



SURFACE AND GROUNDWATER

GISERA | Gas Industry Social and Environmental Research Alliance

Understanding the lifecycle of hydraulic fracturing fluids

This project will improve understanding of the lifecycle of chemicals used during hydraulic fracturing processes in the Northern Territory.

CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) is undertaking research to improve understanding of what happens to chemicals used in hydraulic fracturing fluids, along with naturally occurring chemicals that are found in flow-back water and industry facilities.

The project seeks to understand how the chemicals used in hydraulic fracturing fluids move and degrade in the sub-surface shale reservoirs of the Beetaloo Sub-basin.

Additionally, the study will examine flow-back waters that are held in tanks and treatment ponds at the surface and provide insights into the degradation of key chemicals within that water.

Researchers will also characterise naturally occurring hydrocarbons that are produced during the hydraulic fracturing process, and then examine their fate in sub-surface formations, in produced water, and in surface facilities such as storage tanks and holding ponds.

The Beetaloo Sub-basin

The Beetaloo Sub-basin lies south-east of Katherine in the Northern Territory and spans an area of about 30,000 square kilometres. The estimated gas resources for the Beetaloo Sub-basin are of similar size to other major gas producing basins in Australia, such as the Surat Basin in Queensland and the Bonaparte/Browse basins in Western Australia.

If an onshore gas industry is developed in the Beetaloo, it is expected that hydraulic fracturing technologies will be used.

Photo: The Beetaloo Sub-basin features a variety of arid landscapes.

Key points

- The project will focus on a number of chemicals used for hydraulic fracturing that have been identified as having potential environmental and health impacts.
- Researchers will study how the chemicals move and degrade in the sub-surface, in flow-back water and in surface facilities.
- The results will provide key information for assessing chemical risks associated with hydraulic fracturing.
- Research outcomes help Government, industry and community to make informed decisions about proposed onshore gas development.

Supporting evidence-based decision making

To improve community understanding about the impacts of hydraulic fracturing on water quality, it is important to build a better understanding of the fate of chemicals used by industry. That includes both naturally occurring chemicals, and those that are added to fracturing fluids.

The data from this project will provide key information for assessing chemical risks associated with hydraulic fracturing in the Beetaloo, and for improving government and industry mitigation strategies if required.





An exploration well pad in the Beetaloo Sub-basin.

The fate of hydraulic fracturing fluids below ground

After hydraulic fracture treatment of a well, there is a period of production called flow-back where fluids are produced. This recovers a proportion of the hydraulic fracturing fluids – but a proportion is also left within the reservoir.

The first major objective of this GISERA study is to analyse what happens to those residual fluids – how they degrade, and whether they travel in the sub-surface .

The processes of degradation and migration are strongly influenced by the specific conditions of the sub-surface environment – including pressure, temperature and formation water chemistry.

For this project, researchers will gather geological samples including water and shale, and subject them to experiments under reservoir conditions. This will lead to an improved understanding of chemical behaviour and processes below ground in the Beetaloo.

Researchers can then take what they've learned from the experiments and use modelling to further investigate the fate and migration of chemicals present in residual hydraulic fracturing fluids.

Back at the surface: flow-back water and industry facilities

A range of chemicals are used in hydraulic fracturing fluid to make the process as effective as possible. Many of these return to the surface in flow-back water, which is stored in tanks or treatment ponds.

The hydraulic fracturing process also liberates a number of naturally occurring (geogenic) chemicals from below ground and these too are brought to the surface in flow-back water.

Researchers will characterise these geogenic chemicals and investigate how these chemicals degrade within the holding tanks and ponds. It is likely they will behave differently in each environment, as tanks and ponds create markedly different conditions.

For this study, researchers will analyse water samples that have been collected from two hydraulic fracturing sites in the Northern Territory.

More information

- Find out more about the [lifecycle of hydraulic fracturing fluids project](#)
- Read about other [GISERA projects in the Northern Territory](#)

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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.