GISERA
Gas Industry Social and Environmental Research Alliance

Air quality assessment in the Surat Basin

May 2018

Measured air pollutants were mostly well below relevant air quality criteria.

Analysis of data collected during September 2014 –December 2016

Comprehensive air quality measurements have been made at three gas field and two regional ambient air monitoring sites, and through a network of passive gas sites in the Miles-Chinchilla-Condamine area. These measurements are compared to air quality standards / guidelines and used to investigate coal seam gas (CSG) industry influence on levels of air pollutants.

Where air quality criteria were exceeded, investigations showed that likely sources of particles in the study area were mostly typical of rural Australian regions. This includes vegetation fires, livestock activities, and dust from unsealed roads, with the CSG industry likely contributing to dust events at one site.

Air monitoring analyser

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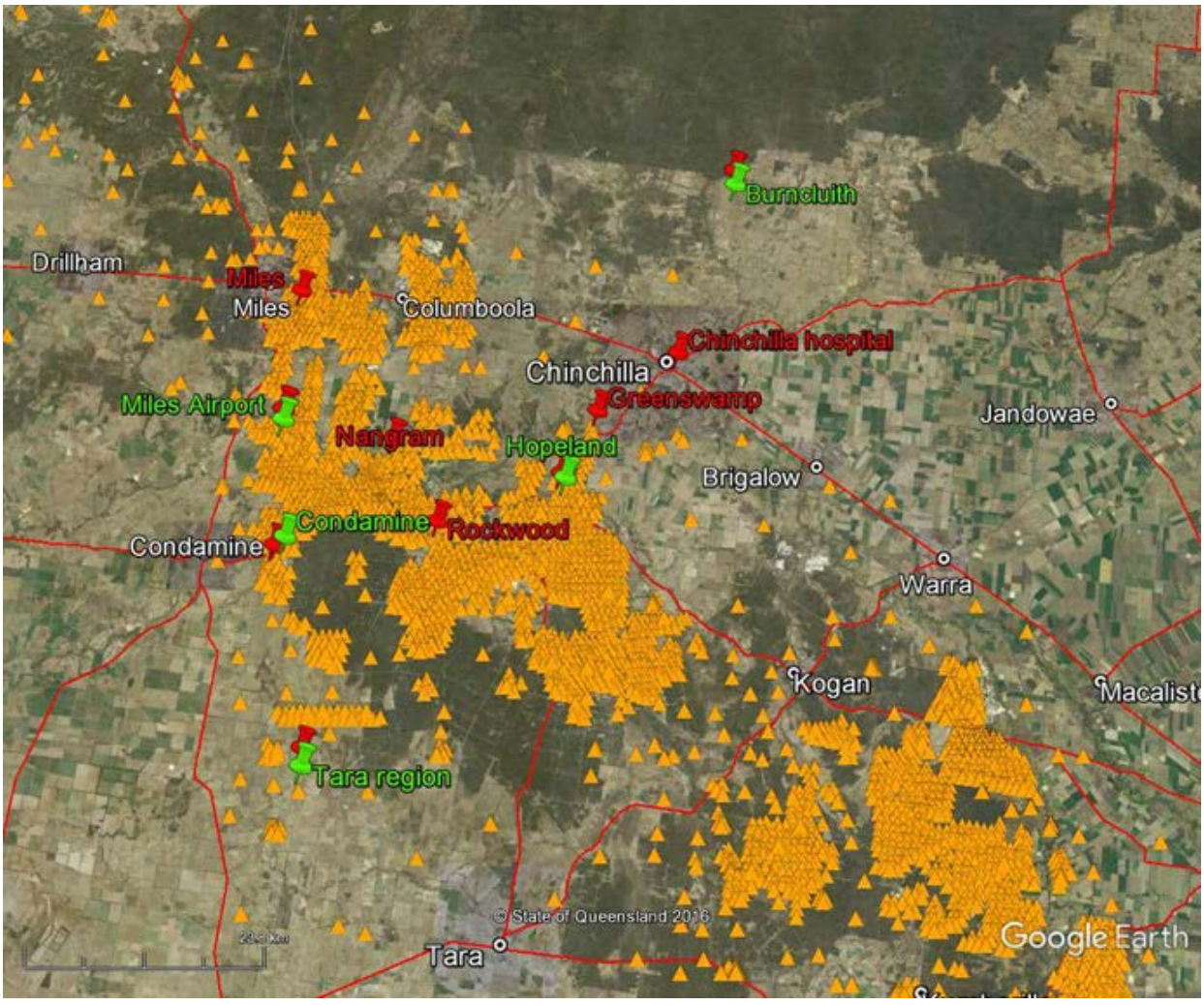
KEY FINDINGS

- Levels of air pollutants measured were generally well below relevant air quality criteria.
- There were no exceedances of carbon monoxide (CO), nitrogen dioxide (NO_2) or ozone (O_3) air quality criteria at any of the regional or gas field sites.
- At gas field sites there were some exceedances of air quality criteria for particles less than 2.5 micrometres ($PM_{2.5}$), particles less than 10 micrometres (PM_{10}) and total suspended particles (TSP). There were no particle measurements made at regional sites.
- When particle exceedances occurred, the likely cause was investigated and found to be from fires, dust from cattle farming, CSG development and operational activities, other dust sources possibly including unsealed roads and other agricultural activities, as well as some unknown sources.
- Methane was measured at the gas field sites as a tracer for CSG-related activities. Methane does not have an air quality criterion as it is not considered to pose a direct risk to human health in the ambient environment.
- CSG emissions from infrastructure and activities were most likely the source of the largest observed methane concentrations at gas field sites. These CSG-related methane peaks were not associated with any exceedance of air quality criteria.

Where was the data collected?



Map of project 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)

Data was collected at Hopeland (measurements started January 2015), Miles Airport (measurements started July 2015) and Condamine (measurements started March 2016) gas field stations. These sites (green pins on the study map) are located between 1 and 5 km from gas processing facilities (Orana, Condabri Central and Condabri South) and are located 100 – 450 m from operating CSG wells. Gas field stations have between 15 and 25 wells within a 2 km radius.

The two Regional stations (green pins on the study area map) have been incorporated into the study to investigate air pollution levels outside the Gas field region. Regional stations are Tara Region/Ironbark (26 km SE of Condamine township) and Burncluith (20 km NE of Chinchilla township). These sites are 10-20 km away from major potential CSG-related emission sources. These stations were commissioned as part of the GISERA Regional Methane Flux project in 2015 and have been used for air quality measurements in this project since June 2016. The study also includes 10 Passive Radiello sampler sites (red pins on the study map).

What was collected at the measuring sites?

- Gas fields sites: nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O_3), particles < 2.5 µm and < 10 µm ($PM_{2.5}$ and PM_{10}), total suspended particles (TSP), methane (CH_4), total volatile organic compounds (TVOCs), carbon dioxide (CO_2), meteorology (temp, humidity, solar radiation, wind speed and direction).
- Regional ambient air quality stations: NO_x, CO, O_3 and meteorology
- Radiello passive sampler sites: 54 gases including VOCs, aldehydes and hydrogen sulphide.

Passive Radiello sampler sites

Concentrations of the 54 gases that were measured at gas field, regional and Chinchilla sites were compared with air quality criteria from the Environment Protection (Air) Policy (EPP), the Air Toxics National Environment Protection Measure (NEPM), and the Texas Commission on Environmental Quality Air Monitoring Comparison Values (Texas AMCV). There were no exceedances of air quality criteria for the 54 target gases.

The most frequently detected gases were BTX (benzene, toluene and xylenes), carbon tetrachloride, formaldehyde and acetaldehyde. Chinchilla had higher BTX concentrations than the gas field and regional sites. The benzene/toluene ratio at Chinchilla was similar to other Australian urban and rural environments, indicating the source of BTX at the Chinchilla site is likely due mainly to motor vehicles and domestic commercial sources.

Carbon tetrachloride, formaldehyde and acetaldehyde concentrations were similar across Chinchilla, regional and gas field sites. The concentrations of carbon tetrachloride measured in this study are at background levels typical of other parts of Australia and do not indicate the presence of a local source.

While the CSG industry is a known source of several of these gases including BTX, formaldehyde and acetaldehyde, levels of VOCs and aldehydes in the study region were well below air quality criteria and were comparable to rural/regional concentrations elsewhere in Australia.

Coal seam gas well

FREQUENTLY ASKED QUESTIONS

What makes this such a comprehensive study?

This is the first comprehensive assessment of air quality in the Surat Basin. Four of the six pollutants identified in the Ambient Air NEPM are measured at gas field sites including NO_2, photochemical oxidants (as ozone), CO and particles ($PM_{2.5}$, PM_{10}). Four of the five air toxics covered by the Air Toxics NEPM are measured at the passive sampler sites including benzene, toluene, xylenes, and formaldehyde.

What was the influence of coal seam gas (CSG) industry on air quality?

The CSG industry likely contributed to dust events at one gas field site including some exceedances of the total suspended particle criterion. The annual average methane concentration at gas field sites was between 1.8 and 1.9 ppm, comparable to methane concentrations measured at the two Regional sites as part of the GISERA Regional Methane Flux study. The largest methane concentrations observed at gas field sites were attributed to sources or activities associated with the CSG industry, however, these methane peaks were not associated with any air quality exceedances.

Is the measured data available?

Since 25th August 2016, preliminary air quality data from the ambient air quality sites has been streamed to the Department of Environment and Heritage Protection (DEHP) website under South West Queensland region. Data streamed comprises CO, NO_2, O_3, $PM_{2.5}$, PM_{10} and TSP (Hopeland, Miles Airport, Condamine) and CO, NO_2, O_3 (Burncluith and Tara Region). Historical data can be viewed on this website.

Does this study measure fugitive methane emissions?

No. Determination of the regional emissions of methane in the study area is being addressed as part of the GISERA's Regional Methane Flux study, visit www.gisera.csiro.au for more details.

What happens next?

Data from the ambient air monitoring stations from January 2017 – February 2018 will be available in a final report around mid-2018. An overall assessment of air quality in the study area from 2014-2018 will be presented in the final report.

While the measurements of air quality undertaken for this CSIRO project were scheduled to finish at Regional and Gas field sites at the end of February 2018 there is a likelihood of industry funding to extend air quality monitoring at Regional sites until mid-2018, and at Gas field sites until the end of 2018. This additional monitoring is beyond the scope of CSIRO's work in this study and will not be incorporated into the final report.

For the complete report and more information about the project please visit the GISERA website, www.gisera.csiro.au