicals as a by-product of the extraction process. Contamination of drinking water and the use and the destruction of productive farmland are also significant issues that also concern the community.

What is BTEX?

BTEX stands for benzene, toluene, ethylbenzene, xylene. BTEX compounds can contaminate soil and groundwater. BTEX chemicals are used in hydraulic fracturing and are commonly found in the products used in the drilling stage of hydraulic fracturing.

BTEX chemicals are also components of the volatile compounds found in coal gas seams. The fracking process itself can release BTEX from the natural-gas reservoirs, which allows them to penetrate into the groundwater aquifers or volatilise into air. As a consequence people may be exposed to BTEX by drinking contaminated water, breathing contaminated air or from spills on their skin.¹⁵

BTEX chemicals are hazardous in the short term causing skin irritation, central nervous system problems (tiredness, dizziness, headache, loss of coordination) and effects on the respiratory system (eye and nose irritation). Prolonged exposure to these compounds can also negatively affect the functioning of the kidneys, liver and blood system. Long-term exposure to high levels of benzene in the air can lead to leukemia and cancers of the blood.¹⁶

In October 2010, traces of BTEX chemicals were found at an Arrow Energy fracking operation in Queensland. Arrow Energy confirmed that benzene, toluene, ethylbenzene and xylene had been found in well water associated with its coal-seam gas operation at Moranbah, west of Mackay¹⁷.

An underground coal gasification project, a joint venture between Origin and the multinational ConocoPhillips, near Kingaroy Queensland, was also temporarily shut down when benzene and toluene were detected.¹⁸

Queensland has banned the use of BTEX chemicals in fracking fluids. The NSW Government recently announced it would examine banning the use of BTEX chemicals in 'situations which may pose risk to groundwater'.¹⁹

¹⁵ Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Interaction Profile for Benzene, Toluene, Ethylbenzene and Xylene (BTEX). U.S. Department of Health and Human Services, Public Health Service.

¹⁶ Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Interaction Profile for Benzene, Toluene, Ethylbenzene and Xylene (BTEX). U.S. Department of Health and Human Services, Public Health Service.

¹⁷ Contamination fear fails to stop project, <http://www.theaustralian.com.au/national-affairs/contamination-fear-fails-to-stop-project/story-fn59niix-1225950389968>

¹⁸ Cancer chemical found at western Queensland gas site, <http://www.couriermail.com.au/business/cancer-chemical-found-at-gas-site/story-e6freqmx-1225940922665>

¹⁹ Tough New Rules for Coal Seam Gas Exploration 19.12.2010 News Release, Premier of NSW

Are Fracking Fluids Safe?

“Chemicals are used at most stages of the drilling operation to reach and release the natural gas from gas coal seams – to drill the bore hole, to facilitate the actual boring, to reduce friction, to enable the return of drilling waste to the surface, to shorten drilling time, and to reduce accidents. After drilling has been completed, hydraulic fracturing is used to release the trapped gas by injecting approximately 2.5 million litres or more of fluids, loaded with toxic chemicals, underground under high pressure.”²⁰

Fracking fluid consists of water, sand and chemicals that are combined and injected into the coal seam at high pressure. The fracking fluid includes chemicals and additives that aid the fracturing process (e.g. viscosifiers, surfactants, pH control agents) as well as biocides that inhibit biological fouling and erosion.

Many of the chemicals and compounds that make up fracking fluids are either acutely toxic or have chronic toxicity to humans, animals and the environment. Companies, however, have argued that the full identity and composition of fracking fluids cannot be publicly disclosed as the information is a trade secret and involves commercial-in-confidence data.

A recent paper on the use of fracking chemicals²¹ lists nearly a thousand products involved in natural gas operations (including CSG) in the USA, but only a small percentage have CAS Registry Numbers²² listed on Material Safety Data Sheets (MSDS). Without a CAS number it is very difficult to search for health and environmental data about a chemical.

MSDS are also a limited source of information as they often only provide rudimentary human health data and little, if any, information on the environmental fate of the chemical or its effects on the environment and ecosystems. *For more information on MSDS see Appendix 2.*

Are Fracking Chemicals ‘Household Chemicals’?

Industry representatives that use fracking have made claims that fracking chemicals are safe because they are similar to ‘food additives’ and are used in ‘household products’. NTN believes these claims are misleading for several reasons.

There has been no comprehensive hazard assessment of the chemical mixtures used in fracking fluids and their impacts on the environment or human health. A number of the chemicals used in fracking fluids would never be permitted as food additives or in household products due to their toxicity. Industry secrecy about fracking fluids means it is impossible to know exactly what chemicals are being used in order to assess their safety (See Tables 1 & 2 below).

²⁰ Theo Colborn, Carol Kwiatkowski, Kim Schultz, Mary Bachran, Natural Gas Operations from a Public Health Perspective, *International Journal of Human and Ecological Risk Assessment*, September 4, 2010. Available at: http://www.endocrinedisruption.com/files/NaturalGasManuscriptPDF09_13_10.pdf

²¹ Theo Colborn, Carol Kwiatkowski, Kim Schultz, Mary Bachran, Natural Gas Operations from a Public Health Perspective, *International Journal of Human and Ecological Risk Assessment*, September 4, 2010. Available at http://www.endocrinedisruption.com/files/NaturalGasManuscriptPDF09_13_10.pdf

²² CAS registry numbers are unique numerical identifiers assigned by the Chemical Abstracts Service to every chemical described in the open scientific literature.

An analysis of the available environmental health data for 980 chemical products used in the gas industry in the USA found that²³:

- Less than 1% of the total composition of the product was reported on the MSDS for 421 of the 980 products (43%), Less than 50% of the composition was reported for 136 products (14%), and between 51% and 95% of the composition was reported for 291 (30%) of the products. Only 133 products (14%) had information on more than 95% of their full composition.
- A total of 649 chemicals were used in the 980 products. Specific chemical names and CAS numbers could not be determined for 286 (44%).
- Using health data identified on MSDSs, in government toxicological reports, and in the medical literature, health effects were identified for the remaining 362 chemicals with CAS numbers.
- Over 78% of the chemicals are associated with skin, eye or sensory organ effects, respiratory effects and gastrointestinal or liver effects. The brain and nervous system can be harmed by 55% of the chemicals. Symptoms include burning eyes, rashes, coughs, sore throats, asthma-like effects, nausea, vomiting, headaches, dizziness, tremors, and convulsions.
- Between 22% and 47% of the chemicals were associated with possibly longer-term health effects such as cancer, organ damage, and harm to the endocrine system.
- 210 chemicals (58%) are water-soluble while 131 chemicals (36%) are volatile; i.e., they can become airborne. Because they can be inhaled, swallowed, and also reach the skin, the potential for exposure to volatile chemicals is greater.
- Over 93% of the volatile chemicals can harm the eyes, skin, sensory organs, respiratory tract, gastrointestinal tract or liver, 86% can cause harm to the brain and nervous system and 72% can harm the cardiovascular system and blood, and 66% can harm the kidneys.

No Australian Assessment of Fracking Chemicals

Australia's industrial chemical regulator, the National Industrial Chemical Notification and Assessment Scheme (NICNAS), has assessed only 2 out of the 23 known compounds used in fracking fluids in Australia. Yet, hydraulic fracturing in Australia involves very large quantities of fracking fluids, with almost all of them not assessed for their safety.

Environmental authorisations by Queensland regulators identified that in one CSG operation, approximately 18,500kg of additives were to be used in each well during

²³ Chemicals in Natural Gas Operations, Health Effects Spreadsheet and Summary TEDX 2011, Available at <http://www.endocrinedisruption.com/chemicals.multistate.php>. The Endocrine Disruption Exchange (TEDX) maintains a publicly available database of the potential health effects of chemicals used during natural gas operations. It is available for download in an Excel file format for easy searching and sorting

the fracturing process, with only 60% recovered and up to 40%, i.e. 7,500kg of the fluids remaining in the formations²⁴

In 2010, a coal seam gas-drilling site near Lismore NSW, run by Metgasco, was permitted to use fracking after supplying only a generic list of hazardous materials safety guidelines.²⁵

Other companies claim they are already disclosing the content of their fracking fluids as they provide the required Material Safety Data Sheets (MSDS). However, the data provided by MSDS is often limited and often does not disclose the actual identity of the chemical substance.

Table 1. Chemicals Used in Fracking Fluids in Australia

Note: This list of chemicals and their uses was consolidated from the MSDSs provided by gas companies and verified by industry sources.

Additive Type	Main Compound(s)	Purpose
Diluted Acid	Hydrochloric Acid, muriatic acid	Dissolves minerals
Biocides	Glutaraldehyde, Tetrakis hydroxymethyl phosphonium sulfate /THPS	Eliminates bacteria in water
Breaker	Ammonium persulfate/ sodium persulfate	Delayed break gel polymer
Corrosion Inhibitor	n,n-dimethyl formamide, mixtures of methanol, naphthalene naptha, nonyl phenol and secret data	Asset protection
Friction Reducer	Mineral oil	Reduces friction
Gel	Guar gum	Thickens water
Iron Control	Citric acid	Prevent metal oxides
KCl	Potassium chloride	Brine solution
pH Adjusting Agent	Sodium or potassium carbonate	Maintains pH
Scale Inhibitor	Ethylene glycol	Prevents scale deposits in pipe
Surfactants	Isopropanol	Affects viscosity of fluid
Crosslinker	Ethylene glycol	Viscosity of fracking fluid

²⁴ Reference supplied on request

²⁵ <http://www.smh.com.au/environment/toxins-found-at-third-site-as-fracking-fears-build-20101118-17zfv.html>

Table 2. NICNAS Status of Chemicals Used in Fracking Fluids

Note: The following list was compiled from MSDS provided by three companies involved in hydraulic fracturing in Queensland and NSW.

Chemical	CAS RN	AICS Status*
Tetramethylammonium Chloride	75-57-0	Pub/NA
Potassium carbonate	584-08-7	Pub/NA
Methanol	67-56-1	Pub/NA
Isopropanol	67-63-0	Pub/NA
Propargyl alcohol	107-19-7	Pub/NA
Formamide	75-12-7	Pub/NA
Ethoxylated 4-nonylphenol	26027-38-3	Pub/NA
Heavy aromatic naphtha	64742-94-5	Pub/NA
Pine oil	8002-09-3	Pub/NA
Naphthalene	91-20-3	Pub/NA; PEC Candidate list
Citric acid anhydrous	77-92-9	Pub/NA
Hemicellulase Enzyme Concentrate	9025-56-3	Pub/NA
Tetrakis(Hydroxymethyl) Phosphonium Sulphate	55566-30-8	Pub/NA
Sodium persulfate	7775-27-1	Pub/NA; Declared PEC
Guar gum	9000-30-0	Pub/NA
Ethylene glycol	107-21-1	Pub/NA
Sodium hydroxide	1310-73-2	Pub/NA
Diethylene glycol	111-46-6	Pub/NA
2-Bromo-2-nitro-1,3-propanediol	52-51-7	Pub/NA
Alcohols, C12-14	80206-82-2	Pub/NA
Tris(2-hydroxyethyl) amine	102-71-6	Pub/NA; PEC Candidate list
2-Butoxyethanol	111-76-2	Pub/Ass; Declared PEC
Cristobalite (silica)	14464-46-1	Pub/NA

*AICS = Australian Inventory of Chemical Substances; Pub = public AICS; NA = not assessed; Ass = assessed; PEC = priority existing chemical

Other chemicals listed in fracking chemical products without CAS Numbers include:

- Alkanes / Alkenes (Multiple CAS)
- Oxyalkylated alcohol(s)
- Fatty alcohol
- Oxyalkylated alkanolamine(s)
- Silicone(s)
- Surfactant(s)

Health and Environmental Risks of Some Fracking Chemicals

Note: The following information was compiled from publically available sources including International Program on Chemical Safety, INCHEM www.inchem.org, US Agency for Toxic Substances & Disease Register www.atsdr.cdc.gov, Material Safety Data Sheets and NICNAS literature. Health data and sources for 560 fracking chemicals is available for download at <http://www.endocrinedisruption.com/chemicals.multistate.php>

Tetrakis(hydroxymethyl)phosphonium sulfate (THPS)

Tetrakis(hydroxymethyl)phosphonium sulfate (THPS) acts as a biocide, that is a chemical that is toxic to the microorganisms and is used as anti-fouling agent. Little is known about the effects of THPS's break down products, but THPS has been shown to produce mutations in mouse lymphoma cells and increase the frequency of chromosomal aberrations in Chinese hamster ovary cells.²⁶ THPS has also shown some mutagenic potential in lab animals but has not been fully assessed for cancer. Repeated dermal exposure of rats resulted in severe skin reaction. As no exposure information is available for either humans or organisms in the environment, no quantitative risk assessment can be made.²⁷

Sodium Persulfate

Exposure to Sodium Persulfate via inhalation or skin contact can cause sensitization, i.e., after initial exposures individuals may subsequently react to exposure to very low levels of that substance. Exposure to Sodium Persulfate can cause skin rashes and eczema as well as allergies that may develop after repeated exposures. Sodium Persulfate is irritating to eyes and respiratory system and long-term exposure may cause changes in lung function i.e. pneumoconiosis resulting in disease of the airways.

Ethylene Glycol

Exposure to ethylene glycol via inhalation or skin contact can irritate the eyes, nose and throat. It is a human respiratory toxicant. Among female workers, exposures to mixtures containing Ethylene Glycol were associated with increased risks of spontaneous abortion and sub-fertility. Ethylene glycol is a teratogen (i.e., an agent that causes malformation of an embryo or foetus) in animal tests and showed positive mutation results in tests on mammalian cells indicating cancer potential. Ethylene Glycol is on the U.S. EPA list of 134 priority chemicals to be screened as an

²⁶ NTP Study Reports, Abstract for TR-296 - Tetrakis(hydroxymethyl)phosphonium sulfate (THPS) (CASRN 55566-30-8) and Tetrakis(hydroxymethyl)phosphonium chloride (THPC) (CASRN 124-64-1)

²⁷ Environmental Health Criteria 218 Flame Retardants: TRIS(2-BUTOXYETHYL) PHOSPHATE, TRIS(2-ETHYLHEXYL) PHOSPHATE and TETRAKIS(HYDROXYMETHYL) PHOSPHONIUM SALTS United Nations Environment Programme, the International Labour Organisation, and the World Health Organization, and produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals. World Health Organization Geneva, 2000

endocrine disrupting substance (EDC).

2-Butoxyethanol

2-butoxyethanol was declared a Priority Existing Chemical (PEC) under Australia's regulatory National Industrial Chemicals Notification and Assessment Scheme.²⁸ The assessment of 2-butoxyethanol showed it is highly mobile in soil and water and has been detected in aquifers underlying municipal landfills and hazardous waste sites in the US. It is recommended that waste 2-butoxyethanol not be disposed of to landfill because of its high mobility, low degradation and its demonstrated ability to leach into and contaminate groundwater.

While high doses of 2-butoxyethanol can also cause reproductive problems and minor birth defects in animals, it is not known whether 2-butoxyethanol can affect reproduction or cause birth defects in humans. Animal studies have shown hemolysis (destruction of red blood cells that results in the release of hemoglobin) from exposure to 2-butoxyethanol. The International Agency for Research on Cancer has not classified 2-butoxyethanol as to its human carcinogenicity as no carcinogenicity studies are available.

Ethoxylated 4-nonylphenol

Ethoxylated 4-nonylphenol (NPE) is a persistent bioaccumulative endocrine disruptor, which has been detected widely in wastewater and surface waters across the globe. Canada classified NPE metabolites as toxic.²⁹ The European Union classifies nonylphenol as very toxic to aquatic organisms, which may cause long-term adverse effects in the aquatic environment.³⁰

In the aquatic environment, NPE metabolites can cover organisms with a soap-like coating that inhibits them from moving and causes the organism to become stupefied and lose consciousness. NPE metabolites also disrupt normal hormonal functioning in the body and thus are considered endocrine disrupting chemicals. NPE metabolites mimic the natural hormone estradiol and bind to the estrogen receptor in living organisms. Exposure to NPE metabolites change the reproductive organs of aquatic organisms.³¹ Sexual deformities were found in oyster larvae exposed to levels of NP that are often present in the aquatic environment.³² A 2005 study also found that exposure to NP increases the incidence of breast cancer in lab mice.³³ The intermediary chemicals formed from the initial degradation of NPEs are much more persistent than the original compound.

²⁸ Declared Priority Existing Chemical (PEC). Full report at www.nicnas.gov.au/Publications/CAR/PEC/

²⁹ Environment Canada 2001 Nonylphenol and its Ethoxylates: Priority Substance Lists Assessment Report. Minister of Public Works and Government Services

³⁰ European Union 4-Nonylphenol (branched) and Nonylphenol Risk Assessment Report. Institute for Health and Consumer Protection, European Chemicals Bureau Volume 10,

³¹ Gray, M., and C. Metcalfe. 1997. Induction of Testis-Ova in Japanese Medaka (*Oryzias Latipes*) Exposed to p-Nonylphenol. *Environmental Toxicology and Chemistry*, No. 16, Issue 5, p. 1082.

³² Nice, H., D. Morritt, M. Crane and M. Thorndyke. 2003. Long-term and Transgenerational Effects of Nonylphenol Exposure At a Key stage in the Development of *Crassostrea gigas*. Possible Endocrine Disruption?

Marine Ecology Progress Series, Vol. 256, p. 293.

³³ Acevedo, R., P. Parnell, H. Villanueva, L. Chapman, T. Gimenez, S. Gray, and W. Baldwin. 2005. The Contribution of Hepatic Steroid Metabolism to Serum Estradiol and Estriol Concentrations of Nonylphenol Treated MMTVneu Mice and Its Potential Effects on Breast Cancer Incidence and Latency. *Journal of Applied Toxicology* Volume 25, Issue 5, pages 339–353, September/October 2005

Naphthalene

Based on the results from animal studies, which demonstrated nasal and lung tumours in lab animals, the International Agency for Research on Cancer (IARC) concluded that naphthalene is a possible human carcinogen, and the US Department of Health and Human Services (DHHS) concluded that naphthalene is reasonably anticipated to be a human carcinogen.

Naphthalene causes lung toxicity in mice, either by injection or inhalation. Acute and chronic exposure to naphthalene caused nasal toxicity in both mice and rat.

Naphthalene can cause cataracts in humans, rats, rabbits and mice. Animal studies suggest that naphthalene is readily absorbed following oral or inhalation exposure.

Although no data are available from human studies on absorption of naphthalene, the detection of metabolites in the urine of workers indicates that absorption does occur, and there is a good correlation between exposure to naphthalene and the amount of 1-naphthol excreted in the urine.

Humans accidentally exposed to naphthalene by ingestion develop haemolytic anaemia (damage or destruction of red blood cells). Symptoms of hemolytic anemia include fatigue, lack of appetite, restlessness, and pale skin. Exposure to large amounts of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin.

Isopropanol

Isopropanol is reproductive toxin and irritant. It is a central nervous system depressant and prolonged inhalation exposure of rats can produce degenerative changes in the brain.³⁴

Formamide

Formamide is a teratogen with the potential to affect the unborn child. The substance is irritating to the eyes and the skin and may cause effects on the central nervous system. It can be absorbed into the body by inhalation, through the skin and by ingestion. It is harmful by all exposure routes.

Other Risks Associated with CSG Fracking

There are other chemical risks associated with the extraction and production of coal seam gas. These include:

Ozone

Ozone is produced by fugitive emissions mixing with nitrogen oxides from the exhaust of diesel-driven, mobile and stationary equipment to produce ground-level ozone. Ozone combined with particulate matter less than 2.5 microns produces smog (haze). Gas field produced ozone in the USA has created a serious air pollution problem similar to that found in large urban areas, and can spread large distances (up to approx. 300km) beyond the immediate region where gas is being produced.³⁵

³⁴ International Agency for Research on Cancer (IARC) - Summaries & Evaluations ISOPROPANOL

³⁵ The Endocrine Disruption Exchange <http://www.endocrinedisruption.com/chemicals/introduction.php>

Evaporation ponds

Extraction of CSG typically involves pumping the water used in the extraction process plus any associated fracking fluid into large ponds for evaporation. These ponds may cover a large area and will subsequently need to be remediated and rehabilitated.

The water is typically saline and should the ponds fail (e.g. leak) surrounding soil quality and vegetation could be compromised or in the worst case destroyed. If pond liners fail, it could also contribute to aquifer contamination with chemicals and saline water. If ponds are flooded, their contaminants are released to surface water.

Evaporative ponds will inevitably result in the transfer of chemical pollutants into the atmosphere either in gas or particle phase.

Produced water

Gas companies in Australia are now developing and/or operating plants to treat the 'produced water' (for instance using reverse osmosis) and to on sell it to farmers for irrigation, domestic drinking water supply or cooling of power stations. However, reverse osmosis filtration has significant limitations and may not be successful in removing all contaminants.³⁶ The Queensland Gas Company (QGC) will open a water treatment facility in the Western Downs region in October 2011. The \$350 million facility will treat 100 megalitres of water used at the Chinchilla gas processing plant. It is unknown what the company will do with the 200 tonnes of salt produced a day, but a company representative has said, "Dumping it will be a last resort".³⁷

Flare stacks and flare pits

Gas flare or flare stacks are used in gas wells (and chemical plants, landfills, oil wells etc.) to 'dispose' of waste gas. Flares act as a safety system to manage excess gas pressure and can be used in an emergency to help burn off excess gas. Gas flares contribute significantly to local air pollution and flares are a significant global contributor to greenhouse gas emissions (0.5% of all anthropogenic carbon dioxide emissions).³⁸ Over 250 toxins have been identified as being released from flaring including carcinogens such as benzopyrene, benzene, carbon di-sulphide (CS₂), carbonyl sulphide (COS) and toluene; metals such as mercury, arsenic and chromium; sour gas with H₂S and SO₂; nitrogen oxides (NO_x); carbon dioxide (CO₂); and methane (CH₄) which contributes to the greenhouse gases.³⁹

Flare pits are the earthen pits constructed beneath the flare stacks to contain any fluids produced from the flaring of the gas associated liquid hydrocarbons and brine water. The soil surrounding these pits is typically hydrocarbon and salt contaminated. These fluids mix with other toxic chemicals and are hazardous to birds and wildlife. Wildlife may die from the inhalation of toxic hydrogen sulphide gas (if the

³⁶ See A. Bbdalo-Santoyo, J.L. Gbmez-Carrasco, E. Gbmez-Gbmez, M.F. M&no-Martin, A.M. Hidalgo-Montesinos Spiral-wound membrane reverse osmosis and the treatment of industrial effluents. *Desalination* 160 (2004) 15-1-58: Also see Lianfa Song, J.Y. Hu, S.L. Ong, W.J. Ng, Menachem Elimelech, Mark Wilf Performance limitation of the full-scale reverse osmosis process. *Journal of Membrane Science* 214 (2003) 239-244

³⁷ Farms to get treated coal seam gas water, Sam Burgess and Fidelis Rego ABC News 29/11/2010 Available <http://www.abc.net.au/news/stories/2010/11/29/3079368.htm>

³⁸ Global, Regional, and National CO₂ Emissions. In *Trends: A Compendium of Data on Global Change*, Marland, G., T.A. Boden, and R. J. Andres, 2005, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee.

³⁹ Canadian Public Health Association, Background to 2000 Resolution No. 3 Available at

<http://www.climatelaw.org/cases/country/nigeria/cases/casedocuments/nigeria/report/section7/doc7.1.pdf>

flare igniter is faulty), or by direct incineration in the flare stack. At minimum, antiperching devices for birds should be installed.⁴⁰

Hazardous waste disposal

Concentrated hazardous wastes from evaporation ponds need to be disposed of to an appropriate licensed facility. This adds significant demands on regional waste management capacity (e.g. landfills).

Radioactive tracers

Radioactive tracers are used with various types of propane that include resin coated sand and man made ceramics (eg polymers, nanomaterials) which can be retained in the produced water.

Risk Assessments and the Effects of Fracking Fluids

The Queensland Environmental Protection Act of 1994 (S310D) calls for companies to provide a complete inventory of chemicals, full toxicity data including mixture toxicity and a risk assessment. Relevant authorities acknowledge however that not all chemicals can be assessed because some are commercial secrets, and even those that are disclosed, have very little data available.

Only 2 out of 23 of the known fracking chemicals have been assessed by the regulator of industrial chemicals NICNAS, and neither was assessed for its use in CSG fracturing. There have been no requirements imposed for monitoring to assess long term impacts of fracking chemicals.

Risk assessments of fracking fluids have generally failed to include adequate assessment of:

- Air emissions (eg volatile organic compounds) produced by fracturing chemicals
- The impact of the release of BTEX from the coal seam
- The impact of potential break down products or intermediates from fracking chemicals
- The endocrine disrupting potential of contaminants (of concern as impacts occur at very low levels)
- The combined effect of the mixture of chemicals on human health and the environment, especially water contamination
- Lack of life cycle assessment of fracking fluids.

⁴⁰ See: http://www.fws.gov/mountain_prairie/contaminants/contaminants1f.html
Contaminant Issues - Oil Field Waste Pits. US Fish and Wildlife Service

APPENDIX 1.

Some of the companies actively exploring and/or extracting CSG in Australia include:

Note: this is an indicative list of companies at the time of writing. Companies may cease exploration or expand exploration as required. 41,42

- Santos Ltd - Surat and Bowen Basins
- Origin Energy - Surat and Bowen Basins
- Westside corporation (<http://www.westsidecorporation.com/>) - Bowen Basin.
- Queensland Gas Company - Surat Basin
- Sunshine Gas Ltd - Surat and Bowen Basins
- Arrow Energy NL - Surat and Bowen Basins, Clarence-Moreton Basins
- Molopo Australia Ltd - Gloucester, Bowen and Clarence-Moreton Basins
- Blue Energy Pty Ltd - Bowen, Surat and Maryborough Basins
- Magellan Petroleum Australia - Maryborough Basin
- Red Sky Energy - Clarence-Moreton Basins
- Metgasco Ltd - Clarence-Moreton Basin
- AGL(agl.com.au): Gloucester Basin
- Sydney Gas Ltd - Sydney Basin
- Eneabba Gas Ltd - Perth Basin
- Pure Energy Resources Ltd - Bowen, Duaringa, Surat and Tasmania Basins
- Comet Ridge Ltd - Bowen, Galilee and Gunnedah Basins
- Planet Gas Ltd - Gippsland, Eromanga, Wilochra, Gunnedah and Otway Basins
- Eastern Star Gas – Otway Basin, Gunnedah Basins (Narabi Coal Seam project)
- Westralian Gas and Power Ltd - Perth, Collie and Wilga Basins
- Central Petroleum Ltd - Pedirka Basin
- Rey Resources Ltd - Canning Basin
- Red Sky Energy – numerous basins In NSW, Northern Territory and Queensland are being explored

⁴¹ Coal bed methane- factsheet, Australian Mining Atlas Available at http://www.australianminesatlas.gov.au/education/fact_sheets/coal_bed_methane.jsp

⁴² Coal Seam Gas Factsheet. Australian Mining Atlas Available at http://www.australianminesatlas.gov.au/education/fact_sheets/coal_seam_gas.jsp

APPENDIX 2: MSDS Supplementary Information

To download *The National Code of Practice for the Preparation of Material Safety Data Sheets* go to: www.safeworkaustralia.gov.au/AboutSafeWorkAustralia/WhatWeDo/Publications/Pages/CP2003MaterialSafetyDataSheets2ndEdition.aspx

Material Safety Data Sheets (MSDS)

The MSDS National Code

The National Occupational Health and Safety Commission (NOHSC) has produced *The National Code of Practice for the Preparation of Material Safety Data Sheets*, 2nd Edition 2003, which has been adopted as a Code of Practice under some state legislation. The application of the code is the prerogative of that State or Territory. MSDS are controlled by the hazardous substances and dangerous goods Acts in each state and territory.

(*The Workplace Health and Safety Regulation 2008* and the *Workplace Health and Safety Act 1995* provide a framework for managing health and safety risks in Queensland workplaces. The regulation sets out the legal requirements to prevent or control certain hazards, which might cause injury or death in the workplace.)

While an MSDS is not required for substances not classified as hazardous, there is often a legislative requirement to provide hazard information.

Hazardous Substances

The Code applies to hazardous substances and dangerous goods.

"A material is classified as hazardous and/or dangerous if it is:

(a) classified as hazardous according to the latest edition of the NOHSC *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008] and is above the cut-off concentration criteria for being classified as a hazardous substance;

(b) specified in the NOHSC *List of Designated Hazardous Substances* [NOHSC:10005];

(c) classified for physicochemical hazards according to the ADG Code (including class(es), subsidiary risk(s), Packing Group, Proper Shipping Name and UN Number); and/or

(d) specified as dangerous in the ADG Code or determined by the Competent Authorities. "

Under the code, Australia MSDS are based on 16 part data sheet, all sections of an MSDS need to be completed. Where information relevant to a particular section is not available, the MSDS should state 'Not available'.

Acceptability of Overseas MSDS

Currently, MSDS prepared overseas are accepted by Commonwealth, State and Territory legislation if they meet the following requirements:

The MSDS is prepared in accordance with this code including the provision of the following information:

- (i) Australian contact details – name of supplier, address and telephone number, including emergency contact details (see section 6.1);
- (ii) classification in accordance with the Australian hazardous substance and Dangerous Goods regulatory framework
- (iii) ingredient disclosure as required by Commonwealth, State and Territory legislation (see section 6.3);
- (iv) national exposure standard value if available (see section 6.8); and
- (v) relevant additional Australian regulatory information (see section 6.15).

New Zealand is in the process of harmonizing their MSDS with Australia. Their MSDSs also adhere to the 16 sections and are based on the UN GHS classification. Overall, they are a much more detailed and useful documents.

MSDS must be updated or reviewed:

- whenever there is new information on changes to hazardous properties of the product;
- whenever there is a formulation change;
- often enough to keep it up to date; and
- at least every five years.



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Aquifers

Environmental rules for aquifers

The environmental provisions in the groundwater sharing plans are based on:

1. protecting the long-term storage component of each aquifer
2. reserving 95-100 per cent of the average annual recharge in high conservation areas, such as national parks and nature reserves, for the environment
3. reserving a proportion of the average annual recharge in the remaining part of the aquifer for the environment

In addition there are provision in the *Water Management Act 2000* (in section 324) to set local restrictions on pumping at certain times to protect the environment eg if water level drawdowns below a specified level are occurring or water quality is declining. Distance limits are also set between bores and groundwater dependent ecosystems. These distances are based on the aquifer type and the nature of the dependent ecosystem.

Over the long-term, reducing the storage of an aquifer, that is permanent mining of the resource, could affect its stability and integrity, and could cause land subsidence. The aim of the water sharing plans is to ensure that this does not occur. In addition the volume of water, usually from infiltration of rainfall or river flows, that enters or recharges the groundwater system each year is important for replenishing supplies and supporting dependent ecosystems. As a result, based on the extent of the groundwater dependent ecosystems, a proportion of the recharge is allocated to the environment and the remaining proportion defined as the long term average extraction limit (or "sustainable yield") – that is the amount of groundwater that can be extracted.

In some groundwater systems in NSW, the water allowed to be extracted (that is, the current licensed entitlement) is more than the sustainable yield of the aquifer. These water sharing plans include a process for reducing total entitlements in any over-committed groundwater system to the sustainable yield over the ten years of the plan. This is mainly the case in the plans finalised in 2006 to 2008 for the major inland alluvial aquifers – the Upper and Lower Namoi, Lower Gwydir, Lower Macquarie, Lower Lachlan, Lower Murrumbidgee and Lower Murray groundwater systems. To assist licence holders in adjusting to reduced entitlements, a program of financial assistance known as the Achieving Sustainable Groundwater Entitlements Program was developed for these aquifers.

More information

- [How the changes will affect licence holders](#) (PDF 239 KB)
- [Financial assistance](#) (PDF 259 KB)



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3. Groundwater-surface water connectivity

Groundwater-surface water connectivity

Although it is not always apparent, surface water in many rivers, dams, lakes and wetlands is connected to underground water resources in aquifers. There are several different examples of these connections:

- groundwater can contribute to base flows in streams when it is discharged from aquifers.
- surface water can recharge groundwater resources when it seeps down into aquifers.
- extraction bores can affect surface water stream flows, even if they are tens of kilometres away from the stream.

This connectivity means that issues such as over-extraction, environmental flows and river salinity could impact on the water quantity and quality in both ground and surface water systems.

"The Commission considers that unless and until it can be demonstrated otherwise, surface water and groundwater resources should be assumed to be connected, and water planning and management of the resources should be conjunctive. This is the reverse of the current situation."

- Biennial Assessment 2009 -

Managing connected systems

Traditionally groundwater and surface water have been managed separately in Australia. This has led to the same water being recorded twice - once in the groundwater management plan, and again in the surface water management plan. This has contributed to the overallocation of water resources.

Another difficulty in managing connected systems is that it takes some time for the effects of taking water from one system to be apparent in the other. While the impacts of groundwater extraction on stream flows can be virtually instantaneous in some systems, in others the impacts may take decades.

There's now concern that groundwater extractions over the past decades will result in reduced surface stream flows in some areas, although how much the flows will be reduced and how long this will take to occur is not clear.

An area of particular concern is the Murray-Darling Basin, where groundwater extractions have increased dramatically following the 1997 cap on surface water diversions.

Groundwater-surface water connectivity and water reform

Groundwater and surface water resources are intimately linked. Although we are still unclear as to the extent of these interconnections, they have important implications for management of both ground and surface water resources. It is critical that we build the knowledge and capacity needed to jointly manage these resources.

The National Water Initiative recognises the connectivity between surface and groundwater resources and requires connected systems to be managed as a single resource.

In its 2009 Biennial Assessment of progress against the National Water Initiative, the Commission found that although good progress is being made, more work is needed to complete the identification and integrated management of connected surface water and groundwater resources across Australia.

To mitigate the risks to the water resource, the Commission considers that unless and until it can be demonstrated otherwise, surface water and groundwater resources should be assumed to be connected, and water planning and management of the resources should be conjunctive. This is the reverse of the current situation.

Addressing groundwater quality issues

The National Groundwater Assessment Initiative under the Groundwater Action Plan provides for investment in managing risks to groundwater quality.

Related information:

- [National Water Initiative](#)
- [Biennial assessments](#)
- [Groundwater Action Plan](#)
- [Australian Water Resources 2005: Groundwater-surface water interactions and implications](#)

External links

- [Connected Waters \(University of NSW\)](#)
- [Connected Water \(Bureau of Rural Sciences\)](#)

Last updated 14 Jan 2011



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5. coal seam gas

The Coal Seam Gas and water challenge: National Water Commission position

December 2010

The Coal Seam Gas (CSG) industry offers substantial economic and other benefits to Australia. At the same time, if not adequately managed and regulated, it risks having significant, long-term and adverse impacts on adjacent surface and groundwater systems. In light of the scale of potential benefits and associated risks, the National Water Commission is highlighting the need for appropriate management of CSG developments, consistent with the objectives of the National Water Initiative (NWI).

To meet NWI objectives, the Commission recommends that industry, water and land-use planners, and governments adopt a precautionary approach to CSG developments, ensuring that risks to the water resource are carefully and effectively managed.

Current projections indicate the Australian CSG industry could extract in the order of 7,500 gegalitres of co-produced water from groundwater systems over the next 25 years, equivalent to ~300 gegalitres per year. In comparison, the current total extraction from the Great Artesian Basin is approximately 540 gegalitres per year.

Potential impacts of CSG developments, particularly the cumulative effects of multiple projects, are not well understood.

Potential risks to sustainable water management

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

In addition to these water management risks, CSG development could also cause significant

social impacts by disrupting current land-use practices and the local environment through infrastructure construction and access.

The Commission is concerned that CSG development represents a substantial risk to sustainable water management given the combination of material uncertainty about water impacts, the significance of potential impacts, and the long time period over which they may emerge and continue to have effect. Therefore, an adaptive and precautionary management approach will be essential to allow for progressive improvement in the understanding of impacts, including cumulative effects, and to support timely implementation of 'make good' arrangements.

CSG and the National Water Initiative

Under clause 34 of the NWI, the signatory governments agreed that there may be special circumstances facing the petroleum and minerals sectors that need to be addressed by policies and measures beyond the scope of the NWI Agreement. In this context, all governments noted that specific project proposals would be assessed according to environmental, economic and social considerations, and that factors specific to resource development projects (such as isolation, relatively short project duration, water quality issues, and obligations to remediate and offset impacts) may require specific management arrangements outside the scope of the NWI.

Progress on CSG related reforms

In its 2009 Biennial Assessment of national water reform progress, the Commission found that the circumstances in which special clause 34 would apply are not defined and identified in a consistent and transparent manner. Little progress had been made in the five years since the signing of the NWI in fleshing out the special provisions for the minerals, petroleum and related industries. As a consequence, there has been little integration of those industries with broader water markets and water planning processes, despite the potential for considerable benefits in many cases.

The potential impacts of CSG extraction are currently managed through state and territory laws and policies, including environmental approval processes with subsequent conditions or special arrangements often implemented to mitigate risks to the environment and communities. These conditions are set by the approving authority which can be a state government minister or appointed official. In certain circumstances, the Commonwealth Minister for the Environment will have a role in approving and setting conditions for projects under the *Commonwealth Environment Protection and Biodiversity Conservation Act*. While these processes have the capacity to address many of the issues relating to water and CSG development, they are often not well integrated with state and territory water planning and management arrangements.

The Commission's work on CSG

The Commission is completing a discussion paper on CSG water issues and potential impacts to provide useful background information for regulators, water managers and other water users. A \$1.8 million *Potential local and cumulative effects of mining on groundwater resources* project funded by the Commission is also developing tools and guidelines to account for potential local and cumulative effects of mining on groundwater resources. These guidelines and tools are intended to assist in the management of CSG.

Principles for managing CSG and water

The Commission believes that wherever there is potential for significant water resource impacts, CSG activities should be incorporated into NWI consistent water planning and management regimes from their inception. Given the high level of uncertainty around water impacts, and the temporal nature of CSG developments, this will likely require a precautionary approach that demands innovation from water managers and planners, and

significantly greater coordination with existing project approval processes. Specifically, the Commission proposes the following principles be applied by state and territory jurisdictions to managing the cumulative impacts of CSG water:

- The interception of water by CSG extraction should be licensed to ensure it is integrated into water sharing processes from their inception.
- Project approvals should be transparent, including clear and public articulation of predicted environmental, social and economic risks along with conditions implemented to manage the risks.
- Adequate monitoring, including baseline assessment of surface and groundwater systems, should be undertaken to provide a benchmark for assessing cumulative impacts on other water users and water-dependent ecosystems.
- Jurisdictions should work to achieve consistent approaches to managing the cumulative impacts of CSG extraction. Such arrangements should consider and account for the water impacts of CSG activities in water budgets and manage those impacts under regulatory arrangements that are part of, or consistent with, statutory water plans and the National Water Initiative.
- Potential options to minimise the cumulative impacts of extraction on the water balance should be pursued as a first priority. These options include aquifer reinjection, where water quality impacts are acceptable, and groundwater trading or direct substitution for other water use.
- If discharges to surface waters are unavoidable, discharges should be conditioned so that environmental values and water quality objectives, including water quality to meet public health objectives, are protected. In such circumstances discharges to ephemeral streams should be pulsed to avoid flows in naturally dry periods.
- Jurisdictions should undertake water and land-use change planning and management processes in an integrated way to ensure that water planning implications of projects are addressed prior to final development approval.
- Clear accountabilities should be identified for any short- or long-term cumulative impacts from CSG processes, clarifying which organisations are responsible for managing and rectifying or compensating for any impacts.
- The full costs, including externalities, of any environmental, social and economic water impacts and their management should be borne by the CSG companies. This includes, if not already in place, mechanisms such as bonds and sureties that deal with uncertainty and the timeframes associated with potential impacts. Given that these timeframes may extend for 100 or more years, current systems need to be re-evaluated.
- A precautionary and adaptive approach to managing and planning for CSG activities is essential to enable improved management in response to evolving understanding of current uncertainties. This includes impacts such as long-term reductions in adjacent aquifer pressures and levels, and impacts on environmental assets that are not adequately protected by current 'make good' mechanisms.
- Water produced as a by-product of CSG extraction, that is made fit for purpose for use by other industries or the environment, should be included in NWI-compliant water planning and management processes. This will enable CSG producers to manage this resource in accordance with the principles of the National Water Initiative.

The consequences of not managing the water risks and uncertainties associated with the economic benefits of CSG are substantial. Therefore, the Commission strongly argues for the careful, transparent and integrated consideration of water-related impacts in all approval processes.

The Commission's position is that NWI-consistent water access entitlements should be made available to coal seam gas activities wherever possible, as the use of Clause 34 of the NWI is only intended to operate in exceptional circumstances. Where Clause 34 is used, a clear and transparent explanation of why it was used, rather than complying with the normal water

The Commission's position is that NWI-consistent water access entitlements should be made available to coal seam gas activities wherever possible, as the use of Clause 34 of the NWI is only intended to operate in exceptional circumstances. Where Clause 34 is used, a clear and transparent explanation of why it was used, rather than complying with the normal water planning and management regime, should be provided.

Document for download

 [The Coal Seam Gas and water challenge: National Water Commission position \(303KB\)](#)
Last updated 3 Dec 2010



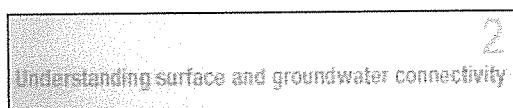
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5. [Biennial Assessment - 2009](#)
6. Chapter 2 - Understanding surface and groundwater connectivity

Australian Water Reform 2009

Second biennial assessment of progress in implementation of the National Water Initiative EXECUTIVE SUMMARY



The NWI parties have agreed to recognise the connectivity between surface and groundwater resources and to manage connected systems as single resources.

All jurisdictions have passed legislation or implemented planning processes that recognises the potential for connectivity, and all have begun assessments of connectivity, as required under the NWI, although their approaches vary significantly. Investments through the National Groundwater Action Plan are also improving our understanding of system connectivity. All jurisdictions have made some progress in developing integrated management arrangements for identified connected systems.

However, the continuing slow rollout of water plans, and a failure to adequately address overallocation in some systems, are inhibiting wide adoption of integrated surface water and groundwater management. The jurisdictions need to strengthen the foundations for integrated management by developing and implementing integrated plans, and by gathering additional data on the nature and extent of connectivity.

The Commission considers that, ultimately, all surface and groundwater extractions, including for stock and domestic purposes, should be licensed and metered or otherwise measured. The Commission acknowledges the need for pathways to metering for groundwater extractions, taking into account the water management benefits of better metering, the level of risk to the resource, impacts on third parties, and cost effectiveness. The Commission considers that unless and until it can be demonstrated otherwise, surface water and groundwater resources should be assumed to be fully connected, and water planning and management of the resource should be conjunctive. This is the reverse of the current situation.

Document for download

[Complete version of Chapter 2 \(163KB\)](#)

Related information

[Commission media release](#)

[Video of address to CEDA by CEO Ken Matthews](#)

[Transcript of address \(267KB\)](#)

[Minister's media release](#)

[Stakeholder reaction](#)

[Main Biennial Assessments page](#)

[First biennial assessment - 2007](#)

Executive summary by chapter

Ch 1 - [Water planning](#)

Ch 2 - [Understanding surface and groundwater connectivity](#)

Ch 3 - [Water accounting and water data](#)

Ch 4 - [Environmental water](#)

Ch 5 - [Addressing overallocation and overuse](#)

Ch 6 - [Water entitlements](#)

Ch 7 - [Water markets and trading](#)

Ch 8 - [Pricing, demand management and other policy initiatives](#)

Ch 9 - [Risk assignment](#)

Ch 10 - [Structural adjustment and water reform](#)

Ch 11 - [Urban water](#)

Other related documents

[2011 Biennial Assessment discussion paper and public submissions](#)

[2011 Stakeholder Forum communique](#)

[2009 Stakeholder Forum communique](#)

 [December 2008 discussion paper - 2009 \(142KB\)](#)

[Public submissions for the 2009 assessment](#)

Last updated 9 Oct 2009

Customs duties of Western Australia

95. Notwithstanding anything in this Constitution, the Parliament of the State of Western Australia, if that State be an Original State, may, during the first five years after the imposition of uniform duties of customs, impose duties of customs on goods passing into that State and not originally imported from beyond the limits of the Commonwealth; and such duties shall be collected by the Commonwealth.

But any duty so imposed on any goods shall not exceed during the first of such years the duty chargeable on the goods under the law of Western Australia in force at the imposition of uniform duties, and shall not exceed during the second, third, fourth, and fifth of such years respectively, four-fifths, three-fifths, two-fifths, and one-fifth of such latter duty, and all duties imposed under this section shall cease at the expiration of the fifth year after the imposition of uniform duties.

If at any time during the five years the duty on any goods under this section is higher than the duty imposed by the Commonwealth on the importation of the like goods, then such higher duty shall be collected on the goods when imported into Western Australia from beyond the limits of the Commonwealth.

Financial assistance to States

96. During a period of ten years after the establishment of the Commonwealth and thereafter until the Parliament otherwise provides, the Parliament may grant financial assistance to any State on such terms and conditions as the Parliament thinks fit.

Audit

97. Until the Parliament otherwise provides, the laws in force in any Colony which has become or becomes a State with respect to the receipt of revenue and the expenditure of money on account of the Government of the Colony, and the review and audit of such receipt and expenditure, shall apply to the receipt of revenue and the expenditure of money on account of the Commonwealth in the State in the same manner as if the Commonwealth, or the Government or an officer of the Commonwealth, were mentioned whenever the Colony, or the Government or an officer of the Colony, is mentioned.

Trade and commerce includes navigation and State railways

98. The power of the Parliament to make laws with respect to trade and commerce extends to navigation and shipping, and to railways the property of any State.

Commonwealth not to give preference

99. The Commonwealth shall not, by any law or regulation of trade, commerce, or revenue, give preference to one State or any part thereof over another State or any part thereof.

Nor abridge right to use water

100. The Commonwealth shall not, by any law or regulation of trade or commerce, abridge the right of a State or of the residents therein to the reasonable use of the waters of rivers for conservation or irrigation.

Inter-State Commission

101. There shall be an Inter-State Commission, with such powers of adjudication and administration as the Parliament deems necessary for the execution and maintenance, within the Commonwealth, of the provisions of this Constitution relating to trade and commerce, and of all laws made thereunder.

Parliament may forbid preferences by State

102. The Parliament may by any law with respect to trade or commerce forbid, as to railways, any preference or discrimination by any State, or by any authority constituted under a State, if such preference or discrimination is undue and unreasonable, or unjust to any State; due regard being had to the financial responsibilities incurred by any State in connexion with the construction and maintenance of its railways. But no preference or discrimination shall, within the meaning of this section, be taken to be undue and unreasonable, or unjust to any State, unless so adjudged by the Inter-State Commission.

Commissioners' appointment, tenure, and remuneration

103. The members of the Inter-State Commission:

- (i) shall be appointed by the Governor-General in Council;
- (ii) shall hold office for seven years, but may be removed within that time by the Governor-General in Council, on an address from both Houses of the Parliament in the same session praying for such removal on the ground of proved misbehaviour or incapacity;
- (iii) shall receive such remuneration as the Parliament may fix; but such remuneration shall not be diminished during their continuance in office.

Heath Aston
haston@sunherald.com.auNumber of fatalities on
NSW roads in 2010.

"The only alternative [Kristina Keneally] has is to allow the parliamentary power inquiry to do its job." Barry O'Farrell calls on the Premier to let the electricity inquiry proceed.

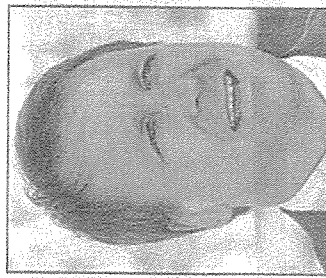
'Good word' for gas company

Heath Aston

A STRING of Coalition MPs appears to have promoted the cause of a coal-seam gas company headed by former Nationals leader John Anderson. Eastern Star Gas, chaired by the deputy prime minister in the Howard government, has been favourably mentioned in speeches in the NSW Parliament by at least two Nationals MPs and a Liberal member.

Government sources claim some Nationals members have also acted as "unpaid lobbyists" for Eastern Star in private, seeking meetings with senior officials, right up to the Premier, Kristina Keneally.

A letter obtained by *The Sun-Herald* shows Nationals MP Kevin Humphries requested an "urgent meeting with the Premier" on behalf



Shared interest ... Kevin Humphries (left) sought a meeting on behalf of a company chaired by John Anderson.



of Eastern Star. In it, Mr Humphries said the company wanted to brief Ms Keneally on the "future of the gas industry in NSW".

"Our competitive advantage/future potentially at risk ... domestic power cogeneration at risk. Five minutes to update the Premier and organise a proper briefing from John

the state of the industry in NSW compared to Queensland, not to promote Eastern Star Gas," he said.

"The Queensland gas industry is light years ahead of us in NSW because of the government support in Queensland for the industry."

Mr Humphries's seat of Barwon – the second biggest in NSW – covers areas such as Gunnedah and Narrabri, where Eastern Star explores for, and drills for, coal-seam gas.

Eastern Star, formed in 2000, donated a total of \$22,850 to the Coalition in 2009, documents lodged with the Election Funding Authority show.

A Nationals source said it was "standard practice" for MPs to seek meetings on behalf of groups in their electorate.

Mr Anderson was not active

within the NSW Nationals, the source said.

The number of references to Eastern Star in parliamentary speeches has nonetheless raised eyebrows within the Labor government.

Nationals MPs George Souris and Geoff Provest and Liberal MP Michael Richardson have all expressed the view of Eastern Star Gas, outlining its support for the introduction of a short-term trading market in NSW.

The coal-seam gas issue has created divisions within the Nationals, with farmers recently calling for a halt to exploration until prime agricultural land is protected and water supplies ensured.

Large tracts of Mr Humphries's electorate cover fertile farming land that could be mined for minerals.

The search is on for gas reserves

Arrow Energy starts drilling at Keerrong

By PETER WEEKES

peterweekes@northernstar.com.au

KEERRONG Valley farmer Mick Fields was slightly bemused when Arrow Energy contacted him and said it wanted to test drill for coal seam gas on his rural property.

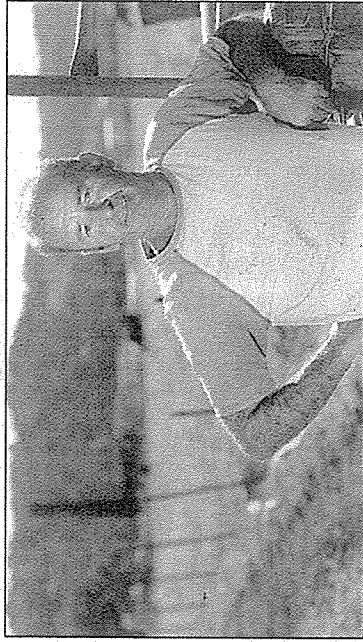
"They told me they dropped a pin on a map and it hit my farm," he said. "They said they will be drilling for a couple of weeks and would restore the site for me."

That was about six months ago and last week workmen erected the towering drill surrounded by Brahman bulls and dairy cows.

The exploratory drilling in the pristine rural valley, which has piqued the interest of locals, is one of five test drills across the region, Arrow Energy spokesman Gareth Quinn told *The Northern Star*.

"We will have two rigs drilling five test sites to the end of the financial year," he said.

"It's not intensive. It's a government requirement that we do some work so we don't



ALL MINE: Cattle farmer Mick Fields of Keerrong with the exploration mining drill at work on his property in the background.

lose the rights."

The testing sites form a 'horse shoe' shape and include two holes at Bexhill, four at Geneva, two at Peacock and one at T'ungfebung, as well Mr Fields' at Keerrong.

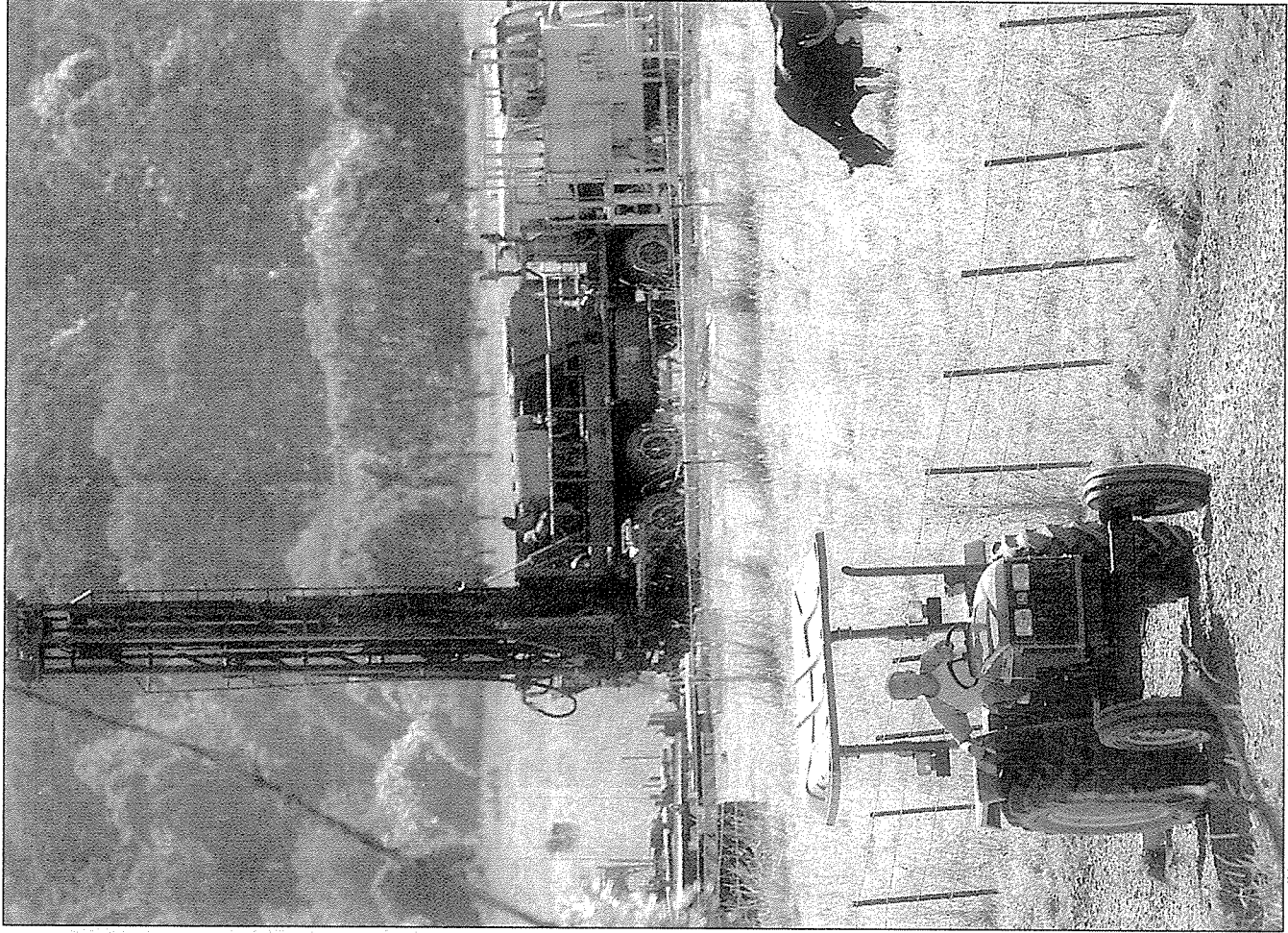
Mr Quinn said while the company was hopeful about finding large gas reserves, even a positive result would not mean mining in the Northern Rivers for the foreseeable future.

"Our activity for some time will be concentrated around the Dalby gas field (in Queensland)," he said.

Mr Fields said he was happy to see what happens. Since Arrow started preparatory work on his property last Saturday they have put in two new gates and improved the dirt track to the drilling site, and paid him a small amount of money for his troubles.

"I've got no complaints," he said. "They told me 'anything I need just let them know' and when I have they have fixed things immediately."

"If they decide to mine it will be a totally different issue because I don't know what I am up for."



POLITE VISITORS: Farmer Mick Fields of Keerrong is happy with Arrow Energy's approach to exploration for coal seam gas on his rural property.

Picture: DAVID NIELSEN

Council calls for coal seam mine ban

TO CHEERS of delight from about a dozen protesters who descended on Lismore City Council's meeting on Tuesday night, councillors voted unanimously to back a moratorium on coal seam mining.

Council voted to write to the State Government and the NSW Opposition, as well as the Prime Minister, urging a ban on the practice that it said could contaminate ground water.

"I'm not against mining, it has the potential to bring income, investment, money and jobs into our community," said Councillor David Yarnall in proposing the motion. "But we've got to be sure what we are doing is not going to ruin the environment, especially a vital resource such as water."

The council's call for the moratorium follows similar calls by the NSW Farmers Association and the Australian Greens.

Protester Helen Gibbons, who lives at Keerrong Valley, where Arrow Energy has



WHAT A GAS: Protesters against coal seam gas mining gather outside the Lismore City Council Chambers at Goonellabah ahead of Tuesday's meeting.

Picture: JERAD WILLIAMS

recently completed exploratory drilling, said the expansion of coal seam gas mining was occurring too rapidly and without safeguards.

"No one is really aware of the dangers - that's why we need a moratorium," she said. "We need to have an independent survey by the environmental protection agency to ensure what's happening in America doesn't happen here."

Not so happy after Tuesday's meeting were the James Gibson Road Action Group, who were calling on councillors not to approve an application to laterally expand Corndale Quarry.

The quarry's Bob Smith said the expansion, which would not increase the extraction rate, was needed to ensure workers could safely get to the basalt.

However, the action group's Raya Blok said the application was 'expansion by stealth to achieve the outcomes of the initial development application in 2008'. Councillors unanimously passed the proposal.

Peter Weekes

peter.weekes@nothernstar.com.au

Council supports ban on coal seam gas mining

By Rudi Maxwell

Lismore City Council has added its voice to a growing list of organisations and people concerned about coal seam gas mining and the controversial process of hydraulic fracturing.

At Tuesday night's meeting Council unanimously supported Cr David Yarnall's notice of motion to "unreservedly support the request of the NSW Farmers Association for a moratorium on all coal seam gas (CSG) mining in NSW" and to write letters lobbying state and federal ministers.

"In NSW we're experiencing a gas rush, with 100 exploration permits approved this year, up from four in 2005," Cr Yarnall said. "There are concerns about hydraulic fracturing and BTEX (benzene, toluene, ethylbenzene and xylene) chemicals, which have been banned in Queensland."

"There's an enormous amount of ground water produced containing salt and other toxic chemicals, it uses large quantities of water and there are problems with evaporation ponds and land use conflicts."

"Geoscience Australia has questioned the environmental modelling; there are problems with aquifers... There is insufficient data, and we need to improve

monitoring," Cr Yarnall said.

"With anything to do with water we should follow a precautionary principle. The social impacts of CSG mining are at a high level; the National Water Commission strongly argued that you need to be careful with all water-related impacts in all water-related instances. We don't know about the cumulative environmental or social impacts."

Cr Yarnall said the Queensland government banned the use of BTEX in the extraction of CSG after traces of the cancer-causing chemicals were found in bores at Kingaroy, Mackay and at another site near Miles, 300km west of Brisbane.

"In the Gulf of Mexico recently, BP found itself in dire problems simply because the mining company had not taken due regard. We've had literature from companies regarding monitoring as you go; if you encounter problems, they will be repaired. I wonder if BP thought that too."

"We need to minimise impacts, increase production data, transparent processes, have a clear account of what happens and have a consistent jurisdictional approach to water and land-use planning."

"I'm not against mining, it

continued page 3 >

Ban on gas mining

< from page 1

has the potential to create income, money and jobs for the community, but we've got to be sure it's not going to ruin the environment."

The Environmental Defender's Office is holding a public seminar on CSG extraction from 6-8pm on Wednesday, February 2, at the Red Dove Hall in Lismore.

Echo 16/12/10 Walk carefully on water

It seems pretty sensible to take a cautious approach to anything that might contaminate water so Lismore City Council is to be commended for their decision to support the NSW Farmers Association's call for a moratorium on coal seam gas mining (see story page 1).

Anything that messes with our water supply - or even has the potential to - should be treated with autoclaved kid gloves.

And that means fluoride too.

If there's even a small chance that fluoride can harm people or animals or the environment, then we should err on the side of caution and not put it in the water



RUDI MAXWELL

Editorial

supply. I was formerly ambivalent towards fluoridation, thinking that it would probably help those most socially disadvantaged and least likely to look after their teeth. But I've changed my view.

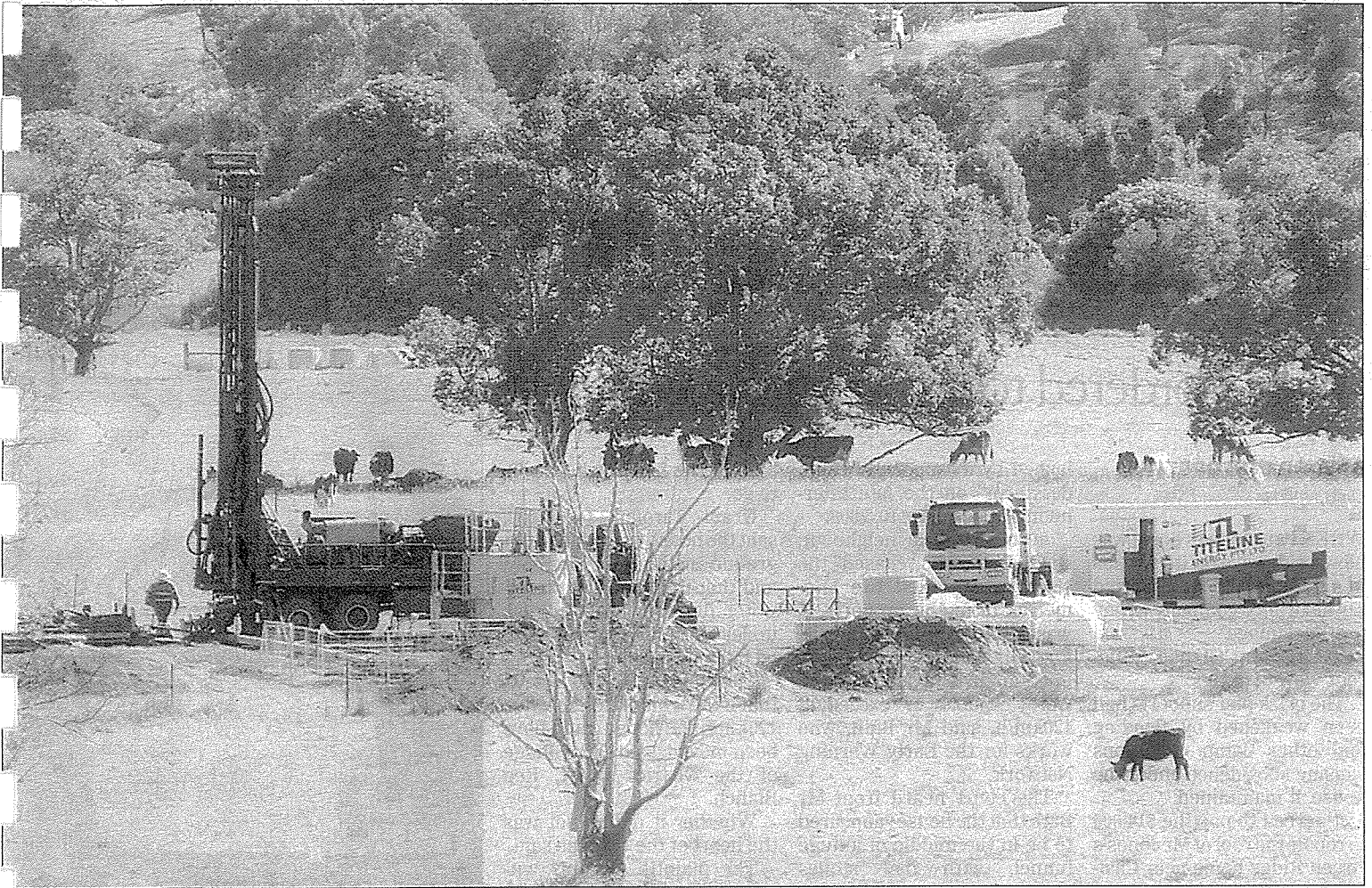
It's not to do with the anti-fluoride lobby, who appear to be able to see a conspiracy behind a closed grassy knoll

(maybe they're getting their information from WikiLeaks) but because it seems to me that to mass-medicate when there are arguments about health benefits is simply not worth it.

And that's before you even look at the monetary expense, which is estimated to be more than \$2 million just to build the dosing plants, even if you don't take into account the growing legal bill.

\$2 million buys a lot of trips to the dentist. You can't filter out fluoride so putting it in the water supply takes away people's choice.

When it involves water, then a precautionary approach has to be best.



ON MINING: Rous Water delegates have narrowly passed a notice of motion lodged by Lismore City Council supporting the NSW Farmers Federation's call for a moratorium on coal seam gas mining across NSW.

Gas mining freeze backed

Rous Water calls for moratorium on exploration of coal seam reserves

by **ALEX EASTON**
Chief reporter

ROUS Water has backed calls for a moratorium on coal seam gas mining across NSW – albeit with some serious reservations.

The Rous Water council has narrowly backed a notice of motion lodged by Lismore City Council representative and deputy chairman David Yarnell, supporting the NSW Farmers Federation's call for a moratorium; and to pass the call along to Premier Kristina Keneally, Environment Climate Change and Water Minister Frank Sartor and their opposite numbers in the Coalition (Barry O'Farrell and Lennox Head-based MLC Catherine Cusack).

The council also voted to write to Prime Minister Julia Gillard and Federal Environment Minister

Tony Burke, along with their Opposition counterparts (Tony Abbott and Greg Hunt), to raise the issue on a Federal level.

The vote barely made it through the Rous Water council. It was opposed by the Ballina and Richmond Valley representatives – Phillip Silver, Keith Johnson, Stuart George and Col Sullivan – and made it through only on the casting vote of Rous Water chairman and Byron Shire councillor Richard Staples.

The result has also provided fodder for Ballina Christian Democrats candidate Bruce Kemp, who has cited it among his reasons for positioning himself against coal seam gas exploration on the Northern Rivers.

Mr Kemp yesterday conceded he had not yet spoken to Metgasco, the most active of the coal seam gas companies operating on the North-

ern Rivers, but said he intended to.

In the meantime, he was concerned enough about the potential impacts of coal seam gas drilling on drinking water – notably in the Wilsons River, which is used by Rous Water as a back-up supply when Rocky Creek Dam sinks below 90 per cent full – that he was prepared to champion a cause that had little direct impact on the electorate he hoped to represent.

Ballina Rous Water representative, Councillor Keith Johnson, said he opposed the motion calling for the moratorium because he 'didn't see the sense in (Rous Water) politicking on the issue'.

Cr Johnson said any concerns about coal seam gas drilling were the province of the NSW Department of Environment, Climate Change and Water and it was not

Rous Water's job to police the way the department did its job.

Personally, Cr Johnson said he had read Metgasco's responses as concerns were raised about coal seam gas drilling and said he was satisfied with them.

Lismore Rous Water representative, Councillor David Yarnall, said it was 'important for Rous to voice its concerns as the predominant water supplier in the region'.

Cr Yarnall said he had been looking at the 'precautionary principle' in lodging the motion.

"We need to examine it and make sure we're not opening a Pandora's Box and not having an environmental catastrophe on our hands," he said.

"Once it's in the water table, there's no turning back."

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DETAILS - PAGES 12 & 18

GAS LEAK



'Bubbling'
coal seam
well triggers
new fears for
residents

**STORY
PAGE**

POLLUTION FEARS: Lynda Brooks, of Old Dyraaba, says she has seen bubbles escaping from the coal seam gas well near where she lives.

Picture: JACKLYN WAGNER

CSG concerns bubble to surface

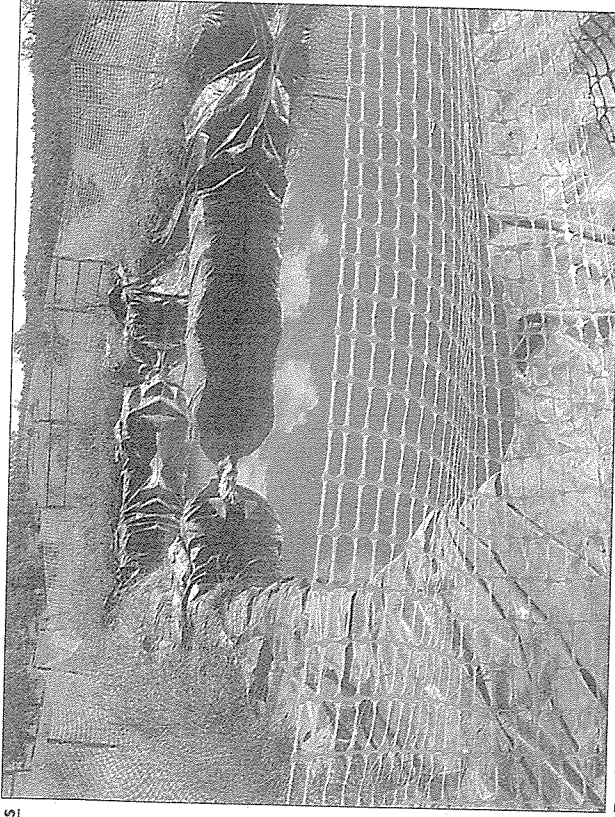
By Rudi Maxwell and Andy Parks

Northern Rivers residents continue to be alarmed by the practices involved in coal seam gas exploration, with revelations that a tailing pond (where water used in the test bore is kept until it can be trucked away) is poorly maintained. The pond at Dyraba has a lining made of builder's plastic that is ripped in places and overflowed in the January rains.

Reports of a possible third leaking test well, at the same site at Dyraba, have added to concerns of the Keerrong Gas Squad. Vicki and Ian Gaillard breed Arab horses on their property at Keerrong and Arrow Energy drilled a test bore 3km upstream from where they live.

"My major concern immediately is the quality of the water that I shower in, my horses drink, my children swim in and the penetration and disruption of the local aquifer system," Ian said. "Keerrong Valley residents wrote to Arrow and asked them about community consultation, touted in their PR literature as being their practice. None had taken place in the local community. The first call back from the company was from a solicitor asking if anyone intended to sue for damage or nuisance – hardly consultation."

Ian said the test drilling prompted him to find out more about the industry and he quickly discovered Red



Pond at Metgasco's test well at Dyraba.

Sky Energy, Metgasco and Arrow have leases covering the entire Northern Rivers region, which they refer to as 'company acreage'.

Arrow Energy, which is a wholly-owned subsidiary of Shell and PetroChina focussed purely on coal seam gas, held an information session to try and address residents' questions.

"They held the info session after the fact. Arrow Energy has a test bore at Lagoons Grass Road, 1500-1800m upstream from the Wilsons River Source pumping

station," Ian said. "CSG companies need a lot of water. The first water that is held in the coal seam comes up as 'produced water' to be trucked and then stored in large settling ponds, such as those proposed by Metgasco near their power station, 12km west of Casino."

"Queensland Mines technical officer has stated that the longer water resides in a coal seam the more known toxins accumulate in it. There is no available data as to the interconnectivity of aquifers in the

Clarence-Moreton basin. How then can Metgasco, as stated in *The Northern Star*, angle drill to avoid deep aquifers?"

Last weekend Ian and other locals visited the test wells at Dyraba (the 'Bowerbird' test exploration well) and at Sextonville Rd ('Corella'), perched between three agricultural enterprises, including a disease-free piggery, a stud bull farm, and chicken sheds, raising chickens for Sunnybrand. At Sextonville Road, they saw flaring, where gas is burnt from a vertical pipe,

within 100m of the local creek. A large drilling operation is across the road, within 250m of the piggery. "We would like to know what volatile chemicals from underground coal seams or introduced by the operation are being burned off," Ian said. "There are also three big pumps grinding away, pumping something in and something out... As a local resident, I see this as a massive invasion and an experiment without due regard for the consequences."

Ian said. "A draft report from the federal government, as shown on *Four Corners*, said it would take upwards of 10,000 years for the pressure to return to pre-CSG mining levels once the myriad of wells have sucked the water out.

"A major concern is the fact that mining companies pay nothing for the water they use, whereas farmers like me are required to apply and pay for permits to bore water... It's been approved simply because CSG mining companies have employed environmental graduates and hydro-geological graduates to satisfy the inadequate paperwork required to apply for CSG mining leases and production licences."

Ian expressed concerns that state and federal governments seem to have left it to the company to self-monitor and self-regulate in the field.

However *The Echo* has

been in contact with Industry & Investment NSW (I&I), which is responsible for monitoring the compliance of gas exploration across the state.

"I&I has strong rules in place for the way in which the petroleum exploration licences are granted. We have petroleum inspectors who routinely inspect the active sites, and they go to the active sites to have a look at how the operations are being conducted when they're down to the target seam level, and then when the wells are plugged and abandoned. They then inspect the site to see that they've been plugged and abandoned to the standards required by the department," a spokesperson said.

The Keerrong Gas Group is in contact with a rapidly growing number of individuals and groups all over the Clarence-Moreton basin, who are concerned about CSG mining. "New technology is available for mapping and showing the interconnectivity of aquifers. So far none of these mining

continued page 3 >

Arrow Energy and Metgasco respond pages 6-7

NationalToxics Network calls for moratorium on fracking page 3

local news

NTN calls for fracking ban

By Rudi Maxwell

The National Toxics Network, an independent NGO involved in public education and research, has called for a

moratorium on hydraulic fracturing chemicals.

The NTN has released a briefing paper titled *Hydraulic Fracturing in Coal Seam Gas Mining: The Risks to Our Health, Communities, Environment and Climate*.

Dr Mariann Lloyd-Smith has a PhD in law and specialises in chemical management and was one of the two authors of the paper.

"I certainly think anyone living in the vicinity of (coal seam gas) projects should be concerned, as should all Australians, because this is a real threat to our water security, and our water security should be paramount," Dr Lloyd-Smith said. "Of the 23 most commonly identified fracking chemicals 21 have not been assessed by our chemical regulator, the National Industrial Chemical Notification and Assessment Scheme (NICNAS)."

"21 had not been assessed at all, two had been looked at for a totally different use. The chemicals being used have not been assessed from a health or environmental perspective."

Fracking chemicals – Metgasco Kingfisher well Nitrogen 70% BE-7 bactericide BE-6 preventative bactericide WG-11 –HPG gelling agent SP Breaker and CAT-3 BC-140 gel crosslinker HC-2A foaming agent Gelsta-L –neutraliser acetic acid and caustic solution Gasperm 1100 –surfactant KCl –clay control additive HAI-150E acid inhibitor HCl FE-2 iron chelator ceramic beads embedded w radionuclides

Dr Lloyd-Smith said Australia was "not on the ball" when it came to chemical regulation. "This is of extreme concern. With fracking we are talking about quantities of 18,000kg of chemical additives per well. Not all of that is got back out. With CSG, what we see is about 40% remains within the structure; that's 7500kg remaining in the earth after fracking each well. "Risk assessments for specific CSG projects in Queensland lacked basic information on the chemicals. The ones we were able to identify concerned us because of their significant potential to cause damage to the environment and human health.

"Some were linked with cancer and birth defects, while others damaged the hormone system of living things and affected aquatic species at very low levels. Fracking chemicals are complex mixtures of different chemicals which increases their risks. "They are being used in very large volumes and unknown concentrations for purposes they were never intended for. Despite industry claims that fracking chemicals are 'only used in small quantities' and are all 'food grade chemicals used in household chemicals', NTN has discovered that hazardous chemicals such as ethylene glycol, formamide, naphthalene, ethoxylated nonylphenol and sodium persulfate are commonly used in fracking mixtures."

Mining companies have consistently said that their wells do not pollute aquifers. "I'm not 100% sure what they mean by that, once a fracture has opened cleats, then

cracks release gas. Then they pump chemicals into those cracks, and as we've seen in the past, we see those chemicals escape through those cracks going further and entering water. "If a fracturing process has taken place, it's near impossible to seal a coal seam gas seam."

NTN called for a moratorium on the use of all hydraulic fracturing chemicals.

"That moratorium is essential until there has been a full environmental, health and full lifecycle analysis on the whole process.

Until that happens I cannot see how they can go ahead and develop uses for these chemicals and we should not be going ahead with any hydraulic fracturing."

Dr Lloyd-Smith said there were issues about CSG, besides fracking.

"There has not been any overall assessment of this as an energy source being anywhere near greenhouse neutral. A recent Cornell University report clearly concluded the technique was neither green nor climate friendly and that it did not make sense looking at it as an alternate energy source," she said.

The briefing paper can be found <http://ntn.org.au/wp-content/uploads/2011/02/NTN-Fracking-Briefing-Paper-2011.pdf> on NTN's website.

CSG concerns surface

< from page 1

companies have made available to the public evidence that they know where these aquifers are," Ian said. "We are left with assurances and, as Arrow Shell PetroChina showed around the Tara area, in Southern Queensland, information that is known by the company as to the extent of their plans is dribbled out to land holders over a number of years. That is plain deceit.

"Glenda McLoughlin, Chief Financial Officer of Metgasco, said on ABC Radio recently that Metgasco had invested \$70million in their operation to date, they have created jobs, but in this case we cannot and must not be seduced by the promise of jobs and wealth at the expense of our water and our air."

"The corporate dictum of not releasing facts about the geological strata and future plans under the guise of commercial in confidence leaves the public at large wondering where we stand.

"In time to come it will be shown that these companies are colluding as evidenced by plans to



The leaking well head at Dyraba.



Detail of the pond featured on page 1.

build an export pipeline through the Lions Rd corridor to southern Queensland and the network of other export pipelines. Will Arrow Shell PetroChina build their own pipeline or pay for use of the proposed Metgasco pipeline?" Metgasco is holding an information meeting on March 14 at Casino RSM. "I urge as many Northern Rivers residents as possible to attend and question vigorously the company spokesmen. I challenge Metgasco to allow us to show footage of some of their shoddy operations on old Dyraba Road," Ian said.

Living Library's human face

By Terra Sword

Forget Julian Assange



"THE SCHOOL WITH A BEAUTIFUL VIEW TO EDUCATION"

More haste, less speed hits coal seam surge

The race to advance coal seam projects may have overlooked some vital assessments, writes **Mathew Murphy**.

Wayne Newton has lived on his Dalby cotton and grain farm in Queensland ever since he married his wife, Bev, almost 33 years ago. Like most farmers, he knows every patch of his 900 hectares. But there is one area which is causing him concern.

Almost four years ago, two employees from Arrow Energy knocked on his door. Newton was not altogether surprised to see them. Other farmers in the area had been tapped on the shoulder and told their land would be used as a pin cushion to drill gas wells. Asian demand for energy had made coal seam gas, once the ugly stepsister to conventional gas, more economical and Queensland is CSG mecca for energy companies.

Newton was told by Arrow that he would receive one exploration well on a non-farming part of his property. In return, he would be paid \$500 a year, a figure much more generous than the average \$250 a well a year most farmers say they pocket.

"We weren't asked as much as we were told that this was going to happen," he said. "It seems inevitable that they will drill more wells but we will have to wait and see."

Newton is concerned about the effect on groundwater. He is one of a number of farmers who are questioning the rapid development of tens of billions of dollars of investment in coal seam gas, and to a lesser degree, the underground coal gasification industries.

First, it is important to understand the differences between the two processes. UCG involves injecting oxidants down a well and over-mined coal seams. The hot combustion effect converts the coal into a syngas, which is transported up a second well where it can be used as a fuel, a chemical feedstock or for power generation. The syngas is a mixture of hydrogen, carbon monoxide, methane, carbon dioxide and, sometimes, nitrogen.

CSG involves hydraulic fracturing, a controversial process which pumps fluid, under pressure, into a coal seam to improve the flow rate of the gas. What is released is almost entirely methane, a relatively pure gas which is used domestically to cook food and heat homes. It is the reason CSG is often called a "greener" gas when compared with conventional gas, which has a higher carbon dioxide content. Fracking is being put under the microscope overseas. In the US, where companies including BHP Billiton are spending billions on shale gas interests, legislation has been introduced called the Fracturing Responsibility and Awareness of Chemicals Act, or the FRAC Act, which requires companies to disclose the chemicals it mixes with water to pump underground.

The potential for connectivity between aquifers in the fracking process is significant. Landholders are concerned about maintaining current water levels and the quality of the water which is left.

In Queensland, the presence of cancer-causing chemicals known as BTEX (benzene, toluene, ethylbenzene and xylenes) has been recorded in wells of both UCG and CSG proponents.

In May, Cougar Energy found traces of toluene in its T5038 moni-

oring well at its UCG pilot project at Kingaroy. That recording was at 45 parts per billion (ppb). However, a reading of 4ppb was recorded a few weeks later.

In June, its T5037 monitoring well recorded benzene at 2ppb. A month later the Queensland Department of Environment and Resource Management shut down the Kingaroy project. Then, last month, after receiving an independent expert's report highly critical of the technical expertise and operations, the government accepted its recommendation to shut down Kingaroy permanently, unless Cougar could show just cause why it should continue.

Among the CSG players, Australia Pacific LNG, then a joint venture between Origin Energy and ConocoPhillips, announced in October that it too had found traces of BTEX at undisclosed levels from eight exploration wells in the Surat Basin, 300 kilometres north-west of Brisbane.

Australia Pacific LNG was not alone. In November, Arrow Energy also found trace amounts of BTEX at around 1 to 3ppb.

Both companies have denied using the chemicals in fracking fluids.

The Cougar founder and managing director, Len Walker, who has worked on developing UCG for almost 30 years, says he does not believe he is getting a fair go when compared to his more fancied CSG counterparts.

"To put the test results in perspective, the Australian drinking water guidelines for toluene is 800ppb and the highest concentra-

Newton is one of a number of farmers who are questioning the rapid development of coal seam gas.

tion recorded by the company was 45ppb," Dr Walker said. "The only monitoring bore to return a test result for benzene in excess (of the Australian standard) of 1ppb was T5037 where a benzene concentration of 2ppb was detected."

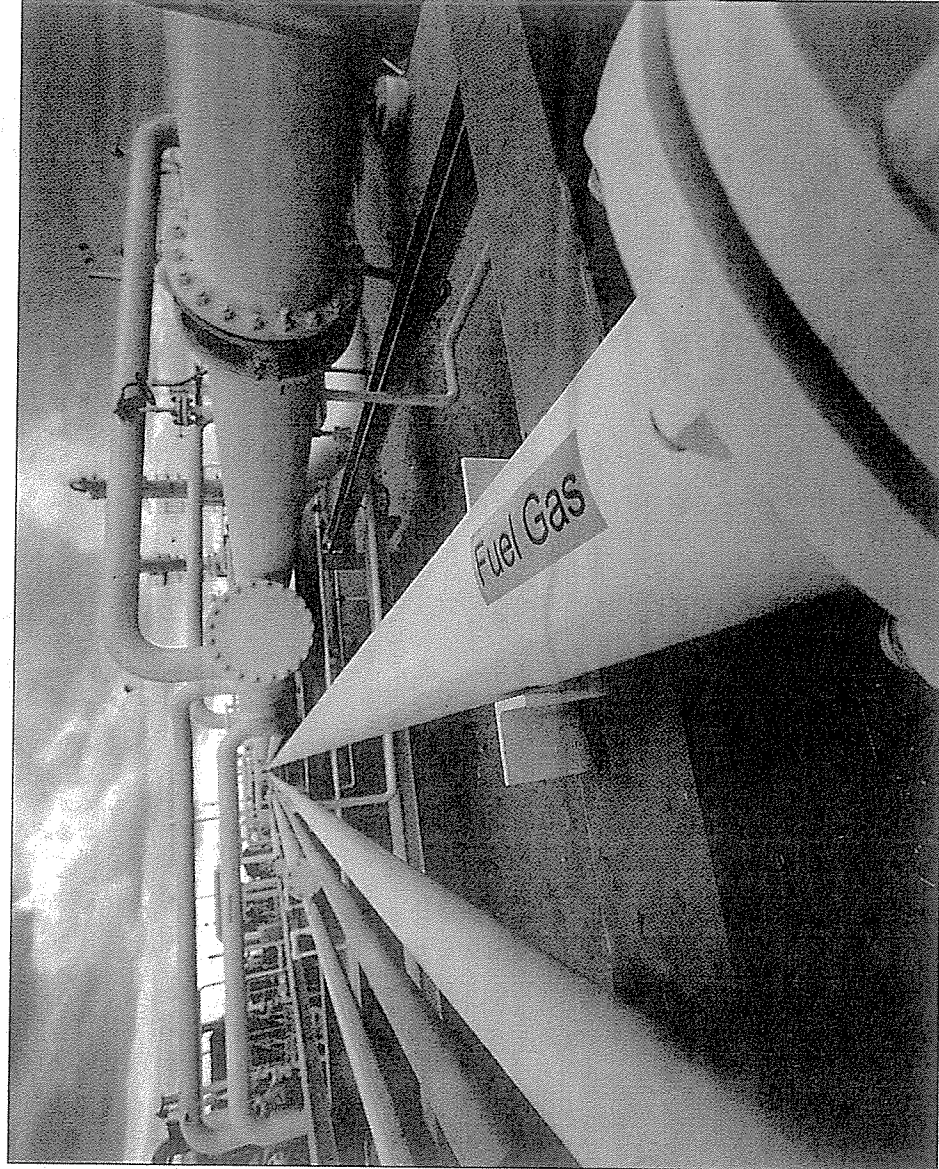
"And they had been confined to isolated monitoring bores that do not access potable water."

Cougar has submitted a detailed rebuttal poking holes in the independent expert's report and could still appeal to Queensland's Planning and Environment Court.

However, the Queensland government looks set to stare down any challenge. Last week it said the department "is confident the [government's] decision will withstand any legal challenge."

Walker said Queensland was wasting its first mover advantage in UCG.

"If you were to ask anyone in the world three or four years ago, there would have been no doubt that Queensland was leading the world internationally in underground coal gasification," he said. "Now complete uncertainty exists for the industry. The two other main UCG proponents, Linc Energy and Carbon Energy, who are doing their pilot burns, are still unsure about



High demand ... the sector has seen strong growth in Queensland, but has raised concerns. Photo: Glenn Hunt

whether they can do any projects until June 2012, so there is no incentive to spend any money."

Arrow and Origin say they are following the state's additional monitoring requirements.

Dean Ellwood, the department's assistant director-general for environment, said the incident at Cougar's Kingaroy site was "fundamentally different" to the recent incidents at CSG sites.

"In the case of Cougar, the well being used to extract gas from the seam cracked, allowing contaminated water to get into a groundwater supply," he said.

Cougar disputes that any amount of groundwater was contaminated. "In the recent case investigated at Arrow Energy's CSG site there was no evidence of environmental harm, operational failure, or any impact on groundwater landholder bores," Ellwood said. "The circumstances in relation to APLNG are similar to that of Arrow."

Even more worrying than the traces of BTEX is the broader issue of groundwater management, according to Ian Hayllor, chairman of the Basin Sustainability Alliance.

"The BTEX levels are honestly pretty low. It is not greater than what you would get if you were filling up your car or walking down a street in a major city. The concern is that it these chemicals got into these wells, and no one seems to know how they got there," he said.

The agricultural lobby group AgForce wants a moratorium on further CSG development until the impacts of fracking can be assessed by a national regulator.

Late last month, the federal Environment Minister, Tony Burke, agreed to visit affected landowners. AgForce has extended the same invitation to the Queensland Environment Minister, Kate Jones, and Mines Minister, Stirling Hinchliffe, who will both share the responsibility for the gas industry's development following Anna Bligh's cabinet reshuffle last month.

In NSW, the companies might be different and the industry less mature than in Queensland, but similar rumblings are already occurring.

"We have to look at different energy sources, but we do need to start looking at the science and at

for the other information."

A Total Environment Centre spokesman, Dave Burgess, said the methane plume was obvious from the bank of the river.

"It's outrageous that, six years

ago when drought combined with cracking of the river bed, upstream from the site of the current methane leaks.

Longwall mining, which cuts broad horizontal slices of coal

the very least let's get the legislation right," the vice-president of NSW Farmers Association, Fiona Simson, says. "Dollars on the table for farmers are not the answer but they are part of the answer."

On the NSW scene, while AGL is producing its small CSG project in Camden, Eastern Star Gas is likely to be the first to be exporting LNG from Newcastle in 2014 – the same time as its more talked-about Queensland counterparts.

Simson, Hayllor and Newton are all quick to emphasise that they do not want to see an end to the CSG industry. However all feel that the NSW and Queensland governments have raced to advance CSG projects without first carrying out proper due diligence.

For UCG, the future looks less rosy. Linc and Carbon are continuing their respective projects but Cougar says it may have to look overseas to keep the company afloat.

"We will be looking around to advance other projects," Walker said. "It would be incredibly disappointing given all the work that has been done in Queensland for it to come to this."

behind schedule ... but that is purely because there has been a lot of heavy rain and the river has been flowing," Ms Morgan said. "But it shows we are serious about fixing any damage."

HUMAN RIGHTS Greens propose bill of rights

Ben Cubby
ENVIRONMENT EDITOR

A NEW coal seam gas drilling site near Gloucester in the Hunter Valley will use controversial "fracking" techniques to extract gas, but not some of the more notorious chemicals that have been associated with water pollution.

A proposal by AGL to build up to 110 gas extraction wells and a pipeline received state government approval two days before it went into caretaker mode for the election.

The plan was discussed at a public meeting in Singleton yesterday, which the Planning Minister, Tony Kelly, attended.

Residents told the *Herald* they were angry that the coal seam gas project could pollute rivers and aquifers and also that the presence of gas wells every few hundred metres would destroy the character of the rural valley. The pipeline to transport methane crosses 201 properties.

"There is significant doubt within the community that existing laws and regulations are suitable to manage the potential impacts of [coal seam gas]," Tim Duddy, a farmer from the Liverpool

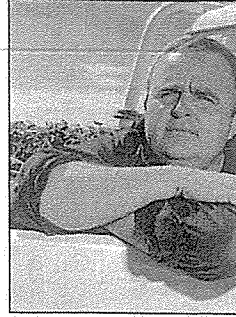
Plains who is standing independent candid the election, said.

"That message have hit home with the ernment by now. I we've got a secretive minute approval. The munity was kept in the about the approval for after the decision."

AGL said BTEX, one more notorious combinations associated water pollution during ing, would not be used

The government was advised which ch would be used before f took place.

Fracking involves in a mixture of water, sa



Tim Duddy ... public wa in the dark. Photo: Paul Ma

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