Narrabri Gas Project Community Consultative Committee 17th July 2018

Dr Craig Dalton
Hunter New England Population Health
Today

- Connect with CCC
- Understand your Concerns
- How can NSW Health Support the CCC?

If you want, I can tell you about:

- Our approach to assessment of health risk
- Emissions we focus on in assessment and their potential health risk
Our Approach to Health Risk Assessment
Excess physical suffering

Excess psychological suffering

Physical health risk

High

Low

Minimise

Exaggerate

How we talk about the risk
Community wellbeing and local attitudes to coal seam gas development Social Baseline Assessment: Narrabri project - Phase 3 Survey report Andrea Walton and Rod McCrea October 2017

Figure 73 Perceptions of potential impacts: Frequencies of responses
3.2.2 Health studies and assessments

A number of approaches can be considered to try to determine potential health impacts that may arise from CSG activities. These include undertaking epidemiological studies and performing an environmental health risk assessment. There are uncertainties inherent in both methodologies and neither is able to provide a definitive risk level for an adverse health outcome for an individual in an at-risk population, such as people with particular sensitivities to chemicals.

**Epidemiological studies**

Epidemiological studies involve looking at patterns of disease in defined populations. Study designs that may be utilised to examine potential adverse health effects from environmental pollutants (Vaneckova & Bambrick, 2014) include:

- spatial study – which examine the regional distributions of disease
- case-control study – where groups are compared retrospectively with one group demonstrating an outcome of interest and a matched control
- cohort study – where subjects or a subset from the population are followed over time with repeated monitoring; can be prospective or retrospective
- time-series study – where observations, such as GP/ hospital records, over a specified time period is obtained and analysed
- cross-sectional studies – provide information on disease frequency at a given time.

Causation and correlation in an epidemiological study can be difficult to show. This is due to many factors including: obtaining an accurate assessment of exposure by individuals or the community; small population sizes exposed; varied and mild health effects; chronic low exposures in sensitive individuals; lifestyle; socioeconomic status; and alternative potential exposure sources such as combustion heating and power generators. Failure of a study to control for these factors adequately means that its ability to attribute a particular symptom to a specific chemical or industrial activity is limited.
The small scale and short history of CSG production in NSW; the small size of the potentially exposed population; and the difficulty of measuring individual or community level data on exposure to CSG related hazardous materials means that such epidemiological studies are not likely to be useful at this time (Chant, 2014).

**Environmental Health Risk Assessment**

Environmental health risk assessment (EHRA) is another and likely better approach to determining health risk. It aims to determine the risk to human health from a potential environmental impact, if relevant chemicals, their toxicity, concentrations and exposure pathways are known. If used early in the project approvals stage, an EHRA can provide a valuable tool in assessing potential risks, if any, to human health from CSG activities. This can provide an opportunity for third parties to review the assessment, and for regulators to request amendments to projects deemed high risk before approval is granted. An EHRA can be undertaken at any subsequent stage, with its results being incorporated into management plans and Trigger Action Response Plans.

A nationally agreed framework, *Environmental Health Risk Assessment Guidelines for assessing Human Health Risks from Environmental Hazards* outlines the steps involved in undertaking such an assessment (enHealth, 2012) (see Figure 6). An EHRA can range in complexity from a simple screening study to a lengthy and complex analysis.
Issue Identification
What are the key issues of concern?

Hazard Assessment
Collection and analysis of data:
- Hazard identification - identify chemicals of potential concern
- Dose-response assessment - identify relevant toxicity data

Exposure Assessment
- Identification and analysis of hazard locations, exposed populations, potential exposure pathways
- Estimation of exposure concentration and intakes for each pathway

Risk Characterisation
- Characterise and summarise the potential for adverse health effects to occur
- Evaluate uncertainty
Is there actual exposure and enough to have an effect?

Figure 4.5  Exposure pathway and effect.
A “Health Study” is more than epidemiology

Health Risk Assessment
Protective Dome of Air Monitoring
EIS Review – Main Focus

Air
- Nitrous oxides from gas combustion
- PM2.5/diesel from trucks, generators, gas burning
- PM10, also from combustion + construction traffic
- Ozone

Water & Noise
<table>
<thead>
<tr>
<th>Column 1 Item</th>
<th>Column 2 Pollutant</th>
<th>Column 3 Averaging period</th>
<th>Column 4 Maximum concentration standard</th>
<th>Column 5 Maximum allowable exceedances</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Carbon monoxide</td>
<td>8 hours</td>
<td>9.0 ppm</td>
<td>1 day a year</td>
</tr>
<tr>
<td>2</td>
<td>Nitrogen dioxide</td>
<td>1 hour</td>
<td>0.12 ppm</td>
<td>1 day a year</td>
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<tr>
<td></td>
<td></td>
<td>1 year</td>
<td>0.03 ppm</td>
<td>None</td>
</tr>
<tr>
<td>6</td>
<td>Particles as PM$_{10}$</td>
<td>1 day</td>
<td>50 μg/m$^3$</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 year</td>
<td>25 μg/m$^3$</td>
<td>None</td>
</tr>
<tr>
<td>7</td>
<td>Particles as PM$_{2.5}$</td>
<td>1 day</td>
<td>25 μg/m$^3$</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 year</td>
<td>8 μg/m$^3$</td>
<td>None</td>
</tr>
</tbody>
</table>
What generates the most PM10 at an open cut coal mine?
Quiz – which of these activities produce the most PM10 or PM2.5 at open cut coal mines?

- Blasting
- Wind erosion of overburden (piles of dirt around mine)
- Wheel generated particulates on unpaved roads
- Wind erosion of coal stockpiles
7.3.3 Ranking of coal mining activities

Table 31 ranks each activity in order of its relative potential to produce emissions of particulate matter. Activities in Table 31 have been ordered based on the ranking determined for PM$_{10}$ emissions.

**Table 31  Ranking of coal mining activities based on total emissions of TSP, PM$_{10}$ and PM$_{2.5}$**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Rank of particle emissions</th>
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<tbody>
<tr>
<td></td>
<td>TSP</td>
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<tr>
<td>Wheel generated particulates on unpaved roads</td>
<td>1</td>
</tr>
<tr>
<td>Wind erosion of overburden</td>
<td>2</td>
</tr>
<tr>
<td>Blasting</td>
<td>6</td>
</tr>
<tr>
<td>Bulldozing coal</td>
<td>4</td>
</tr>
<tr>
<td>Trucks unloading overburden</td>
<td>5</td>
</tr>
<tr>
<td>Bulldozing overburden</td>
<td>3</td>
</tr>
<tr>
<td>Front-end loaders on coal</td>
<td>8</td>
</tr>
<tr>
<td>Wind erosion of exposed areas</td>
<td>7</td>
</tr>
<tr>
<td>Wind erosion of coal stockpiles</td>
<td>11</td>
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<tr>
<td>Unloading from coal stockpiles</td>
<td>10</td>
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<tr>
<td>Dragline</td>
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<tr>
<td>Front-end loaders on overburden</td>
<td>12</td>
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<tr>
<td>Trucks unloading coal</td>
<td>13</td>
</tr>
<tr>
<td>Loading coal stockpiles</td>
<td>15</td>
</tr>
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</table>
• haul roads accounted for almost 40% of PM$_{10}$ emissions from mines; the greatest reduction would be achieved by applying suppressants to haul roads, which could reduce emissions by 21%
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