

Chapter 4

The health, social, business, agricultural, environmental landholder and economic impacts of unconventional gas mining

4.1 In this chapter, the committee sets out the evidence received in relation to term of reference (b):

(b) the health, social, business, agricultural, environmental, landholder and economic impacts of unconventional gas mining.

4.2 The main focus of this chapter is the evidence received by the committee from landowners and community members relating to their experiences with the unconventional gas mining industry.

4.3 The committee heard from landowners and community members about their first-hand experiences with gas mining companies, and heard that unconventional gas mining had placed significant strain on their ability to conduct their business and agricultural operations, and had affected their lives.

4.4 This chapter will discuss evidence received by the committee relating to:

- the rights of landholders;
- health;
- agriculture, including domestic and export capacity, supply chain integrity and production capacity;
- water resources, including issues of water quality and quantity; and
- the social impact of the unconventional gas mining industry.

4.5 The committee received submissions and heard evidence at public hearings from members of communities across Australia raising concerns at the potential impacts of the unconventional gas mining industry on many facets of life.

Baseline testing

4.6 A consistent theme of submissions and evidence heard at public hearings was that, without baseline testing, it was challenging to undertake investigation of the potential effects of unconventional gas mining.

4.7 Numerous submitters drew the lack of baseline evidence to the committee's attention.¹ For example, Mr Gary and Mrs Kerry Ladbrook submitted that landowners may face challenges in commissioning baseline data for their own property:

The covering of costs for the landowner to engage experts required when assessing required drilling depths, access & equipping costs and ensuring an adequate baseline data is retained after drilling are essential to protect landowner water security rights.

The cost of an independent expert assessment is not inexpensive, and is a cost most landowners can ill afford.²

4.8 The Australian Dairy Industry Council submitted that:

We are not satisfied that adequate baseline data yet exists nationally on which to base a reliable monitoring reporting and compliance system. Establishing robust independent baseline data is a role for the government not mining companies. Once baseline data is established, the regulation should support transparent project monitoring where information is shared with landholders and communities.³

1 Dr Pauline Roberts, *Submission 1*; Dr Geralyn McCarron, *Submission 12*; National Toxics Network, *Submission 15*; Dr Wayne Somerville, *Submission 16*; Ms Kylie Haeusler, *Submission 30*; Rushbrook, *Submission 71*; Mr Damien O'Sullivan, *Submission 80*; Mr Avon Rayner, *Submission 88*; Ms Christine Dixon, *Submission 102*, p. 1; Ms Jane Judd, *Submission 103*; Cotton Australia, *Submission 104*; Ms Patricia McAuliffe, *Submission 113*; Dr Samantha Phelan, *Submission 120*; Australian Ethical Investments, *Submission 127*; Darling Downs Environment Council, *Submission 128*; Frack Free Tas, *Submission 140*; Friends of the Earth, *Submission 141*; Gold Coast and Hinterland Environment Council Association Inc, *Submission 142*; Ms Heather Drayton, *Submission 145*; Lock the Gate Alliance, *Submission 146*; Ms Heather Gibbons, *Submission 147*; Mr Hugh Nicholson, *Submission 149*; International Association of Hydrogeologists, *Submission 151*; Ms Jasmine Scheidler, *Submission 153*; Mr John Coverdale, *Submission 155*; Ms Lynne Deweaver, *Submission 164*; Ms Nanette Nicholson, *Submission 170*; OzEnvironmental, *Submission 173*; Mr Philip Armit, *Submission 174*; Ryde - Hunter's Hill Flora and Fauna Preservation Society, *Submission 177*; Ms Rosemaree Thomasson, *Submission 179*; RDPO, *Submission 180*; Ms Shirley Doyle, *Submission 183*; *Submission 184*; Mr Tony and Mrs Stephanie Meggitt, *Submission 185*; Dr Steve Robinson, *Submission 188*; Mr Tony Pickard, *Submission 190*; Mr David Paull, *Submission 200*; Mr Leigh Evans, *Submission 201*; Mrs Shay Dougall, *Submission 203*; No Fracking WAY, *Submission 218*; Mr Brian Feeney, *Submission 236*; Ms Michelle Agius, *Submission 239*; Mrs Dianne Hoy, *Submission 241*; Stop Coal Seam Gas Blue Mountains, *Submission 242*; Mr Fergus and Mrs Deborah O'Connor, *Submission 243*; p&e Law, *Submission 246*; Western Downs Alliance, *Submission 247*; Ms Sarah Ciesiolka, *Submission 250*; Lock the Gate Alliance NT, *Submission 251*; Gasfield Free Bairnsdale, *Submission 254*; Ms Debbie Carruthers, *Submission 255*; Ms Gillian Laland, *Submission 256*; Groundwater Solutions International, *Submission 257*; Interbeing, *Submission 258*; Dr Jo McCubbin, *Submission 260*; Limestone Coast Protection Alliance Inc., *Submission 263*; Mr Mark Rich, *Submission 265*; Ms Patricia Kahler, *Submission 268*; Ms Elena Garcia and Mr Alan Jamison, *Submission 271*.

2 Mr Gary and Mrs Kerry Ladbrook, *Submission 29*, p. 6.

3 Australian Dairy Industry Council, *Submission 46*, p. 8.

4.9 The Centre for Coal Seam Gas, University of Queensland, identified baseline testing as an important step in the process of unconventional gas mining activity:

Ensure that a comprehensive range of predevelopment data and trend line data is gathered before commencement of large field developments in relation to issues perceived to be important.⁴

4.10 It was also noted that there are existing data sources which could be of significance:

[R]esearchers at UQ have found that there are often important, under-used, pre-existing records from resource exploration (oil, gas and mining), which contain data that can help to establish trends and baselines that could be highly relevant to water quality, emissions, and natural occurrences of hydrocarbons.⁵

4.11 Further, the Centre for Coal Seam Gas recommended the creation of data repositories and portals:

Establish high quality data management infrastructure and systems that can hold historical, baseline, production, and monitoring data and facilitate the interrogation of this data. It is important that government facilitates sharing of data as well as providing access to researchers.⁶

4.12 This issue will be further discussed throughout this chapter.

The rights of landholders

4.13 In Australia, mineral rights are reserved to the Crown. Austrade set out that:

The acquisition of rights to minerals stems from separate legislative frameworks in each State. These frameworks provide initially for exploration of the resource, and consist of the grant by the Crown in the form of exploration permits, licences or leases. Exploration permits, leases or licences permit works to be undertaken to determine the likely existence of minerals or resources. Actual mining is subject to a further grant of mining or minerals production leases or licences. The legislation also provides for the payment of royalties to the State and to compensate the owners or occupiers of the surface land.⁷

4.14 The committee heard that in areas with unconventional gas mining activity, there is significant tension between landowners and unconventional gas mining companies, particularly around access to land and the right to refuse access. For example, the Wilderness Society Newcastle submitted that the lack of a right to refuse

4 Centre for Coal Seam Gas, University of Queensland, *Submission 98*, p. 4.

5 Centre for Coal Seam Gas, University of Queensland, *Submission 98*, p. 4.

6 Centre for Coal Seam Gas, University of Queensland, *Submission 98*, p. 5.

7 Austrade, *Mining, minerals and petroleum rights*, <http://www.austrade.gov.au/land-tenure/Land-tenure/mining-and-mineral-exploration-leases> (accessed 26 April 2016).

access 'has created an unbalanced and socially destructive dynamic, causing lasting harm to individuals, businesses and communities'.⁸

4.15 The Lock the Gate Alliance submitted that landholders in areas experiencing unconventional gas mining activity had 'a sense of injustice that they do not have the right to refuse access to companies for UG [unconventional gas] activities'.⁹

4.16 Ms Sarah Ciesiolka submitted that the lack of a right to refuse access had created 'an uneven and unbalanced playing field and is a testament that the current system is broken'.¹⁰

4.17 No Fracking WAY submitted that the lack of a right to refuse access created uncertainty for landowners and had impacted their ability to plan development or activity.¹¹

4.18 Ms Naomi Hogan, from the Lock the Gate Alliance NT, noted that surveys seeking views on fracking had been conducted in the Northern Territory. Ms Hogan told the committee:

I think the gas field-free survey really demonstrates that community members, because they are not given the right to say no, are having to go to other means to try and have some sort of say in this process. They are feeling very disempowered, which is why people are talking amongst themselves, talking to their neighbours and wanting to declare their own communities gas field free.¹²

4.19 A number of submitters expressed the very strong view that landowners should be given the right to refuse access to their land for unconventional gas mining.¹³

Co-existence: the Multiple Land Use Framework

4.20 The Multiple Land Use Framework (MLUF) was developed by the COAG Standing Council on Energy and Resources to 'address challenges arising from competing land use, land access and land use change' in the energy and mineral resources sector, and 'is intended to be used where land access and land use conflict has the potential, real or perceived, to arise'.¹⁴

8 The Wilderness Society Newcastle, *Submission 53*, p. 5.

9 Lock the Gate Alliance, *Submission 146*, p. 19.

10 Ms Sarah Ciesiolka, *Submission 250*, p. 6.

11 No Fracking WAY, *Submission 218*, p. 3.

12 Ms Naomi Hogan, Coordinator, Lock the Gate Alliance Northern Territory, *Committee Hansard*, 12 April 2016, p. 25.

13 See, for example, Bass Coast Shire Council, *Submission 65*, p. 2; Rushbrook, *Submission 71*, p. 1; Ms Margaret Scheidler, *Submission 75*, p. 1; Ms Lucy Daley, *Submission 161*, p. 1; p&e Law, *Submission 246*, p. 12; Lock the Gate Alliance NT, *Submission 251*, p. 4; Limestone Coast Protection Alliance Inc., *Submission 263*, p. 102; Mr Stuart Box, *Submission 269*, p. 2;

14 COAG Standing Council on Energy and Resources, *Multiple Land Use Framework*, <http://scer.govspace.gov.au/files/2013/12/Endorsed-MLUF.pdf> (accessed 19 April 2016).

4.21 The Australian Government submitted that:

The COAG Energy Council's Multiple Land Use Framework (MLUF) supports a balanced approach to multiple and sequential land access, including negotiating access arrangements in good faith. It focuses on the overall principle that to maximise the social and economic benefit, land should not be put to a single use purpose without considering other potential uses. Each jurisdiction implements the MLUF in a way which allows it to operate most effectively alongside existing regulation and land rights.¹⁵

4.22 The committee heard from energy companies that co-existence was a successful model. For example, Santos submitted that:

Importantly, our activities have been undertaken in successful co-existence with the agricultural sector. Santos is proud of its reputation with its landholders. For GLNG alone, we have more than 920 agreements with more than 350 landholders for long-term gas infrastructure alongside their farming businesses. Many hundreds more agreements have been signed for activities such as exploration and pipeline easements. The results demonstrate co-existence. Independent surveys of Santos landholders, conducted by respected consultancy Nielsen, have shown that 92% would welcome Santos back onto their property.¹⁶

4.23 Origin Energy also submitted that, in their view, co-existence was successful:

We strive to ensure that multiple land uses can occur at one time. We consult with our landholders to make sure that our activities complement their existing business and we work with them to achieve their business goals. Of our first 100 landholders for the Australia Pacific LNG project with gas infrastructure on their land, 100% of them are still using their land for farming and grazing purposes.¹⁷

4.24 The Queensland Government submitted that co-existence had been successful in that state:

Queensland's prosperity has been based on the long-term cooperative co-existence of landholders and resource companies, underpinned by laws that balance the interests of both parties.¹⁸

4.25 However, the committee heard that many local residents in unconventional gas mining areas were extremely dissatisfied with 'co-existence'.¹⁹ Numerous submitters and witnesses told the committee that there is an imbalance of power between local landholders and the energy companies, with landholders unable to

15 Australian Government, *Submission 123*, p. 15.

16 Santos, *Submission 57*, p. 4.

17 Origin Energy, *Submission 172*, p. 2.

18 Queensland Government, *Submission 217*, p. 6.

19 Ms Jenny Chester, *Submission 18*, p. 1; Gasfield Free Seaspray, *Submission 34*; Mr Fergus and Mrs Deborah O'Connor, *Submission 243*, p. 4.

refuse access to their land. Mr Allan and Mrs Narelle Nothdurft submitted the view that in practice, co-existence meant compensation.²⁰

4.26 Dr Geralyn McCarron submitted that, in her view, co-existence 'in the Tara/Chinchilla gas fields effectively means living within an immense gas processing plant'.²¹ Further, Dr McCarron submitted that:

Decision makers need to understand that healthy co-existence with unconventional gas is a myth. Healthy communities cannot thrive in the middle of an unconventional gas field. The choice to be made is between pre-existing industries such as agriculture or gas. It is a choice between healthy food production or gas. It is a choice between the long-term safety of the water supply or gas. It is a choice between tourism or gas.²²

4.27 The committee heard that the effects of unconventional gas mining were not limited to those landholders with gas wells on their property, but that close neighbours could be directly affected as well. For example, at the public hearing in Dalby, Queensland, Mr Joe Hill and Mr John Jenkyn spoke of their experiences of unconventional gas mining despite not having gas wells on their land. Mr Hill told the committee that a dam across the road from his property had burst, flooding his property with CSG treated water, and Mr Jenkyn told the committee that there were 'something like 700 [gas wells] within a 17 kilometre radius of me', and noted that the closest gas well was around 500 metres from his house.²³

4.28 Gasfield Free Seaspray submitted that:

The legal right of farmers to veto mining access does not at all address the position that neighbours will be placed in if access is given. At the very least mining access into any location needs to be a community decision, social licence needs to be sought and given.²⁴

Queensland

4.29 Queensland's current regime for land access and compensation was introduced by the Queensland Government in 2010, and aims to balance the interests of the agricultural and resources sectors.²⁵

4.30 The Environmental Defenders Office Northern Queensland (EDO NQ) submitted that the main features of the current Queensland regime are that:

20 Mr Allan and Mrs Narelle Nothdurft, *Submission 28*, p. 2; Ms Annette Hutchins, *Submission 84*, p. 5.

21 Dr Geralyn McCarron, *Submission 12*, p. 8.

22 Dr Geralyn McCarron, *Submission 12*, pp 37-38.

23 Mr Joe Hill, *Committee Hansard*, 17 February 2016, p. 2; Mr John Jenkyn, *Committee Hansard*, 17 February 2016, p. 25.

24 Gasfield Free Seaspray, *Submission 34*, p. 16.

25 Queensland Government, *Submission 217*, p. 11.

- a landholder has no prima facie right to deny a mining or petroleum tenement holder access to their land;
- preliminary activities may be conducted after the issuing of a notice of entry to a landholder by the tenement holder;
- a landholder has a right to compensation for advanced activities, and a conduct and compensation agreement must be negotiated; and
- the Land Court may make a final determination if the negotiation is unsuccessful.²⁶

4.31 The EDO NQ submitted the view that:

The process of compensation negotiation is skewed heavily against landowners. The lack of veto power means that there appears to be little incentive for tenement holders to seriously negotiate given that they are essentially guaranteed mining rights. This is partly corrected for by sections in the Mineral and Resources Act (MRA) and Petroleum and Gas Act (P&G Act) which oblige tenement holders to negotiate in good faith.²⁷

4.32 The committee heard from landowners in Queensland that the lack of power to refuse entry had caused significant strain and frustration. For example, Ms Erica Bates submitted that:

I learned that I could not stop Arrow [Energy] coming onto my land, and the feeling of helplessness was immense and devastating. We had just invested everything in purchasing and moving to our new farm...and everything we dreamed of was now at risk.²⁸

Health

4.33 The committee received numerous submissions and heard evidence from residents of the Western Downs Region of Queensland, concerned that the unconventional gas mining industry in their area had adversely affected their health.

4.34 The committee heard that local residents of the Western Downs Region had experienced, and continue to experience, headaches and migraines, nosebleeds, fatigue, nausea, skin and eye irritations, and rashes.²⁹ These symptoms have been reported to Queensland Health and have been investigated through the studies set out below.

4.35 Dr McCarron submitted that there had been no baseline testing and no health impact assessments conducted 'prior to the Coal Seam Gas production licences being

26 Environmental Defenders Office Northern Queensland, *Submission 44 Attachment 2*, p. 1.

27 Environmental Defenders Office Northern Queensland, *Submission 44 Attachment 2*, p. 2.

28 Ms Erica Bates, *Submission 279*, p. 1.

29 See, for example, Mr and Mrs Allan and Narelle Nothdurft, *Submission 28*; Ms Kylie Haeusler, *Submission 30*, p. 7; Mr Hugh Nicholson, *Submission 149*, p. 1; Mrs Shay Dougall, *Submission 203*, p. 5; Ms Sandra Bamberry, *Submission 248*; Bender Family, *Submission 274*.

issued in Queensland, and in Queensland comprehensive health studies have still not been done'.³⁰

4.36 The Knitting Nannas Against Gas submitted that:

A number of water samples from different tanks has shown dangerous levels of toxic chemicals in the past 2 years, but as there were no baseline studies conducted prior to unconventional gas exploration, there is no link between contamination in the water and the industry. The same scenario is applicable to air quality.³¹

Previous studies of the potential health effects of unconventional gas mining in Queensland

4.37 Several studies have been conducted or commissioned by Queensland Health since 2012, and an independent study was conducted by a Brisbane-based GP.

Darling Downs Public Health Unit

4.38 In January 2013, the Darling Downs Public Health Unit released the *Investigation into the health complaints relating to Coal Seam Gas Activity from residents residing within the Wieambilla Estates, Tara, Queensland*. The study was conducted after a rise in the number of health complaints in that region from July 2012.

4.39 The study examined the symptoms reported to Queensland Health's Health Contact Centre (commonly referred to as '13HEALTH') between 4 July 2012 and 12 November 2012, which included:

30 Dr Geralyn McCarron, *Submission 12*, p. 2.

31 Knitting Nannas Against Gas, *Submission 27*, p. 2.

Symptoms	Number of people reporting symptom
Headaches	34
Sore, itchy eyes	18
Nose bleeds	14
Skin rashes	11
Nausea	8
Pins and needles	7
Nasal congestion	6
Metallic taste	5
Depression	5
Diarrhoea	<5
Respiratory symptoms	<5
Anxiety/ stress	<5
Blackouts	<5

32

4.40 The study found that 'no substantive evidence was available to support these allegations that the health complaints were due to CSG activities' and noted that the symptoms reported were difficult to link with one particular cause.³³

4.41 However, the study did note the mental health of the community:

A new concept 'Solastalgia' has been used to describe the distress that is produced by environmental change impacting on people while they are directly connected to their home environment. These negative effects can be exacerbated by a sense of lack of control over the unfolding change process.

It is the perception of the author that Solastalgia is contributing significantly to the ill health of this community.³⁴

Queensland Government Department of Health

4.42 In March 2013, a study was released by the Queensland Health called *Coal seam gas in the Tara region: Summary risk assessment of health complaints and environmental monitoring data*.³⁵ This study drew on the report conducted by the

32 Darling Downs Public Health Unit, *Investigation into the health complaints relating to Coal Seam Gas Activity from residents residing within the Wieambilla Estates, Tara, Queensland*, p. 9.

33 Darling Downs Public Health Unit, *Investigation into the health complaints relating to Coal Seam Gas Activity from residents residing within the Wieambilla Estates, Tara, Queensland*.

34 Darling Downs Public Health Unit, *Investigation into the health complaints relating to Coal Seam Gas Activity from residents residing within the Wieambilla Estates, Tara, Queensland*, p. 17.

35 Queensland Government Department of Health, *Coal seam gas in the Tara region: Summary risk assessment of health complaints and environmental monitoring data*, March 2013.

Darling Downs Public Health Unit and a clinical investigation conducted by Dr Keith Adam in 2012.

4.43 Dr Keith Adam visited Tara over two days in October 2012, and spoke with residents. Dr Adam set out that the most common symptoms reported were:

- headaches, which began around 2005-06;
- nausea and vomiting;
- nosebleeds of varying severity;
- nose, throat and eye irritation;
- rashes and sores, redness and cracking of the skin;
- pins and needles in hands and feet.³⁶

4.44 The study concluded that:

Based on the clinical and environmental monitoring data available for this summary risk assessment, a clear link can not be drawn between the health complaints by some residents in the Tara region and impacts of the local CSG industry on air, water or soil within the community. The available evidence does not support the concern among some residents that excessive exposure to emissions from the CSG activities is the cause of the symptoms they have reported.³⁷

4.45 The National Toxics Network submitted that in their view, the report was:

... cursory and included little clinical investigation. The report concluded that it was unable to determine whether any of the health effects reported by the community were clearly linked to exposure to CSG pollutants. This was not a surprising finding and but one that is common in cases of chronic chemical exposures and suspected health effects, especially when no baseline health or environmental data was available.³⁸

Dr Geralyn McCarron

4.46 Dr Geralyn McCarron, a Brisbane based GP, surveyed the health of 113 residents from the Tara rural residential estates and surrounding areas, and reported that:

The pattern reported was outside the scope of what would be expected for a small rural community. In all age groups there were reported increases in cough, chest tightness, rashes, difficulty sleeping, joint pains, muscle pains and spasms, nausea and vomiting. Approximately one third of the people over 6 years of age were reported to have spontaneous nose bleeds, and

36 Dr Keith Adam, 'Appendix 2 - Health Effects of Coal Seam Gas – Tara', *Coal seam gas in the Tara region: Summary risk assessment of health complaints and environmental monitoring data*, March 2013, p. 1.

37 Queensland Government Department of Health, *Coal seam gas in the Tara region: Summary risk assessment of health complaints and environmental monitoring data*, March 2013, p. 13.

38 National Toxics Network, *Submission 15 Attachment 1*, p. 20.

almost three quarters were reported to have skin irritation. Over half of children were reported to have eye irritation.

A range of symptoms were reported which can sometimes be related to neurotoxicity (damage to the nervous system), including severe fatigue, weakness, headaches, numbness and paraesthesia (abnormal sensations such as pins and needles, burning or tingling).³⁹

4.47 Dr McCarron's survey asked participants about their experiences before and after unconventional gas mining began in their area. The results of the study for those surveyed, aged between 6 and 82, were that:

- 72 per cent of surveyed residents reported skin irritations after the arrival of unconventional gas mining;
- 60 per cent reported eye irritations;
- 32 per cent reported spontaneous nosebleeds;
- 87 per cent reported mild headaches;
- 55 per cent reported severe headaches;
- 64 per cent reported severe fatigue; and
- 42 per cent reporting tingling, numbness and pins and needles.⁴⁰

4.48 Dr McCarron submitted that the study conducted by Queensland Health relied on industry data and limited clinical data, and was not comprehensive. Dr McCarron also noted that the clinical investigation conducted by Dr Adam was poorly advertised and also relied on limited data.⁴¹ Further, Dr McCarron advised the committee of the existence of cancer clusters among residents living with coal seam gas mining, as well as a lack of access to medical assistance.

Testing of soil around Hopeland, Queensland

4.49 The Queensland Department of Environment and Heritage Protection (EHP) is currently investigating soil gas contaminants in the Hopeland area, between Chinchilla and Dalby:

In February 2015, a whole-of-government response was triggered when the Department of Environment and Heritage Protection (EHP) detected gases, including carbon monoxide, hydrogen and hydrogen sulphide, during testing on private property in the Hopeland area. This testing was in relation to ongoing investigations into Linc Energy's trial underground coal gasification operation at Chinchilla. The gases were detected at depths below ground from two to six metres.⁴²

39 Dr GERALYN McCARRON, *Submission 12 Attachment 2*, p. 1.

40 Dr GERALYN McCARRON, *Submission 12 Attachment 2*.

41 Dr GERALYN McCARRON, *Submission 12*, p. 5 and p. 21.

42 Queensland Department of Environment and Heritage Protection, *Hopeland area testing update Issue 5*, August 2015, <https://www.ehp.qld.gov.au/management/hopeland.html> (accessed 21 April 2016).

4.50 EHP set out that 'the gases are associated with combustion processes and are not associated with coal seam gas development'.⁴³ The investigation is ongoing.

4.51 Also in February 2015, EHP established an excavation caution zone for the Hopeland locality which sets out that 'caution should be exercised during activities that may encounter hazardous gas contaminants, such as excavations or trenching works below depths of two metres or more from the surface'.⁴⁴

4.52 Carbon monoxide, hydrogen and hydrogen sulphide are associated with the process of underground coal gasification. According to the National Pollutant Inventory, low level exposure to carbon monoxide can cause

...headache, dizziness, light-headedness and fatigue. Exposure to higher concentrations (400 parts per million) of carbon monoxide can cause sleepiness, hallucinations, convulsions, collapse, loss of consciousness and death. It can also cause personality and memory changes, mental confusion and loss of vision.⁴⁵

4.53 Low level exposure to carbon monoxide can cause headaches, light-headedness and fatigue, and can cause mental confusion.⁴⁶ Low level exposure to hydrogen sulphide can cause eye, nose and throat irritations, headaches, dizziness and nausea.⁴⁷

4.54 The committee sought information from Queensland Health about whether testing for carbon monoxide, hydrogen and hydrogen sulphide had been undertaken in conjunction with the environmental testing conducted by EHP.

Access to healthcare

4.55 Key issues raised by submitters and witnesses related to the potential impact of unconventional gas mining on physical and mental health, and frustration at difficulties in obtaining healthcare. The committee heard from submitters and witnesses from the Western Downs Region of Queensland that obtaining access to healthcare was difficult, could involve long periods of travel time, and was inadequate or inappropriate for their needs. Further, many residents informed the committee that they were regularly denied medical attention when they advised medical practitioners that they believed they were suffering from unconventional gas related illness. They attended local general practitioners and hospitals only to be told that they would need

43 Queensland Department of Environment and Heritage Protection, *Hopeland area testing update*, <https://www.ehp.qld.gov.au/management/hopeland.html> (accessed 21 April 2016).

44 Queensland Department of Environment and Heritage Protection, *Hopeland area testing update*, <https://www.ehp.qld.gov.au/management/hopeland.html> (accessed 21 April 2016).

45 National Pollutant Inventory, *Carbon monoxide*, <http://www.npi.gov.au/resource/carbon-monoxide-0> (accessed 21 April 2015).

46 National Pollutant Inventory, *Carbon monoxide*, <http://www.npi.gov.au/resource/carbon-monoxide-0> (accessed 21 April 2015).

47 National Pollutant Inventory, *Hydrogen sulphide*, <http://www.npi.gov.au/resource/hydrogen-sulfide> (accessed 21 April 2015).

to contact 13HEALTH. When they contacted 13HEALTH they were told to contact local general practitioners and hospitals.

4.56 For example, Mrs Narelle Nothdurft told the committee that it had been difficult to obtain healthcare:

We have tried going to the doctors with the children. I have a letter here...from Dalby Medical Centre saying that we would not be allowed to go to their centre because it now relates to CSG and to please call 13HEALTH. I ring 13HEALTH and they say please go to your doctor. I go to the doctor and they please ring 13HEALTH. It goes around and around.⁴⁸

4.57 Similarly, Mr John Jenkyn told the committee that the 13HEALTH number and doctors at the hospital had continually referred him to each other, and set out that:

I say to them, 'Every time I send you a complaint, that's another 20 minutes that I'm not doing what I'm supposed to be doing as a father'...If it is a CSG related issue, you must ring the 13HEALTH number. So I ring them and they tell me, 'John, you've got to get to a hospital immediately.' So you go in to see the doctor at the hospital and the GP will say to you, 'But it's a CSG related issue. You must ring 13HEALTH.' You say, 'But I've rung them; that's why I'm here,' and they say, 'Well, there's nothing I can do. You must go back and ring 13HEALTH.' So we keep going around in that terrible loop that way.⁴⁹

4.58 Dr Marion Carey, from Doctors for the Environment Australia, outlined some of the difficulties around providing medical testing relating to unconventional gas mining:

Some chemical exposures can be tested for but some are much more difficult to test for. As we know, there are numerous problems with chemicals. There are different chemicals used in different places, in different wells and at different times. One of the big problems is the transparency around the chemicals. If we do not even have any information about what chemicals are used in a particular well, it is very difficult for a doctor to order appropriate testing, even if that testing is available, without knowing what people have been exposed to.⁵⁰

4.59 Dr Carey raised concerns over a lack of information on what chemicals are used in unconventional gas mining:

In order to be able to do a risk assessment, you need to know about the hazard—the thing you are being exposed to and that you are worried about. In this case, it is a chemical or a range of chemicals. So you need the toxicity information about that. As we have said in our submission, the vast majority of chemicals that are used have not been assessed for safety. So

48 Mrs Narelle Nothdurft, *Committee Hansard*, 17 February 2016, p. 16.

49 Mr John Jenkyn, *Committee Hansard*, 17 February 2016, p. 23.

50 Dr Marion Carey, Coordinator, Unconventional Gas Special Interest Group, Doctors for the Environment Australia, *Committee Hansard*, 12 April 2016, p. 37.

there is very little information and, for some of them, we do not even know what they are because they are commercial in confidence.⁵¹

4.60 Dr Carey also outlined the type of testing which, in her view, should be carried out in order to assess the health of those living alongside unconventional gas mining:

It is very important to have that environmental monitoring because, from that, we can start to see whether things are bio-indicated in humans. Sometimes when people are exposed to something it does not necessarily cause a harmful effect. But sometimes it does. And sometimes there can be something in their blood or urine that can be measured, depending on what the chemical is. But the early starting point is really to get that environmental information, which in many cases has not been required. We absolutely have to have information about what chemicals are going to be used.⁵²

Impact on agriculture

4.61 Australia's agricultural industry could be affected by unconventional gas mining activity in several ways. This section sets out key issues relating to unconventional gas mining and the agricultural industry, with regard to:

- domestic and export capacity;
- supply chain integrity; and
- production capacity, with areas of concern relating to:
 - land allocated for unconventional gas mining rather than agriculture; and
 - amount of time spent by landholders undertaking administrative work relating to unconventional gas mining.

4.62 The view of the Australian Dairy Industry Council regarding unconventional gas mining is that:

The Australian dairy industry must continue to operate and prosper without unconventional gas mining activity compromising the natural resources upon which the industry relies and without loss to industry reputation or market access.⁵³

4.63 It was also submitted that agriculture was central to Australia's supply of food:

The Australian agriculture sector plays a crucial role in sustainably supplying food and fibre to domestic and international markets. The place

51 Dr Marion Carey, Coordinator, Unconventional Gas Special Interest Group, Doctors for the Environment Australia, *Committee Hansard*, 12 April 2016, p. 37.

52 Dr Marion Carey, Coordinator, Unconventional Gas Special Interest Group, Doctors for the Environment Australia, *Committee Hansard*, 12 April 2016, p. 38.

53 Australian Dairy Industry Council, *Submission 46*, p. 3.

of agriculture as a core pillar of the Australian economy is recognised by Federal and state governments.⁵⁴

4.64 The Australian Wine Industry submitted that:

The Australian wine industry does not believe that unconventional gas mining can coexist within or near the wine growing regions of Australia, because it:

- is incompatible with viticulture, winemaking and wine tourism,
- threatens the brand and reputation of the internationally recognised wine brands of specific regions and Australia more generally,
- presents an unacceptable risk to scarce water and land resources, and
- appears to be inadequately regulated.⁵⁵

4.65 Cotton Australia noted that there are a variety of views among cotton growers on unconventional gas mining, with some growers supportive of unconventional gas mining, some against it, and some unsure. Cotton Australia indicated that as an organisation, they are not opposed to coal seam gas mining.⁵⁶

4.66 AgForce submitted that supporting landholders to manage 'the rapid development and expansion of the coal seam gas (CSG) industry' across regional Queensland has been 'a key organisational priority'.⁵⁷

4.67 AgForce set out the role of their CSG Landholders' Project:

In response to our member's needs and following changes in 2010 to Queensland's land access laws, AgForce Queensland through AgForce Projects (the independent extension and delivery arm of AgForce Queensland) received Queensland Government funding to develop and implement a project to disseminate and provide factual information and independent support to landholders dealing with the CSG industry via local on ground workshops.⁵⁸

4.68 Further, it was noted that annual surveys of landholders have been carried out as part of the CSG Landholders' Project, finding that common concerns relate to:

- potential cumulative groundwater impacts;
- potential impacts of CSG on their individual groundwater supplies/bore;
- weed and biosecurity risks on property from CSG; and

54 Australian Dairy Industry Council, *Submission 46*, p. 3.

55 Australian Wine Industry, *Submission 87*, p. 3.

56 Cotton Australia, *Submission 104*, pp 1-2.

57 AgForce, *Submission 235*, p. 1.

58 AgForce, *Submission 235*, p. 1.

- time taken away from their property/business to negotiate agreements and/or manage CSG activities.⁵⁹

Production capacity

4.69 In this section, two aspects of the potential impact of unconventional gas mining on agriculture will be discussed:

- cropping and livestock land allocated to unconventional gas mining rather than agricultural production; and
- the amount of time spent by landholders undertaking administrative work relating to unconventional gas mining rather than agriculture.

Allocation of land to unconventional gas mining

4.70 Submitters and witnesses highlighted the impact that coal seam gas infrastructure may have on the productive capacity of their land by reallocating agricultural land to unconventional gas mining.⁶⁰

4.71 For example, the Australian Dairy Industry Council submitted that the dairy industry has specific requirements relating to infrastructure and routine:

Dairy production has specific infrastructure requirements and relies upon seasonal and daily routines, unique to the management of each farm, being conducted without disruption. Farmers' ability to operate their farms, have ongoing access to their farm assets, and have options to develop and grow their business must not be compromised by unconventional gas mining operations either on their own land or in the local area.⁶¹

4.72 In Queensland, the *Regional Planning Interests Act 2014* (QLD) restricts resource activity in an area of regional interest, where the activity is not exempt or where a regional interests development approval as not been granted. There are four areas of regional interest which set out the priority land use for that area:

- priority agricultural area;
- priority living area;
- strategic environmental area; and
- strategic cropping area.⁶²

4.73 The Bender Family suggested that a review 'be undertaken on the percentage of prime agricultural land held within Queensland (5.87%) that is NOT protected by

59 AgForce, *Submission 235*, p. 2.

60 Ms Stina Foster, *Submission 6*; Dr GERALYN McCARRON, *Submission 12 Attachment 1*.

61 Australian Dairy Industry Council, *Submission 46*, p. 4.

62 Queensland Government, *Submission 217*, p. 10. Strategic cropping areas are determined by the state.

the Strategic Cropping Laws', and estimated that 'only 1.5% of prime agricultural land will be protected from mining/CSG activities'.⁶³

4.74 Rabobank outlined concerns over concurrent coal seam gas and agricultural activity in a submission to the Senate Standing Committee on Rural Affairs and Transport References Committee's inquiry into the management of the Murray-Darling Basin in 2011. Rabobank submitted that 'CSG activities could constrain the productive capacity of agricultural land by impacting groundwater supply and quality, affecting infrastructure, and de-intensifying production systems'.⁶⁴

4.75 Further, Rabobank submitted that they held concerns around:

- flow level and quality/contamination of hydro-geological systems;
- space required for roads, wellheads and connection pipes on agricultural land; and
- above-ground infrastructure on agricultural land potentially limiting agricultural production.⁶⁵

4.76 A related concern was that the nature of the heavy black soil, or vertosol, in inland Queensland, is particularly unsuitable to the disruption of gas pipelines and unconventional gas mining infrastructure. This soil is of agricultural importance, and is a clay soil with shrink/swell properties, and can be self-mulching.⁶⁶

Time spent by landholders – administrative burden

4.77 The amount of time spent by affected landholders reading and responding to unconventional gas mining documents, and in negotiations, was raised by a number of submitters and witnesses.⁶⁷

4.78 The committee considers that there is no greater example of the administrative burden felt by those living in unconventional gas mining areas than the experience of the Bender Family in Queensland.

4.79 The Bender Family submitted that

To be really honest, it is impossible to determine the tangible magnitude of the time required to deal and manage the volume of correspondence that

63 Bender Family, *Submission 274*, p. 18.

64 Rabobank, *Submission 371* to the Senate Standing Committee on Rural Affairs and Transport References Committee inquiry into the management of the Murray-Darling Basin, 2011, p. 2.

65 Rabobank, *Submission 371* to the Senate Standing Committee on Rural Affairs and Transport References Committee inquiry into the management of the Murray-Darling Basin, 2011, p. 2. Rabobank expressed the view that 'given careful management and due consideration of each industry's needs, the agriculture and energy production should be able to co-exist'.

66 Australian Soil Classification, *Vertosols [VE]*, http://www.clw.csiro.au/aclep/asc_re_on_line_V2/ve/vertosols.htm (accessed 10 March 2016).

67 See, for example, Dr Pauline Roberts, *Submission 1*; Ms Annette Hutchins, *Submission 84*; Mr Herbert Bamerry, *Submission 148*, p. 2.

pertains to this industry while running an intensive farming operation 24/7. This is an area where the resource industry requires serious education.

...

It would be estimated to consume at a minimum 2 full days per week. However, in reality this industry is on the forefront of your mind 24/7.⁶⁸

4.80 The committee heard that the Bender Family had needed to create and maintain a meticulous filing system to manage their interaction with the resources industry. Ms Helen Bender told the committee that her family had accumulated 21 folders of documents relating to their interaction with unconventional gas mining companies in a ten year period.⁶⁹

4.81 Ms Bender highlighted the burden put on landowners who have had to dedicate significant amounts of time to learning and understanding unconventional gas mining legislation and their rights as landowners, showing the committee her father's copy of the Petroleum and Gas Act, noting '[h]e had to learn this himself'.⁷⁰

4.82 The Bender Family submitted that:

...the volume of correspondence and stress that this industry places on a landholder requires serious reforms across the Land Access Framework, legislation and providing the landholder with an avenue to go to for genuine assistance.⁷¹

4.83 A number of other submitters highlighted the amount of time spent on interacting and managing contact with the resources industry. For example, Mr Gary and Mrs Kerry Ladbrook submitted that:

Time spent (not including reading/responses to 5 Draft EIS & 6 Environmental Impact Statements that directly impacted us) was well in excess of 3000 hours each in a 20 month period with further ongoing time impacts occurring on a weekly if not daily basis. It is the equivalent to losing two days per week away from your business which is unacceptable unless compensated properly throughout the process.

We had between 2012 & 2014 six Draft Environmental Impact Statements (approx 400-500 A4 pages in size) to respond to individually and 5 Environmental Impact Statements (400 plus pages in size) to read & respond where required.⁷²

4.84 Ms Annette Hutchins submitted that the time spent by local residents on unconventional gas mining administration was harming productivity:

68 Bender Family, *Submission 274*, p. 18.

69 Ms Helen Bender, *Committee Hansard*, 17 February 2016, p. 8.

70 Ms Helen Bender, *Committee Hansard*, 17 February 2016, p. 14.

71 Bender Family, *Submission 274*, p. 14.

72 Mr Gary and Mrs Kerry Ladbrook, *Submission 29*, p. 3.

There is financial distress caused by trying to deal with the impacts of CSG and mining companies legally and continually having to monitor activities taken on their land and changes to regulations and legislation, reading EIS, writing submissions, attending meetings, etc....Taking time out of their working day which impacts on productivity, finances and personal lives.⁷³

4.85 Cotton Australia submitted that they had worked towards an understanding of unconventional gas mining development, but acknowledged that cotton growers may not have similar time and resources:

Through our involvement on the PAG Cotton Australia has improved its understanding of requirements for gas field development, and the differences involved in moving from the exploratory to production stages. This has been a long term process which has involved ongoing interactions with petroleum companies, extensive reading of literature based on limited local experience, and engagement with locals impacted by development.

Growers often do not have the time available to build this familiarity, and so when approached by extractive industry companies often commence negotiations with a limited understanding of what is involved.⁷⁴

4.86 Similarly, p&e Law explained that:

Landowners do not have access to employees with expertise in the matters to be addressed by the reports. They do not have the time to keep monitoring the changes. They frequently do not have the financial capacity to pay for the expertise needed to be properly and fully informed.⁷⁵

4.87 The committee notes that community members have expended a significant amount of energy in monitoring and recording the activities of unconventional gas mining. In particular, the committee has seen and published forty short video recordings made by Mr Tony Pickard of unconventional gas mining infrastructure around the Bibblewindi site in NSW.

Domestic and export capacity

4.88 The potential impact of unconventional gas mining on the capacity of agricultural land to produce food for domestic consumption was raised by submitters. For example, CSG Free Maffra & Districts submitted that 'we need to protect every square metre of arable land for food production'.⁷⁶

4.89 The Bass Coast Shire Council expressed the view that '[t]he uncertainty and risks involved with unconventional gas exploration and mining activities cannot be sufficiently mitigated to protect the agricultural land in the Shire'.⁷⁷

73 Ms Annette Hutchins, *Submission 84*, p. 5.

74 Cotton Australia, *Submission 104*, pp 4-5.

75 p&e law, *Submission 246*, p. 3.

76 CSG Free Maffra & Districts, *Submission 105*, p. 1.

77 Bass Coast Shire Council, *Submission 65*, p. 2.

4.90 Mr Max Mudford, a farmer from NSW, told the committee that

The meat—the lamb, beef, chicken and fish—that turns up on your plate was our product; not mine alone, but our product as a nation, delivered onto your plate. The coal seam gas industry and the government are asking us to step aside so they can drill a hole here and forget about production of food but get into a gas system that destroys the water that we need on this planet to survive.⁷⁸

Supply chain integrity

4.91 Submitters raised concerns over the potential for contamination of livestock or produce by chemicals used during unconventional gas mining.⁷⁹ Further, the committee also notes concerns raised by landholders of the impact of unconventional gas mining on local livestock and pets, including loss of hair, blindness, an increase in the number of stillborn animals, premature death, unusual behaviour and a variety of illnesses.

4.92 Friends of the Earth Australia raised concerns over the 'ongoing issues of insurance arrangements with landholders should there be issues with unconventional gas mining infrastructure in the long term', and submitted that:

Questions have also arisen regarding the burden of responsibility and insurance should a contamination incident impede a farmer's ability to sell produce. Under Australian law, it is a criminal offence to sell food that you know is unsafe. Unconventional gas mining operations that involve large volumes of toxic chemicals and run the risk of surface and ground water contamination could create pathways of exposure of crops and animals to chemicals.⁸⁰

4.93 Further, submitters raised concerns regarding their ability to secure insurance for their businesses when they advised insurance companies that they had unconventional gas mining on their land.

4.94 Ms Sarah Ciesiolka submitted that:

We approached our insurance company to mitigate the risk and safeguard our assets but were told that there is no policy available in Australia that

78 Mr Max Mudford, *Committee Hansard*, 29 March 2016, p. 49.

79 Dr Geralyn McCarron, *Submission 12*; Mr Richard Deem, *Submission 21*; Ms Frances Winfield, *Submission 22*, pp 1-2; Ms Lorraine Stern, *Submission 24*; Mr David and Mrs Julie Boulton, *Submission 35*, p. 4; Ms Dianna Flint, *Submission 50*; Mr Trevor Flint, *Submission 51*; Ms Annette Dean, *Submission 68*; Ms Louise Somerville, *Submission 70*; Ms Annette Hutchins, *Submission 84*; Mr Brett Lancaster, *Submission 94*; Ms Patricia McAuliffe, *Submission 102*; Protect Arnhem Land, *Submission 115*; Ms Sharlene Henderson, *Submission 118*; Ms Diane Lawton, *Submission 132*; Ms Heather Gibbons, *Submission 147*; Midwest and Gascoyne Alliance, *Submission 232*; Interbeing, *Submission 258*; Limestone Coast Protection Alliance, *Submission 263*; Ms Stacey O'Brien, *Submission 270*.

80 Friends of the Earth Australia, *Submission 141*, p. 13.

will do so. Our insurer advised that our farm business, water resources and/or product are considered "uninsurable" against CSG contamination.⁸¹

4.95 Further, Ms Ciesiolka wrote that:

Being unable to obtain insurance leaves food producers like myself at grave risk, questioning what consequences there may be for food products sold into the future, and whether we may ultimately incur a legal or financial liability. Detection of contaminants would also mean that we would be immediately suspended from current and future market participation for our product. Our signed contracts for supply all include clauses related to contamination of the shipment and, as per the terms of those documents, we know that our supply chain partners would hold us liable for any product contamination caused by CSG activities within our wider region, essentially leaving us to bear the ultimate burden in the event of contamination of the food chain.⁸²

4.96 Submitters told the committee they were concerned that unconventional gas mining activity had an adverse effect on the health of their animals, including livestock and pets.⁸³

4.97 The Australian Dairy Industry Council submitted that:

The health and wellbeing of people and animals is crucial for the Australian dairy industry. The unconventional gas mining industry exposes the dairy industry to a range of risks that could compromise achievement of high quality safe dairy products...The dairy industry faces commercial risks if consumer confidence is affected by impacts or potential impacts of unconventional gas mining. The reputation of the Australian dairy industry needs to be protected and promoted in order for the industry to prosper and grow.⁸⁴

4.98 The National Livestock Production Assurance (LPA) was introduced in 2004 to be the 'Australian livestock industry's on-farm food safety program' and is overseen by the LPA Advisory Council, which is made up of representatives of peak industry bodies.⁸⁵

4.99 The LPA National Vendor Declaration (LPA NVD) provides for the recording of stock movement and guarantees the food safety status of animals.⁸⁶

81 Ms Sarah Ciesiolka, *Submission 250*, p. 5.

82 Ms Sarah Ciesiolka, *Submission 250*, p. 5.

83 See, for example, Bender Family, *Submission 274*.

84 Australian Dairy Industry Council, *Submission 46*, p. 3.

85 Meat and Livestock Australia, *About LPA*, <http://www.mla.com.au/Meat-safety-and-traceability/Livestock-Production-Assurance/About-LPA> (accessed 11 March 2016).

86 Meat and Livestock Australia, *About LPA*, <http://www.mla.com.au/Meat-safety-and-traceability/Livestock-Production-Assurance/About-LPA> (accessed 11 March 2016).

4.100 Safemeat, a partnership between the red meat and livestock industry and state and federal governments, set out that beef producers are ultimately responsible for the assessment of risks:

...producers are responsible for undertaking a property risk assessment to ensure they are aware of any potential areas of contamination, and take appropriate management steps to avoid the risks (this could include excluding stock from risk areas if necessary). Where circumstances change, it is the producer's responsibility to update the property risk assessment.⁸⁷

4.101 Safemeat note their risk management measures:

In the event that any concerns are raised by environment protection agencies, or state agriculture departments, SAFEMEAT has a range of measures which it could initiate to monitor livestock which may have been exposed to such risks (measures include traceability systems, residue monitoring programs and assignment of statuses).⁸⁸

4.102 Ms Gillian Laland wrote that:

...when you sign an NVD you are providing the buyer with a guarantee relating to the food safety status of the animals they are purchasing. Farmers who sign National Vendor Declarations for livestock that may have been contaminated by contact with CSG waste are likely to be liable for any harm incurred.⁸⁹

4.103 Ms Heather Gibbons submitted the view that:

The National Vendors' Declaration form is meant to keep our food chain safe. Is it? eg. the crops and animals, which are exposed to chemical contaminants in the gasfields of Queensland. Are the forms filled in? Is there a 'heads in the sand' attitude? Do we wait for the problem to blow up in our faces in the future with food being tested for contamination? I believe the potential to lose our export markets is huge.⁹⁰

Water resources

4.104 The impact of the unconventional gas mining industry on agriculture has generally been assessed with regard to water usage, and the impact on the quantity and quality of water available to landowners.

4.105 During the coal seam gas mining process, drilled wells are 'de-watered' as water is withdrawn from the subterranean aquifer to help the gas flow more freely.

87 Safemeat, *Coal Seam Gas Production and Implications for Livestock*, <http://safemeat.com.au/announcements/coal-seam-gas-production-and-implications-for-livestock> (accessed 2 March 2016).

88 Safemeat, *Coal Seam Gas Production and Implications for Livestock*, <http://safemeat.com.au/announcements/coal-seam-gas-production-and-implications-for-livestock> (accessed 2 March 2016).

89 Ms Gillian Laland, *Submission 256*, p. 13.

90 Ms Heather Gibbons, *Submission 147*, p. 33.

The largest volume of water produced is during the early stages of coal seam gas recovery.⁹¹

4.106 The water brought up from the well requires treatment before it can be reused or disposed of:

Water of suitable quality can be used for town water, aquaculture, recharging aquifers, wetlands, recreational lakes or at mining operations and power stations, and recent practice has been for poor quality water to be contained in storage ponds.⁹²

4.107 Hydraulic fracturing (fracking) requires water, a mix of chemicals and a proppant (generally sand) to be pumped into the well. The recovery of coal seam gas through fracking can use between 0.2 and 1ML per well (a megalitre, or ML, is one million litres), and the recovery of shale gas through hydraulic fracturing can use 15 – 25 ML.⁹³

Water quality and quantity

4.108 Submitters to the inquiry and witnesses who appeared at the committee's public hearing in Dalby told the committee that they were concerned over the amount of water being used in coal seam gas mining in their area, and the effect it may have on their ability to maintain their agricultural operations.⁹⁴ Many submitters advised the committee that their bores have been depleted and that the remaining water had been contaminated after noting that their water had changed colour and developed an unusual taste and smell. As a result, many landholders advised the committee that they no longer used the groundwater for fear of toxins and dangerous chemicals.

Baseline testing

4.109 Submitters highlighted the lack of baseline data available for water resources. For example, Dr Gavin Mudd submitted that:

Another approach to identifying the source of contaminants and distinguishing water origins is the use of environmental isotopes. This means that all aquifers which could be impacted by CSG activities need to include such a complete chemical suite in their baseline studies and ongoing monitoring. Baseline data is especially crucial in establishing trigger levels for intervention and determining contamination levels and sources.⁹⁵

91 Department of Environment and Heritage Protection (QLD), *Fracking*, <http://www.ehp.qld.gov.au/management/non-mining/csg-water.html> (accessed 8 January 2016).

92 Michael Roarty, *The development of Australia's coal seam gas resources*, Parliamentary Library Background Note, July 2011, p. 5.

93 Victorian Legislative Council Environment and Planning Committee, *Inquiry into unconventional gas in Victoria*, p. 52, <http://www.parliament.vic.gov.au/epc/references-committee-inquiries/article/2633> (accessed 8 December 2015).

94 Reverend Graham Slaughter, *Submission 20*, p. 6; Mr Joe Hill, *Submission 26*, p. 2.

95 Dr Gavin Mudd, *Submission 45 Attachment 1*, p. 4.

4.110 The Centre for Coal Seam Gas submitted that baseline testing of groundwater could be of significance to monitoring effects of unconventional gas mining activity:

...10-20 year trends in groundwater levels and groundwater chemistry can represent a touchstone in assessing effects of extraction of groundwater associated with unconventional gas development and pre-existing uses for agriculture. Such trends are also needed to monitor and assess effects on biodiversity, environmental and public health, and socioeconomic conditions.⁹⁶

4.111 The Australian Dairy Industry Council submitted that sustainable groundwater and surface water reserves were very important to the dairy industry, and argued that:

An assessment and monitoring system needs to provide independently verified baseline data and on-going monitoring data to transparently identify potential cumulative impacts of unconventional gas mining in a regional context, with any impacts remedied.⁹⁷

Great Artesian Basin

4.112 Submitters have raised concerns over the impact of unconventional gas mining on the quality and quantity of groundwater sourced from the Great Artesian Basin (GAB).⁹⁸

4.113 Ms Anne Kennedy in her evidence to the committee at the Narrabri public hearing stated her concerns:

Australia is the driest inhabited continent on earth, and we have one incredible resource: our Great Artesian Basin. The governments can forget about gold, uranium, coal or gas. The single greatest resource we have is our groundwater. Vast areas of Australia would be uninhabitable without it. We literally could not live out there without our groundwater. This is not just a fight to save our water and our farms and our communities; this is actually about the future of agriculture and the future of Australia. I am not exaggerating one iota when I say that. We will not be able to live out here without water, and this coal seam gas industry will destroy our water.⁹⁹

4.114 In September 2015, Santos stated that water extracted for the Narrabri Gas Project will not be drawn from the GAB. Dr Richard Cresswell, a former CSIRO hydrogeologist, stated:

They [the waters] are not Great Artesian Basin waters, they are from the Gunnedah Basin, beneath the GAB and it is isolated from the GAB by some very fine grain sediments which do not allow water to go up or down between those two basins...

96 Centre for Coal Seam Gas, University of Queensland, *Submission 98*, p. 4.

97 Australian Dairy Industry Council, *Submission 46*, p. 3.

98 Dr Pauline Roberts, *Submission 1*; Dr Geralyn McCarron, *Submission 12, Attachment 2*; Ms Jenny Chester, *Submission 18*; Reverend Graham Slaughter, *Submission 20*; Ms Lorraine Stern, *Submission 24*.

99 Ms Anne Kennedy, *Committee Hansard*, 29 March 2016, p. 20.

A farmer's water would not be impacted by any of the drilling that goes through the Great Artesian Basin to get to the gas.¹⁰⁰

4.115 Santos set out that routine baseline testing is carried out in Narrabri, NSW:

In Narrabri in New South Wales, Santos has used the best available science to build an understanding of the potential effect our operations may have on local water. This includes routine baseline monitoring of over 100 groundwater locations across the Narrabri region and historical monitoring at more than 100 landholder bores.¹⁰¹

Contamination of groundwater

4.116 The recovery of coal seam gas requires the drilling of wells through geological layers, including groundwater layers. Water produced during unconventional gas mining contains very high levels of salt.

4.117 Submitters told the committee of their concerns that their groundwater had been contaminated through unconventional gas mining practices. For example, Mr Joe Hill told the committee that a dam across the road from his property had burst, flooding his property with CSG treated water. Mr Hill provided the committee with a letter from the Queensland Department of Environment and Heritage Protection which outlined that as the farm dam sites on Mr Hill's property which were affected by the burst dam 'are not classed as waters, there has been no evidence of non-compliance with this condition of the BUA [Beneficial Use Agreement]'.¹⁰² In the letter, EHP further set out that the CSG water was:

...fit for the purpose intended in the beneficial use approval and that it posed no greater risk than what is acceptable for any other irrigation project, to the extent that it complied with the conditions of the BUA.¹⁰³

4.118 At the Dalby public hearing, Mr and Mrs Boyle told the committee that a valve in above-ground infrastructure on their property had leaked, spilling 120,000 litres of CSG water onto their property.¹⁰⁴

4.119 Ms Anne Kennedy in her evidence to the committee at the Narrabri public hearing expressed her concerns about contamination of groundwater in the Great Artesian Basin:

If they contaminate it, it is all over. You cannot decontaminate an aquifer. Once they have fractured it, it can never be repaired. Once it is

100 Santos, *The Santos Narrabri Gas Project will not impact the Great Artesian Basin*, <https://narrabrigasproject.com.au/2015/09/the-santos-narrabri-gas-project-will-not-impact-the-great-artesian-basin/> (accessed 4 March 2015).

101 Santos, *Submission 57*, p. 24.

102 Letter from Queensland Department of Environment and Heritage Protection to Mr Joe Hill, 2 April 2015, Additional information.

103 Letter from Queensland Department of Environment and Heritage Protection to Mr Joe Hill, 2 April 2015, Additional information.

104 Mr Lindsay Boyle, *Committee Hansard*, 17 February 2016, p. 28.

contaminated, it is poisoned...Once we lose our water, we will no longer exist out there. We have very, very productive black soil plains, but it is black soil. It is fertile soil, and it is rich. But you cannot run water, even if it does rain, for dams. We have nothing but our Great Artesian Basin, and that is a vast area out there.¹⁰⁵

Social impact

4.120 The committee heard that divisions within communities have been caused by the unconventional gas mining industry, and that unconventional gas mining activity had a significant social impact.¹⁰⁶

4.121 Mrs Shay Dougall submitted that:

The social impact of the industry has been devastating. It has divided extended families, it has resulted in many marriage break ups, it has changed the very fabric of the community with many locals leaving and socioeconomic disadvantaged groups being sent to the community due to the devastating economic downturn.¹⁰⁷

4.122 Mr and Mrs Gary and Kerry Ladbrook submitted that there had been an 'exodus of families' as gas mining companies bought out properties in the community.¹⁰⁸

4.123 Reverend Graham Slaughter submitted that in his view, divisions had been created in communities:

Sadly, confidentiality clauses and the dilemma of whether to fight the company or to give in has pitted rural families against each other. Instead of neighbours being a lifeline in times of trouble and a social support of friendship and loyalty, mining companies have successfully and deliberately divided and conquered through tactics which include bullying, manipulation and threats of legal action ensuring that in many instances, battlelines of conflict and mistrust are drawn...¹⁰⁹

4.124 The Lock the Gate Alliance submitted that proposed and current unconventional gas mining activity had led to a range of impacts on the mental and emotional wellbeing of landholders.¹¹⁰ The Lock the Gate Alliance further submitted that landholders and affected communities felt a 'a sense of powerlessness, betrayal and frustration' at the imposition of the industry in their lives.¹¹¹

105 Ms Anne Kennedy, *Committee Hansard*, 29 March 2016, p. 22.

106 See, for example, Ms Jane Stevenson, *Submission 197*; *Submission 249*.

107 Mrs Shay Dougall, *Submission 103*, p. 8.

108 Mr Gary and Mrs Kerry Ladbrook, *Submission 29*, p. 8.

109 Reverend Graham Slaughter, *Submission 20*, p. 5.

110 Lock the Gate Alliance, *Submission 146*, p. 19.

111 Lock the Gate Alliance, *Submission 146*, p. 20.

Lack of communication/information

4.125 The committee heard there was insufficient communication between gas mining companies and landholders and insufficient information provided, which has led to uncertainty for residents about the potential impact of unconventional gas mining.

4.126 One key issue raised by submitters and witnesses was the frustration experienced by landholders and residents in obtaining relevant information. For example, Mrs Narelle Nothdurft told the committee that although testing was conducted on the noise level on their property (by the Queensland Department of Environment and Heritage Protection (EHP)) it had been difficult to gain access to the report:

On noise monitoring, we got EHP to come and do the noise monitoring on our place. It has now taken us over six months through RTI—right to information—to get any information out of them. They could only give us three days instead of the whole ten days [tested]. It was in our bedrooms in our own house and they would not give it to us.¹¹²

4.127 Mrs Nothdurft and Mrs Shay Dougall, residents of the Western Downs Region, noted that when access had been granted to the report, it was incomplete, with no explanation given. Ms Dougall told the committee that:

[Mr and Mrs Nothdurft] sent a right to information in to get their own data back after EHP promised they would give it to them. Five months later they received a portion of the data after the EHP had checked with QGC about what it was they should release. They have received only a portion of the data.¹¹³

Social licence

4.128 A number of organisations have claimed that no social license exists for unconventional gas mining in communities across Australia.¹¹⁴

4.129 According to the Australian Centre for Corporate Social Responsibility, a social licence is 'the level of acceptance or approval continually granted to an organisation's operations or project by local community and other stakeholders'.¹¹⁵

112 Mrs Narelle Nothdurft, *Committee Hansard*, 17 February 2016, p. 17.

113 Mrs Shay Dougall, *Committee Hansard*, 17 February 2016, p. 17.

114 See, for example: Mr Julian Sharp, *Submission 14*; Dr Wayne Somerville, *Submission 16*; Gasfield Free Seaspray, *Submission 34*; Mr Peter Thompson, *Submission 43*; Bass Coast Shire Council, *Submission 65*; Sustainable Boolarra Group, *Submission 66*; Ms Cynthia Lyons, *Submission 67*; Mr Brian McLure, *Submission 93*; Dr Catherine Pye, *Submission 97*; Ms Christine Degan, *Submission 101*; Ms Elke Nicholson, *Submission 119*; Frack Free Moriac, *Submission 139*; Mrs Lynley Manson, *Submission 163*; Ms Megan Kuhn, *Submission 190*; No Fracking WAy, *Submission 218*; Ms Deborah and Mr Fergus O'Connor, *Submission 243*.

115 Australian Centre for Corporate Social Responsibility, *Defining the elusive and essential social licence to operate*, <http://accsr.com.au/news/defining-the-elusive-and-essential-social-licence-to-operate/> (accessed 3 March 2015).

4.130 Gaining and maintaining a social licence is a fluid process which relies on stakeholder expectations, and the continuing relationship between a company and its stakeholder group.¹¹⁶

4.131 Some communities have conducted local surveys of views on unconventional gas mining in the local area. For example, local resident groups of the Narrabri area have stated that, according to surveys carried out locally, there is no broad community support or social licence for coal seam gas mining in the area.¹¹⁷

4.132 Mrs Megan Kuhn told the committee about surveys conducted in the Narrabri area of NSW:

...our 'gas field free' community surveys, which began in 2012, have been witnessing the growth of something extremely powerful. The survey is a grassroots participatory process where 100 per cent of the community are approached to take part, whereby a simple question is posed to them by their own community members, and that is: 'Do you want your road or land gas-field-free?' The responses they can give are 'yes', 'no' or 'not sure'. It is undertaken by individual members, road by road, neighbour by neighbour, and it is a genuine opportunity for all community members to have their voices heard.¹¹⁸

4.133 Mrs Kuhn continued that if a majority of views against unconventional gas mining is recorded for an area, it is declared 'gasfield free'. Mrs Kuhn told the committee that: 'By establishing a mandate on this one issue, we are engaged in protecting our community. Our clear rejection of dangerous, invasive gas fields is undeniable'.¹¹⁹

4.134 However, the Energy Resource Information Centre has argued against claims that there is no social licence for unconventional gas mining in the Narrabri area, and stated that 85 per cent of landholders in the project support unconventional gas mining.¹²⁰

Senator Glenn Lazarus

Chair

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