

The 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

July to November 2012

**FINAL REPORT
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Some information in the report has been removed for privacy reasons.

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Acronyms

CSG	Coal Seam Gas
DDPHU	Darling Downs Public Health Unit
DEHP	Department of Environment and Heritage Protection
DIP	Department of Infrastructure and Planning
DNRM	Department of Natural Resources and Mines
DOC	Department of Communities, Child Safety and Disability Services
GIS	Geographic Information System
GP	General Practice
HCC	Health Contact Centre
HCP	Healthcare provider
PHP	Public Health Physician

Summary

Health impacts due to Coal Seam Gas (CSG) have been a major community concern since the introduction of CSG industries in Queensland. Since 2008 the Darling Downs Public Health Unit (DDPHU) has received a variety of health complaints related to this industry. These have been followed up with relevant agencies and, where appropriate, local health care providers, however, no substantive evidence was available to support these allegations that the health complaints were due to CSG activities.

In July 2012, an increase in the number of health complaints to Queensland Health occurred. These were made through representatives of the community of the Wieambilla Estates, a residential area located close to the CSG wells. The DDPHU was asked to undertake an investigation into these health complaints. This report describes the investigation undertaken by the DDPHU as a component of a broader health risk assessment. The health risk assessment has been undertaken to determine the likelihood of a direct physical link between the symptoms experienced by the residents of the Wieambilla Estates and exposure to the CSG related activities in the local area.

The area of interest is located to the north-east of the town of Tara in South-West Queensland approximately 170 km north-west of Toowoomba (300 km north-west of Brisbane) within the Western Downs Regional Council. The estimated population of the area is 1257 persons.

Purpose of Investigation

The purposes of this investigation are as follows:

- to determine the nature of the complaints reported by the community
- to determine the prevalence of the health complaints experienced by the community
- to determine the severity of the health complaints experienced by the community
- to examine the level of exposure of residents in the Wieambilla Estates to CSG activities including:
 - types of exposure
 - proximity of residents in the Wieambilla Estates to CSG activities
 - duration of exposure (length of time living in the area)
- to identify other potential exposures that could be relevant to the residents' health concerns.

Methodology

The DDPHU undertook the following activities:

- medical reporting: local healthcare providers (HCPs) were contacted to establish if residents had presented with symptoms allegedly related to exposure to CSG activities
- self reporting: residents experiencing symptoms could report symptoms to Queensland Health through its 24-hour telephone assistance Health Contact Centre (HCC) on 13 HEALTH (13 43 25 84)
- follow-up of residents and their families who had either presented to a local HCP or reported symptoms through the HCC by the Public Health Physician (PHP), DDPHU
- mapping of the households reporting symptoms relative to the locations of the CSG wells
- contact was also made with the mining companies to determine whether there had been health complaints of a similar nature reported to company HCPs.

Results

The data used in this report was collected between 4 July and 12 November 2012, however as of 25 January 2013, this data collection is still ongoing. The new data will be evaluated periodically to determine if it affects the overall assessment.

Prevalence, nature and severity of symptoms

As of 12 November 2012, Queensland Health had received reports from 11 local families representing 56 individuals (of the 56 individuals where information was provided only 46 were reported to have had symptoms). Eleven families reported symptoms through the HCC. Three families reported symptoms to

both their local general practitioner and the HCC. Local HCPs reported 16 encounters (nine individuals) who felt their symptoms were related to CSG exposure. The most common symptoms experienced were:

- headache (34)
- sore itchy eyes (18)
- nose bleeds (14).

As of 12 November 2012, there had been no hospital admissions with symptoms allegedly related to exposure to CSG activities. On inquiry there have been no reported presentations by employees of the mining companies with symptom patterns similar to those reported by the residents of the Wieambilla Estates.

The level of exposure of residents in the Wieambilla Estates

The types of exposures individuals reported were:

- noise: related to the venting of compressors at well sites and often worse at night
- odours: rotten egg smell
- dust: created by the increase in traffic on unsealed roads in the area.

The minimum distance from a household to a known active well is 1.0 km (range 1.0 to 7.2 km). There were difficulties in obtaining information on the operational status of the wells due to the rapid expansion of the industry and issues around commercial-in-confidence.

Other potential exposures that could be relevant for residents' health concerns

The household environment and other environmental exposures were considered as other potential causes of symptoms. The use of wood heaters or fireplaces for heating homes may be a potential source of irritation (particularly eyes and respiratory).

The use of unboiled/unfiltered rainwater for daily activities could potentially be a cause of gastrointestinal symptoms experienced as could be the handling of domestic animals.

No other household exposures of note could be identified.

Discussion and conclusion

The results of this investigation are unable to provide the evidence for a direct causal link between health complaints and CSG activities in the area due to the following:

- the nature of the complaints currently being reported are mainly non-specific and have multiple causes
- the lack of any clinical findings on clinical examination
- the low prevalence of reported symptoms (3.7 per cent of the population)
- the lack of evidence of symptom patterns similar to those of the community in employees of the mining companies
- other relevant environmental exposures which could also explain the symptoms
- no information on the presence of hazards at levels that may cause health problems.

There are significant limitations to the DDPHU investigation, primarily the reliance on residents within the Wieambilla Estates experiencing symptoms needing to report symptoms to the HCC and/or to present to local HCPs with their symptoms. The reasons for this are multiple. Another limitation of the investigation was the limited ability of DDPHU staff to undertake a clinical examination and further investigations of all individuals reporting symptoms as this is not a role undertaken by public health staff.

Evaluation of comprehensive information on air, water and soil contaminants, as well as an evaluation of the level of noise currently experienced, is essential to assist in establishing the likelihood of a causal link between the symptoms experienced and exposure to CSG activities.

Background

Health impacts due to CSG have been a major community concern since the introduction of CSG industries in Queensland. Exploration for CSG in the Surat Basin region commenced in 1995, however further exploration did not occur until 2000 when the Queensland Gas Company began explorations in the area. CSG activities in the area near the Wieambilla Estates (Berwyndale South) commenced in 2006. The DDPHU has received a variety of complaints from residents in the Wieambilla Estates since 2008. Initially these complaints related to environmental concerns associated with CSG related activities (primarily road dust suppression using waste water), but more recently progressed to issues relating to a range of negative health impacts. All complaints were followed up by the DDPHU with the relevant agencies and, where appropriate, local HCPs. However, no substantive evidence was available to support these complaints.

In May 2012, a group called the Gasfields Community Support Group was established. This group consisted of concerned:

- community members
- industry groups
 - Queensland Gas Company
 - Origin Energy
 - Arrow Energy
- government agencies
 - Department of Environment and Heritage Protection (DEHP)
 - Department of State Development
 - Department of Natural Resources and Mines (DNRM)
 - Department of Communities, Child Safety and Disability Services (DOC)
 - Gasfields Commission
 - Queensland Health
 - non-government agencies, such as Lifeline.

The inaugural meeting was held on 18 May 2012.

In July 2012, a considerable number of reports of symptoms, such as headaches, nose bleeds, bleeding from ears, seizures and blackouts were made to Queensland Health from representatives of residents of the Wieambilla Estates. The DDPHU was asked to undertake an investigation of these reports.

A health risk assessment has been undertaken to determine the likelihood of a direct physical link between the symptoms experienced by the residents of the Wieambilla Estates and exposure to CSG related activities in the local area.

This report describes the investigation undertaken by the DDPHU as a component of the health risk assessment.

Population of the Tara and Wieambilla Estates

Tara is a statistical local area situated within the Western Downs Regional Council. The town of Tara is approximately 170 km north-west of Toowoomba (300 km north-west of Brisbane) (refer to Appendix 1).

The main complaints were received from the Wieambilla region. This region includes areas covering the north-eastern part of the Tara region as well as some parts of the Southern Downs Local Government area.

As of 30 June 2011, the target area had an estimated resident population of 1257 persons, with a median age of 49.5 years. This constituted 55.5 per cent male compared to 44.5 per cent female. About 22.4 per cent of persons were aged 0 to 14 years, 65.9 per cent were aged 15 to 64 years and 11.8 per cent were aged 65 years and over. Overall 5.9 per cent stated they were from an Indigenous background and 9.2 per cent reported that they were born overseas.

Purpose of investigation

The purposes of this investigation are as follows:

- to determine the nature of the complaints reported by the community
- to determine the prevalence of the health complaints experienced by the community
- to determine the severity of the health complaints experienced by the community
- to examine the level of exposure of residents in the Wieambilla Estates to CSG activities including:
 - types of exposure
 - proximity of residents in the Wieambilla Estates to CSG activities
 - duration of exposure (length of time living in the area)
- to identify other potential exposures that could be relevant to the residents' health concerns.

Methodology

In order to achieve the purposes of this investigation the DDPHU undertook the following activities:

- determining the nature of the complaints experienced by the community:
 - self reporting, 13HEALTH (13 43 25 84)
 - medical reporting
- determining the prevalence of the health complaints experienced by the community:
 - self reporting, 13HEALTH (13 43 25 84)
 - medical reporting
- determining the severity of the health complaints experienced by the community
 - medical reporting
- determining the level of exposure of residents in the Wieambilla Estates to CSG activities which includes types of exposure
 - follow up interviews of individuals reporting symptoms and their families
- proximity of residents in the Wieambilla Estates to CSG activities
 - geo-coding of reporting households to CSG wells and establishing the status of the wells (i.e. whether they are operational or not)
- duration of exposure (length of time living in the area)
 - follow-up interviews of individuals reporting symptoms and their families
- identifying other potential exposures that could be relevant for the residents' health concerns
 - follow up interviews of individuals reporting symptoms and their families.

1. Self reporting—Health Contact Centre 13HEALTH (13 43 25 84)

One of the problems reported by residents of the Wieambilla Estates was difficulty in accessing medical care. The distance from the estate to the nearest town, Tara, is approximately 40 km. Other difficulties with access related to the costs of consultations at the general practice (GP).

To assist with access issues, the HCC was engaged to administer a specific questionnaire to those residents who contacted the service with health complaints relating to the CSG activities.

The HCC operates 24 hours a day, seven days a week delivering confidential telephone assessment and information services to the people of Queensland. These services can be accessed by calling 13 HEALTH (13 43 25 84).

The service was promoted through signage at GP surgeries and local hospitals and through the Gasfields Community Support Group who subsequently undertook a leaflet drop to advertise the service.

Initially a full questionnaire was administered by the service. However, following complaints from representatives of the Gasfields Community Support Group around waiting times and the resultant mobile phone costs, a much shorter screening questionnaire was developed (refer to Appendix 2). All

completed screening questionnaires were forwarded to the PHP, DDPHU, who then contacted the complainant and administered a more detailed follow-up questionnaire (refer to Appendix 4).

2. Medical reporting

Initially any allegations made to Queensland Health or to Queensland's Minister for Health were followed up by the DDPHU with the local HCPs for verification.

Medical reporting involved regular contact (twice weekly) with the local HCPs in the area and, included both the GP surgeries and local hospitals. The towns of Tara, Dalby, Chinchilla and Miles were included as part of the investigation as these places are in close proximity to CSG activity in this region. The DDPHU contacted local general practitioners and local hospitals in these towns requesting information on presentations from residents who believed their health complaints were related to exposure to CSG activity. The hospitals and GPs were also provided with a questionnaire they could complete when someone presented with symptoms (refer to Appendix 3). An opinion was sought as to the likelihood these symptoms were related to CSG activities.

In addition to this, medical representatives from the mining companies were also contacted to determine if any employees had reported symptoms.

Any presentations to HCPs were followed up by the PHP, DDPHU, using the more detailed follow-up questionnaire (refer to Appendix 4).

3. Follow up of individuals and their families

A detailed questionnaire was developed to capture further information about the symptoms experienced by those reporting symptoms and their families (refer to Appendix 4). Other information, included:

- relevant past medical history
- social history
- family history (e.g. number of people in each household)
- whether there are pets or other animals at the residence
- an exposure history
- an assessment of the local home environment (e.g. water supply, effluent management).

4. Mapping of households reporting symptoms to the locations of Coal Seam Gas wells

Mapping of the region to demonstrate the proximity of households reporting symptoms to CSG wells was undertaken using Mapinfo version 11.5. The map was developed using three data layers.

1. First layer: is from the State Digital Road Network dataset¹, and shows the Queensland road network with road names.
2. Second layer: obtained from DNRM shows the Coal Seam Gas boreholes² in the area, as at 27 September 2012. This data was provided as an excel spreadsheet with the boreholes geo-coded and categorised according to their status³ and mapped accordingly.
3. Third layer: shows the locations of the households reporting symptoms. These addresses were geo-coded using Property Address Queensland, a cadastral dataset maintained by the DNRM. The distances of the closest CSG wells to each residence was then calculated using the Geographic Information System (GIS) tool Mapinfo ver 11.5 and noted accordingly.
 - Citation for SDRN: Unique Record ID: 8004924B-F0A4-4821-8076-02AA4E0B99C8 Title: QLD SDRN Streets Custodian: Pitney Bowes Software Jurisdiction: Queensland
 - Well data from Geological Survey Queensland, Department of Natural Resources and Mines (DNRM)
 - 'Producing Hydrocarbons'; Suspended/Capped/Shut-In; Plugged and Abandoned; Unknown.

Note: maps are removed for privacy reasons

Results

The data use in this report was collected between 4 July 2012 and 12 November 2012, however as of 25 January 2013, this data collection is still ongoing. The new data will be evaluated periodically to determine if it affects the overall assessment.

1. The nature of the complaints experienced by the community

Table 1 details the types of symptoms reported and the number of people affected by them.

The most common symptom was headache (34), followed by sore, itchy eyes (18) and nose bleeds (14). Although individuals from a variety of age groups complained of nose bleeds, this symptom and skin rashes were reported predominantly in children. A number of people reported symptoms of depression and anxiety, but these conditions were often pre-existing.

It was noted that while there were community concerns about children with bleeding from the ears, no households reported this symptom either to the HCC or their local HCP.

Table 1: Symptoms reported by residents to the Health Contact Centre 13HEALTH (13 43 25 84) and local healthcare providers

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

2. The prevalence of the health complaints experienced by the community

As of 12 November 2012, Queensland Health had received reports from 13 families representing 58 individuals (of the 58 individuals where information was provided only 48 were reported to have had symptoms). Eleven families contacted the HCC, of the remaining families, one reported symptoms to the GP and another reported symptoms through the Gasfields Community Support Group. Three families reported their symptoms to both, the GP and the HCC.

Two individuals who reported symptoms were not residents but had visited the area on a bus trip and were excluded from further analysis. The analysis was conducted on the information provided by the remaining 11 households representing 56 individuals.

Follow-up with the local mining companies revealed that there had been no employees presenting to their healthcare personnel with a similar pattern of symptoms to those described by the residents.

3. The severity of the health complaints experienced by the community

Local HCPs reported 16 encounters (nine individuals) who felt their symptoms were related to CSG exposure. The symptoms, included headache, nose bleeds, skin rashes and generally feeling unwell. The individuals affected with symptoms ranged from young children to adults. Several individuals presented on more than one occasion with the same symptoms.

Findings on physical examination

PHP, DDPHU, followed-up with the local GP at Tara (who was the only HCP who report seeing patients with possible CSG related symptoms) who advised that physical examination did not reveal any significant findings. In particular, examination of all individuals who had complained of nose bleeds failed to find any evidence of a recent bleed.

Hospital admissions

As of 12 November 2012, there were no reported hospital admissions related to CSG exposure.

4. The level of exposure of residents in the Wieambilla Estates to CSG activities

Types of exposure

Table 2 details the individual exposures reported at each household.

Residents reported varying exposures to noise, odours and dust. One resident observed that even though the family did not experience any odours or fumes at their residence, they did experience this when out driving mainly through Chinchilla. Several residents identified a noise they related to the venting of the compressors at the CSG well sites. Residents reported the noise tended to be worse at night. Residents' reports also suggested that considerable dust appears to be generated by the increase in traffic on the unsealed roads in this area.

Table 2: Individual exposures reported at each household

Household	Exposure: Y = Yes and N = No			
	Odours/fumes	Waste water	Dust	Noise/ vibration
1	Y (Windy days)	N	N	N
2	Y (Rotten egg smell)	N (Waste water used to wash down roads; now stopped)	Y (Mainly when drilling)	Y (Noise from compressor)
3	Y (Rotten egg smell)	N	Y (Dust storms)	N
4	N	Y (Run off into dam)	N	Y (Light hum mainly noticed at night)
5	N	Y	Y	Y (Venting from compressor)
6	Y	Y	Y	Y
7	Y (Sweet smell)	N	N	Y (Mainly traffic noise)
8	Y	N	N	N
9	Y (Rotten egg smell)	N	Y (Unsealed roads)	N
10	N	N	Y	Y (Humming noise)
11	N (Notices when driving)	N	Y (Unsealed roads)	N
Total	7	3	7	6

The proximity of residents' households in the Wieambilla estates to CSG activities

The proximity of households to the nearest well ranges from 1.0–7.2 km (median 2.2 km). The minimum distance from a household to a known active well is 1.0 km. However, the current status of the well is difficult to determine due to delays in receipt of information from the Department of Infrastructure and Planning (DIP) and issues around commercial in-confidence.

Duration of exposure (length of time living in the area)

Nine of the 11 families (82 per cent) had been living in the area for five years or less with some only moving to the area within the last 12 to 18 months. Most of the homes (78 per cent) where residents have reported symptoms have been built within the last 15 years.

5. Other potential exposures that could be relevant to the residents' health concerns***Household exposures***

The majority of households use wood heaters or fireplaces for heating their homes and most use gas for cooking. Many of the homes are not connected to the electricity grid and use generators for electricity supply. The majority of households have animals, mostly dogs and cats, and also other domestic animals.

Water supply

Table 6 details the water supplies to the households. The majority of households reported use of rainwater for most of their activities although some households still use dam water for showering and laundry.

Effluent management

The majority of households use a septic system for effluent disposal.

Discussion

Although there is information in the published literature about potential negative health effects resulting from exposure to CSG activities, there is no conclusive evidence of health effects directly related to this exposure. This may be due to the minimal levels of exposure to potentially hazardous contaminants in air, water and soil in community settings. When determining whether a particular activity is generating health risks from hazardous agents, a number of factors need to be considered:

- the nature of the agent i.e. what it is
- any known harmful effects on health
- the level of exposure at which the agent causes harm i.e. concentration in the environment, duration of the exposure (hours, days, months or years)
- the exposure pathways i.e. whether it is ingestion, inhalation or topical
- the nature of the exposed population, including vulnerable groups (such as children or the elderly)

1. Nature of the complaints experienced by the community

The main symptoms reported by the residents were headaches, nose bleeds, sore eyes and rashes. Each will be discussed in detail in turn.

Headache

The most common symptom, headache, was described by the majority of complainants as a generalised headache more predominant around the eyes. Most described their headache as a dull ache, although a few described a pounding sensation. The headaches generally would worsen over the day and be most intense at night. At night most of the residents advised that the headache would worsen as they could hear the sound of the compressors coming from the CSG wells. Although some residents advised they were awakened during the night from other causes, whilst awake they were conscious of the headache. There were no reports of sleep disturbance from headache. The headache was often described as being present for months on end. Some complainants perceived benefits from simple over the counter analgesics. However, some complainants advised they had received narcotic analgesia in order to settle the headache. Several complainants advised they had consulted their GP about the headaches which was verified by the medical reporting (seven presentations from July to 12 November 2012). Some complainants noted pins and needle in the hands or lips associated with their headache.

There are many causes of headache and the symptom itself is very subjective. The lack of associated symptoms and the reported characteristics of the headache suggest that the nature of the headaches is benign rather than being indicative of serious medical conditions affecting the head or brain. To determine if the CSG activities play a role, a review of the environmental investigation is required.

Eye irritation

The second most common symptom reported was sore, itchy eyes. The complainants said they experienced sore, itchy eyes mainly when outside and the symptoms would settle on entering the home. These symptoms can be associated with irritation from environmental sources as well as other causes e.g. infection (bacterial or viral), allergies and underlying systemic disease. To determine if the CSG activities play a role, a review of the environmental investigation is required.

Epistaxis (nose bleeds)

This symptom seems to have caused the most angst within the community. This symptom was reported predominantly in children. Several of the complainants provided quite graphic descriptions of their children with blood pouring from their noses on a daily basis for several months. If nose bleeds were of such frequency and severity, then this would lead to health problems related to anaemia from chronic blood loss. There were no such reports.

Several residents (mainly children) presented to the local GP for epistaxis since medical reporting commenced in July 2012. On no occasion did the general practitioner report any findings on physical examination.

Types of nose bleeds

There are two types of nose bleeds:

1. **Anterior** nose bleeds which start in the area of the lower part of the nasal septum close to the nostrils called Little's area. These are more common in children and young adults and are usually mild and easy to control.
2. **Posterior** nose bleeds originate from far back in the nose and are often due to arterial bleeding. They can present a risk of airway compromise or aspiration of blood. They are more common in older people and are more difficult to control.

"Epistaxis is so common that almost everyone has had a nosebleed on at least several occasions, usually as a result of trauma. It has peaks of incidence at age 2–10 and 50–80 years old. Both sexes are affected equally. American studies calculate the incidence in the general population as being 60 per cent with less than 10 per cent seeking medical attention" (Knott, 2010).

Causes of nose bleeds

Nose bleeds often have no particular cause (spontaneous) or may be caused by:

- environmental factors e.g. cold dry air, low humidity, high altitudes, chemical fumes, smoke
- local factors e.g. infection, rhinitis (allergic, non-allergic), sinusitis
- trauma e.g. hitting or bumping the nose, picking the nose, blowing the nose, nasal fracture or foreign body
- abnormal structure of the nose e.g. nasal polyps, deviated nasal septum
- Arteriosclerosis (usually older patients)
- abnormal blood vessels in the nose (Rendu-Osler-Weber Syndrome an inherited disorder)
- tumours (benign or malignant) of Nasopharynx or Paranasal sinuses (evidence on physical examination or CT scan)
- septal perforation (visible on examination)
- nasal abuse of illegal drugs e.g. cocaine and amphetamines
- blood clotting disorders e.g. Haemophilia, Leukaemia, Thrombocytopenia or von Willebrand's Disease (history of previous Epistaxis or bleeding from elsewhere on clinical examination e.g. easy bruising and evidence from investigations)
- Medicines:
 - those that affect blood clotting e.g. aspirin, warfarin, non steroidal anti-inflammatory drugs
 - cold and allergy medicines
 - oxygen (high concentration)
 - nasal inhalers
 - steroid nasal sprays.

(Fried, 2012)

Therefore, potential causes for the reported nose bleeds are multiple and may be more a reflection of the age group than any particular cause. For emissions from CSG activities to be relevant to the reports of nose bleeds, it is considered there would need to be substantial exposure to irritant contaminants at levels associated with significant irritation of the nose, eyes and airways. To determine if the CSG activities play a role, a review of the environmental investigation is required.

Skin rashes

This symptom was another more commonly reported in children. Skin rashes also have multiple causes ranging from environmental irritants, allergies, infections (bacterial, viral, fungal), drug reactions and underlying systematic disorders e.g. SLE, psoriasis. To determine if the CSG activities play a role, a review of the environmental investigation is required.

2. The prevalence of the health complaints experienced by the community

The estimated population for the Wieambilla Estate (exposure) area is 1257. As of 12 November 2012, 56 residents have been involved in the investigation and 46 have reported symptoms. The 46 residents

with symptoms equates to approximately 3.7 per cent of the population. Follow-up with the mining companies revealed no presentations from employees with similar symptom patterns to those described by the community.

3. The severity of the health complaints experienced by the community.

As of 12 November 2012, nine individuals presented to the local GP at Tara with symptoms described as being related to CSG activities. This represents 0.7 per cent of the population.

As of 12 November 2012, there have been no admissions to hospital for these symptoms. This indicates that although residents may have experienced these symptoms, they generally were not severe enough to warrant visiting the local GP or hospital for treatment.

4. The level of exposure of residents in the Wieambilla Estates to Coal Seam Gas activities

Types of exposure

Odour/fumes, dust and noise all rated highly as exposures to CSG activities. The most common odour reported by residents was of a rotten egg gas smell. This generally is caused by hydrogen sulphide. Exposure to water appears to be a historical one where previously waste water was used to dampen down the dust on the unsealed roads (this practice has now ceased).

The majority of roads in the area of the Wieambilla Estates are unsealed and with the increase in the volume of traffic due to the resource development this is the most likely cause of the dust.

The major noise complaint was related to the noise coming from the compressors and was described as a humming sound.

Proximity of residents in the Wieambilla Estates to CSG activities

The majority of households reporting symptoms lived within 1–3 km of the nearest wells. One of the difficulties in reviewing the proximity of the wells to their dwelling is determining when the well became operational. For example, up until recently, the Duke CSG Wells were not operational.

Duration of exposure (length of time living in the area)

The majority of households reporting symptoms have lived in the Wieambilla Estates for five years or less.

5. Other potential exposures that could be relevant for the residents' health concerns

Household exposures

Most of the dwellings were built within the last 15 years. The majority of households reporting symptoms used wood heaters or open fires for heating, therefore exposing occupants to smoke, a potential irritant of eyes, nose, throat and airways. It is worthwhile noting that the formal symptom reporting has occurred almost exclusively during the winter months (July) when the use of wood heaters and open fires could be expected to peak.

Most households had animals on their properties (mainly dogs and cats), but there was no evidence to suggest that any animals were experiencing symptoms of irritation.

Water supply

Nearly all households were using rainwater for drinking purposes. However, in the majority of cases this water was not boiled or filtered prior to consumption. Some households were using dam water for laundry and showering.

Limitations of the Darling Downs Public Health Unit investigation

One of the main limitations of this investigation was the reliance on residents within the Wieambilla Estates to report symptoms to the HCC and/or to present to local HCPs with their symptoms. A small number of residents reported symptoms through both channels but overall the number of residents reporting symptoms represented only 3.7 per cent of the population.

Possible reasons for potential under-reporting of symptoms include:

- lack of awareness of reporting mechanisms (the HCC service was advertised through local GPs and hospitals as well as by word of mouth and a leaflet drop undertaken by the Gasfields Community Support Group)
- costs and/or access issues (often GPs in rural areas are heavily booked so it is difficult to see a doctor at the time of experiencing symptoms)
- concern residents would experience a negative reaction from health care providers if they reported that their symptoms were related to CSG.
- information reported to the HCC was not provided to the DDPHU.

There were often discrepancies between what was reported by the residents and what was reported by the local HCPs. This arose where the resident presented to the HCP with what they believed were symptoms related to CSG but the HCP believed that there was another cause for the symptoms and therefore did not record this as a presentation.

Similarly there have been no reported presentations by employees of the mining companies with symptom patterns similar to those described by the residents. There are multiple potential reasons for this including:

- the employees are not experiencing symptoms
- employees are presenting to health-care providers outside the local area (many mining employees work fly in/fly out or drive in/drive out rosters so they leave the local area and return to their usual place of residents between working shifts)
- employee concerns that if they report similar symptoms to those in the community it may jeopardise their employment.

Another limitation of the investigation was the limited ability of DDPHU staff to undertake a clinical examination and further investigations of all individuals reporting symptoms as this is not a role undertaken by public health staff.

Conclusion

Given the nature of the health complaints, there are multiple potential causes and explanations. This investigation by itself is unable to determine whether any of the health effects reported by the community are linked to exposure to Coal Seam Gas activities.

The reasons for this are multiple and include:

- the nature of the symptoms—apart from Epistaxis and skin rashes, the predominant symptoms reported by the residents of the Wieambilla Estate are subjective and non-specific with a lack of clinic findings
- the low number of individuals affected—the estimated population for the Wieambilla Estate (exposure) area is 1257. Fifty-six residents have been involved in the investigation. However, only 46 have reported symptoms. This equates to approximately 3.7 per cent of the population. There is also a degree of individual susceptibility to developing a reaction to environmental exposures
- the lack of evidence of employees working within the CSG industry having similar symptoms. If community members were experiencing symptoms due to CSG activities, it would be highly likely for workers in the industry to be reporting similar and probably more severe effects due to their likely much higher exposure
- the severity of the symptoms—nine out of 46 who had reported symptoms actually presented to the local GP and there were no reports of presentations or admissions to the local hospitals. This is in contrast to the comments made by the residents who have complained that this is a serious issue that needs urgent attention and warrants immediate suspension of all CSG activity in the region.
- other possible sources of air and water contamination—no environment is absolutely pure and there are multiple contaminants in air and water which may be of natural or man-made origin.

These can cause symptoms in individuals and the difficulty is in determining what contaminant has caused the symptoms. The majority of residents use wood-fired heaters or open fires for heating in the winter time (when the majority of complaints occurred) and both could explain some of the symptoms the residents are complaining of e.g. eye irritation, nasal congestion, headache. The majority of residents use rainwater for drinking purposes and the majority do not filter or boil their drinking water. This water can also be contaminated with bacteria, viruses or other organisms which are unlikely to be caused by CSG activities, but may cause the symptoms experienced by the residents e.g. nausea and vomiting. Other communicable diseases such as Q-fever, Leptospirosis and Ross River fever may cause some of the symptoms experienced by the residents and these causes also need to be excluded. The local GP has been informed of this and will investigate accordingly.

To better assess whether these reported symptoms could be related to exposure to CSG activities, comprehensive information on air, water and soil contaminants, as well as an evaluation of the level of noise currently experienced needs to be obtained. Environmental monitoring of these factors has been undertaken by other government agencies and industry. Queensland Health intends to access that information to assist in assessing whether the medical complaints detailed in this report may be due in some way to hazardous emissions from CSG activities.

Foot note

Although not within the scope of this investigation, throughout this investigation the community has continued to voice concerns about the psychological impacts of the rapidly progressing CSG industry with anecdotal reports of increased levels of anxiety, depression and even suicidal ideation. The author has personally experienced the distress the community feels about the environmental changes through the follow up interviews and at the gas field Community Support meetings attended.

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 (Albrecht et al 2007).

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

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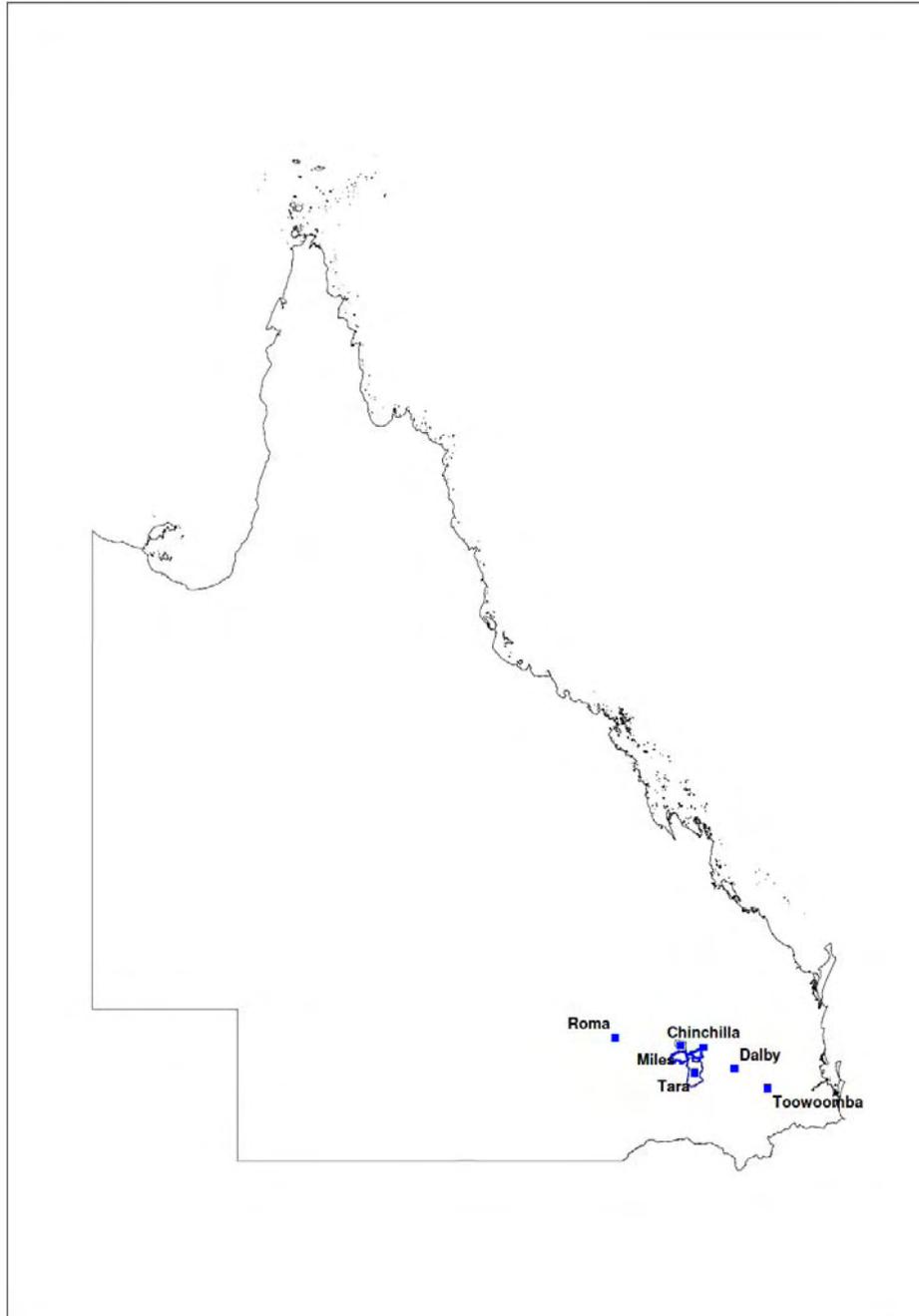
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Appendix 1

Map of the state of Queensland, Australia outlining the area of interest



Appendix 2

13 HEALTH (13 43 25 84) Questionnaire

Health complaints related to exposure to Coal Seam Gas (CSG)

Date:/...../.....

Registration ID:

RegistrationName:
First name
*Surname*Date of birth:/...../..... Age: Years Months Sex: Male Female Aboriginal Torres Strait Islander Aboriginal and Torres Strait Islander Non-Indigenous UnknownAddress:
Postcode:

Home tel: Mob: Email:

How many people live at home?

Please provide details of names and dates of birth and relation to person registering

Name (*first and surname*)**Date of birth****Relation to person registering**

Usual General Practitioner: Dr

Address: Postcode:

Telephone: Mob: Email:

CASE DETAILS:Name:
First name
*Surname*Date of birth:/...../..... Age: Years Months Sex: Male Female

Symptoms experienced (tick more than one)

- | | | |
|---|---------------------|---------------|
| <input type="checkbox"/> Headaches | Date of onset | Duration..... |
| <input type="checkbox"/> Epistaxis | Date of onset | Duration..... |
| <input type="checkbox"/> Sore/itchy eye | Date of onset | Duration..... |

Family

Is anyone else in the family currently experiencing similar symptoms? Yes No Unknown

If yes, please tick symptom and number of affected family members

Symptom	Number affected	Symptom	Number affected
<input type="checkbox"/> Headaches		<input type="checkbox"/> Vomiting	
<input type="checkbox"/> Epistaxis		<input type="checkbox"/> Nausea	
<input type="checkbox"/> Sore/ itchy eyes		<input type="checkbox"/> Diarrhoea	
<input type="checkbox"/> Skin rash		<input type="checkbox"/> Metallic taste in mouth	
<input type="checkbox"/> Bleeding from ears			

Is the client happy for Public Health staff to contact them to obtain further details? Yes No

What is the best number to contact them on?

Appendix 3

GP/Hospital Monitoring Questionnaire

Health complaints related to exposure to Coal Seam Gas (CSG)

Date:/...../.....

Registration ID:

CASE DETAILS:

Name:

Address:

Postcode:

Date of birth:/...../..... Age: Years Months Sex: Male Female**Symptoms experienced (tick more than one)**

- | | | |
|--|---------------------------------|---------------|
| <input type="checkbox"/> Headaches | Date of onset/...../..... | Duration..... |
| <input type="checkbox"/> Epistaxis | Date of onset/...../..... | Duration..... |
| <input type="checkbox"/> Sore/ itchy eyes | Date of onset/...../..... | Duration..... |
| <input type="checkbox"/> Skin rash | Date of onset/...../..... | Duration..... |
| <input type="checkbox"/> Bleeding from ears | Date of onset/...../..... | Duration..... |
| <input type="checkbox"/> Vomiting | Date of onset/...../..... | Duration..... |
| <input type="checkbox"/> Nausea | Date of onset/...../..... | Duration..... |
| <input type="checkbox"/> Metallic taste in mouth | Date of onset/...../..... | Duration..... |

FamilyIs anyone else in the family currently experiencing similar symptoms? Yes No Unknown

If yes, please tick symptom and number of affected family members

- | Symptom | Number affected | Symptom | Number affected |
|---|------------------------|--|------------------------|
| <input type="checkbox"/> Headaches | | <input type="checkbox"/> Vomiting | |
| <input type="checkbox"/> Epistaxis | | <input type="checkbox"/> Nausea | |
| <input type="checkbox"/> Sore/ itchy eyes | | <input type="checkbox"/> Diarrhoea | |
| <input type="checkbox"/> Skin rash | | <input type="checkbox"/> Metallic taste in mouth | |
| <input type="checkbox"/> Bleeding from ears | | | |

In your opinion is there another explanation for these symptoms? Yes NoIs the client happy for Public Health staff to contact them to obtain further details? Yes No

What is the best number to contact them on?

Appendix 4

Follow up Questionnaire

Health complaints related to exposure to Coal Seam Gas (CSG)

Date:

Name of interviewer:

CASE DETAILS:

Case Identification No:

Name:
First name
*Surname*Date of birth:/...../..... Age: Years Months Sex: Male Female

Name of parents/carer:

Name of the parent answering questionnaire:

 Aboriginal Torres Strait Islander Aboriginal and Torres Strait Islander Non-Indigenous UnknownAddress:
Postcode:

Home tel: Mob: Email:

Occupation: Work telephone:

Work place Address: Postcode:

Usual General Practitioner: Dr

Address: Postcode:

Telephone: Mob: Email:

CLINICAL DETAILS:Symptom onset: Date:/...../..... Time:..... Unknown

What are the symptoms you experiencing:

Further details about symptoms (duration, severity, exacerbating or relieving factors, activities at symptoms onset) :

Did you seek medical advice? Yes NoIf Yes, do you consent to Queensland Health to contact your local health care provider for further information? Yes No

If Yes, Name of local health care provider

Address: Postcode:

Telephone: Mob: Email:

PAST MEDICAL HISTORY:

What is your health like generally? Any significant medical history? Yes No

If yes, please provide details

.....

.....

.....

Do you suffer from any allergies? Yes No Unknown

If yes, please provide details

.....

.....

.....

Medications: Are you taking any prescribed medications? Yes No Unknown

If yes, please provide details

.....

.....

.....

Are you taking any over the counter medications or any alternative medicine treatments? (Herbal remedies/naturopathic medications/ homeopathy) Yes No Unknown

If yes, please provide detail

.....

.....

.....

Do you drink alcohol? Yes No Unknown

If Yes, How much in average would you consume in a week?

Do you smoke? Yes No Unknown

If Yes, How much on average would you consume in a day?

Does anyone else at home smoke? Yes No Unknown

If yes provide details:

Special diets/ dietary requirements vegetarian vegan gluten free lactose free other (please specify)

.....

.....

FAMILY HISTORY:

Any family history of health problems? Yes No Unknown

If yes, please provide details

.....

.....

How many people live at home?

Is anyone else in the family experiencing similar symptoms? Yes No Unknown

If yes, please provide details in table below.

Name	DOB	Relationship to interviewee	Symptoms

Is anyone in the household pregnant? Yes No Unknown, If yes gestation? (weeks)

Do you have any animals on your property? Yes No Unknown

If yes, please provide details.....

Have any of your animals been sick? Yes No Unknown

If yes, please provide details.....

Do you think these signs and symptoms are related to CSG exposure? Yes No Unknown

If Yes, Why do you feel that it is related to CSG?

EXPOSURE HISTORY:

Are you currently exposed to any of the following?

Fumes or odour from CSG wells Yes No Unknown If Yes; since when Date/...../.....

Waste water from CSG activity Yes No Unknown If Yes; since when Date/...../.....

Dust Yes No Unknown If Yes; since when Date/...../.....

Loud noise, vibration associated with CSG activity Yes No Unknown If Yes; since when Date/...../.....

Other comments

How long have you lived in the area?

What is the size of your property?

Proximity of closest CSG well to your house?

Proximity of closest CSG well to the boundary of your property?

Number of wells in your local vicinity

Do you undertake any regular activities in close proximity to the CSG wells? Yes No Unknown

If Yes, please provide further details (Type of activity and duration etc)

Are there any schools playgrounds, community buildings in close proximity to the CSG wells? Yes No Unknown

If Yes, please provide further details (Type of activity and duration etc)

ENVIRONMENTAL HISTORY (These are questions about your home environment)

Approximately what year was your home built?

Which of the following do you have in your home?

Please circle those that apply.

- Air conditioner
 Air purifier
 Central heating (gas or oil?)
 Gas stove
 Electric stove
 Fireplace
 Wood stove
 Humidifier

Have you recently acquired new furniture or carpet, refinished furniture, or remodelled your home? Yes No Unknown

Are pesticides or herbicides (bug or weed killers; flea and tick sprays, collars, powders, or shampoos) used in your home or garden, or on pets? Yes No Unknown

If Yes, please provide details

Do you (or any household member) have a hobby or craft (scrapbooking, woodwork, work on cars)? Yes No N/A

If yes, please provide details.....

.....

.....

.....

Have you ever changed your residence because of a health problem? Yes No Unknown

If yes, please provide details.....

.....

.....

.....

What water supply do you have to your house? (dam, bore, reticulated, rainwater) if different supplies what do you use each supply for?

.....

.....

If other than reticulated water do you use water filters, boil water for drinking and showering? Yes No Unknown

If using a filter, what type is it?

.....

.....

Do you grow your own vegetables? Yes No

If Yes, what water do you use on the vegetables (dam, bore, reticulated, rainwater)?

To manage effluent, what system do you use?

- council sewer
 septic system
 composting toilets
 other.....

Are you happy for the public health to contact you for further information? Yes No

What is the best way to contact you?

Any further comments?

.....

.....

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