



GROUND AND SURFACE WATERS

GISERA | Gas Industry Social and Environmental Research Alliance

Assessing the exposure of identified chemicals used in the coal seam gas (CSG) activities in the Surat Basin, Queensland

This project will improve the understanding of the potential presence, distribution and exposure of identified chemicals associated with CSG activities in the Surat Basin, in southern Queensland.

Various chemicals are used in the production of CSG. CSIRO has identified several chemicals associated with CSG operations in the Surat Basin that require further assessment due to their potential health hazards. CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) will undertake a study to assess the potential hazards posed by these identified chemicals.

Key points

- The Surat Basin hosts some of Australia's largest CSG fields. Local communities have concerns about potential health impacts of chemicals associated with CSG.
- There is no evidence of concerning exposure levels in the study area, but there is a need for more research. Through desktop study and field work, the study will assess potential hazards of chemicals associated with CSG operations.
- GISERA researchers will identify the chemicals that may present a potential hazard to the community. They will then run tests on these chemicals to see how readily they biodegrade.
- For any chemicals that do not readily biodegrade, researchers will undertake exposure assessments, and propose potential management options.
- All results will be publicly available.

Research objectives

There is a need for further research into chemicals associated with CSG operations in the Surat Basin area.

In this study, GISERA researchers aim to:

Identify which chemicals in the study area that may present a hazard to the community, and which therefore warrant further investigation.

- Determine which of these chemicals do not readily biodegrade in the soil or groundwater.
- Assess the community's level of exposure to identified chemicals.
- Where appropriate, suggest potential management options for identified chemicals.

This research will be a combination of desktop and field-based surveys, as set out in the project methods, below.

The Surat Basin, southern Queensland

South-east Queensland hosts some of the largest CSG producing fields in Australia. The number of wells in Queensland is expected to reach 22,000 by 2050. The Surat Basin, one of two key CSG reservoirs in Queensland, is the focus area of this study.



Chemicals used in CSG activities

A range of chemicals are associated with CSG activities. In the unlikely event of a spill, soils and groundwater offer potential pathways for movement of chemicals in the environment.

Most of these chemicals — like salt — do not pose a risk to human health; a small number have been assessed as Chemicals of Potential Concern (COPCs), for example, Tetrakis (Hydroxymethyl)Phosphonium Sulfate (THPS). THPS is a biocide used in drilling and hydraulic fracturing fluids.

Chemicals are found as additives that are used in drilling CSG wells, and in hydraulic fracturing, a process which is only used in some CSG operations.

Hydraulic fracturing for CSG is the process of pumping water, proppant (such as sand) and a small percentage (1-2%) of chemical additives under high pressure into the underground coal to better release the trapped CSG. The water and chemicals are pumped back out of the well, leaving most of the sand and small amounts of the chemicals underground. These chemicals will be part of this assessment.

There is no evidence of concerning exposure levels in the study area, but there is a need for further research.

Building on existing research into human health

In response to community concerns, CSIRO's GISERA has conducted [several studies](#) on the potential human health impacts of CSG activities.

This project is a direct follow up to a [GISERA research project](#) from 2018. This study identified 19 chemicals associated with CSG activities in the Surat Basin that had a potential pathway through groundwater or soil, and require further assessments. The same research identified a list of approximately 40 chemicals requiring further appraisal for potential health impacts. These chemicals were identified after the mid-2020 cut off date for data collection, and were used in a small number of wells.

Project methods and outcomes

In this study, scientists will:

1. Evaluate chemical factors requiring further appraisal by assessing the hazards these chemicals pose to human health at the study site. This will be done through a desktop exposure assessment based on industry reports and chemical toxicity reviews.
2. Categorise chemicals to decide which present a potential hazard to human health at the study site.
3. Undertake microbial biodegradation trails of these identified chemical factors. Researchers will conduct tests to see if any of chemicals are resistant to biodegradation: do they persist in the soil and groundwater, or do they break down naturally?
4. Undertake field exposure assessments for any of the chemicals that do not readily biodegrade (this includes the 19 chemicals from previous research in 2018). Exposure assessments will involve comprehensive sampling of specific wells and surface water bodies in the study area for COPCs. Researchers will test for the presence and concentration of COPCs in these samples.
5. Propose potential management options, such as the use of alternative chemicals, for any COPCs detected in samples at relevant concentrations.
6. Synthesise and summarise the findings into a public report that is accessible on the GISERA web site.

More information

All results will be shared with the community, and will be publicly available on GISERA's web site.

[Learn more about the project.](#)

Read about other [GISERA projects based in Queensland.](#)

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GISERA is a collaboration between CSIRO, Commonwealth and state governments and industry established to undertake publicly-reported independent research. The purpose of GISERA is to provide quality assured scientific research and information to communities living in gas development regions focusing on social and environmental topics including: groundwater and surface water, greenhouse gas emissions, biodiversity, land management, the marine environment, and socio-economic impacts. The governance structure for GISERA is designed to provide for and protect research independence and transparency of research.