Australia's National
Science Agency

GISERA | Gas Industry Social and Environmental Research Alliance

Progress report

Exposure assessment of identified chemicals used in the coal seam gas activities at a study site in the southern Surat Basin, Queensland.

Progress against project milestones

Progress against milestones/tasks are approved by the GISERA Director, acting with authority in accordance with the GISERA Alliance Agreement.

Progress against project milestones/tasks is indicated by two methods: Traffic light reports and descriptive Project schedule reports.

1. Traffic light reports in the Project Schedule Table below show progress using a simple colour code:

- **Green**:
  - Milestone fully met according to schedule.
  - Project is expected to continue to deliver according to plan.
  - Milestone payment is approved.
- **Amber**:
  - Milestone largely met according to schedule.
  - Project has experienced delays or difficulties that will be overcome by next milestone, enabling project to return to delivery according to plan by next milestone.
  - Milestone payment is withheld.
  - Milestone payment withheld for second of two successive amber lights; project review initiated and undertaken by GISERA Director.
- **Red**:
  - Milestone not met according to schedule.
  - Problems in meeting milestone are likely to impact subsequent project delivery, such that revisions to project timing, scope or budget must be considered.
  - Milestone payment is withheld.
  - Project review initiated by GISERA Director.

2. Progress Schedule Reports outline task objectives and outputs and describe, in the 'progress report' section, the means and extent to which progress towards tasks has been made.

Project schedule table

TASK NUMBER	TASK DESCRIPTION	SCHEDULED START	SCHEDULED FINISH	COMMENT
1	Prescreening of ~50 chemicals for further assessment	Feb-23	Feb-23	Completed
2	Screening assessment of high-risk chemicals	Mar-23	Apr-23	Completed
3	Microbial degradation trial of screened high-risk chemicals	May-23	Feb-24	Completed.
4	Communication product	Sep-23	Mar-24	Completed
5	Desktop exposure assessment	Sep-23	Nov-23	Completed
6	Sampling logistics	Oct-23	Mar-24	Completed
7	Sampling campaign – exposure assessment	Nov-23	Apr-24	Completed
8	Chemical analyses	Mar-24	Sept-24	Completed
9	Project reporting	Feb-23	Oct-24	This task will be completed June 2025.
10	Communicate findings to stakeholders	Feb-23	Oct-24	This task will be completed June 2025.

Project schedule report

TASK 1: Prescreening of ~50 chemicals for further assessment

BACKGROUND

Prescreening of chemicals to determine potentially hazardous chemicals to take forward.

TASK OBJECTIVES

Critical appraisal of the H.2 chemicals list (~50) by the project team through chemical toxicity reviews, evaluation of exposure potential, evaluation of persistence and bioaccumulation in soil environments, and known CSG usage (concentration of chemical used, recent usage, widespread usage) and other industrial usage. The chemicals wills be triaged, and high-risk chemicals will be identified for further investigation.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Brief technical report providing the list of high-risk chemicals to be taken forward in this project and methods of evaluation.

PROGRESS REPORT

This task is complete with the two reports provided by the external contractor. Review of these reports by the project team is complete. An outcome of this review identified some additional information regarding chemical toxicity and bioaccumulation should be sort. This falls outside of the scope of this task and will be reported on in the final report.

TASK 2: Screening appraisal of potentially hazardous chemicals

BACKGROUND

This task will be carried out by an external contractor following the Health Study Framework and will identify any additional chemicals for further investigation.

TASK OBJECTIVES

- Desktop appraisal of potentially hazardous chemicals identified from Task 1.
- This appraisal will follow the GISERA Health Study Framework.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Report providing screening appraisal of high-risk chemicals through the Health Study Framework

PROGRESS REPORT

This task is complete.

The external contractor has completed and finalised the screening appraisal report. The assessment from the report found that two chemicals were estimated to pose a potential risk based on available industry information on their use, and that these two chemicals required further assessment. These two chemicals were naphthalene and Dazomet, and these chemicals will be taken forward in Task 3 for microbial degradation trials.

The external contractor has carried out an appraisal, following the Health Study Framework, of the eighteen chemicals identified in Task 1. A draft report has been provided for comment and is currently being reviewed.

TASK 3: Microbial degradation trial of screened potentially hazardous chemicals

BACKGROUND

Chemicals identified to be potentially hazardous through the Screening Assessment (Task 2) will be used in microbial degradation trials to determine persistence in soil and groundwater samples from the Queensland study area.

TASK OBJECTIVES

- Field sampling to obtain two bore water and two soil samples.
    - Sufficient samples for chemical testing and measurement of degradation of chemicals
- Detailed chemistry of two water and two soil samples to be done.
- Replicated microcosm biodegradation trials in soil and water samples for potentially hazardous chemicals Water microcosms will be incubated for 3 months and soil microcosms will be incubated for 1 month.
- Chemical analyses will be undertaken at the start and end of the biodegradation experiments to determine the extent of biodegradation of the chemical by microbes present in water and soil samples.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Brief technical report detailing microbial biodegradation trials of high-risk chemicals in soil and water samples collected from the Queensland study area. Potentially hazardous chemicals that are persistent in soil and water samples will be taken forward.

PROGRESS REPORT

The Screening Assessment (Task 2) identified dazomet (DAZ) and naphthalene (NAP) as chemicals requiring further assessment using microcosm biodegradation trials. Two paired bore water and soil samples collected from the Queensland study area were used in microbial degradation trials to determine chemical persistence. Quantitation of chemicals was used to assess the microbiological degradation and to determine whether further assessment of the chemicals was required. For DAZ quantitation, its active breakdown product methyl isothiocyanate (MITC) was also tested. All results from these analyses are with the project team and will be included in the final report.

TASK 4: Communicate H.2 and H.3 Part A project progress and findings to stakeholders

BACKGROUND

Communications of GISERA research are an important component of outreach and dissemination of findings to diverse audiences.

TASK OBJECTIVES

- Communicate H.2 and H.3 Part A project progress and findings to stakeholders through fact sheets, interviews, meetings, infographics and/or animations. This task will be done in collaboration with GISERA Communications officers.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Communicate H.2 and H.3 Part A project progress and results to GISERA stakeholders.

PROGRESS REPORT

This milestone is complete.

The GISERA Communication officers arranged a GISERA research forum in Chinchilla where the H.2 and H.3 project progress and findings were presented to a diverse group of stakeholders including those in the agriculture community, research sector, community centres, health professionals, local council and independent organisations. The presentation was followed by a robust Q&A session.

A second research forum was conducted in Brisbane with participants from Queensland Government, Commonwealth Government, industry and university researchers.

It is important to note that the GISERA Communication officers have also decided to prepare a Q&A sheet that will be released alongside the final report as part of task 9.

Additionally, after the report has been released, the research proponent will visit Miles/Chinchilla to have one-on-one meetings with landowners that supplied samples to provide them with a copy of the report and discuss the findings.

TASK 5: Desktop exposure assessment

BACKGROUND

The desktop exposure assessment will include industry and government reports/data, and an analysis of relevant information for the COPCs identified in Tasks 1-3. This assessment will focus on data from the most recent use of these chemicals in the study area and will determine timing and location of recent COPC usage.

TASK OBJECTIVES

- Provide information about the timing and location of recent COPC usage in the Queensland study area. This information will guide Tasks 6 and 7.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Brief technical report detailing the timing and location of recent COPC usage in the Queensland study area.

PROGRESS REPORT

This task is complete.

The desktop exposure assessment has examined the geographic distribution of CSG industry use of various chemical factors of potential concern (COPCs) in the study area around Chinchilla, Miles and Condamine.

Chemicals examined include: methylisothiazolinones (MIT/CMIT), dazomet, fluorobenzoic acid tracers, glutaraldehyde, naphthalene, nonylphenols, polyacrylamide (principally its monomer, acrylamide), tetrakis (hydroxymethyl) phosphonium sulfate (THPS) and tributyl tetradecyl phosphonium chloride (TTPC). These COPCs vary in their use patterns within the study area. Some, for example, dazomet, have been only used in a very small number of wells in a geographically narrow area, while others, like glutaraldehyde have been used more widely across the study area. Similarly, the biocide THPS has been comparatively widely used, while MIT/CMIT have only been

used in a very restricted number of wells in a limited area. These data have been collated and will be used for determining sampling sites for the field campaign (tasks 6 and7).

This data will be presented in the final report.

TASK 6: Sampling logistics

BACKGROUND

Results from the desktop exposure assessment (Task 5) will be used, along with consultation with this project's TRG and other industry contacts, to guide the sampling campaign to ensure that appropriate and representative water and soil samples are collected for the exposure assessment.

TASK OBJECTIVES

- Identification of sites for water and soil sampling to ensure adequate representative samples for COPC exposure assessment.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

This task will yield a series of documents describing the contacts, sampling sites, relevant permissions, sampling equipment and OH&S considerations for the exposure assessment (Task 7).

PROGRESS REPORT

This milestone task has been completed with a total of 35 groundwater, 17 surface waters and 7 soil samples collected from the QLD study area from sites identified in Task 5 and 6.

TASK 7: Sampling campaign- exposure assessment

BACKGROUND

Task 7 will involve two staff traveling to the Queensland study area with the purpose of collecting representative water and soil samples across the region for exposure assessment of COPCs.

TASK OBJECTIVES

- To collect groundwater and soil samples from sites identified in Task 5 and 6, for the purpose of analysing COPC presence and concentration within the Queensland study site (Task 8).

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Collection of water and soil samples for analyses for the presence and concentration of COPCs within the Queensland study area.

PROGRESS REPORT

This milestone is completed, with a total of 35 groundwater, 17 surface waters and 7 soil samples collected from the QLD study area from sites identified in Task 5 and 6.

TASK 8: Chemical analyses

BACKGROUND

Chemical analyses for the presence or absence of the COPCs will be carried out by a NATA accredited external laboratory. Where present, the concentration of COPCs will be determined. All samples collected in Task 7 will undergo analyses for COPCs.

TASK OBJECTIVES

Each water and soil sample from the exposure assessment (Task 7) will be analysed for the presence or absence of COPCs. Where present the concentration of COPCs will be determined.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Brief technical report detailing the presence or absence of the COPCs in the Queensland study area.

PROGRESS REPORT

Analyses for exposure assessments of chemicals used in coal seam gas activities in the Queensland study area have been completed for all COPCs identified for further assessment. In total over 60 samples collected from the study area were assessed including 38 groundwater samples, seven soils samples and 18 surface water samples. The analyses targeted multiple analytes identified in the screening assessments, desktop exposure assessments, and through microbial biodegradation trials. These chemicals were methylisothiazolinones, dazomet and its breakdown product methyl isothiocyanate, glutaraldehyde, naphthalene, ethoxylated nonylphenols, polyacrylamide (principally its monomer, acrylamide), tetrakis (hydroxymethyl) phosphonium sulfate and tributyl tetradecyl phosphonium chloride. In addition, a suite of 13 fluorobenzoic acid tracers were also analysed in all exposure assessment samples. All samples were analysed at external, NATA accredited laboratories. The data have been returned to the project team and will be included in the final report.

TASK 9: Project reporting

BACKGROUND

The final report for this project will bring together human health impact data from the CSG-related chemicals used across the Queensland study. It will identify the COPCs used by the CSG industry and the management options for their mitigation.

Critical evaluation of the results is needed to understand the experimental outcomes of this study.

TASK OBJECTIVES

- Preparation of final report bringing together the information from all project tasks, including scope, methods, results, findings, analyses and management options for COPCs used in the Queensland study area.
- Reporting results and analyses from Tasks 1-8.
- Providing management options for mitigation of COPCs with the Queensland study area.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Final report encompassing all the tasks outlined above and integration with the related projects.

PROGRESS REPORT

This task will be completed by June 2025.

TASK 10: Communicate findings to stakeholders

BACKGROUND

Communications of GISERA research are an important component of outreach and dissemination of findings to diverse audiences.

TASK OBJECTIVES

Communicate project objectives, progress and findings to stakeholders through meetings, knowledge transfer session, factsheet and journal article, in collaboration with GISERA Communications officers.

TASK OUTPUTS AND SPECIFIC DELIVERABLES:

Communicate project objectives, progress and results to GISERA stakeholders according to standard GISERA project procedures which may include, but not limited to:

1) Knowledge Transfer session with Government/Gas Industry
2) Presentation of findings to Community members/groups
3) Preparation of article for GISERA newsletter and other media outlets as advised by GISERA's communication team
4) Two project factsheets: A factsheet, hosted on the GISERA website, will be developed at commencement of project, and another that will include peer-reviewed results and implications will be developed at completion of project.
5) Peer reviewed scientific manuscript ready for submission to relevant journal

PROGRESS REPORT

This task is progressing.

- Presented interim project results to community stakeholders in Chinchilla at a GISERA research forum held in April 2024.
- A knowledge transfer session is scheduled for early June 2025.

This task will be completed by June 2025.

Variations to Project Order

Changes to research Project Orders are approved by the GISERA Director, acting with authority, in accordance with the GISERA Alliance Agreement. Any variations above the GISERA Director's delegation require the approval of the relevant GISERA Research Advisory Committee.

The table below details variations to research Project Order.

Register of changes to Research Project Order

DATE	ISSUE	ACTION	AUTHORISATION
20/10/23	Tasks delayed due to scheduling of sample collection and due to risk assessments for safe handling of the chemical dazomet.	Milestone 3 extended from August 2023 to February 2024 Milestone 4 extended from October 2023 to March 2024 Milestone 5 extended from September 2023 to November 23 Milestone 6 pushed back from October 23 to November 23	
03/04/24	Delay due to the field campaign now being conducted in April 2024 and field work planned for week 2 or 3 of April 2024.	Milestone 6 extended from November 2023 to March 2024 and Milestone 7 extended from February 2024 to April 2024	
03/04/24	This task is delayed due to knock on effects of Task 5 and 6.	Milestone 8 extended from March 2024 to Mid-May 2024	
10/08/2024	Delay in results from external contractor, knock on effect for task 9 and 10.	Milestone 8 extended from mid-June to September 2024, milestone 9 & 10 extended from July 2024 to October 2024.	

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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.