GISERA
Gas Industry Social and Environmental Research Alliance

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FACTSHEET

Assessing the ambient air quality in the Surat Basin

Research finds good ambient air quality in study region.

The first comprehensive ambient air quality study in a CSG region of Australia has been undertaken near Condamine, Miles and Chinchilla in Queensland. The purpose of the study was to assess air quality in this region and to investigate the influence of coal seam gas (CSG) activities on air quality.

KEY POINTS

- Analysis of data revealed good ambient air quality within the Surat Basin area because pollutant levels were mostly within relevant air quality objectives for a wide range of pollutants that are potentially emitted by CSG activities.
- Concentrations of volatile organic compounds (VOCs,) including benzene, toluene and xylenes (BTX), formaldehyde and acetaldehyde were low and typical of other rural regions in Australia. Chinchilla township site had a higher detection frequency and concentrations of BTX than the gas field and regional sites. The source in Chinchilla is likely to be mainly from vehicle exhaust, as well as domestic and commercial sources within the town.
- CSG activities were a likely contributor to occasional coarse particle (PM_{10} and total suspended particle (TSP)) exceedances of 24-hr average air quality objectives in the study area along with a range of other activities and sources. These include wind-blown dust, dust from agricultural activities including cattle farming and vehicles driving on unsealed roads, all typical of rural areas.
- CSG activities were not found to contribute to occasional fine particle ($PM_{2.5}$) exceedances of 24-hr average air quality objectives in the region, these were mainly the result of smoke from vegetation fires.

Measurements undertaken

Air quality measurements were made at 5 ambient air monitoring stations including 3 gas field sites (Hopeland, Miles Airport and Condamine) and 2 regional sites (Tara Region and Burncluith). Gas field stations were located between 1 and 5 km from gas processing facilities, between 100–450 m from operating CSG wells and had 15–25 wells within a 2 km radius. The regional sites were 10–20 km away from major potential CSG-related emission sources.

Continuous measurements were made at ambient air monitoring stations during 2015–2018. Pollutants measured continuously included nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O_3) (gas field and regional sites), methane (CH_4), carbon dioxide (CO_2) and particles including $PM_{2.5}$ (particles < 2.5 µm), PM_{10} (particles < 10 µm) and total suspended particles (TSP) (gas field sites only). Meteorology was measured at all sites. Since August 2016 preliminary air quality data from the monitoring sites (including ozone, nitrogen dioxide, carbon monoxide, $PM_{2.5}$, PM_{10} and TSP) has been streamed to the Department of Environment and Science (DES) website under South West Queensland region.

Measurements of 54 individual volatile organic compounds (VOCs), aldehydes and hydrogen sulphide were made during 2014–2016 at a network of 10 passive gas sampling sites, including gas field and regional sites, and in the Chinchilla township.

Air quality analyser at an air monitoring station.

CSIRO | Australia Pacific LNG | QGC | origin | Santos | NSW Government | Australian Government Department of Industry, Innovation and Science | Supported by Government of South Australia | Queensland Government | Northern Territory Government

Analysis of data

Air quality measurements from the 5 ambient air monitoring sites were compared to relevant air quality objectives including the Queensland Government Environment Protection (Air Policy) (EPP 2008), the Ambient Air Quality National Environment Protection Measure (NEPM 2016), and Nuisance Dust Guidelines for TSP (New Zealand Ministry for the Environment 2016) used by the Queensland Government Department of Environment and Science (DES).

Passive gas measurements of VOCs, aldehydes and hydrogen sulphide were assessed against the Air Toxics NEPM (2011) and the Queensland Government Air EPP (2008). Where no Australian objectives were available, the Texas Commission on Environmental Quality Air Monitoring Comparison Values (AMCV) and Effects Screening Levels (ESLs) were used instead (2016).

Where exceedances of air quality objectives occurred, or where the concentration of a pollutant was greater than 80% of an air quality objective, the main source/s of the pollutant was investigated using a protocol. This included a combination of wind speed and direction, identification of emission source locations (including hotspots and smoke plumes on satellite images), and comparing measured pollutant correlations and ratios with published data. For example ratios of methane (CH_4) to carbon dioxide (CO_2) were used to identify emissions associated with cattle farming and ratios of $PM_{2.5}$ to carbon monoxide (CO) were used to identify smoke from vegetation fires.

Read out from air quality analyser.

FREQUENTLY ASKED QUESTIONS

How big are PM_{10} and $PM_{2.5}$ particles?

The width of a typical human hair is about 100 micrometers, so about 10 PM_{10} particles and 40 $PM_{2.5}$ particles could fit on the width of a human hair.

Why are these pollutants and not others measured?

Emission sources in the Surat Basin were reviewed, including emissions from the CSG industry. This ensured that the most relevant pollutants were targeted in this study. Australia's National Clean Air Agreement and Ambient Air Quality Standards (National Environment Protection Measure – NEPM) were also used to decide which pollutants to target.

Where is the raw data?

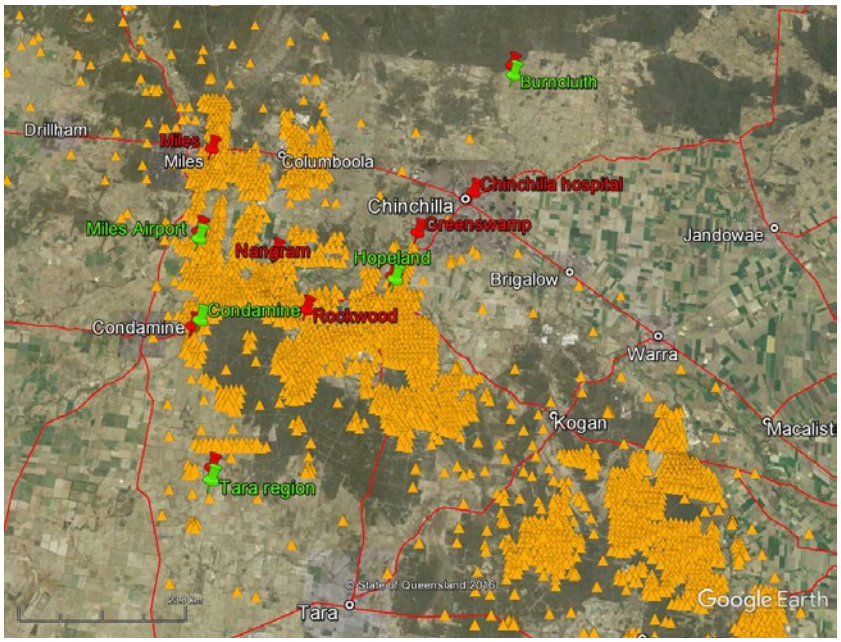
Validated carbon monoxide, ozone, nitrogen dioxide, $PM_{2.5}$, PM_{10} and TSP data from this study is available to download from data.qld.gov.au/dataset.

Passive gas data will be available via the GISERA website.

What happens next?

The air quality modelling study is the final output for this project and will give an estimate of what proportion CSG-related emissions contribute to the total air pollutant levels. The model will also explore pollutant levels over a larger spatial area (300 km by 300 km) than is covered by the monitoring sites.

While the measurements of air quality undertaken for this CSIRO project were scheduled to finish at ambient monitoring sites at the end of February 2018, industry funding may extend air quality monitoring at the Tara Region, Hopeland and Miles Airport sites until the end of 2018. This additional monitoring, and reporting of this data is beyond the scope of this project.



Map of study area (town names in white text, green pins are ambient air monitoring sites, red pins are passive gas sites, orange triangles are CSG wells).

Dive deeper on the GISERA website at

gisera.csiro.au/project/ambient-air-quality-in-the-surat-basin

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